Chapter 2

Working with Points

Learning Objectives

After completing this chapter, you will be able to:

- *Understand the concept of points in Civil 3D*
- *Create points using different methods*
- *Create point styles*
- *Create point label styles*
- *Understand file formats*
- *Edit points*
- *Understand description keys*

POINT OBJECT

A point object represents a location in 3D space, and is defined by its X, Y, and Z coordinates. Each civil engineering project starts with data collection. This data is imported into Civil 3D workspace as points by using a suitable coordinate system. Generally, points specify the location of different features on the site such as trees, road geometry points, property corners, edge of pavements, and so on. However, Civil 3D points offer you more than just specifying the location of different objects on the site. In Civil 3D, each point represents an individual object with different information and has a unique point number. The information displayed by a Civil 3D point object depends upon the point settings, which will be discussed later in the chapter.

Components of Point Object

In AutoCAD Civil 3D a point object has two major Components, marker and label. Marker represent the location of point object whereas label displays information about that point object. The display of point marker is controlled by point style and the display of the point label style. Figure 2-1 shows a point with number, elevation, and description.

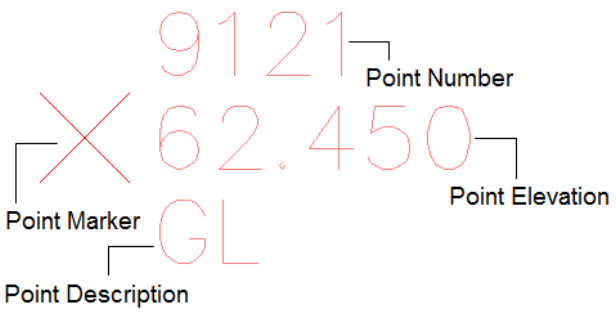


Figure 2-1 *A point with number, elevation, and description*

The properties of an individual Civil 3D point can be viewed in the **PROPERTIES** palette, refer to Figure 2-2. You can modify the properties of the selected point(s) such as color, layer, linetype, and point elevation.

Creating Points

In AutoCAD Civil 3D, you can create points using various methods. These methods of point creation involve conversion of AutoCAD points into Civil 3D points, importing points from external point files, and creation of points using input parameters specified by the user.

These methods for point creation have been broadly classified into six categories which are discussed next.

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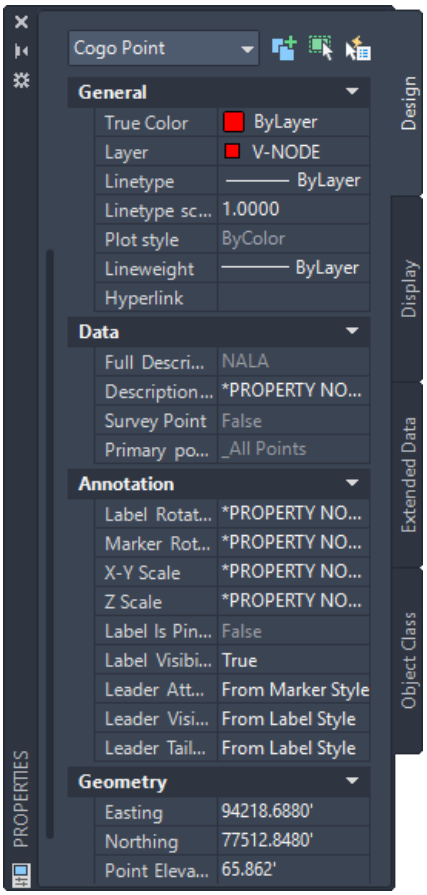


Figure 2-2 *Partial view of the* ***PROPERTIES*** *palette showing different point properties*

The Miscellaneous Category

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points-Miscellaneous

The tools in the **Miscellaneous** category are used to create points by manually specifying the point location in the drawing. The tools in the **Miscellaneous** category are the most commonly used tools to create points. To access these tools, choose the **Create Points-Miscellaneous** option from the **Create Ground Data** panel; a flyout will be displayed with different tools, as shown in Figure 2-3. Some of the tools in this category are discussed next.

Manual

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points- Miscellaneous > Manual
Command:	CREATEPOINTMANUAL

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The **Manual** tool is used to manually create points. To create points using this tool, invoke this tool from the **Create Ground Data** panel; the **Create Points** toolbar will be displayed and you will be prompted to specify the location of the point. Click in the drawing to specify the location.

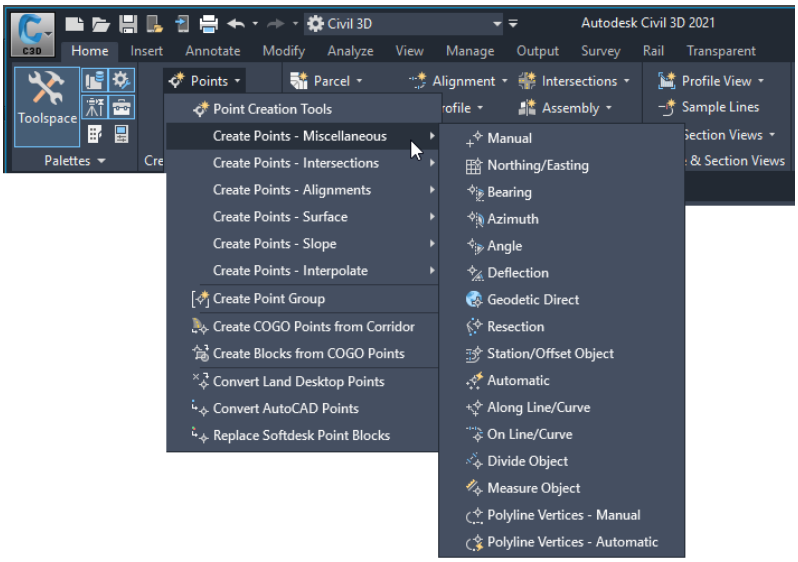


Figure 2-3 *The tools in the* ***Miscellaneous*** *category*

Next, enter description of the point in the command line or in the dynamic input edit box and right-click; you will be prompted to specify the elevation of the point. Now, specify the elevation of the point and right-click again to continue or press ENTER to terminate the command.

Geodetic Direct

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points- Miscellaneous > Geodetic Direct
Command:	CREATEPTGEODETICDIR



The **Geodetic Direct** tool is used to create points by using geodetic direction and azimuth. Before using this tool, you need to assign a coordinate system and a zone to the current drawing. To do so, choose the **Settings** tab in the **TOOLSPACE** palette. In the **Settings** tab, right-click on the current drawing name; a shortcut menu will be displayed.

Choose the **Edit Drawing Settings** option from the shortcut menu; the **Drawing Settings <drawing name>** dialog box will be displayed. In the dialog box, choose the **Units and Zone** tab. Next, in the **Zone** area of this tab, select the required geographic zone from the **Categories** drop-down list. Also, select the coordinate system within the selected zone category from the **Available coordinate systems** drop-down list. Choose the **Apply** button and then the **OK** button to close the dialog box.

Once the coordinate system has been assigned, choose the **Geodetic Direct** tool from the **Create Ground Data** panel; you will be prompted to specify the start point. Click in the

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drawing to specify the start point; you will be prompted to specify the azimuth. Azimuth is the angle measured with respect to the true north. Specify azimuth; you will be prompted to specify the geodetic distance. The geodetic distance is the shortest path between two points along the ellipsoid of the earth at sea level. Specify distance; you will be prompted to enter description. Enter the point description. Next, specify elevation for the point. Press ENTER to terminate the command.



Note

*1. The **Geodetic Direct** tool is also known as the **Geodetic Direction and Distance tool** when accessed through the **Create Points** toolbar.*

*2. If the coordinate system is not assigned to the drawing and you invoke the **Geodetic Direct** tool to create points then an **AutoCAD Civil 3D 2020** warning message will be displayed.*

Automatic

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points- Miscellaneous > Automatic
Command:	CREATEPOINTAUTOMATIC



The **Automatic** tool is used to create points automatically at the endpoints of single or multiple lines, feature lines, or lot lines. In case of an arc, a point is also created at the center. To create points using this tool, choose the **Automatic** tool from the **Create Ground Data** panel. Next, select the required entity and press ENTER; you will be prompted to specify the description and elevation for the points to be generated. Enter the point description and elevation at the Command prompt. You will notice that points are displayed at endpoints, center of arc, and vertices of the selected entity. Next, press ENTER to exit the command.

Polyline Vertices - Manual

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points- Miscellaneous > Polyline Vertices - Manual
Command:	CREATEPTPLYLINECTRVERTMAN



The **Polyline Vertices - Manual** tool is used to create points at each vertex of a polyline at the specified elevation. To do so, choose the **Polyline Vertices - Manual** tool from the **Create Ground Data** panel; you will be prompted to specify the default elevation of all points to be created. Enter the elevation at the command prompt; you will be prompted to select polyline. Next, select the required polyline; you will be prompted to enter a description. Enter a description for the point either at the Command prompt or in the dynamic input edit box and press ENTER; a point will be created at the first vertex of the polyline. Similarly, enter description for other points on the polyline and then press ESC to exit the command.

Polyline Vertices - Automatic

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points- Miscellaneous > Polyline Vertices - Automatic
Command:	CREATEPTPLYLNCTRVERTAUTO

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The **Polyline Vertices - Automatic** tool is used to create points automatically at each vertex of a polyline. To do so, choose the **Polyline Vertices - Automatic** tool and select the required polyline. Next, enter a point description in the command line. Press ENTER to end the command or continue it by specifying the description of all points on the polyline. On doing so, points will be created at vertices of the selected polyline and the elevation of the generated points will be the same as that of the selected polyline.



Tip

*Remember that on pressing the **ENTER**, the continuing command will exit only once you have created the points on all vertices.*

The Intersections Category

Ribbon: Home > Create Ground Data > Points drop-down > Create Points-Intersections

The tools in the **Intersections** category are used to create points at the intersection of direction lines of two points, intersection of distances of two points, intersection of two alignments, and so on. To access tools in the **Intersections** category, choose the **Create Points - Intersections** option from the **Create Ground Data** panel; a flyout will be displayed with different tools, as shown in Figure 2-4. Some of the tools in this category are discussed next.

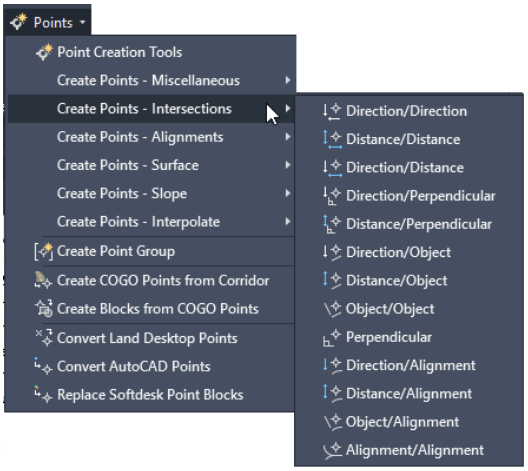


Figure 2-4 *The tools in the **Intersections** categories*

Direction/Diretion

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Intersections > Direction/Direction

Command: CREATEPOINTDIRECTIONDIR



The **Direction/Direction** tool is used to create points at specified offset distance from the point where the direction lines meet, refer to Figure 2-5.

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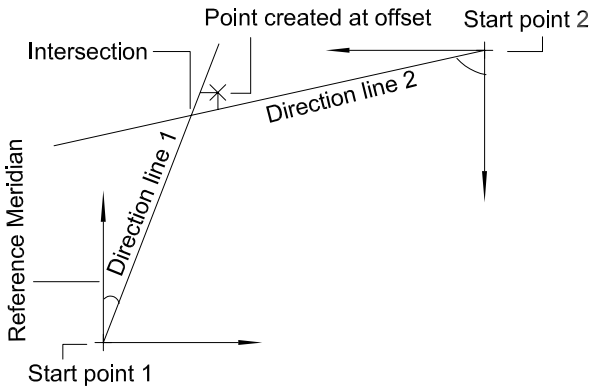


Figure 2-5 *The point created at the specified offset distance from the intersection of direction lines of two points*

To create points using this tool, choose the **Direction/Direction** tool from the **Create Ground Data** panel; you will be prompted to specify the start point in the drawing. Specify the point by clicking in the drawing. On doing so, you will be prompted to specify the direction at the start point. You can specify direction using the **Bearing** or **Azimuth** option. You can use the **Bearing** option to specify the direction with reference to a particular quadrant, or the **Azimuth** option to specify the direction with reference to the North meridian. Enter **B** to select **Bearing** or **Z** to select **Azimuth**. If you select the **Bearing** option, a quadrant will be displayed at the specified point. Move the cursor in the required quadrant and click to select the quadrant.

Next, click again to specify the bearing by clicking in the drawing or by entering the bearing in the command line; you will be prompted to specify the offset from the point of intersection. Enter the offset distance in the command line or specify the distance by picking points from the drawing.

Specify the second point by following same procedure. Once you specified the offset for the second point, you will be prompted to specify the point description and elevation. Enter the description and elevation of the point. On doing so, you will notice that a point is displayed at the specified offset distance from the intersection of direction lines of points, refer to Figure 2-5.

Distance/Distance

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points-Intersections > Distance/Distance
Command:	CREATEPOINTDISTANCEDIST



The **Distance/Distance** tool is used to create a point at the intersection of arcs of given radial distances from specified points. On choosing this tool, you will be prompted to specify the location of the radial point. Click in the drawing to specify the location; you will be prompted to specify the radius. Enter the radius in the command line using the dynamic input or pick points in the drawing to specify the radius. Similarly, specify

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the location of the second point and enter a radius; two cross marks indicating two points at the apparent intersection of arcs will be displayed. Click near the intersection, where you want to create point or press ENTER to accept the default **ALL** option to enable you to create points at both intersections. Next, follow the prompts and specify the point description and elevation. On doing so, the point(s) will be created at the intersection of the arcs, refer to Figure 2-6. Press ESC to exit the command.

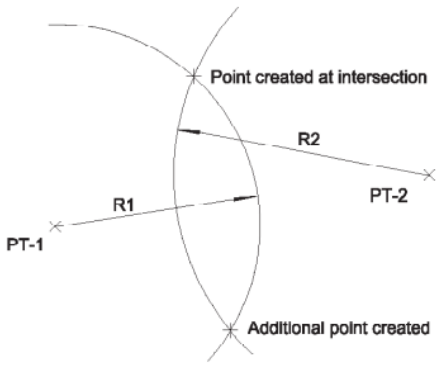


Figure 2-6 *Points created at the intersection of arcs of specified radial distances defined from two points*



Note

Cross-marks, indicating the intersections of two points, will not be displayed if the radii are non-intersecting.

Direction/Perpendicular

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points-Intersections > Direction/Perpendicular
Command:	CREATEPOINTDIRECTIONPERP



The **Distance/Perpendicular** tool is used to create a point at the intersection of the direction line and the perpendicular line that passes through the specified location. Choose this tool from the **Create Ground Data** panel; you will be prompted to specify the start point. Click in the drawing to specify the start point; you will be prompted to specify the direction at the start point. Specify the direction by specifying bearing or azimuth. On doing so, you will be prompted to specify the offset distance. Specify the offset distance from the direction line or press ENTER to accept the default value **0**. Next, specify the location of the perpendicular point; a cross mark will be displayed perpendicular to the specified point. Follow the prompts and specify the point description and elevation; a point coinciding with the cross mark will be created, as shown in Figure 2-7.

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Distance/Object

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points-Intersections > Distance/Object
Command:	CREATEPOINTDISTANCEOBJECT

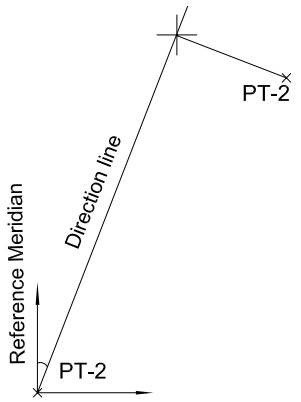


Figure 2-7 *The point created in the specified direction at a perpendicular distance from the specified point*



The **Distance/Object** tool is used to create a point at the intersection of an object such as line, arc, feature line, polyline, or plot line and an arc of specified radial distance of given point. To create a point using this tool, choose the **Distance/Object** tool from the **Create Ground Data** panel; you will be prompted to select the specified line, arcs, or any other objects from the drawing. Select the object from the drawing.

Next, specify an offset distance of the point from the selected object by entering a suitable value in the command line. Alternatively, you can specify the distance by picking points from the drawing. If no offset is required, enter **0** as the offset value. On doing so, you will be prompted to specify the radial point. Click at the required location in the drawing to specify the radial point. Next, specify the radial distance by entering the required value in the command line or by picking points from the drawing; you will notice that two cross marks are displayed at the apparent intersection of the object and the arc of specified radial distance. Click near the cross-mark where you want to add a point or press ENTER to accept the default **All** option to add points at all intersections. Enter a description and elevations for the points and then press ENTER to end the command. Figure 2-8 shows the points created at 0 offset distance from the arc object.

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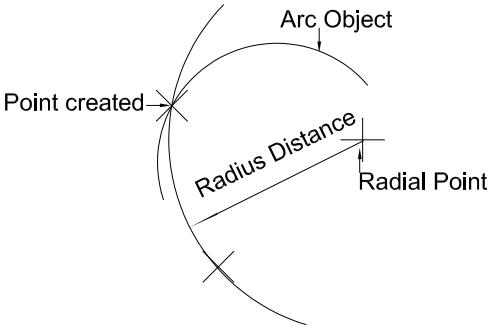


Figure 2-8 *Point created at the intersection of the arc object and the radial distance from a point*

The Alignments Category

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Alignments

The tools in the **Alignments** category are used to create points on or along the horizontal alignment at a given offset distance. To access tools in the **Alignments** category, choose the **Create Points - Alignments** option from the **Create Ground Data** panel; a flyout will be displayed with different tools, as shown in Figure 2-9. Some of the tools in this category are discussed next.

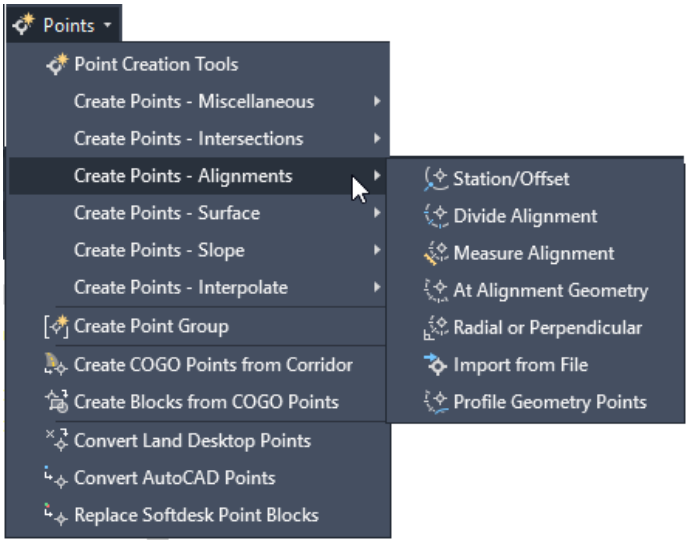


Figure 2-9 *Flyout displaying tools in the* ***Alignments*** *category*

Station/Offset

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Alignments > Station/Offset
Command: CREATEPOINTSTATIONOFFSET

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The **Station/Offset** tool is used to create a point at a given offset from the point station selected on the alignment. To create a point, invoke this tool from the **Create Ground Data** panel; you will be prompted to select an alignment. Next, click on a station on the alignment and then specify an offset distance. Also, specify the description and elevation of the point when prompted; a point will be created and displayed at the specified offset distance from the station that was selected on the alignment. This tool is useful for creating points for right of way, lanes, and shoulders.

Divide Alignment

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points - Alignments > Divide Alignment
Command:	CREATEPOINTDIVIDEALIGN



The **Divide Alignment** tool is used to create points at equal divisions of an alignment. Using this tool, you can create points at vertex or endpoints of each segment. Choose the **Divide Alignment** tool from the **Create Ground Data** panel; you will be prompted to select the required alignment from the drawing. Select the alignment from the drawing; you will be prompted to specify the number of segments. Specify the number of segments; you will be prompted to specify the offset distance. Specify the offset distance or enter **0** if the points are not required to be created at an offset; you will be prompted to specify the description and elevation for all the points that will be created at the vertex of each segment. Enter the description and elevation; the points will be created, as shown in Figure 2-10.

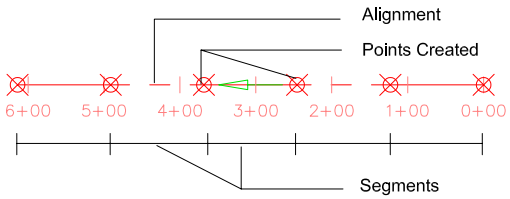


Figure 2-10 *Points created at 0 offset distance at each vertex of all five segments*

Measure Alignment

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points - Alignments > Measure Alignment
Command:	CREATEPOINTMEASUREALIG



The **Measure Alignment** tool is used to create points at fixed intervals along an alignment. To create points using this tool, you need to specify an interval and an offset distance from the alignment at which the points will be created. Choose the **Measure Alignment** tool from the **Create Ground Data** panel and select the required alignment. Next, specify the starting station from where you want to start creating points or press ENTER to accept the default option. Similarly, specify the end station.



Note

To enter a user-specified station through command bar, type station value in the xx+xx.xx format. For example, to enter a station value of 1024.75, use 10+24.75 as input value.

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Note

You can specify the start and end station values manually to replace the default values.

On doing so, you will be prompted to specify the offset from the alignment. Next, enter the offset distance in the command line or press ENTER to create points on the alignment. Similarly, specify the interval at which you want to create these points. Now, enter the point description and elevation; points will be created at specified interval along the entire alignment. Note that once you specify the description and elevation for points, they will be created and displayed automatically.

At Alignment Geometry

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Alignments > At Alignment Geometry
Command: CREATEPOINTATPTPCSCETC



The **At Alignment Geometry** tool is used to create points at each geometry point such as start and end points of alignment (EP, BO), spiral tangents (TS, ST), spiral curves (SC, CS) as well as point of intersections (PI), point of Curvature (PC), and so on. This tool is named as **At Geometry Points** in the **Create Points** toolbar. To create points, choose the **At Alignment Geometry** tool from the **Create Ground Data** panel. Next, select the required alignment from the drawing. Next, specify the starting station from where you want to start creating points. Similarly, specify the second station and end station and press ENTER. On doing so, you will be prompted to enter a point description. Specify the point description and elevation till all the points are created. Next, press ENTER to terminate the command.



Tip

*You can automatically extract the point description such as alignment and surfaces from any of the Civil 3D objects. To do so, select the **Automatic - Object** option in the **Prompt for Description** drop-down list displayed under the **Points Creation** head in the **Create Points** toolbar.*

Import from File

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Alignments > Import from File
Command: CREATEPOINTIMPORTFROMFILE



The **Import From File** tool is used to create points from the text file (*.txt*) containing information about the station, offset, and elevation of an alignment. To create points using this tool, choose the **Import from File** tool from the **Create Ground Data** panel; the **Import Alignment Station and Offset File** dialog box will be displayed. Browse to the required location and open the required file. On doing so, the **Enter file format** dynamic input prompt will be displayed, as shown in Figure 2-11.

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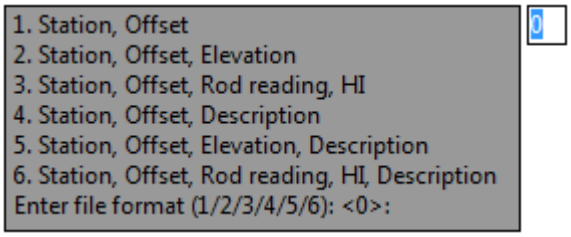


Figure 2-11 *The* ***Enter file format*** *dynamic input prompt*

Note

The station value in the text file should have a xxxx.xx format. For example, station 4+57.28 in a text file should be written as 457.28.

Also, six different file formats in the prompt will be displayed. Specify the required format by entering the corresponding number of the format starting from 1 to 6 in the text box, as shown in Figure 2-11. For example, if the text file consists of the Station and Offset information, enter **1** in the text box. Next, specify delimiter type of the text file using **1** for space delimiter and **2** for comma delimiter. After specifying the delimiter, specify the invalid indicator for elevation, station, or offset. Next, select the required alignment along which points will be created using the text file; Civil 3D will import points from the selected file and create points along the alignment.

Note

To get the dynamic input, ensure that the ***Dynamic Input*** *in the status bar is selected and turned on.*

The Surface Category

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Surface

The tools in the **Surface** category are used to create points on the horizontal alignment or at a certain offset distance from it. To access tools in the **Surface** category, choose the **Create Points - Surface** option from the **Create Ground Data** panel; a flyout will be displayed with different tools, as shown in Figure 2-12. Some of the tools in this category are discussed next.

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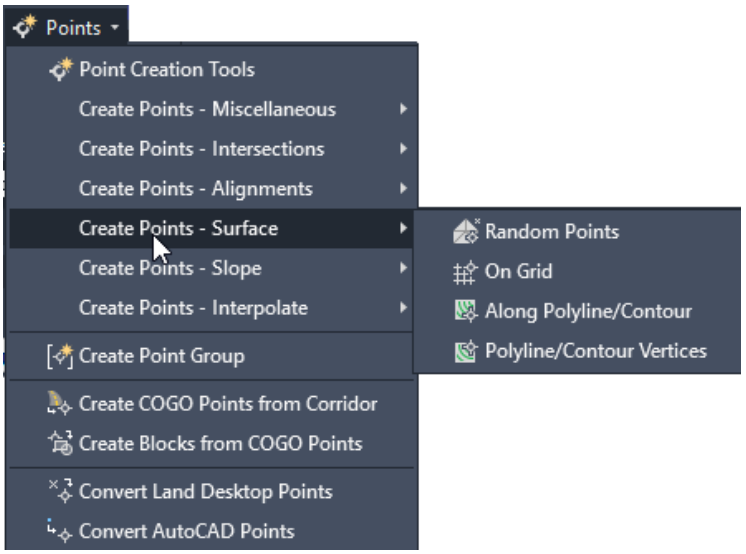


***Figure 2-12** Partial view of flyout displaying tools in the **Surface** category*

Random Points

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Surface > Random Points
Command: CREATEPOINTRANDOMPOINTS

The **Random Points** tool is used to add points anywhere on the surface. The points that are added acquire their elevation from the surface itself. You can invoke the **Random Points** tool from the **Points** drop-down. On doing so, you will be prompted to specify a location for the new point. Next, click at the required location inside the surface and specify the description of the point. Continue adding these points or press ENTER to end the command.

Note

AutoCAD Civil 3D calculates the elevation for a point using the surface and assigns it to the point.

On Grid

Ribbon: Home > Create Ground Data > Points drop-down> Create Points - Surface > On Grid
Command: CREATEPOINTONGRID

The **On Grid** tool is used to create points on a surface by specifying the spacing along the X and Y axes of the grid. To do so, choose the **On Grid** tool from the **Points** drop-down; you will be prompted to specify a grid base point. Now, click on the surface to specify the base point of the grid; you will be prompted to specify the rotation of the grid in the command line. Press ENTER to accept the default value. Now, specify the spacing between each point in the X direction in the command line or pick the points on the screen. Similarly, specify the spacing along the Y direction. Now, specify the upper right corner of the grid; a single boundary of the grid will be displayed. Also, you will be prompted to

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change the spacing or the rotation of the grid. Press ENTER to accept the default option **No**. Follow the prompts and enter description for points. As you continue to enter description in the command line, you will notice that points will be displayed in a grid. These points will be added at the surface elevation, as shown in Figure 2-13.

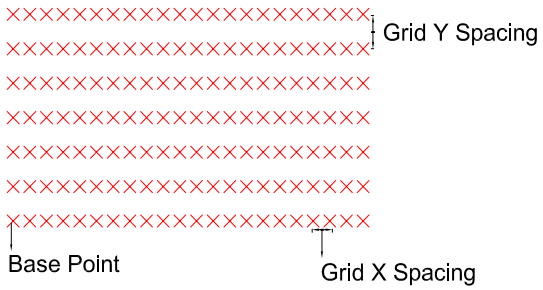


Figure 2-13 *The points added at the surface elevation*

Along Polyline/Contour

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Surface > Along Polyline/Contour
Command: CREATEPTALONGPOLYCONTOUR



The **Along Polyline/Contour** tool is used to create points along a polyline or a contour on a surface. To create points using this tool, choose the **Along Polyline/Contour** tool from the **Create Ground Data** panel and select the required surface. Next, specify the distance between the points in the command line. Now, select the required polyline or contours in the surface; you will be prompted to specify the point description. Specify the description for the points and then press ENTER. The point will be created and you will be again prompted to enter description for the next point. Continue doing this until you are prompted to select a new polyline or contour. Press ESC to exit the command.

The Slope Category

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Slope

The tools in the **Slope** category are used to create points based on the slope, grade intersections, elevations, or distances. To access tools in the **Slope** category, choose the **Create Points - Slope** option from the **Create Ground Data** panel; a flyout will be displayed with different tools, as shown in Figure 2-14. Some of the tools in this category are discussed next.

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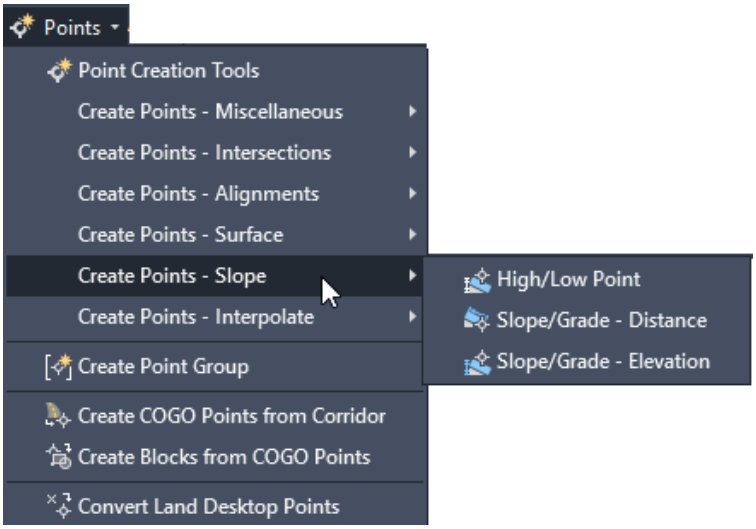


Figure 2-14 *Partial view of flyout displaying tools in the* ***Slope*** *category*

High/Low Point

Ribbon:	Home > Create Ground Data > Points drop-down > Create Points - Slope > High/Low Point
Command:	CREATEPOINTHIGHLOWPOINT

The **High/Low Point** tool is used to create a high or low elevation point by specifying the slope or grade of two points. These points are created at a location where the slopes or grades of two points intersect. Choose this tool from the **Create Ground Data** panel and click in the drawing to specify the first point. Click again to specify the second point. Next, you need to specify the required slope or grade for the first point in the drawing area by entering a value in the command line or by using the dynamic input. To do so, enter **S** in the command line to specify the slope (in ratio) or enter **G** to specify the grade (percent) and press ENTER. Similarly, specify the required slope or grade for the second point; a cross mark will be displayed. Now, press ENTER to accept the default option **Yes** after being prompted to add a point at the intersection. Next, enter the point description; a new point will be added at the intersection of the forward slope/grade of the first point and the back slope from the second point, as shown in Figure 2-15.

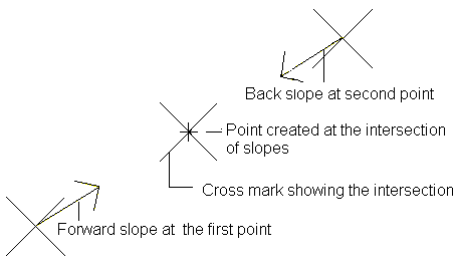


Figure 2-15 *Point created at the intersection of slopes*

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Slope/Grade-Distance

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Slope > Slope/Grade - Distance
Command: CREATEPOINTSLOPEGRADEDIST



The **Slope/Grade-Distance** tool is used to create specified number of points at a desired slope or grade from a given point at the specified direction and distance. To do so, choose the **Slope/Grade-Distance** tool from the **Create Ground Data** panel and click in the drawing to specify the start point. Next, click in the required direction again to specify the direction of intermediate points. Now, specify the required slope or grade at that point. Next, enter the distance at which you want to create multiple points in the command line. Enter the number of points in the command line and press ENTER. Specify the offset distance or press ENTER to accept the default value. Optionally, press ENTER to add the endpoint. Follow the prompts and enter the point description or continue pressing ENTER to skip description. As you continue pressing ENTER, points will be displayed in the drawing in the specified direction.

Slope/Grade Elevation

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Slope > Slope/Grade - Elevation
Command: CREATEPOINTSLOPEGRADEELEV



The **Slope/Grade-Elevation** tool is used to create multiple points in a specific direction by specifying grade/slope at a specified distance and elevation. Choose the **Slope/Grade - Elevation** tool from the **Create Ground Data** panel and click in the drawing to specify the start point. Click again to specify the direction in which points will be created. Next, specify the required grade or slope in the command line and press ENTER. Specify the end elevation in the command line and press ENTER. Now, enter the number of points to be created. Optionally, specify the offset distance in the command line and press ENTER. Again, press ENTER to add the endpoint, if required. Follow the prompts and enter the description for all the points. As you enter the description, points will be created and displayed.

The Interpolate Category

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Interpolate

The tools in the **Interpolate** category are used to add points to the drawing by interpolation. To access tools in this category, choose the **Create Points - Interpolate** option from the **Create Ground Data** panel; a flyout will be displayed with different tools, as shown in Figure 2-16. Some of the tools in this category are discussed next.

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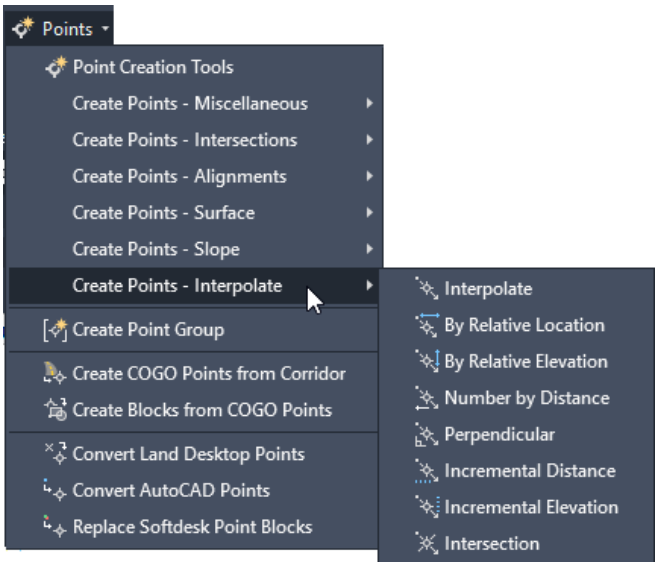


Figure 2-16 *The flyout displaying tools in the* ***Interpolate*** *category*

Interpolate

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Interpolate > Interpolate
Command: CREATEPOINTINTERPOLATE

The **Interpolate** tool is used to create specified number of points between two existing points by interpolation. To create points using the **Interpolate** tool, choose the **Interpolate** tool from the **Create Ground Data** panel; you will be prompted to select the object. Select the first point; you will be prompted to specify the second point. Specify the second point. Next, specify the number of points that you want to create in the command line and press ENTER. Then, specify the offset and press ENTER. Now, enter the description for each point and press ENTER; the points will be created between the two points through interpolation and will be added to the drawing between these two points.

By Relative Location

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Interpolate > By Relative Location
Command: CREATEPOINTBYRELLOCATION

The **By Relative Location** tool is used to create a point by interpolating a point between two given points based on the distance specified. To create points, choose the **By Relative Location** tool from the **Create Ground Data** panel and click in the drawing to specify the first control point. Next, specify the elevation of the point in the command line and press ENTER. Similarly, specify the second control point; you will be prompted to specify the distance at which you want to create the point. You can specify the distance either by entering the required value in the command line or by using the dynamic input. Next, specify the offset distance of the point from the arbitrary line or the arc joining two control

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points. Now, specify the point description in the command line and press ENTER; the point will be created and displayed at the specified distance from the first control point and at the specified offset distance from the arbitrary line joining two control points. Press ENTER to end the command.

Intersection

Ribbon: Home > Create Ground Data > Points drop-down > Create Points - Interpolate > Intersection
Command: CREATEPTINTERPOLINTERSEC



The **Intersection** tool is used to create points by interpolation at the intersection of two existing entities such as arc or line. If there are no existing entities in the drawing, you can create arbitrary regions for two entities by picking points from the drawing. To create points, choose the **Intersection** tool from the **Create Ground Data** panel. Next, click in the drawing at the required location to specify the first point for the first region. The first control point of the first entity will be created. Next, specify the elevation for the first control point in the command line or press ENTER to skip the elevation; you will be prompted to specify the second point. Click to specify the second point; you will be prompted to specify elevation. To specify the elevation of the second point using the elevation difference between the first and second point, enter **D** in the command line, enter **S** to specify the slope between the two points, or enter **G** to specify the grade between two points. This is called the second control point of the first entity. Thus, you have created an arbitrary region for the first entity. Next, specify the offset distance of the point to be created from the entity. To do so, follow the prompts and specify two more control points for the second entity. On doing so, green colored cross marks indicating the intersection of two points will be displayed and you will be prompted to specify the description for the point. If the entities intersect only at one point, one cross-mark will be displayed and if the entities intersect at two points, two cross marks will be displayed. Specify the description or press ENTER to skip the description; a point will be interpolated and displayed on the cross mark. Press ENTER to end the command. Figure 2-17 shows the interpolated points created at the intersection.

To create a point from the existing entities, choose the **Intersection** tool from the **Create Points** toolbar. Next, enter **E** in the command line and press ENTER; you will be prompted to select the existing line, arc, lot line, feature line, or polyline entity. Select the required existing entities and follow the prompts to create points by the intersection of two entities.

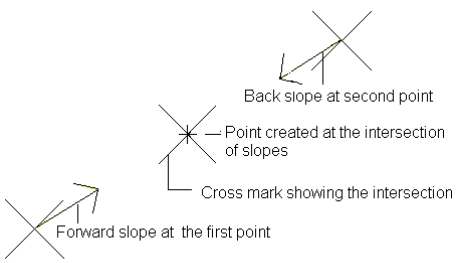


Figure 2-17 *The interpolated points created at the intersection*

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Import Points

Ribbon:	Insert > Import > Points from File
Command:	IMPORTPOINTS



The **Points from File** tool is used to create points by using the point data contained in the imported files. The point data is generally imported from the ASCII (.txt) or Microsoft Access (.mdb) files. Creating points using the point data collected by the data collector or surveyor is the most convenient way to create points. Before importing points, you need to specify the file format according to the point data in the file.

To import the point data file, choose the **Points from File** tool from the **Import** panel; the **Import Points** dialog box will be displayed, as shown in Figure 2-18. In this dialog box, you can select a file format and specify other necessary options prior to importing points. The options in this dialog box are discussed next.

Selected Files

The **Selected Files** list box displays the name and path of the selected file to be imported as points. To add a source file, choose the button on the right of the **Selected Files** list box; the **Select Source File** dialog box will be displayed. Browse to the required folder and then select the file to be imported. Also, select the file type from the **Files of type** drop-down list and choose the **Open** button to open the file; the name and path of the file will be displayed in the **Selected Files** list box.

Specify point file format

The **Point File Formats** dialog box displays various file formats supported by Civil 3D. A file format describes the sequence or arrangement of point data in the file to be imported. It is important to select file format similar to point file before importing, exporting, or transferring points. For example, if the point file consists of the northing, easting, and elevation information of points, you need to select the NEZ file format.

There are two main types of file formats, **User point Database** and **User Point File**. The **User Point Database** format is used to specify the arrangement of point data in the Microsoft Access database file and the **User Point File** is used to specify the arrangement in the .txt file. You can use the in-built file formats depending upon the type of file used or create your own formats. The methods of creating new formats are discussed later in this chapter.

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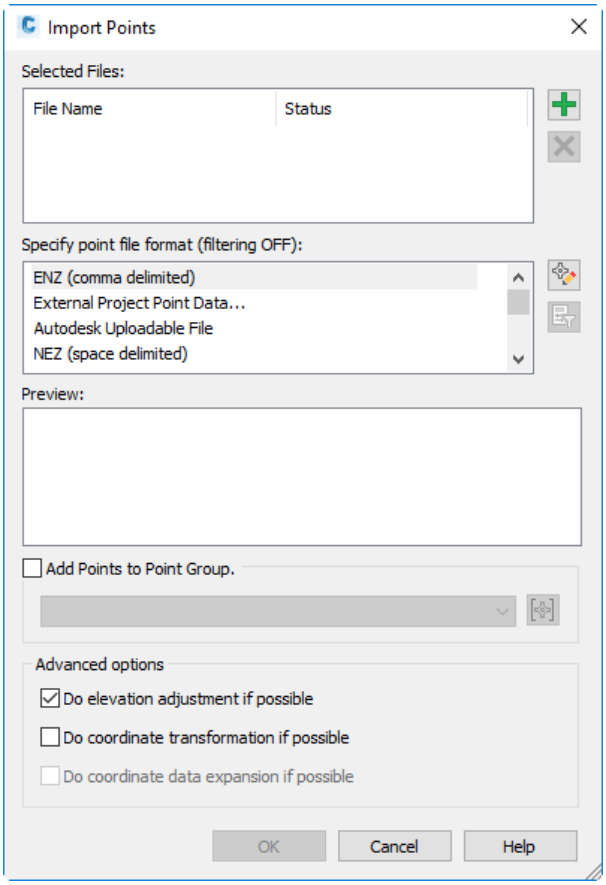


***Figure 2-18** The **Import Points** dialog box*

Add Points to Point Group

Select the **Add Points to Point Group** check box to add the points of the selected file to an existing point group. You can select a point group from the drop-down list located below the **Add Points to Point Group** check box, if the drawing consists of any predefined point groups. If the drawing does not consist of a point group, you can create a point group. To create a point group, choose the button on the right of the drop-down list; the **Point File Formats - Create Group** dialog box will be displayed. Enter the name of the point group that you want to create in the edit box and choose the **OK** button; the point group will be created and the points will be added to the point group.

Advanced options

Selecting the **Do elevation adjustment if possible** check box from the **Advanced options** area enables the elevation adjustment of the points being imported. For adjusting elevation data using this option, the point file format must contain Z+, Z-, or thickness columns.

Here, the value in the Z+ column will be added to the value in the **Elevation** column. The value in the Z- column for a point will be subtracted from the value in the **Elevation** column. This results in new elevation values for the points when they are imported or transferred.

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The Thickness column is used to store data for layer thickness and thickness value will be subtracted from the value in the **Elevation** column for the points.

Selecting the **Do coordinate transformation if possible** check box enables the coordinate transformation for the imported point file. This option is applicable only if the imported point file and the drawing in which the point file is imported has a defined coordinate system. The imported points are transformed to match the coordinate system of the current drawing.

After specifying the file format and other options in the **Import Points** dialog box, choose the **OK** button; the dialog box will be closed and points will be imported. The appearance of the imported points will depend on the point settings.



Tip

*You can also create points using the **Create Points** toolbar, refer to Figure 2-19. To invoke the toolbar, choose the **Points Creation Tools** tool from **Home** > **Create Ground Data** > **Points** drop-down. Alternatively, invoke the **Create Points** toolbar by right-clicking on the **Points** node in the **Prospector** tab in the **TOOLSPACE** palette and then choose **Create** from the shortcut menu displayed.*

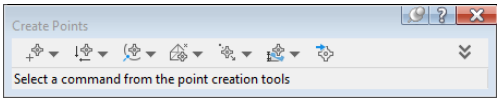


Figure 2-19 *The **Create Points** toolbar*



Note

*If you do not specify a point group, the points created or imported in the drawing will be added to the default **_All Point** point group. The **_All Point** group is displayed in the **Prospector** tab of the **TOOLSPACE** palette.*

POINT SETTINGS AND STYLES

AutoCAD Civil 3D has some in-built point styles that control the visibility and appearance of Civil 3D points. Besides controlling the visibility and display of points, these styles help you manage the workability of points. Point styles can be assigned after the points are imported or created. Alternatively, you can use a drawing template with the required point settings and then import or create points according to industry standards. Civil 3D has some default settings for points. These settings control display, elevation, layer, visibility, size, dimension, and so on. You can view and edit these default settings as per your requirement. To edit these settings, choose the **Settings** tab in the **TOOLSPACE** palette and right-click on the **Point** node; a shortcut menu will be displayed. Choose the **Edit Feature Settings** option from the shortcut menu, as shown in Figure 2-20; the **Edit Feature Settings - Point** dialog box will be displayed, as shown in Figure 2-21.

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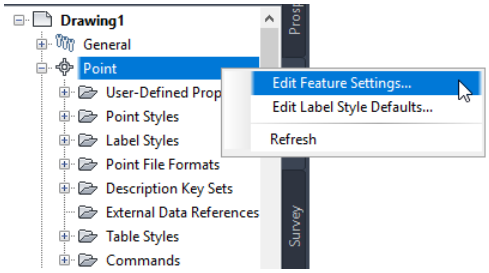


Figure 2-20 *Choosing the* ***Edit Feature Settings*** *option from the shortcut menu*

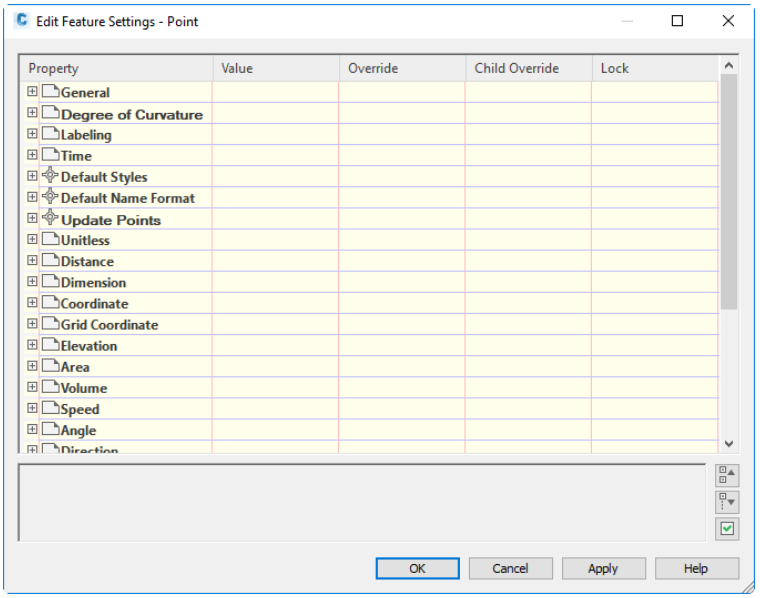


Figure 2-21 *The* ***Edit Feature Settings - Point*** *dialog box*

This dialog box is used to edit the settings of points. Every Civil 3D object has some default settings that can be viewed and modified using the **Edit Feature Settings - Point** dialog box. You can expand various categories in the dialog box and click in the **Value** field of properties to modify values.

For example, expand the **Default Styles** node and then click in the **Value** field of the **Point Style** property; The **Browse** button will be displayed. Choose the **Browse** button to display the **Point Style** dialog box. Select the required option from the drop-down list, as shown in Figure 2-22. Next, choose the **OK** button; the dialog box will be closed and the default point style will be modified. Now, when you create or import points in the drawing or template, the selected point style will be assigned automatically to points.
Similarly, you can modify the other default values related to the point object in this dialog box and choose the **OK** button to close the dialog box.

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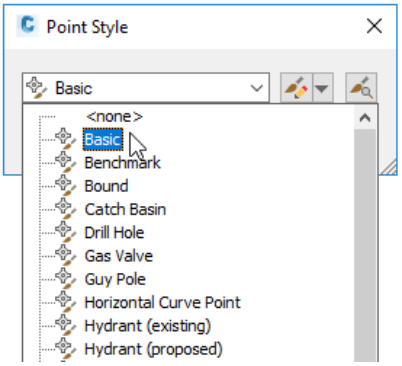


Figure 2-22 *Selecting a point style from the drop-down list*



Note

The drop-down list displayed in the ***Point Style*** *dialog box will be based on the type of drawing template selected while creating the drawing file.*

Point Styles

Point styles control the shape, size, color, and location of the point marker. It also controls the visibility of the point label. Point styles are created and assigned before or after points are created in the drawing. As discussed earlier, AutoCAD Civil 3D provides you with some in-built point styles. However, you can create your own point styles as per the project requirements and use them in the drawing. Point styles are created and managed in the **Settings** tab of the **TOOLSPACE** palette.

Creating a Point Style

You can create a point style by using the options in the **Point Style - New Point Style** dialog box. To invoke the **Point Style - New Point Style** dialog box, choose the **Settings** tab in the **TOOLSPACE** palette and expand the **Point** node. Next, right-click on **Point Styles** and then choose the **New** option from the shortcut menu displayed, as shown in Figure 2-23. On

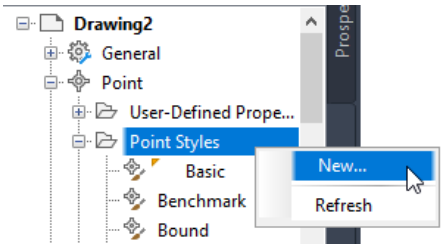


Figure 2-23 *Choosing the* ***New*** *option from the shortcut menu*

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doing so, the **Point Style - New Point Style** dialog box will be displayed with the **Information** tab chosen, as shown in Figure 2-24. The options in different tabs of this dialog box are discussed next.

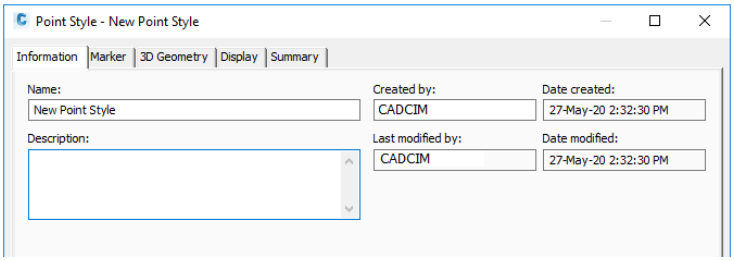


Figure 2-24 *Partial view of the* ***Information*** *tab of the* ***Point Style - New Point Style*** *dialog box*

Information Tab

This tab is chosen by default and is used to specify name for a point style. Enter a name for the new point style in the **Name** edit box. If no name is specified, the point style will be created with the default name **New Point Style**. You can also enter a description about the point style in the **Description** text box.

Marker Tab

The **Marker** tab, as shown in Figure 2-25, is used to specify the appearance of the marker point in the drawing. Using this tab, you can specify the point marker as that of the AutoCAD point style or you can use the AutoCAD blocks to represent them in the drawing. In this tab, you can also use the custom defined point markers to represent as a point marker in the drawing. Various options in the **Marker** tab are discussed next.

In the **Marker** tab, you can specify the marker point using the current AutoCAD point symbol, which can be specified by the AutoCAD PDMODE and PDSIZE system variables. To do so, select the **Use AutoCAD POINT for marker** radio button and see its preview in the **Preview** area. In this tab, you can also use a specified symbol to represent a point marker in the drawing. To do so, select the **Use custom marker** radio button. On selecting this radio button, different symbols to represent the point marker will be displayed as buttons in the **Custom marker style** area. You can choose any one of the five buttons on the left to be used as a base symbol and then choose either sixth or seventh button or both. The last two buttons that are chosen individually or in combination superimposes over the base symbol to form a combined symbol. As you choose these buttons, you can preview them in the **Preview** area of the **Marker** tab.

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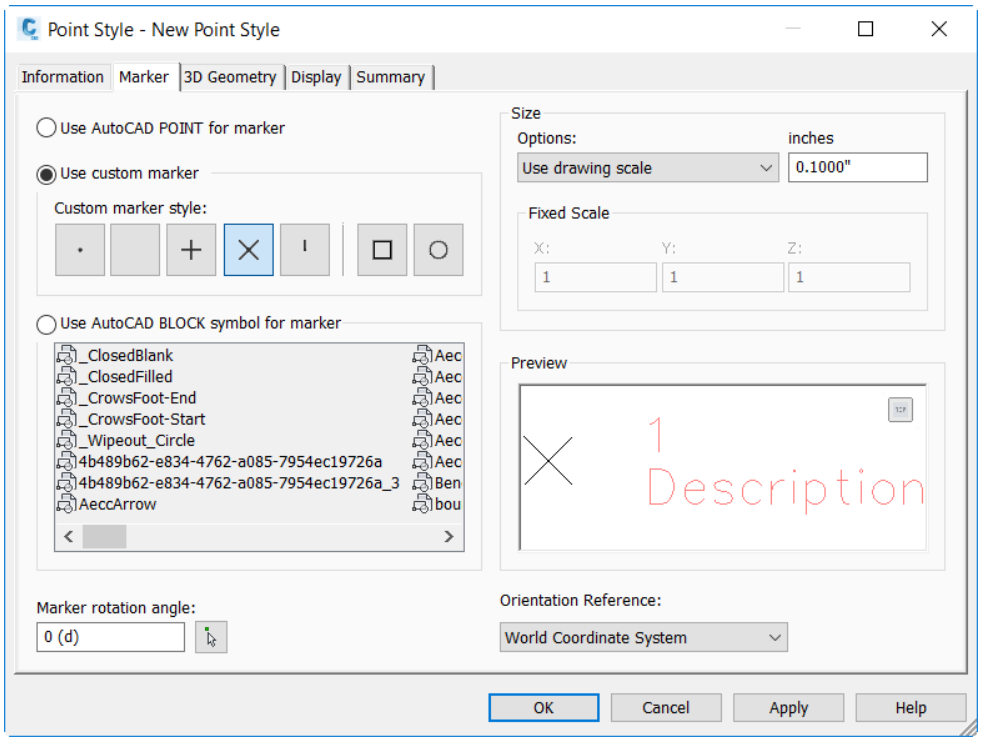


***Figure 2-25** The **Marker** tab in the **Point Style - New Point Style** dialog box*

You can also display the point marker in the drawing using a block reference of an AutoCAD block. To do so, select the **Use AutoCAD BLOCK symbol for marker** radio button; the list of blocks defined in the drawing are listed in the text box below the radio button. Choose any of the blocks from the list and preview it in the **Preview** area.

After selecting the marker style, specify the size of the marker in the **Size** area. You can set the size of the markers using four different options available in the **Options** drop-down list. Select the **Use drawing scale** option to specify the size of the marker by multiplying a specified value with the current drawing scale. Enter the required value in the **inches** edit box. You can select the **Use Fixed Scale** option from the drop-down list to set the size of the point marker by specifying the fixed scale values in the **X**, **Y**, and **Z** edit boxes. Enter a suitable value in these edit boxes to assign a fixed display scale to the marker.

You can also select the **Use size in absolute units** option from the **Options** drop-down list to set the marker size in an absolute value, based on the units displayed. Enter the required value for the size in the edit box next to the drop-down list. The **Use size relative to screen** option in the **Options** drop-down list is used to set the size of the marker as percentage of the drawing screen size. Enter the percentage in the **percent** edit box.

Optionally, specify the marker rotation in the **Marker rotation angle** edit box or choose the button on the right to specify the rotation by picking points from the drawing. Also,

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specify the orientation of the marker by selecting the option from the **Orientation Reference** drop-down list. If you select the **World Coordinate System** option, it ensures that the marker rotation angle will be relative to the world coordinate system. If the **Object** option is selected from the drop-down list then the marker rotation angle will be relative to the object it is attached to. If you select the **View** option from the **Orientation Reference** drop-down list, the marker rotation angle will be relative to the current AutoCAD view direction.

3D Geometry Tab

This tab is used to specify the display of points in the Model view or 3D views. The **Point Display Mode** property specifies the display of point in 3D view. Click in the **Value** field of this property and select any of the three display modes from the drop-down list. Select the **Use Point Elevation** mode to display points at their actual elevation. The **Flatten Points To Elevation** mode is used to flatten or project points to the specified elevation. On selecting this option, the **Point Elevation** property will be enabled. You can specify the required elevation in the **Value** field of this property. The **Exaggerate Points by Scale Factor** mode is used to raise or exaggerate the elevation of point by a specified scale factor. On selecting this option, the **Scale Factor** property will be available and you can enter the required scale factor in the **Value** field of this property.

Display Tab

This tab is used to set the visibility and display of the point marker and label. Using this tab, you can set different display settings for points in different views such as plan view (2D), model (3D), section, or profile view. You can select the required view from the **View Direction** drop-down list. To do so, select the required view from the **View Direction** drop-down list and then set the display settings in the **Component display** area.

The **Component display** area is used to display the point component and different display settings in different columns. The **Component Type** column in this area lists the components of point object. The number of components in the **Component Type** column varies according to the types of object present in the drawing. The **Visible** column specifies the visibility of component. Click on the light bulb icon in this column to control the visibility. The bulb in yellow color indicates that the component is visible. Click on the bulb to turn it off; the select component will now become invisible in the drawing.

The **Layer** column specifies the layer assigned to the component. Click on the default layer value to display the **Layer Selection** dialog box. You can use this dialog box to specify the required layer for the component and choose **OK** to exit the dialog box. The **Color** column specifies the color of the component. Click on the default value in the **Color** column to display the **Select Color** dialog box. You can use this dialog box to select a color for the component.

The **Linetype** column specifies the linetype for the component. Click on the default value in this column to display the **Select Linetype** dialog box. Select the required linetype from the dialog box. Note that the **Show Linetypes in Drawing** radio button is selected by default in this dialog box. As a result, the linetypes loaded in the current drawing are displayed. To view more linetypes, select the **Show Linetypes in File** radio button.

The **LT Scale** column specifies the linetype scale for the component. Click on the default value and enter the scale in the **LT Scale** column.

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The **Lineweight** column specifies the lineweight for the component. Click on the default **Value** in this column to display the **Lineweight** dialog box. Select the required lineweight from this dialog box and choose the **OK** button; the specified lineweight will be applied on the component. The **Plot Style** column specifies the plot style of the component. You can edit the value for the plot style.

The Summary Tab

This tab is used to review or edit the values of properties, if required. After you have specified settings in the point style, choose the **OK** button; the **Point Style** dialog box will be closed and the point style will be added in the **Point Styles** node in the **Settings** tab.

POINT LABEL STYLES

Point label styles control the behavior and appearance of point labels. Point labels provide information about points. Like point styles, point label styles are created and managed in the **Settings** tab of the **TOOLSPACE** palette.

Creating a Point Label Style

Civil 3D provides you with some in-built label styles such as the point styles. But you can create your own point label styles and use them in the drawing. To create a new point label, choose the **Settings** tab and expand **Point** and select **Label Styles** to view the in-built label styles. Right-click on the **Label Styles** option; a shortcut menu will be displayed. Choose **New** from the shortcut menu; the **Label Style Composer dialog box - New Point Label Style** dialog box will be displayed. The options in this dialog box are discussed next.

Information Tab

This tab displays information about point label style such as name, date of creation, and so on. Enter a name for the required point label style in the **Name** edit box in this tab.

General Tab

The **General** tab is used to specify if label is displayed as label or tag. In addition, it specifies the visibility, orientation reference, and so on for the label. The properties in this tab are listed in the **Property** column under three different categories: **Label**, **Behavior**, and **Plan Readability**. The default values of properties are listed in the **Value** column. The **Preview** pane in this tab displays the preview of the point and point label style. You can use the **ViewCube** tool in this pane to view the point style and point label style in different directions. Various properties displayed under these three categories are discussed next.

Text Style

The **Text Style** property is used to specify the default text style for the label text. Click in the **Value** field of this property; The **Browse** button will be displayed. Choose the **Browse** button to display the **Select Text Style** dialog box. Select the required style from this dialog box and then choose the **OK** button to apply the specified style.

Label Visibility

This property is used to control the visibility of the entire label. By default, the value of this property is set to **True**. As a result, the label will be visible in the drawing. To hide the point label in the drawing, set the value of this property to **False**.

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Layer

The **Layer** property is used to specify the default layer for all label components. To modify the layer, click in the **Value** field and choose the browse button available on the right of this field; the **Layer Selection** dialog box will be displayed. You can use this dialog box to select or create the required layer.

Orientation Reference

This property is used to specify the orientation for the point label. By default, orientation is set to **Object**, which indicates that the label will be oriented according to object such as line or arc. To change the orientation of the point label, click in the **Value** field and select the required options from the drop-down list. The options have been explained earlier in this chapter.

Forced Insertion

This property is used to specify the position for a point label relative to an object such as line or arc segment. This property will be active only when the **Orientation Reference** property is set to **Object**. To specify the value for the **Forced Insertion** property, click in its **Value** field; a drop-down list will be displayed. You can select any of the following three options from the drop-down list: **None**, **Bottom**, and **Top**. The **None** option is selected by default. As a result, the point label is placed at its original location. You can select the **Bottom** or **Top** option to add the label at the bottom or top of the object.

Plan Readable

This property is used to specify whether to rotate the label text to make it easily readable in the plan view. By default, the value of this property is set to **True**, which indicates that the label will be rotated in the plan view to make it easily readable. If you set the value of this property to **False** then the **Readability Bias** and **Flip Anchors with Text** properties will not be highlighted

Layout Tab

The options in the **Layout** tab, as shown in Figure 2-26, are used to specify the layout of the point label by creating and editing label components. The options in this tab are discussed next.

Component name

The **Component name** drop-down list is used to display the components of point label. By default, the point label has three components **Point Number**, **Point Elevation**, and **Point Description**. Select the required label component from the **Component name** drop-down list to view its properties in the **Property** column. Different label properties in this tab are discussed next.

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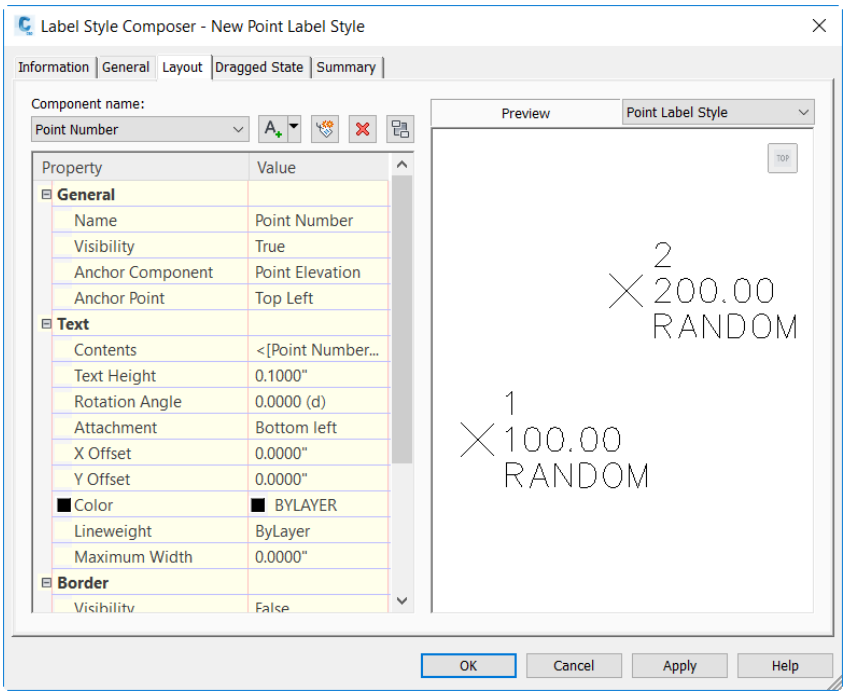


Figure 2-26 *The options in the* ***Layout*** *tab*

Name

This property of the **General** category is used to specify the name of the selected label component. Click in the **Value** field of this property and specify the name of the newly created component or the existing label components. Note that you cannot change the name of **Point Elevation**.

Visibility

This property is used to specify whether the component is visible or not. By default, the value of this property is set to **True**. As a result, the component will be visible in the drawing. Click in the **Value** field of this property and select **False** from the drop-down list to hide the selected component.

Anchor Component

This property is used to specify a reference for positioning the component. There are three options available for **Anchor Component**: **Feature**, **Point Description**, and **Point elevation**. Click in the **Value** field of this property and select the required component from the drop-down list to use it as an anchor for the label. The default option **<Feature>** helps you anchor the label to a feature. A point is called a feature, if a label style is created for it.

Anchor Point

This property is used to specify the location where the text of the label style will be attached on the component. To assign a value to this property, click in its **Value** field and select any of the options from the drop-down list displayed. The options available in the drop-down list are: **Top Left**, **Top Center**, and so on. For example, if you select **Feature** as the anchor

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component for the **Point Description** component and **Top Left** as the anchor point, the **Point Description** will be placed at top left corner of the existing feature (point).

Contents

This property of the **Text** category is used to specify the content of label component. Click in the **Value** field of this property and choose the **Browse** button; the **Text Component Editor - Content** dialog box will be displayed. You can use this dialog box to create label text. The procedure to add text to the label is discussed later in this chapter.

Text Height

This property is used to specify height of the text in the label. Click in the **Value** field of the **Text Height** property and specify the required text height.

Rotation Angle

This property is used to specify the angle of rotation or inclination of the text component. Click in the **Value** field of this property and enter value of rotation. Alternatively, choose the button displayed on the right to specify the rotation by picking points from the drawing. The positive angle direction is always counter clockwise.

Attachment

This property is used to specify the attachment point for the label component attached to the anchor point. Click in the **Value** field and select the required attachment point from the drop-down list that is displayed.

X Offset

This property is used to specify the offset distance of the component from anchor point in the X direction. Click in the **Value** field of this property and enter the offset value to adjust label, if required.

Y Offset

This property is used to specify the offset distance of the component from anchor point in the Y direction. Click in the **Value** field of this property and enter the offset value to adjust the label, if required.

Color

This property is used to specify the default color of the label component. To change the default color, click on the value, and choose the **Browse** button; the **Select Color** dialog box will be displayed. Select the required color from this dialog box and choose the **OK** button.

Lineweight

This property is used to specify the lineweight of the text. Click in the **Value** field of **Lineweight** and choose the button displayed on the right; the **Lineweight** dialog box will be displayed. Select the required lineweight from the dialog box and choose **OK**; the **Lineweight** dialog box will be closed.

Visibility

This property of the **Border** category is used to specify whether the label component text will be displayed with a border or not. By default, the value of this property is set to **False**. As a result, the border will be invisible. To display label in a border, click in the **Value** field

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of this property and select **True** from the drop-down list to make the border visible. You can view the border in the **Preview** window.

Type

This property is used to specify the shape of the border. The **Rectangular** is the default border type. To select a border shape, click in the **Value** field of the **Type** property and select the required shape for the border from the drop-down list. You can view the shape of the border in the **Preview** panel after setting the visibility of the border to **True**.

Background Mask

This property is used to specify whether or not a background mask will be applied to the label. Click in the **Value** field of this property and select **True** from the drop-down list to apply the background mask. If you apply the background mask to the component, the background of the label, such as surface contours, will be hidden by mask.

Gap

This property is used to specify the distance between label component and border. Click in the **Value** field of this property and specify the distance between label and border.

Color

This property is used to specify the color of the border. The default value of this property is **By Layer**, which indicates that the current color assigned to the label is controlled by the layer property of the border.

Linetype

This property is used to specify the linetype of the border. The default value of the **Linetype** property is **By Block**.

Lineweight

This property specifies the lineweight of the border.

Create component



To create a new label component, choose the required option from the **Component name** drop-down; a flyout will be displayed. You can choose the required component to be added from the flyout. You can add a new text component, a line component, or a block component and then set its properties as required.

Copy component



Choose the **Copy component** button to create a copy of the selected component. Specify a name in the **Value** column for the copied component; the component will be added in the **Component** name drop-down list.

Delete component



Choose the **Delete component** button to delete the selected label component from the **Component name** drop-down list.

Component draw order



Choose the **Component draw order** button; the **Component Draw Order** dialog box will be displayed, as shown in Figure 2-27.

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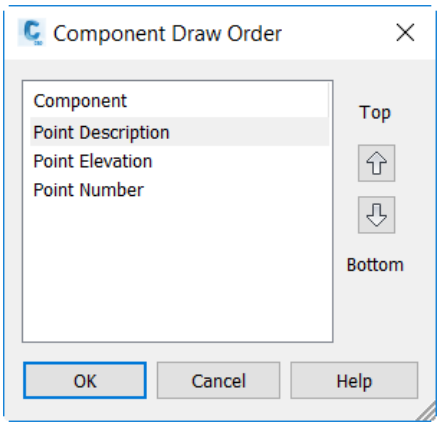


Figure 2-27 *The* ***Component Draw Order*** *dialog box*

You can use this dialog box to specify the order in which label components will be displayed in the multicomponent label. Select the required component from the **Component** area and choose the **Top** or **Bottom** button to move the selected component to the top or bottom in the label. Note that the component at the top of the dialog box is the last component displayed in the label.

Dragged State Tab

This tab is used to specify the properties and display of label when it is dragged from its insertion point. You may drag the label from its original insertion point due to the lack of space in the drawing. When you drag label to a different position, it is followed by a leader with an arrow head. The properties of this tab are listed under two categories, **Leader** and **Dragged State Components**. The **Leader** category contains leader properties where as the **Dragged State Components** category contains label properties. Some of the properties of this tab are discussed next.

Arrow Head Style

This property of the **Leader** category is used to specify the default arrow head style for the leader attached to the dragged label. Click in the **Value** field of this property and select the required style from the drop-down list. The **None** option is used to create a leader without arrow head.

Arrow Head Size

This property is used to specify the default arrow head size of the leader. Click in the **Value** field and change the size, if required.

Visibility

The **Visibility** property controls the visibility of the leader. By default, the value is set to **True**. If you do not want the leader to be displayed when the label is dragged, set the visibility of the leader to **False.**.

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Type

This property is used to specify the type of leader that will be drawn after dragging the label. Click in the **Value** field of this property and then select the **Straight Leader** or **Spline Leade**r type from the **Value** field of this property.

Display

This property of the **Dragged State Components** category is used to control the display of label after it is dragged. There are two options to display the dragged label: **As Composed** and **Stacked Text**. Select the **As Composed** option to display the label the way it is originally composed and oriented. On selecting this option, all other properties in the **Dragged State Components** category will disappear. Select the **Stacked Text** option to display the label based on the settings of the properties specified in the **Dragged State Components** category. On selecting this option, label components will be stacked or arranged vertically in the order they are defined in the label style.

Leader Attachment

This property is used to specify the attachment location of the leader with reference to the label content. Click in the **Value** field of this property and select the required option to attach the leader from the drop-down list.

Leader Justification

This property specifies whether the label text is justified according to the leader or not. Set the value of this property to **True** to enable the left justification of the text if the leader is on the left and vice versa. If the leader justification is set to **False**, the text will always be left-justified, irrespective of the leader position.

Summary Tab

This tab is used to review and edit the properties of all the components of a label. Expand the categories in this tab to view properties and values.

After you have specified the settings of the label style, choose the **OK** button to close the **Label Style Composer - New Point Label Style** dialog box. The label style will be added in the **Label Styles** node of the **Settings** tab.

Adding the Text Component to the Label

To add a new text component to a label, choose the **Layout** tab from the **Label Style Composer - New** dialog box and then choose the default **Create Text component** button available on the right of the **Component name** drop-down; the component with the default name **Text.1** will be added to the **Component name** drop-down list and its properties will be displayed in the **Property** column. Next, click in the **Value** field of the **Contents** property. In the **Text** category, choose the browse button displayed in the **Value** field, as shown in Figure 2-28. On doing so, the **Text Component Editor - Contents** dialog box will be displayed, as shown in Figure 2-29.

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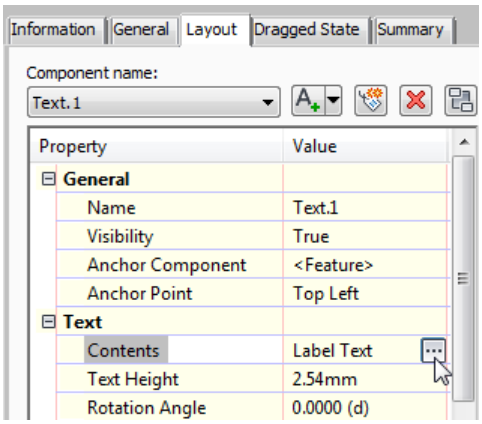


Figure 2-28 *Choosing the browse button displayed in the* ***Value*** *field of the* ***Contents*** *property*

In this dialog box, the **Properties** tab is chosen by default. In this tab, click in the **Properties** drop-down list and then select the property to be added to the label text; the property modifiers and their respective values will be displayed in the **Modifier** and **Value** columns, respectively. Change the property modifier value if required and then choose the right-arrow button next to the **Properties** drop-down list to add the selected property in the **Text Component Editor** window.

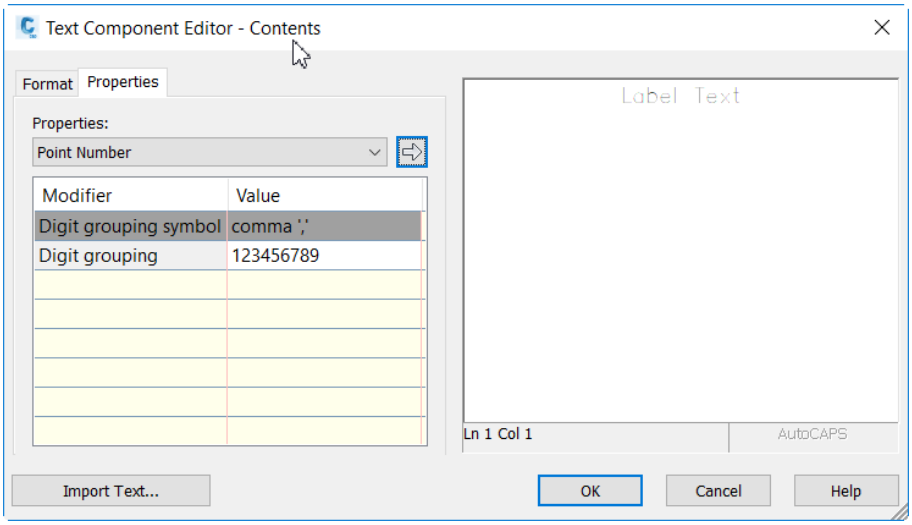


Figure 2-29 *The* ***Text Component Editor - Contents*** *dialog box*



Note

You can edit the modifier values of a property after it has been added to the right pane of the ***Text Component Editor - Contents*** *dialog box. To do so, select the text for the property to be edited in the right pane; the property corresponding to the selected text is displayed in the left pane. Now, edit the required modifier value in the left pane.*

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To format the text, choose the **Format** tab. Select the text in the **Editor** window in the right pane of the **Text Component Editor - Contents** dialog box and choose the options in the **Forma**table to format the text as required. After you have formatted the text, choose the **OK** button from the **Text Editor Component - Contents** dialog box; the dialog box will be closed and you can preview the label content in the **Preview** window.

To view and edit the default settings of point label styles, expand the **Point** node and right-click on the **Label Styles** sub-node in the **Settings** tab; a shortcut menu will be displayed. Choose the **Edit Label Style Defaults** option from the shortcut menu; the **Edit Label Style Defaults - Point Label Style** dialog box will be displayed, as shown in Figure 2-30. Expand the categories in this dialog box to view and edit the default values of label properties. You can assign point style or point label style to a group of points. The point groups are discussed later in this chapter.

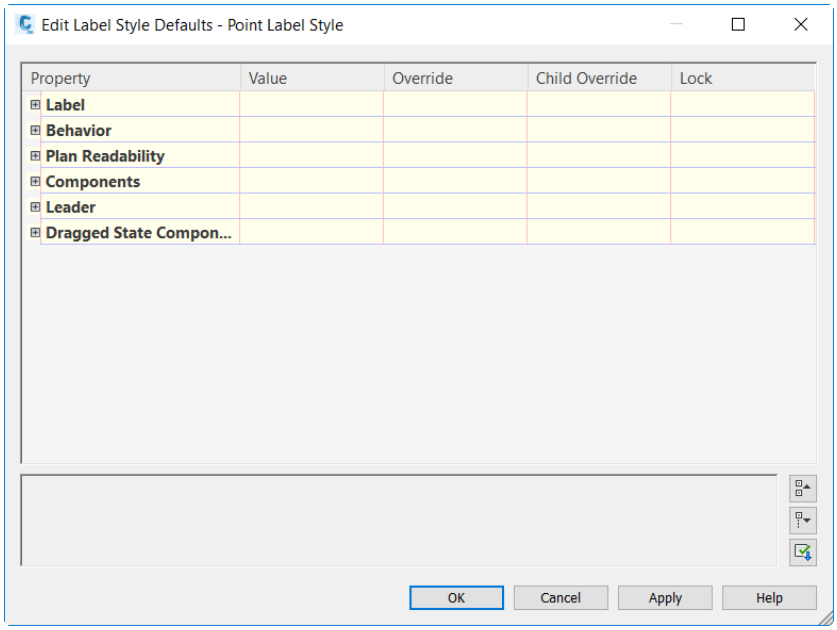


*Figure 2-30 The **Edit Label Style Defaults - Point Label Style** dialog box*

EDITING POINTS

Ribbon: Modify > Ground Data > Points
Command: EDITPOINTS

You can edit the properties of a point. There are various tools that can be used to edit the properties of a point. To edit a property, choose the **Points** tool from the **Ground Data** panel of the **Modify** tab; the **COGO Point** contextual tab will be displayed in the Ribbon, as shown in Figure 2-31.

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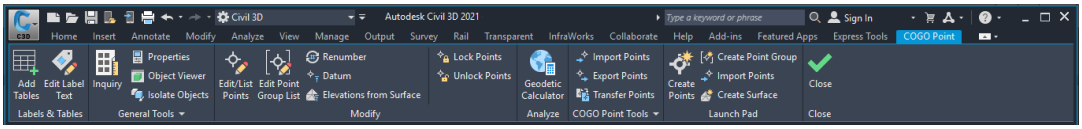


Figure 2-31 *The* ***COGO Point*** *contextual tab*

This tab contains various editing tools. These tools are discussed next.

Renumbering a Point

Ribbon: COGO Point > Modify > Renumber
Command: SELECTANDEDITPOINTNUMBERS

To renumber a point, choose the **Renumber** tool from the **Modify** panel; you will be prompted to specify a method for selecting points. Press ENTER to accept the default **<All>** option to renumber all the points. Enter **N** in the command line to specify the required point number to renumber, **G** to select the point group to renumber points in the point group, or **S** to renumber the selected points from the drawing. Alternatively, you can renumber a point in the **PANORAMA** window. To do so, right-click on the required point number in the **Point Number** column of this window and then choose the **Renumber** option from the shortcut menu; you will be prompted to enter an additive factor. Enter an integer value in the command line and press ENTER; the point will be renumbered according to the integer value specified. The value (additive factor) specified will be added to the existing point number to renumber it.

Changing the Elevation of the Point

Ribbon: COGO Point > Modify > Datum
Command: EDITPOINTDATUM

You can change the elevation of a point(s) with respect to a specified datum. To do so, choose the **Datum** tool from the **Modify** panel; you will be prompted to enter a new elevation or select a reference. Enter the required elevation in the command line or **R** in the command line to select the **Reference** option and then press ENTER. The elevation of the selected point will be modified in the **Point Elevation** column. If you select the **Reference** option, you need to specify the reference elevation and then the new elevation. The elevation of the selected point will be modified on the basis of difference between the two elevations.



Tip

You can also change the elevation of a point by changing the datum. To change elevation using datum, select the point and right-click on it; a shortcut menu will be displayed. Choose ***Datum*** *from the shortcut menu. Then, choose* ***change in Elevation*** *or* ***Reference*** *option and press ENTER.*

Changing the Point Elevation with Respect to a Surface

Ribbon: COGO Point > Modify > Elevation from Surface
Command: EDITPOINTSURFACEELEVS

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You can change the point elevation based on the surface elevation. To do so, select the required point number(s) and choose the **Elevations from Surface** tool from the **Modify** panel; the **Select surface** dialog box will be displayed. Select the required surface from the dialog box and choose the **OK** button to close the dialog box. The **Point Elevation** column will display the elevation from the surface. After selecting the required surface, you will be prompted to specify the points to be edited. Choose the required points and press ENTER. Note that Civil 3D will display a message if there is no surface in the drawing. Alternatively, right-click on the point number(s) and then choose the **Elevation from Surface** option from the shortcut menu displayed; the **Select surface** dialog box will be displayed. Select the desired surface from the drop-down list and then choose the **OK** button to close the dialog box. The **Point Elevation** column will display the elevation from the surface.

Deleting a Point

To delete a point from the drawing, right-click on the point number to be deleted in the item view of **TOOLSPACE**; a shortcut menu will be displayed. Choose the **Delete** option from the shortcut menu; the **Autodesk AutoCAD Civil 3D 2020** message box will be displayed. Choose the **Yes** button to delete the required point(s). Alternatively, select the point object and press DELETE to delete.

Zooming to a Point

To zoom to a point(s), select it in the item view of the **TOOLSPACE** and then right-click; a shortcut menu will be displayed. Choose the **Zoom to** option from the shortcut menu to zoom to the selected point(s).

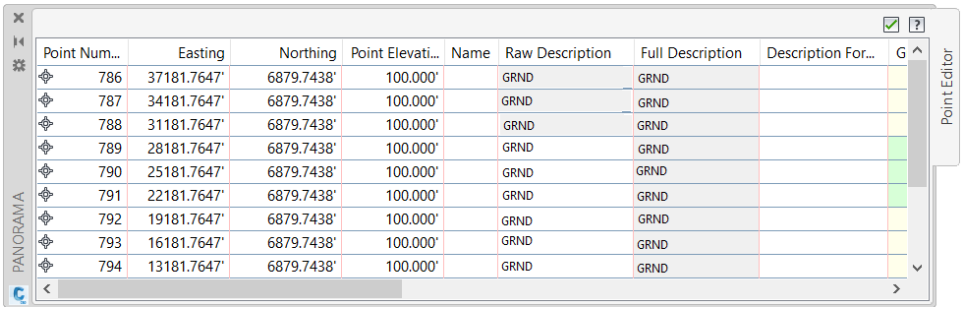
Locking/Unlocking Points

Ribbon:	COGO Point > Modify > Lock Points/Unlock Points
Command:	LOCK POINTS / UNLOCK POINTS

Locking the points prevents you from changing the properties of points. You cannot delete, move, edit, or even change the point style and the point label style of the locked points. To lock points, right-click on the required point numbers from the **Point Number** column of the **Point Editor**; a shortcut menu will be displayed. Choose **Lock** from the shortcut menu; the selected point will be locked and a red colored symbol will be displayed next to the selected point in the **Point Editor** tab, as shown in Figure 2-32.

Similarly, you can choose **Unlock** from the shortcut menu to unlock points to edit. The locked points will be displayed in the **Point Editor** as well as in the **Prospector** List view. Alternatively, the points can be locked or unlocked using the **Lock Points** or **Unlock Points** tools that are available in the **Modify** panel of the **COGO Point** tab.

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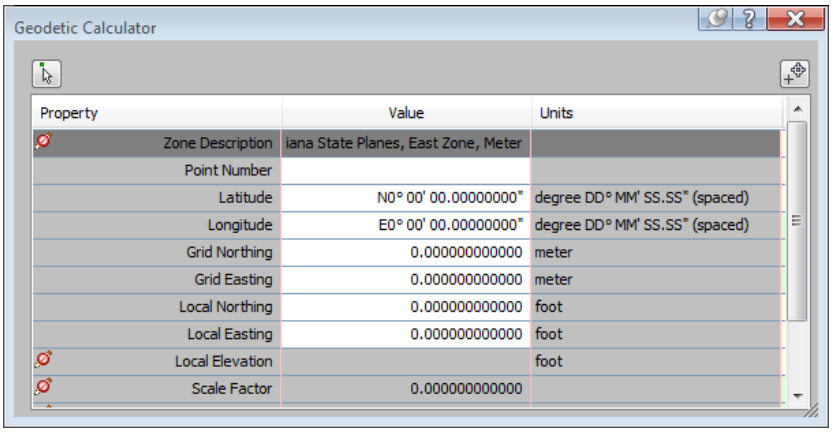
Point Num...	Easting	Northing	Point Elevati...	Name	Raw Description	Full Description	Description For...	G
786	37181.7647'	6879.7438'	100.000'		GRND	GRND		
787	34181.7647'	6879.7438'	100.000'		GRND	GRND		
788	31181.7647'	6879.7438'	100.000'		GRND	GRND		
789	28181.7647'	6879.7438'	100.000'		GRND	GRND		
790	25181.7647'	6879.7438'	100.000'		GRND	GRND		
791	22181.7647'	6879.7438'	100.000'		GRND	GRND		
792	19181.7647'	6879.7438'	100.000'		GRND	GRND		
793	16181.7647'	6879.7438'	100.000'		GRND	GRND		
794	13181.7647'	6879.7438'	100.000'		GRND	GRND		

Figure 2-32 *A red colored symbol displayed next to the selected point in the* ***Point Editor*** *tab*

Using the Geodetic Calculator

Ribbon: COGO Point > Analyze > Geodetic Calculator
Command: SHOWGEODETICCALCULATOR

You can use the **Geodetic Calculator** tool to calculate geodetic information about points. To do so, the drawing must have a defined coordinate system. Civil 3D will display a warning message if no coordinate zone is assigned to the drawing. To calculate geodetic information, choose the **Geodetic Calculator** tool from the **Analyze** panel; the **Geodetic Calculator** dialog box will be displayed, as shown in Figure 2-33. Choose the **Specify point** button at top left corner of the dialog box and click in the drawing to specify the point; the geodetic information of the point will be displayed in the dialog box. Alternatively, enter the point number in the **Value** column. You can also specify the required geodetic information such as **Latitude**, **Longitudes** or **Grid Easting** or **Grid Northing** and create the point with specified geodetic information. To do so, specify the geodetic information and choose the **Create Points** button from top right corner of the dialog box; you will be prompted to specify the point description. Enter the point description in the command line and press ENTER; the point with the specified geodetic information will be created.



Property	Value	Units
Zone Description	iana State Planes, East Zone, Meter	
Point Number		
Latitude	N0° 00' 00.00000000"	degree DD° MM' SS.SS" (spaced)
Longitude	E0° 00' 00.00000000"	degree DD° MM' SS.SS" (spaced)
Grid Northing	0.000000000000	meter
Grid Easting	0.000000000000	meter
Local Northing	0.000000000000	foot
Local Easting	0.000000000000	foot
Local Elevation		foot
Scale Factor	0.000000000000	

Figure 2-33 *The* ***Geodetic Calculator*** *dialog box*

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Editing Points Using the PANORAMA Window

You can edit individual points either graphically in the drawing or by using the **Point Editor** tab in the **PANORAMA** window. To edit points using the **Point Editor** tab, choose the **Edit/List Points** tool from the **Modify** panel of the **COGO Point** tab; the **PANORAMA** window with the **Point Editor** tab will be displayed, as shown in Figure 2-34.

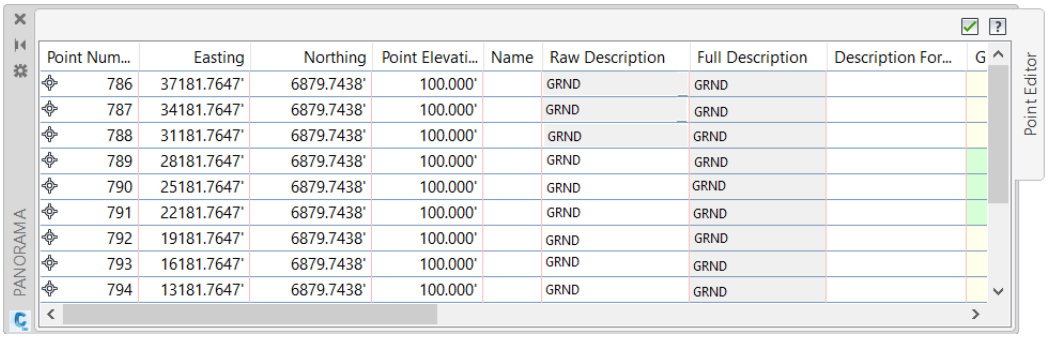


Figure 2-34 *The **PANORAMA** window with the **Point Editor** tab*

The **Point Editor** tab in the **PANORAMA** window is used to display information about points such as its Elevation, Northing, Easting, Number, and others that are relevant to it. Click in the required cell and edit a new value of the point property. For example, to change the elevation of point number 1, click in the corresponding cell of the **Point Elevation** column and enter a new value for this number. Similarly, you can change the **Easting**, **Northing**, **Elevation** and other properties of individual points. You can also use different point editing commands in the **Point Editor** tab. To do so, right-click on any point number in the **Point Number** column of the **Point Editor** tab; a shortcut menu will be displayed. You can also use the **AutoCAD** commands such as rotate, copy, move, and erase to edit points graphically.



Tip

*You can also invoke the **PANAROMA** window from the **TOOLSPACE**. To do so, right-click on the **Points** node in the **Prospector** tab and then choose the **Edit Points** option from the shortcut menu.*

Importing/Exporting/Transferring Points

Civil 3D allows you to import, export, and even transfer points from one file to another. Points can be imported and exported in the ASCII (*.txt*) format or in the Microsoft Access database (*.mdb)* format. Importing points is the easiest method to create and add points in the drawing. The surveyor collects the point data and then imports it to Civil 3D as an ASCII file.

Importing Points

Ribbon: COGO Point > COGO Point Tools> Import Points
Command: IMPORTPOINTS

To import points in the **AutoCAD Civil 3D** workspace, choose the **Import Points** tool from the **COGO Point Tools** panel; the **Import Points** dialog box will be displayed. While

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importing, exporting, and transferring points, you need to select the right type of file format. **AutoCAD Civil 3D** will display a check mark next to the path of the file if the file format selected is correct. Select the required file format from the **Specify point file format** list box in the **Import Points** dialog box and then import the required point file. You can also create your own file format. The method of creating file format is discussed later in this chapter.

Exporting Points

Ribbon: COGO Point > COGO Point Tools > Export Points
Command: EXPORTPOINTS

You can export specific points from AutoCAD Civil 3D to ASCII file or a Microsoft Access database. Before exporting points, you need to select the appropriate file format depending upon the point data and then export points. To export Civil 3D points, choose the **Export Points** tool from the **COGO Point Tools** panel; the **Export Points** dialog box will be displayed, as shown in Figure 2-35. Note that the default file format selected is **Autodesk Uploadable File**.

Next, select the required file format from the **Format** drop-down list in the dialog box. You can also create your own file format, which will be discussed later in this chapter. Next, enter the name and path of the file to which points will be exported or choose the button on the right of the **Destination File** text box; the **Select Destination File** dialog box will be displayed. Browse to the required location where the file is saved. Select the file and then choose the **Open** button; the file name and path will be displayed in the **Destination File** text box. You can export files by using any of the two file format options: **Columnated** or **Delimited**. These options are discussed later in this chapter.

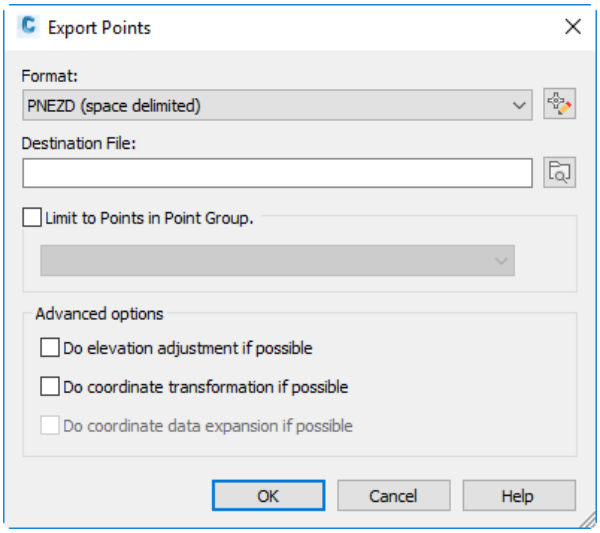


Figure 2-35 *The* ***Export Points*** *dialog box*

Next, in the **Export Points** dialog box, you can also select the **Limit to Points in Point Group** check box; the drop-down list will be activated. Select the required point group from the drop-down list below it. On doing so, points will be added to the required point group. Now, choose the **OK** button; the dialog box will be closed and points will be exported.

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Tip

*You can also invoke the **Export Points** dialog box from the **TOOLSPACE** palette. To do so, right-click on the **Points** node in the **Prospector** tab; a shortcut menu will be displayed. Choose the **Export** option from the menu; the **Export Points** dialog box will be displayed.*

Transferring Points

Ribbon: COGO Point > COGO Point Tools > Transfer Points
Command: TRANSFERPOINTS

AutoCAD Civil 3D allows you to transfer points from the source file to the destination file. A source file is a file from which points are transferred and destination file is a file to which points will be transferred. The source and destination files can be *.txt* files or *.mdb* files. Before transferring points, ensure that the file format of both the files are same. Before transferring points, you need to create two types of file formats for both the source and destination files to specify the layout or arrangement of the point data in files.

After you have created the file formats for both the files, choose the **Transfer Points** tool in the **COGO Points Tools** panel; the **Transfer Points** dialog box will be displayed, as shown in Figure 2-36.

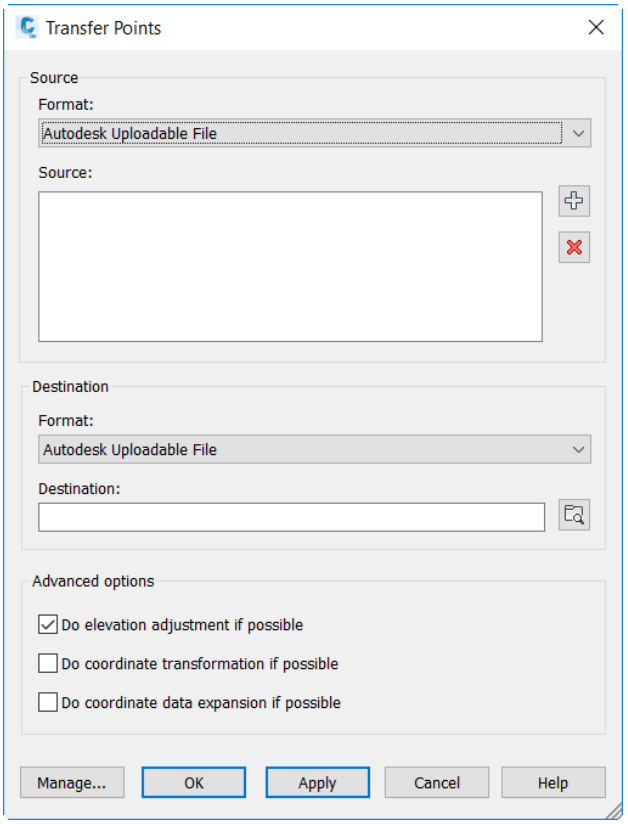


***Figure 2-36** The **Transfer Points** dialog box*

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In the **Source** area of the dialog box, select the required file format of the source file from the **Format** drop-down list. Choose the (**+**) sign button on the right of the text box of this area to display the **Select Source File** dialog box. Select the required file from this dialog box and choose the **OK** button to close it. Similarly, select the required file format and select the destination file from the **Destination** area.



Tip

*You can also invoke the **Transfer Points** dialog box from the **TOOLSPACE** palette. To do so, right-click on **Points** in the **Prospector** tab and then choose the **Transfer** option from the shortcut menu.*

Now, select the required check boxes from the **Advanced options** area to enable the elevation, coordinate adjustment, or data expansion of the point data while transferring point from the source file to the destination file. Note that you can create a new file format by choosing the **Manage** button in the **Transfer Points** dialog box. After selecting the file formats and the files, choose the **OK** button; the **Transfer Points** dialog box will be closed and the point will be transferred to the destination file. The method of creating a new file format is discussed next.

Creating a New File Format

A file format defines the structure of file in which it holds (encodes) data. For example, the point properties in the source point file are arranged in the order, point number, easting, elevation, and description. To import or export the point to or from this file, the file format to which points are imported or exported should have the same format. If the order of properties in the destination file is easting, elevation, and description, the point numbers of the source file will not be transferred to the destination file.

Civil 3D has some in-built file formats that can be used before importing, exporting, or transferring the points. However, you can also create your own file formats as per the requirement. The new file formats are created by using the **Point File Formats** dialog box that can be accessed by choosing the button on the right of the **Format** edit box either in the **Import Points** or **Export Points** dialog box.

To create a new point file format, choose the **Settings** tab in the **TOOLSPACE** palette and expand the **Point** collection. Next, right-click on the **Point File Formats** node and the choose **New** from the shortcut menu displayed; the **Point File Formats - Select Format Type** dialog box will be displayed, as shown in Figure 2-37.

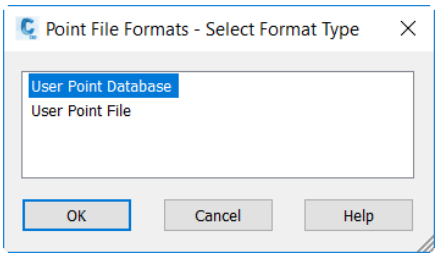


***Figure 2-37** The **Point File Formats - Select Format Type** dialog box*

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You can select any of the two file format types from the dialog box. The **User Point Database** format type is used to describe the arrangement of points in the Microsoft Access database file (*.mdb*) and the **User Point File** option is used to describe the arrangement of points in the ASCII or Text(.txt) file. The methods of creating file formats using these two format types are discussed next.

Creating the User Point Database File Format

To create the user point database point file format, right-click on the **Point File Format** node in the **Settings** tab; a shortcut menu will be displayed. Choose the **New** option from it; the **Point File Formats - Select File Format Type** dialog box will be displayed. Choose the **User Point Database** option from this dialog box and then choose the **OK** button; the **User Point Database Format** dialog box will be displayed, as shown in Figure 2-38. This dialog box is used to view or edit the properties space of the user point database format used to import points from *.mdb* files or export points from *.mdb* files. In the **Format name** edit box, enter a name of the file format; the name of the file format will be displayed in the **Point File Format** node in the **Settings** tab. Select the required table from the **Table name** drop-down list. Note that if the table name is not available in the drop-down list, choose the **Load** button and load the required *.mdb* file from the **Select Source Database** dialog box displayed. You can browse to the location where you have saved the *.mdb* file and choose the **Open** button from this dialog box to load the file. On doing so, the table name will be displayed in the **Table name** drop-down list and the data will be displayed in columns. You can refer it for creating format.

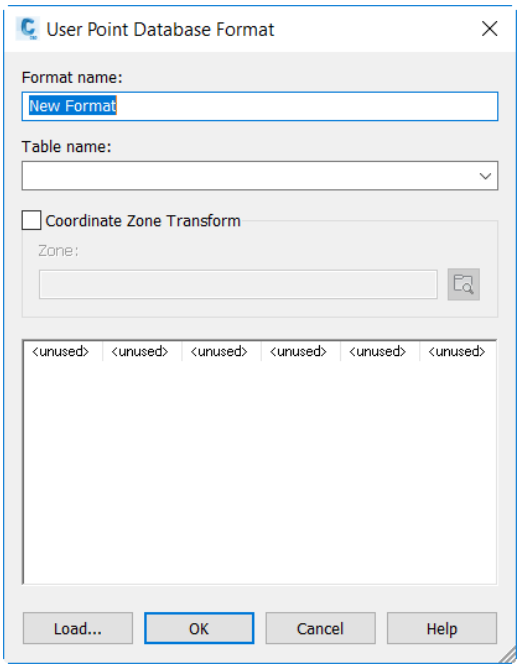


***Figure 2-38** The **User Point Database Format** dialog box*

Optionally, select the check box in the **Coordinate Zone Transform** area to assign a coordinate zone to the file format. Choose the button on the right of the **Zone** edit box and

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then select the required zone from the **Select Coordinate Zone** dialog box. Next, you need to format the column names. To do so, click on the default unused column in the dialog box; the **Point File Formats - Select Column Name** dialog box will be displayed. Select the required option according to the point data from the **Column name** drop-down list, as shown in Figure 2-39. If you do not want any data to be imported and exported, accept the default **<unused>** option from the drop-down list and choose the **OK** button. Similarly, select the name for all columns in the dialog box. To change the order of columns, simply click and drag the column to the required position. Next, choose the **OK** button; the **User Point Database Format** dialog box will be closed and the name of format will be added in the **Point File Format** node of the **Points** collection in the **Settings** tab.

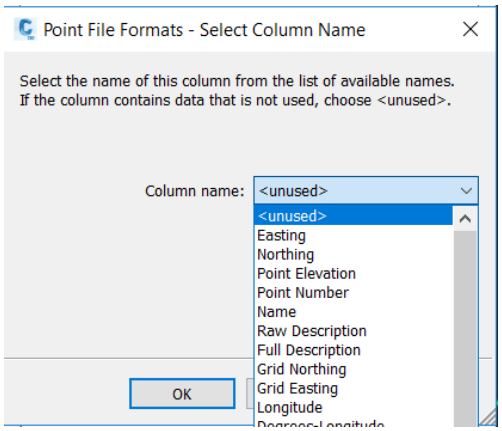


Figure 2-39 *Selecting the column name from the* ***Column name*** *drop-down list*

Creating the User Point File Format

To create the user point file format, right-click on the **Point File Formats** sub-node in the **Point** node of the **Settings** tab; a shortcut menu will be displayed. In the dialog box, choose the **New** option from it; the **Point File Formats - Select Format Type** dialog box will be displayed. Choose the **User Point File** option from the text box and then choose the **OK** button; the **Point File Format** dialog box will be displayed, as shown in Figure 2-40.

Enter the format name in the **Format name** edit box. In the **Default file extension** drop-down list of this dialog box, select the required file extension of the point data file. You can select any of the following extensions from the drop-down list:

.auf: Autodesk Uploadable File, comma delimited. Required values in the file are point number, northing, easting, elevation, and description (in the order).

.csv: Comma Separated Value file; ASCII (text) file comma-delimited

.nez: Northing, Easting, and Elevation data

.pnt: Point file

.prn: Formatted text, space delimited

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.txt: Delimited ASCII (text) file

.xyz: Coordinates X, Y, and Z

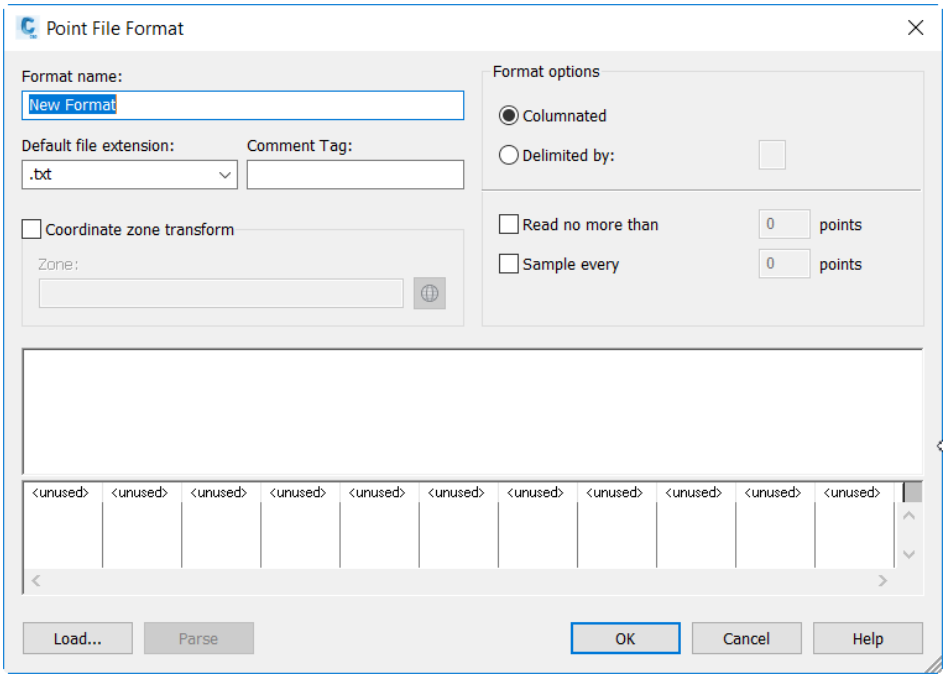


Figure 2-40 *The* ***Point File Format*** *dialog box*

After selecting the default extension, choose the **Load** button; the **Select Source File** dialog box will be displayed. Select the point file from this dialog box and load the point data. You can refer the point data in the file while creating the format. Optionally, assign a coordinate zone to the file format, as explained earlier. Now, in the **Format options** area, select the required format option. There are two types of format options: **Columnated** and **Delimited by**. By default, the **Columnated** radio button is selected. As a result, the imported point data will be arranged in columns and rows, separated by tabs. If you select the **Delimited by** radio button, the point data will be separated by a delimiter such as comma(,) or a space. Figures 2-41 and 2-42 show a typical comma separated value file and a space delimited point file, respectively.

```
1,715.1150,184.6870,-99999,
2,728.2360,222.1870,-99999,
3,737.6090,265.3130,-99999,
4,743.2320,312.1870,-99999,
5,752.6050,359.0620,-99999,
6,750.7300,411.5620,-99999,
7,728.2360,449.0620,-99999,
8,685.1230,460.3130,-99999,
9,651.3830,454.6880,-99999,
10,628.8890,445.3120,-99999,
11,600.7720,439.6880,-99999,
12,563.2820,420.9380,-99999,
13,546.4120,392.8120,-99999,
14,520.1690,349.6880,-99999,
15,497.6750,321.5620,-99999,
16,480.8050,282.1880,-99999,
```

Figure 2-41 *Typical comma separated file format*

```
1       184.687 715.115 102.000
2       222.187 728.236 102.000
3       265.313 737.609 102.000
4       312.187 743.232 102.000
5       359.062 752.605 102.000
6       411.562 750.730 102.000
7       449.062 728.236 102.000
8       460.313 685.123 102.000
9       454.688 651.383 102.000
10      445.312 628.889 102.000
11      439.688 600.772 102.000
12      420.938 563.282 102.000
13      392.812 546.412 102.000
14      349.688 520.169 102.000
15      321.562 497.675 102.000
16      282.188 480.805 102.000
17      252.187 448.938 102.000
18      209.063 430.194 102.000
19      164.062 447.064 102.000
20      141.563 486.428 102.000
21      115.312 523.918 102.000
```

Figure 2-42 *Typical space delimited file format*

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To specify the maximum number of points to be imported or exported, select the **Read no more than** check box and enter a value in the **points** edit box next to it. Civil 3D imports or exports only the specified number of points. For example, if you enter **1000** in the **points** edit box, only 1000 points will be imported or exported from the file. Similarly, to sample the point data with the specified number and import or export the points accordingly; select the **Sample every** check box and enter a number in the **points** edit box next to it. For example, if you enter a value of **50**, every 50th point will be imported or exported from the file.

Adding Point Tables

Ribbon: COGO Point > Labels & Tables > Add Tables
Command: ADDPOINTTABLE

Point tables help you view point information in tabular form. You can create different point table styles and use them to create tables. To add point tables, choose the **Add Tables** tool from the **Labels & Tables** panel; the **Point Table Creation** dialog box will be displayed, as shown in Figure 2-43.

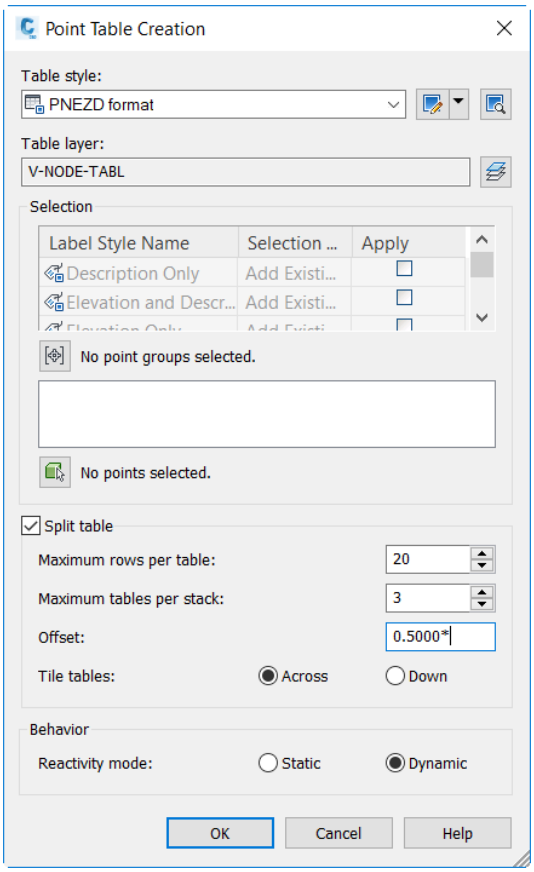


Figure 2-43 *The* ***Point Table Creation*** *dialog box*

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From the **Table style** drop-down list, select the required table style. The **Table layer** option is used to display the default layer on which the table will be created. To modify the default layer, choose the button on the right of this option; the **Object Layer** dialog box will be displayed. You can use this dialog box to select or create a new layer for the table.

The options in the **Selection** area are used to select the points to be labeled. The **Selection** area displays the list of existing point label styles in the **Label Style Name** column. To select the required point label style, select the corresponding check box in the **Apply** column. The label content of the selected point label style will be used to create point table.

Now, choose the **Select Point Groups** button to display the **Point Groups** dialog box. Select the required point group from the dialog box and choose the **OK** button; the points of the selected point group will be added in the table and the total number of point group(s) will be displayed next to the **Select Point Groups** button. You can choose the **Pick On-Screen** button and select the required points from the drawing by using any window selection method and then press ENTER; the selected points will be added in the table and displayed next to the **Pick On-Screen** button.
Optionally, choose the options in the **Split table** to format the table and choose the **OK** button; the **Point Table Creation** dialog box will be closed and you will be prompted to specify the upper left corner of the table. Click at the required location in the drawing area; the point table will added in the drawing.

POINT GROUPS

As mentioned earlier, a point group is a collection of similar points. Point groups help you control, organize, and manage a point easily. Like points, point groups also have their own styles and label styles. You can assign different point styles and point label styles to each point group and control the appearance of points of a point group. It helps you quickly identify and modify point styles or point label styles of the required points of any point group. For example, you can group surface points that are used for creating surface in a group and assign a point style to them. Also, you can create another point group containing points of the centerline of an alignment and assign them a different point style and label style. Now, you can easily identify and distinguish the surface creation points from the centerline points in the drawing. These points can then be easily edited or managed in the drawing as required.

Creating Point Groups

Ribbon: Home > Create Ground Data > Points drop-down > Create Point Group
Command: CREATEPOINTGROUP

Point groups are created based on point properties. You can group points based on their point numbers, elevation, description, and so on. To create a point group, choose the **Create Point Group** tool from the **Create Ground Data** panel; the **Point Group Properties - Point Group - (1)** dialog box will be displayed, as shown in Figure 2-44. The options in the dialog box are discussed next.

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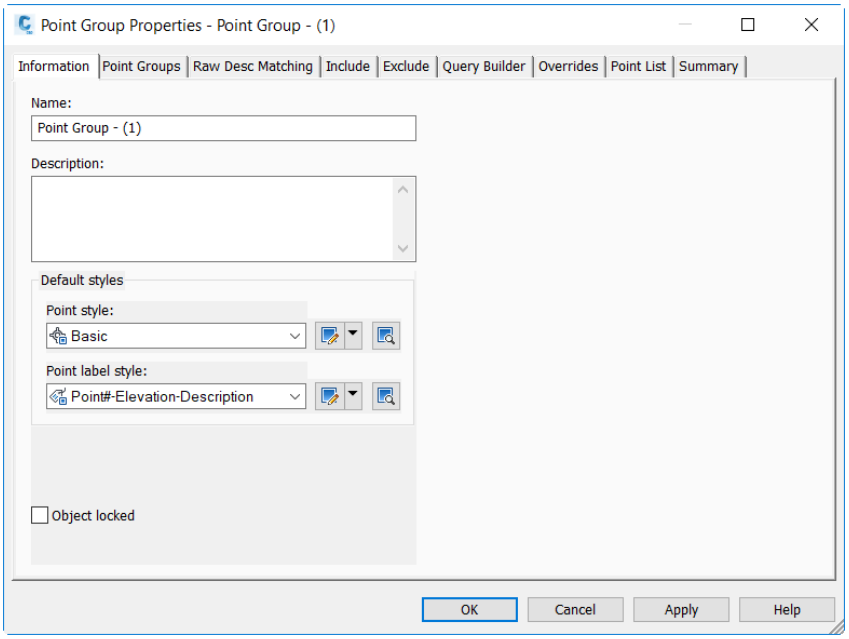


***Figure 2-44** The **Point Group Properties - Point Group - (1)** dialog box*

Information Tab

The **Information** tab in this dialog is chosen by default. Enter a name of the point group in the **Name** edit box. Optionally, enter a short description about the point group in the **Description** text box. Next, in the **Default styles** area, select the point style from the **Point style** drop-down list for the points included in the point group. Similarly, select a point label style from the **Point label style** drop-down list to label the points included in the point group. On selecting the **Object locked** check box, the **Name** and **Description** areas will become inactive.



Tip

*You can also create your own **Point Style** and **Point Label Style** by selecting **Create New** from the drop-down lists available on the right of the **Point Style** and **Point Label Style** drop-down lists.*



Point Groups Tab

This tab is used to list the existing point groups in the drawing. To select a particular point group from the list, select the check box on the left of the point group name in the **Point Group** column. The **_All Points** point group is the default point group.

Raw Desc Matching Tab

This tab is used to list the codes that are used for description keys in the drawing. You can use this tab to include the points whose raw description match with the description key codes displayed in this tab. You can select the required description key code by selecting the check box next to it. The points whose raw description matches with the selected codes will be included in the point group. Note that codes will be displayed in this only if the drawing contains description keys. The description keys and their functions are discussed later in this chapter.

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Include Tab

This tab is used to specify the criteria to include points based on their point numbers, elevations, names, raw description, full description either in the respective edit boxes or by selecting them from the drawing. The options are discussed next.

With numbers matching

Select the **With numbers matching** check box to include points based on specified point numbers. You can enter point numbers in the edit box next to the check box. The point numbers should be separated by comma. You can also enter a point number range separated by hyphen. For example, you can enter point numbers like, 100, 150, 200. On doing so, the points with the point numbers matching to 100, 150, 200 will be included in the point group. Enter the point range as 50-500; all the points with point numbers starting from 50 to 500 will be included in the drawing. Alternatively, choose the **Selection Set in Drawing** button and select the required points from the drawing using the window selection method and press ENTER; the point numbers or the ranges will be displayed in the edit box after the selection.

With elevations matching

Select this check box to include points in the point group based on their elevations. You can enter elevations of points in different ways in your drawing. First, you can enter the elevation by using a comma separated values. For example, if you enter **100**, **500**, **1000** these points will be included in the point group. Second, you can also use the greater than symbol (**>**) followed by the elevation value to include points whose elevation value is greater than the specified value. For example, if you enter **>-500**, the points having elevation greater than **-500** will be included in the point group. Third, you can use the (**<**) less than symbol to include points having elevation less than the specified elevation. For example, if you enter **<1000>**, all points having elevation less than **1000** will be included in the point group. Fourth, you can also use range for specifying the points to be included in the point group. For example, 100-1000 will include points having elevation varying from **10** to **1000**.

With names matching

Select this check box to include points based on name. Enter point names in the edit box next to this check box. The point names should be separated by a comma.

With raw descriptions matching

Select this check box to include points in the point group based on their raw description. Enter the comma separated description in the edit box next to the **With raw descriptions matching** check box; for example, GRND, STN, BLDG. The raw descriptions are not case-sensitive. You can also use wild cards after the raw description, for example, STN*.

With full description matching

Select this check box to include those points that match with the specified full description of points. Enter the required full description in the edit box next to the **With full description matching** check box.

Include all points

Select the **Include all points** check box to include all the points of the drawing in the point group. On selecting this check box, all other options are disabled.

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Exclude Tab

This tab is used to specify the criteria for excluding points from point groups. The options in this tab are the same as discussed in the **Include** tab.

Query Builder Tab

This tab is used to create point groups using a set of query. Query is a set of combined logical expressions that use logical operators such as OR, NOT, AND and so on, using the query builder.

Overrides Tab

The **Overrides** tab is used to display the existing properties of points in a point group and allows you to override the properties of points in a point group that is required. Select the check box on the left of the property that you want to override. To modify **Raw Description**, select the check box in the **Property** column. Next, click in the **Overrides** column and enter a new value in the column. Similarly, enter a new value in the **Overrides** column for the **Point Elevation** property. To override the **Point Style** or **Point Label Style** properties, select the corresponding check boxes in the **Property** column and double-click in the **Overrides** column; the **Point Style** or **Point Label Style** dialog box will be displayed. Select the required style from the dialog box and choose the **OK** button.

Point List Tab

This tab is used to display the list of all points and their properties in the point group. You cannot edit any information in this tab. You can change the sequence of columns by dragging column heads to the desired position.

Summary Tab

This tab is used to review information about point group properties and also lists point group query. After you have specified the point style, point label style, included the points, and specified other properties in the dialog box, choose the **OK** button; the **Point Group Properties - Point Group (1)** dialog box will be closed and the point group name will be added to the **Point Group** collection in the **Prospector** tab of the **TOOLSPACE** palette.

Editing Point Groups

To edit point group properties, right-click on the point group in the **Point Group** node in the **Prospector** tab and choose the **Properties** option from the shortcut menu; the **Point Group Properties - <point group name>** dialog box will be displayed. In the **Information** tab of the dialog box, you can modify the point group name, point style, point label style of points included in the point group. Choose the **Include** or **Exclude** tab from the dialog box to include and exclude points. Choose the **Apply** button to apply the changes and choose **OK** to close the dialog box.



Tip

*You can also open the **Point Group Properties - <point group name>** dialog box from the drawing. To do so, select any point of the point group in the drawing and then right-click to display a shortcut menu. Choose the **Point Group Properties** option from the shortcut menu.*

The options discussed earlier for editing points are used to edit points of any point group. To access the editing options, expand the **Point Groups** collection in the **Prospector** tab and right-click on the required point group to display a shortcut menu, as shown in Figure 2-46.

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You can choose the required options from the shortcut menu and edit the points of the point group as discussed earlier.

Out of Date Points Groups

A point group is called out of date if you add or delete points, or modify properties such as elevation or description of points included in the point group. The out of date point groups are indicated by a yellow symbol displayed in the **Prospector** tab on the left of the point group name, as shown in Figure 2-45. The **Point Group - (1)** is out of date as indicated by the symbol on the left. This shows that some changes have been made in the point group.

To view changes made in the point group, choose the **Show Point Group Differences** button in the **Point Groups** dialog box; the **Point Group Changes** dialog box will be displayed. This dialog box is used to list the changes made in the points of a point group. To update the point group, choose the **Update Point Group** button in the **Point Group Changes** or the **Point Groups** dialog box; the point group will be updated and the out of date symbol will disappear. Alternatively, right-click in the **Prospector** tab and choose the **Show Changes** option to view the changes made in a point group or choose the **Update** option to update the point group from the shortcut menu. The various editing options in **Point Groups** are shown in Figure 2-46.

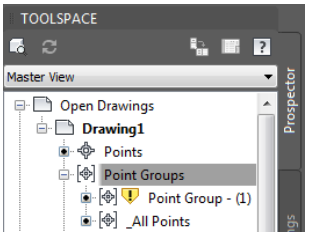


Figure 2-45 *The symbol corresponding to the* ***Point Groups*** *indicating the out of date point group*

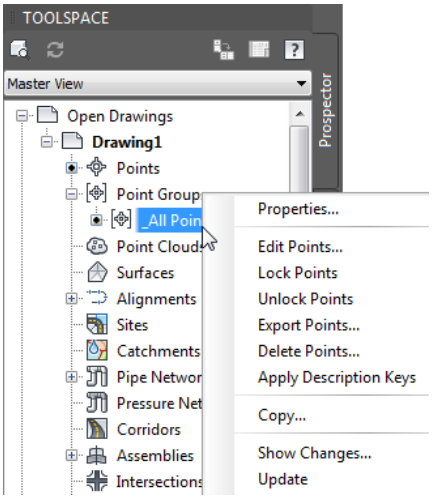


Figure 2-46 *The* ***Point Groups*** *editing options*

Description Keys

This key is used to control the visibility and appearance of points. Unlike point groups, the description keys cannot be used for controlling and appearance of the existing points. You can use these keys for creating and importing new points in the drawing or converting points in the drawing. The point groups are used to control the style and label of all points in a point group but the description keys are applied to individual points as an override. On importing or creating new points, the points are assigned the styles based on the raw description of points matching with the code and format of description keys.

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Creating Description Keys

To create a description key, choose the **Settings** tab of the **TOOLSPACE** palette and expand the **Point** node. Next, right-click on **Description Key Sets** sub-node; a shortcut menu will be displayed. Next, choose the **New** option from the shortcut menu; the **Description Key Set - New DescKey Set** dialog box will be displayed. Enter a description key set name in the **Name** edit box. Optionally, enter a short description about the key set in the **Description** text box and then choose the **OK** button; the dialog box will be closed and a name for the description key set will be added in the **Description Key Sets** node of the **Settings** tab. After creating and naming a description key set, you will create a description key to the description key set. To do so, expand the **Description Key Sets** node, right-click on **New desckey set** that you have created and then choose **Edit Keys** from the shortcut menu, as shown in Figure 2-47.

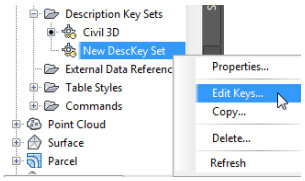


Figure 2-47 *Choosing the* ***Edit Keys*** *option*

On doing so, the **PANORAMA** window with the **DescKey Editor** tab will be displayed, as shown in Figure 2-48. In the **DescKey Editor PANORAMA** window, you will add the raw descriptions that will match the description keys. The columns used for creating description keys in the **DescKey Editor PANORAMA** window are discussed next.

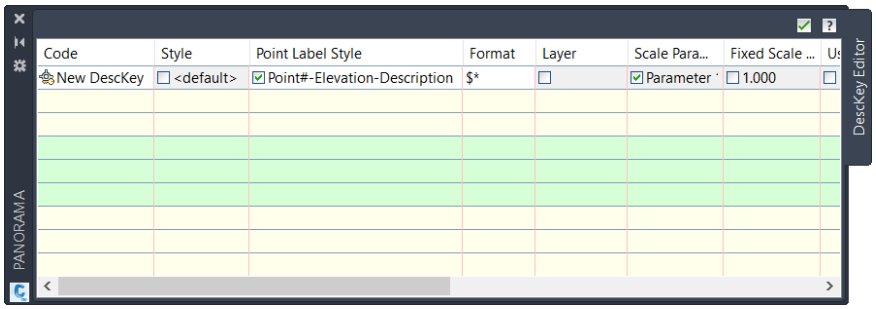


Figure 2-48 *The* ***PANORAMA*** *window with* ***DescKey Editor*** *tab*

Code

This column specifies the raw description of points. A raw description is a code that is used for points by a person who has created points from the site or field. To enter a code, double-click in the **Code** field to activate it and enter the required code in the **Code** column. You can also use the wild cards characters within the codes. These characters are used to expand the matching capabilities of description keys. Some of the common wild card characters used are *(asterisk), # (pound), and so on. For example, the MH raw description for the Manhole points can have raw descriptions as MHole, MH-1, MH-2, and so on. Thus, if you want to assign the same points style, label style and description to all the manhole points, you can use wild card characters with code such as MH*. Adding this wild character (*) means that code MH * will match with all raw description that match with MH such as MH-1, MH-2,

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MHole, and so on. Thus, all manhole points when imported into drawing will be identified automatically and assigned the same style and label styles.

You can specify the description in the **Code** column. Unlike the raw description of points in a point group, the description keys to be matched are case sensitive. This means the raw description MHole will not match with the description key code, MHOLE. Some of the wild cards used are; **?** for specifying number, **#** for single digit, @ for single alphabetical character only, **.** for non- alphanumeric character, **[ ]** for a list, and so on. Note that wild cards characters are always added after the description key code.

Point Style

This column specifies the default point style to be assigned to points matching with description key codes. To modify the point style, select the check box in the **Point Style** column field and click on the **Point Style** field; the **Point Style** dialog box will be displayed. You can use this dialog box to select the required point style or create a new point style using the options in the dialog box.

Point label Style

To specify the required point label style, select the check box in the **Point label Style** field and click in the **Point Label Style** field; the **Point Label Style** dialog box will be displayed. The **Point Label Style** dialog box displays the default point label style to be assigned to the points matching with the description key code. Select the required point label style or create a new point label style using this dialog box.

Format

This column specifies the format used for translating the raw description of points matching the description key into full description. As a result, you can make the raw description more meaningful and comprehensive. As discussed earlier, raw descriptions refer to the point description that is specified by the surveyor on the field and may not give the proper description of points. So, to create a full description of points, you can use the **Format** code of description keys.

The raw description of a point can be translated into full description in three ways. The first way is to keep the full description same as that of the raw description. For example, **GRND** is both the full description and raw description of ground points. To do so, enter $* in the **Format** field to accept the raw description as full description.

The second way is to change the raw description into full description. For example, the **IP** raw description will be replaced by **Iron Pin**. The third way is to change the order and adding information or parameters to the full description. For example, a point has a raw description **TREE OAK 5** in which **OAK** is a parameter of the raw description. This raw description matches with a description key code **Tree** in the key set. Assume that the format for the key is $2"$1tree. Now, this format will help you create a full description in a specified order. The full description of the point will be **5"OAK tree**.

During the description key match, the raw description **TREE OAK 5** will match the description key having the code **TREE** and format code, **$2"$1tree**. This format code will translate the raw description into full description, **5"OAK tre**e. $2 refers to the second parameter in the raw description, **5,** whereas **$1** refers to the first parameter, **OAK**. The

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added information in the format code is ” and tree. Thus, the full description is created by replacing the values of **$2** to **5”** and **$1** to **OAK** to create the **5”OAK tree** as the full description.

To create new description keys in the description key set, right-click in any of the fields and choose **New** from the shortcut menu; a new key will be added to the **Code** column of the **DescKey Editor PANORAMA** window, as shown in Figure 2-49. After you have specified the code, point style, point label styles, and format, choose the green colored button at top right corner of the **PANORAMA** window to close it. Figure 2-50 shows an example of a description key set having different keys.

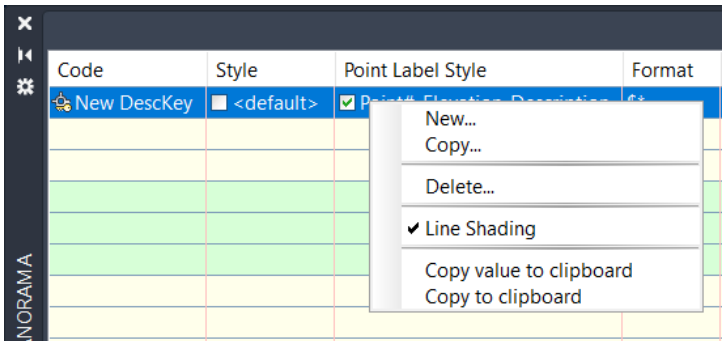


Figure 2-49 *Choosing the* ***New*** *option from the shortcut menu*

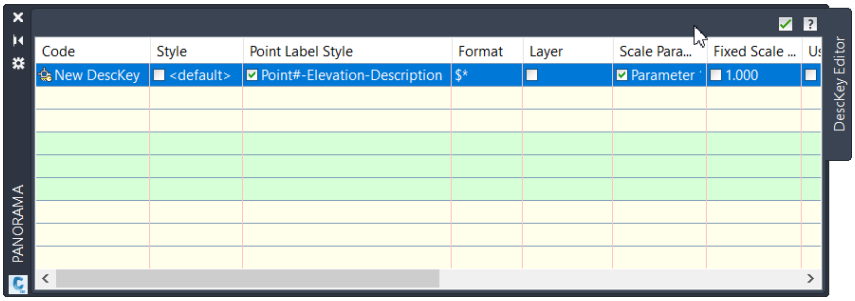


Figure 2-50 *The* ***Desckey Editor*** *tab in the* ***PANORAMA*** *window showing different keys of a description key set*

Activating the Description Key Matching

To activate the process of description key matching, choose the **Settings** tab from the **TOOLSPACE** palette and expand the **Commands** sub-node of the **Points** node in the **Settings** tab. Next, right-click on **Create Points** and choose the **Edit Command Settings** option from the shortcut menu; the **Edit Command Settings - Create Points** dialog box will be displayed. Expand the **Point Creation** category and ensure that the **Disable Description Keys** property is set to **False**, as shown in Figure 2-51. Choose the **OK** button to exit the dialog box.

Alternatively, choose the **Point Creation Tools** option from the **Points** drop-down in **Create Ground Data** panel from the **Home** tab; the **Create Points** toolbar will be displayed.

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Expand the toolbar and then expand the **Points Creation** category in it. Next, ensure that the **Disable Description Keys** property is set to **False**.

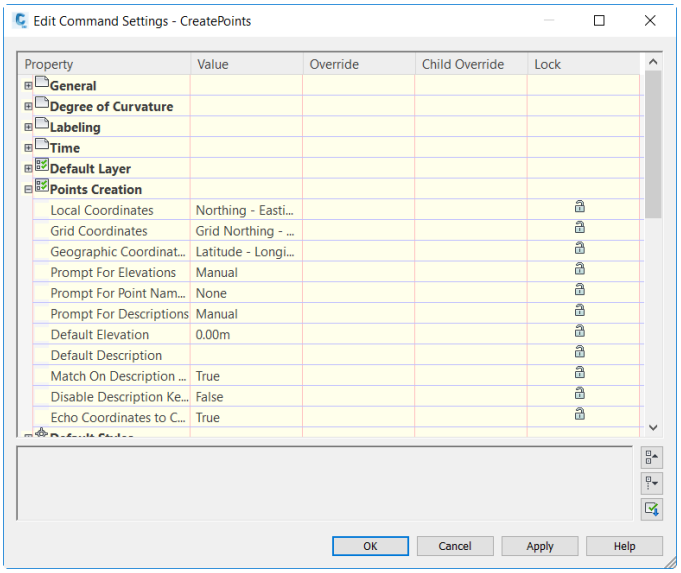


Figure 2-51 *The* ***Disable Description Keys*** *property set to* ***False***

TUTORIALS

Before starting the tutorial, you need to download and save the tutorial files on your computer. To do so, follow the steps given below:

1. Log on to *www.cadcim.com* and browse to *Textbooks > Civil/GIS > AutoCAD Civil 3D > Exploring AutoCAD Civil 3D 2020*. Next, select *c02_c3d_2020_tut.zip* file from the **Tutorial Files** drop-down list. Choose the corresponding **Download** button to download the data file.

2. Now, save and extract the downloaded folder to the following location:

   C:\c3d_2020



Note

While opening the tutorial file, the ***PANORAMA*** *window may appear with an error message. Close this window to proceed further.*

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Tutorial 1 Creating Points I

In this tutorial, you will create points using various tools that are available in the **Create Points** toolbar, as shown in Figure 2-52. **(Expected time: 20 min)**

The following steps are required to complete this tutorial:

a. Open the file.
b. Create points using different options in the **Points** drop-down.
c. Save the file.

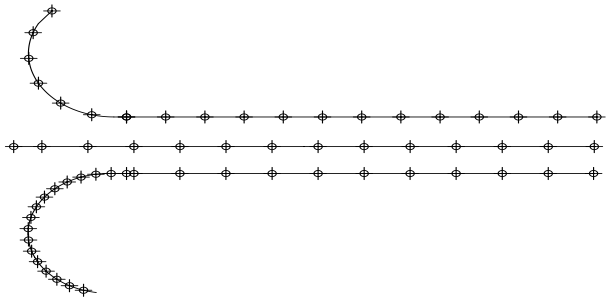


Figure 2-52 *Points created by using various tools in the* ***Create Points*** *toolbar*

Opening the File

1. Choose **Open > Drawing** from the **Application Menu**; the **Select File** dialog box is displayed.

2. In this dialog box, browse to the location *C:\c3d_2020\c02_c3d_2020_tut*.

3. Select the file *c02_c3d_2020_tut01.dwg* and then choose the **Open** button to open the file.

The opened drawing file consists of an alignment and two lines on both sides.

Creating Points Using the Options in the Alignment Category

1. Choose the **Create Points - Alignments** option from **Home > Create Ground Data > Points** drop-down; a flyout is displayed.

2. Choose the **Station/Offset** tool from the flyout to create points at some offset distance from the stations on an alignment; the **Create Points** toolbar is displayed and you are prompted to select the alignment.

3. Select the **Centreline** alignment in the drawing; you are prompted to specify the station along the baseline.

4. As you move the cursor over the alignment, a tooltip showing the first stations is displayed, as shown in Figure 2-53. Zoom in to view the alignment and click on **0+00** at the start of the alignment. Now you are prompted to specify the offset distance.

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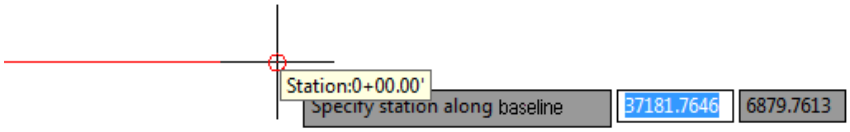


Figure 2-53 *A tooltip showing the first station*



Tip

You can also create a point at the start of an alignment by specifying ***0.00*** *in the command line and then press* ENTER.

5. Press ENTER to accept the default offset value; you are prompted to enter the point description.

6. Next, enter **CL** as the point description in the command line and press ENTER; you are prompted to specify elevation.

7. Specify the point elevation value as **100** in the command line, and press ENTER; a blue colored point is displayed at the first station of the alignment. Also, you are prompted to specify another station in the command line.

8. Pan to the next station **30+00** on the alignment and click on it.

9. Press ENTER to accept the default offset value; you are prompted to specify the description.

10. Repeat the procedure followed in steps 6 and 7 and add a new point at station **30+00**. On creating the point, you are again prompted to specify the next station.

Continue creating points till you reach the other end of the alignment, as shown in Figure 2-54.

11. Press ESC to terminate the command.

In this way, you have created points from the alignment.



Tip

In case, the points do not appear in the drawing you can set the point type by entering the ***DDPTYPE*** *command in the commandbar. As a result, the* ***Point Style*** *dialog box is displayed. In this dialog box, select the required type of point and then choose the* ***OK*** *button; the points are displayed in the drawing.*

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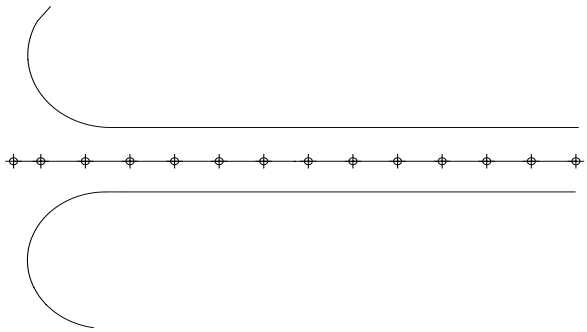


Figure 2-54 *Points created at each selected station*

Creating Points Using the Options in the Miscellaneous Category

1. Choose the **Create Points - Miscellaneous** option from **Home > Create Ground Data > Points** drop-down; a flyout is displayed.

2. Choose the **Divide Object** tool from the flyout; the **Create Points** toolbar is displayed and you are prompted to select an arc, line, polyline, lot line, or feature line.
3. Select the line above the alignment; you are prompted to enter the number of segments.

4. Enter **12** in the command line and press ENTER; you are prompted to specify the offset.

5. Press ENTER to accept the default offset value; you are prompted to specify the point description.

6. Enter **OSP** and press ENTER; you are prompted to specify the point elevation.

7. Enter **100** and press ENTER; a blue colored point is displayed at the endpoint of the selected line; you are prompted to specify the description and elevation.

8. Repeat the procedure given in steps 6 and 7 and keep on specifying the point description and elevation till you are prompted to select an arc, line, polyline, or feature line.

9. Next, select the arc object above the alignment; you are prompted to specify the number of segments. Enter **6** in the command line and press ENTER; you are prompted to specify the offset.

10. Enter **5** as the offset distance in the command line and press ENTER; you are prompted to specify the point description.

11. Enter **OSP** in the command line and press ENTER; you are prompted to specify the point elevation.

12. Enter **100** in the command line and press ENTER; you are prompted to specify the point description.

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13. Repeat the procedure given in steps 11 and 12 to create points at an offset along the selected arc.

14. Press ESC to terminate the command.

Figure 2-55 shows points created from the line and arc objects by dividing these objects into specified segments.

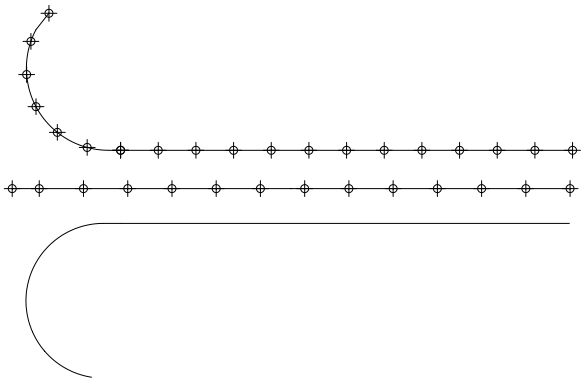


Figure 2-55 *Points created from the line and arc objects*

Creating Points Using the Options in the Intersection Category

1. Choose the **Create Points-Intersections** option from **Home > Create Ground Data > Points** drop-down; a flyout is displayed

2. Choose the **Direction/Perpendicular** tool from the flyout; you are prompted to specify the start point.

3. Click at the start point of the alignment to specify as the first point, refer to Figure 2-56; you are prompted to specify the direction.

4. Drag the cursor vertically downward and click on the line just below the point on alignment; an arrow showing the direction is displayed and you are prompted to specify the offset.

5. Press ENTER to accept the default offset value; you are prompted to specify the location for the perpendicular point.

6. Click on the line object just below the first point on the alignment; a green cross-mark indicating the position of the point is displayed on the screen. Also, you are prompted to specify the point description.



Note

*Ensure that the **OSNAP** or **ORTHO** command is activated to specify the perpendicular point. You can also use the transparent commands to specify the perpendicular points.*

7. Enter **PP** (perpendicular point) and press ENTER; you are prompted to specify the elevation.

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8. Enter **100** in the command line and press ENTER; a point is displayed on the line and you are prompted again to specify the start point.

9. Now, click at the second point on the alignment; you are prompted to specify the direction.

10. Again, drag the cursor downward and click on the line just below the selected point; an arrow is displayed and you are prompted to specify the offset.

11. Press ENTER to accept the default offset distance; you are prompted to specify the location of the perpendicular point.

12. Click on the line just below the second point; you are prompted to specify the point description.

13. Specify the description and the elevation as specified in steps 7 and 8; a point is displayed on the line, refer to Figure 2-56.

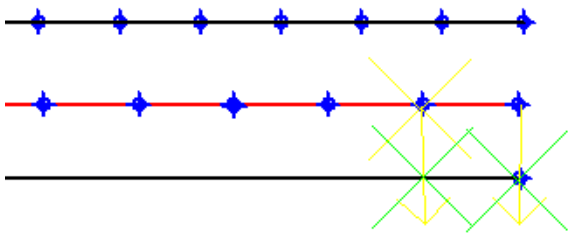


Figure 2-56 *Cross-marks indicating the location of the point*

14. Using the procedure followed in steps 3 to 8, create points in the perpendicular direction of the alignment points.

Figure 2-57 shows the points created at the intersection of the direction specified from alignment points and the perpendicular points specified on the line.

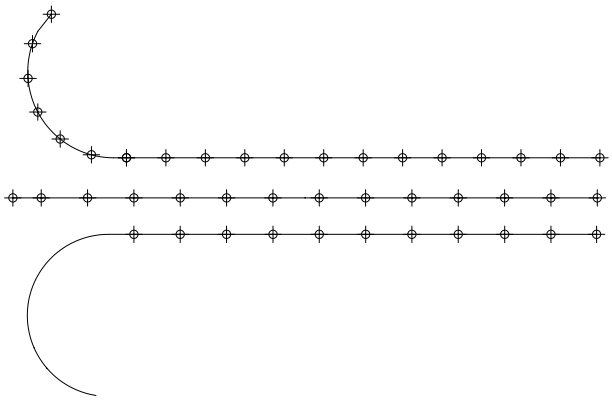


Figure 2-57 *Points created by intersection*

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15. Choose the **Create Points - Miscellaneous** option from **Home > Create Ground Data > Points** drop-down; a flyout is displayed.

16. Choose the **Measure Object** tool from the flyout; you are prompted to select an arc, line, polyline, lot line, or feature line. Select the arc below the alignment; you are prompted to specify the starting station.

17. Press ENTER to accept the default value **<0.000>**. On doing so, the ending station is displayed in the command line.

18. Next, press ENTER; you are prompted to specify the offset distance.

19. Again, press ENTER; the default value is accepted as offset and you are prompted to specify the interval.

20. Enter **1000** in the command line and press ENTER; you are prompted to specify the point description.

21. Enter **OSP** in the command line and press ENTER; you are prompted to specify the elevation.

22. Enter **100** in the command line and press ENTER; you are again prompted to specify the description and elevation.

23. Repeat steps 21 and 22 till you are prompted to select an arc again. Thus, Civil 3D creates the point first by measuring the arc object by identifying the start and end stations of the arc and then divides the arc at specified intervals. Points are created at the end of each interval including the start and end stations of the arc, refer to Figure 2-58.

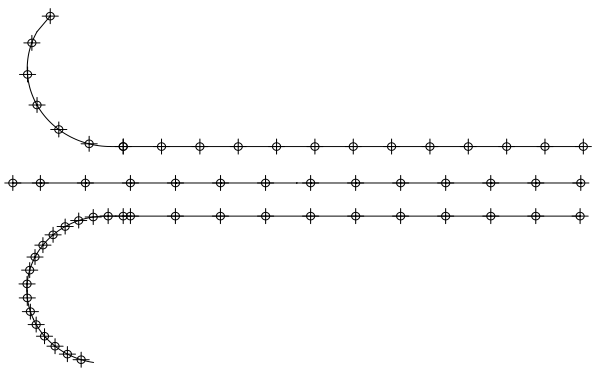


Figure 2-58 *Points created along the arc object below the alignment*

Saving the File

1. Choose **Save As** from the **Application Menu**; the **Save Drawing As** dialog box is displayed.

2. In this dialog box, browse to the following location:

C:\c3d_2020\c02_c3d_2020_tut

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3. In the **File name** edit box, enter **c02_tut01**.

4. Choose the **Save** button; the file is saved with the name *c02_tut01.dwg* at the specified location.

Tutorial 2 Importing Points

In this tutorial, you will import points into a drawing, create a point group, create a new point style, and a point label style for points, as shown in Figure 2-59. **(Expected time: 30 min)**

The following steps are required to complete this tutorial:

a. Open a new template.
b. Import points from the point file.
c. Create a point group.
d. Create a new point style.
e. Create a new label style.
f. Assign point style and label style to Point Group.
g. Save the drawing.

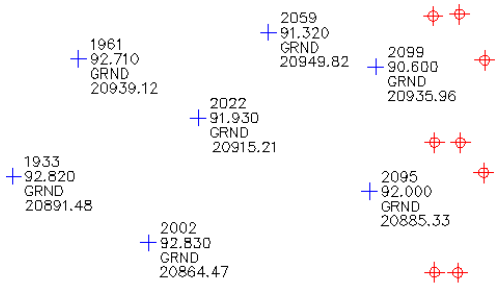


Figure 2-59 *Points created with a new point style and point label style*

Opening the New Template

1. Choose **New** from the **Application Menu**; the **Select template** dialog box is displayed.

2. Select the *_AutoCAD Civil 3D (Imperial) NCS.dwt* template file and choose the **Open** button to open the template file.

Importing Points

1. Choose the **Point Creation Tools** tool from **Home > Create Ground Data > Points** drop-down; the **Create Points** toolbar is displayed.

2. Choose the **Import Points** button from the **Create Points** toolbar; the **Import Points** dialog box is displayed. 

3. Select the **PENZD (space delimited)** option from the **Specify point file format (filtering OFF)** list box.

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Note

*By selecting the **PENZD (space delimited)** option, the points will be arranged in the order of the point number, easting, northing, elevation, and description. The points will be separated by a space delimiter.*

4. Choose the **Add files** button on the right of the **Selected Files** list box; the **Select Source File** dialog box is displayed. Browse to *C:\c3d_2020\ c02_c3d_2020_tut* location.

5. Select the *c02_c3d_2020_tut02.txt* file and choose the **Open** button; the dialog box is closed and the path of the selected file is displayed in the **Import Points** dialog box.

6. Next, choose the **OK** button in the **Import Points** dialog box; the dialog box is closed and the points are imported.

7. Choose the **Prospector** tab in the **TOOLSPACE** palette and notice a black colored symbol on the left of the **Points** node, refer to Figure 2-60. This indicates that the points have been added in the drawing.

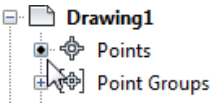


Figure 2-60 *The symbol indicating points addition*

8. Enter **ZE** in the command line and press ENTER; the points are displayed in the drawing. Next, close the **Create Points** toolbar.

9. Expand the **Point Groups** node. You will notice that all the points are added to the default **_All Points** group.

Creating a Point Group

1. Choose the **Points** tool from the **Ground Data** panel of the **Modify** tab; the **COGO Point** tab is displayed in the Ribbon.

2. Choose the **Edit/List Points** tool from the **Modify** panel of the **COGO Point** tab; the **PANORAMA** window with the **Point Editor** tab is displayed.

3. Scroll the bar in the **PANORAMA** window to view the description of points. On scrolling the bar, you will notice that some of the points have **GRND** as the point description. Now, you need to create a new point group that will include all the points with **GRND** as the description.

4. Close the **PANORAMA** window after viewing the point description of all the points that you have imported.

5. Now, right-click on **Point Groups** in the **Prospector** tab of the **TOOLSPACE** palette; a shortcut menu is displayed. Choose the **New** option from the shortcut menu; the **Point Group Properties - Point Group - (1)** dialog box is displayed.

6. In the **Information** tab, enter **Ground Points** in the **Name** edit box.

7. Choose the **Include** tab and then select the **With raw descriptions matching** check box. Enter **GRND** in the corresponding edit box.

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8. Next, choose the **OK** button; the dialog box is closed. All the points with **GRND** as the raw description are added to the **Ground Points** point group in the **Point Groups** node.

9. Expand the **Point Groups** node and select the **Ground Points** point group; all the ground points are displayed in the **TOOLSPACE** list view.

Creating a Point Style

1. Choose the **Settings** tab of the **TOOLSPACE** palette and expand **Point > Point Styles**; a triangular symbol on the left of the style name is displayed, as shown in Figure 2-61. This symbol indicates that the style being used is an existing style named **Basic**.

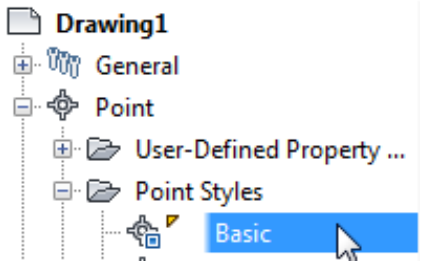


Figure 2-61 *The triangular symbol displayed on the left of the* ***Basic*** *point style*

2. Right-click on the **Point Styles** node and then choose the **New** option from the shortcut menu; the **Point Style - New Point Style** dialog box is displayed.
3. Accept the default point group name in the **Name** edit box and choose the **Marker** tab from the dialog box.

4. Ensure that the **Use custom marker** radio button is selected and then choose the third button from the **Custom marker style** options.

5. Select the **Use size relative to screen** option from the **Options** drop-down list in the **Size** area.

6. Enter **4** in the **percent** edit box.

7. Now, choose the **Display** tab and make sure that the **Plan** option is selected in the **View Direction** drop-down list.

8. In the **Component display** region, click on the color of the **Marker** component; the **Select Color** dialog box is displayed.

9. Select the **blue** color from the dialog box and choose the **OK** button to exit the dialog box.

10. Now, choose **Apply** and then **OK** from the **Point Style - New Point Style** dialog box; the dialog box is closed and the point style name is added to the **Point Styles** node in the **Settings** tab.

Creating a Point Label Style

1. Choose the **Settings** tab of the **TOOLSPACE** palette and expand **Point > Label Styles** in the tab. You will notice that **Point#-Elevation-Description** is the current point label style.

2. Right-click on **Label Styles** and then choose the **New** option from the shortcut menu displayed; the **Label Style Composer - New Point Label Style** dialog box is displayed.

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3. In the **Label Style Composer - New Point Label Style** dialog box, accept the default label style name displayed in the **Name** edit box and choose the **Layout** tab from this dialog box.

4. Now, choose the **Create Text component** button on the right of the **Component name** drop-down list; a new component **Text.1** is created and added to the **Component name** drop-down list.

5. Click in the **Value** field of the **Name** property and enter **Northing** as the name of the component.

6. Click in the **Value** field of the **Anchor Component** property and select the **Point Description** option from the drop-down list. Note the position of the component in the **Preview** window.

7. Similarly, set the value of the **Anchor Point** property to **Bottom Center**. Note the position of the component.

8. Set the values of the **X Offset** and **Y Offset** properties in the **Text** category to **0.1500"** and **-0.0700"**, respectively. Again, note the position of the component in the **Preview** window.

9. Now, click in the **Value** field of the **Contents** property; a browse button is displayed.

10. Choose the browse button; the **Text Component Editor - Contents** dialog box is displayed.

11. In the **Text Component Editor - Contents** dialog box, select **Northing** from the **Properties** drop-down list and set the value of the **Precision** modifier to **0.01**.

12. Select **Label Text** in the **Text Editor**.

13. Choose the button next to the **Properties** drop-down list; the selected property is added to the **Text Editor** window available on the right pane of the **Text Component Editor - Contents** dialog box, refer to Figure 2-62.

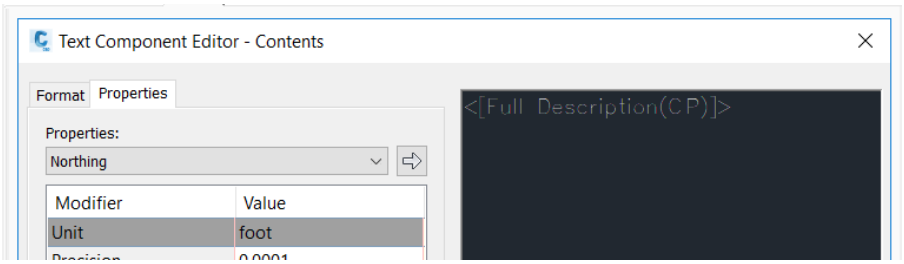


Figure 2-62 *Partial view of the* ***Text Component Editor - Contents*** *dialog box showing the northing label text*

14. Next, choose the **OK** button to close the **Text Component Editor - Contents** dialog box.

15. Again, choose the **OK** button to close the **Label Style Composer - New Point Label Style** dialog box.

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Assigning Point Style and Point Label Style to the Point Group

1. Choose the **Prospector** tab of the **TOOLSPACE** palette and expand the **Point Groups** node.

2. Right-click on the **Ground Points** group; a shortcut menu is displayed. Choose the **Properties** option from the shortcut menu; the **Point Group Properties - Ground Points** dialog box is displayed.

3. In the **Information** tab, select the **New Point Style** option from the **Point style** drop-down list in the **Default styles** area, as shown in Figure 2-63.

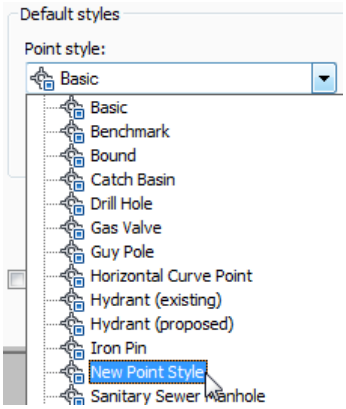


Figure 2-63 *Selecting the* ***New Point Style*** *option from the* ***Point style*** *drop-down list*

4. Choose the **Apply** button from the **Point Group Properties - Ground Points** dialog box; you will notice that all the ground points are displayed in blue color with the selected marker style.

5. Similarly, select the **New Point Label Style** option from the **Point label style** drop-down list.

6. Next, choose the **OK** button; the **Point Group Properties - Ground Points** dialog box is closed. The ground points are displayed with a new point style and label style. Note that the point label displays the point number, elevation, description, and northing of each point, as shown in Figure 2-64.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

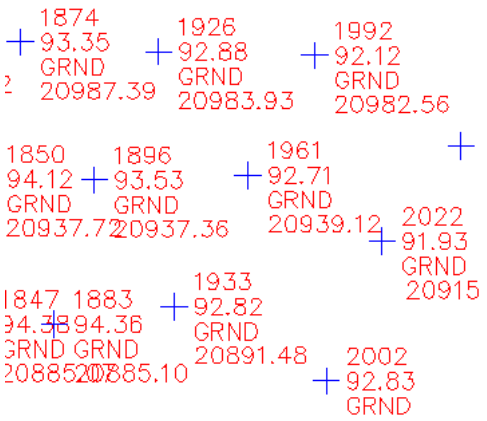


Figure 2-64 *Ground points displaying the point number, elevation, description, and northing of each point*

Saving the File

1. Choose **Save As** from the **Application Menu**; the **Save Drawing As** dialog box is displayed.

2. In this dialog box, browse to the following location:

   C:\c3d_2020\c02_c3d_2020_tut

3. In the **File name** edit box, enter **c02_tut02**.

4. Choose the **Save** button; the file is saved with the name *c02_tut02.dwg* at the specified location.

Tutorial 3 Creating Points II

In this tutorial, you will verify the drawing settings, create points manually using the coordinate data in latitude and longitude format, and create points using the **Slope/Grade - Elevation** tool, refer to Figure 2-65. **(Expected time: 40 min)**

The following steps are required to complete this tutorial:

a. Open the drawing and specify its drawing settings.
b. Create points manually using the coordinate data specified in latitude and longitude.
c. Apply point style and label style.
d. Create points using the Slope/Grade - Elevation method.
e. Save the drawing file.

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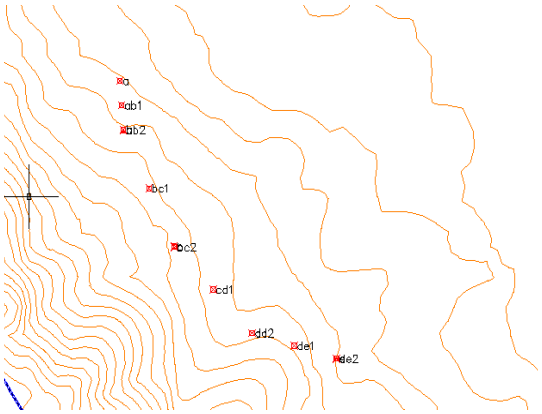


Figure 2-65 *Points created using the* ***Slope/Grade - Elevation*** *tool*

Opening the Drawing File and Specifying its Drawing Settings

In this tutorial, you first need to specify the drawing settings for the project.

1. Choose **Open > Drawing** from the **Application Menu**; the **Select File** dialog box is displayed.

2. In this dialog box, browse to the location *C:\c3d_2020\c02_c3d_2020_tut*.

3. Select the file *c02_c3d_2020_tut03.dwg* and choose the **Open** button to open the file.

4. Choose the **Settings** tab in the **TOOLSPACE** palette. Right-click on the drawing name *c02_c3d_2020_tut03* in the **TOOLSPACE** palette; a shortcut menu is displayed. Choose the **Edit Drawing Settings** option from the shortcut menu; the **Drawing Settings - <drawing name>** dialog box is displayed.

5. In the **Units and Zone** tab of the **Drawing Settings** dialog box, refer to Figure 2-66, ensure the settings as follows:

   Drawing units: **Meters**
   Imperial to Metric Conversion: **International Foot (1 Foot = 0.3048 Meters)**
   Angular units: **Degrees**
   Categories: **UTM, NAD83 Datum**
   Available coordinate systems: **UTM with NAD83 datum, Zone 11, Meter; Central Meridian 117d W**

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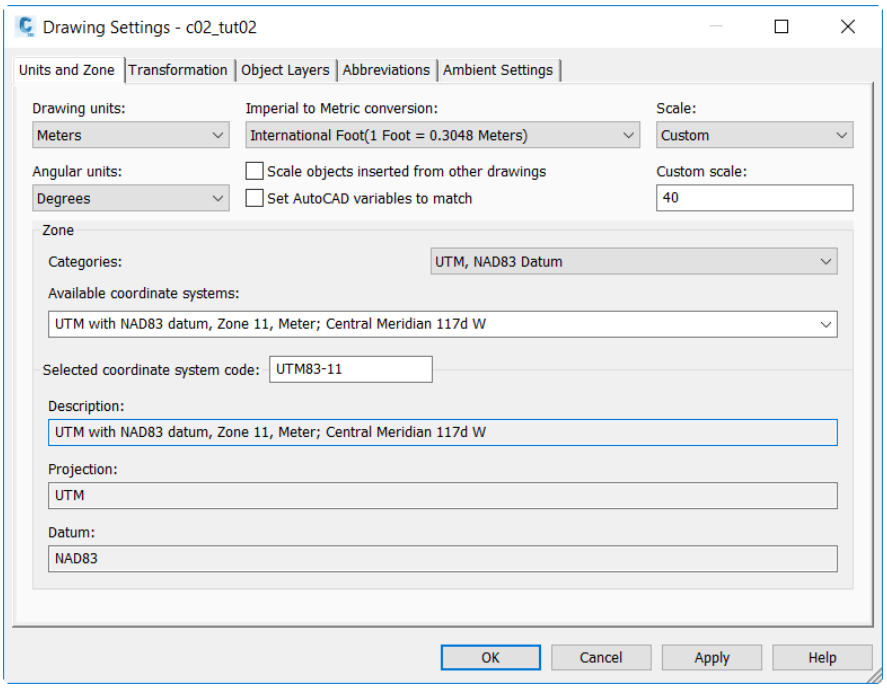


Figure 2-66 *The* ***Units and Zone*** *tab of the* ***Drawing Settings*** *dialog box*

6. In the **Ambient Settings** tab of the **Drawing Settings** dialog box, expand the **Coordinate** node. By default, the value for **Unit** is set to **meter**. If it is not so, click on the corresponding **Value** cell of the **Unit** property and choose the **meter** option from the drop-down list displayed.

7. Ensure that the value of the **Unit** property in the **Elevation** node is set to **meter**.

8. In the **Lat Long** node, set the value of **Unit** and **Format** as **degree** and **decimal**, respectively, if they are not so.
9. Choose the **OK** button to save and exit the **Drawing Settings** dialog box.



Note

If the options in the ***Drawing Settings*** *dialog box are not configured as mentioned in step 5 to 8, you need to set the values as specified in these steps.*

Creating Points Manually Using Point Coordinates

1. Invoke the **Create Points** toolbar by choosing the **Point Creation Tools** tool from **Home > Create Ground Data > Points** drop-down.

2. Choose the **Manual** button from the **Create Points** toolbar; you are prompted to specify a location for the new point.

3. Enter command **'LL** in the command line; the current lat/long unit and input format information are displayed and you are prompted to enter the value for latitude.

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Tip

Nested commands is assigning the commands within the command. In this tutorial, nested commands are being used widely, so assign the commands carefully.



Note

*The points can also be created with the **Northing** and **Easting** coordinate values. To create points using these values, choose the **Manual** tool from the **Create Points** toolbar and then enter **'NE** at the Command prompt.*

4. Specify **N33.229010** in the command line and press ENTER; you are prompted to enter the value for longitude.

5. Specify **E-116.758552** in the command line and press ENTER; you are prompted to specify the point description.

6. Enter **a** as the point description; you are prompted to specify the point elevation.

7. Enter **849.13** in the command line and press ENTER.

8. Create points b, c, d, and e by using the procedure followed in steps 4 to 6 and the data given in the following table:

Point	Latitude	Longitude	Elevation
b	N 33.228168	E -116.758706	860.70
c	N 33.226149	E -116.757575	875.79
d	N 33.224642	E -116.755833	869.28
e	N 33.224198	E -116.753949	849.99



Tip

***E-** or **W** as prefix in the value of longitude indicates the location of the point to the west of prime meridian.*

9. Press ESC twice to exit the **Create Points** command.

Applying the Point Style and Point Label Style

1. Select the **Points** node in the **Prospector** tab of the **TOOLSPACE**; a list of points in the drawing is displayed in the **TOOLSPACE** item view.

2. Right-click the first point in the **TOOLSPACE** item view; a shortcut menu is displayed. Choose the **Select** option from the shortcut menu; the selected point is displayed with the grip editor markers in the drawing area.

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3. Keeping the point selected, right-click in the drawing area; a shortcut menu is displayed. Choose the **Point Group Properties** option from the shortcut menu; the **Point Group Properties- _All Points** dialog box is displayed.

4. In the **Information** tab of the dialog box, select the **Tutorial3-Point Style** option from the **Point style** drop-down list and the **Description Only** option from the **Point label style** drop-down list.

5. Choose **OK** to apply the selected settings and exit the dialog box. The surface with the **COGO** points is displayed, as shown in Figure 2-67.

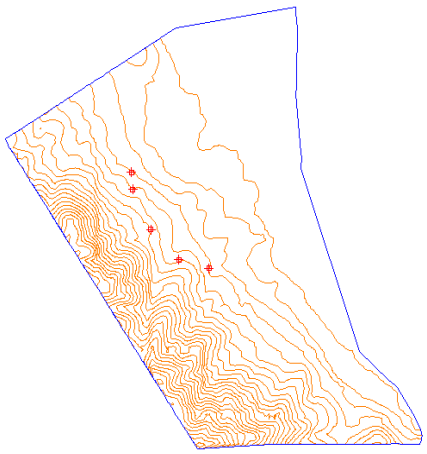


Figure 2-67 *Surface with* ***COGO*** *points*

6. Hover the mouse over the first **COGO** point; the information of the point is displayed in the tooltip, as shown in Figure 2-68.

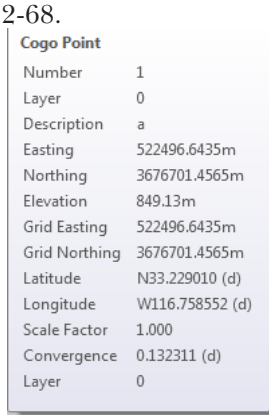


Figure 2-68 *Information of the* ***COGO*** *point displayed in tooltip*

Creating Points Using the Slope/Grade - Elevation Tool

1. Turn on the **Object Snap** with the **Node** option selected.

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Note

*You can toggle the options for snapping in the **Object Snap** tab of the **Drafting Settings** dialog box. To invoke the dialog box, enter **OSNAP** in the command bar.*

Tip

Final image can vary according to the scale of drawing.

2. Choose the **Slope/Grade - Elevation** tool from the **Slope: High/Low Point** drop-down in the **Create Points** toolbar; you are prompted to specify the start point.



3. Select point **a**; you are prompted to specify a point to define the direction of the intermediate points. Select point **b**; you are prompted to specify slope/grade between points **a** and **b**. The points created will be along the line joining points **a** and **b**.

4. Specify **-8.13334** as slope in the command line and press ENTER; you are prompted to specify the ending elevation.

   The slope is negative as the point **b** (860.70m) is on a higher level than point **a** (849.13m)**.**

5. Enter **860.70** as the ending station elevation; you are prompted to specify the number of intermediate points.

6. Enter **2** as the number of intermediate points and press ENTER; you are prompted to specify offset.

7. Accept the default value of **0.00**; you are prompted to add the end point.

8. Enter **NO** in the command line; you are prompted to enter point description for the first point.

9. Specify **ab1** as the point description and press ENTER; you are prompted to specify description for the point.

10. Enter **ab2** as the description of the second point; you are prompted to specify the point for defining the direction.

11. Use ESC to terminate the create points command.

12. Using the procedure followed in steps 2 to 10, create points between points **b** and **c**, points **c** and **d**, and points **d** and **e** based on the data given in the following table:

Points between	Start point	Slope	End elevation	Point description
bc	b	-16.48	875.79	bc1, bc2
cd	c	27.39	867.28	cd1, cd2
de	d	10.57	849.99	de1, de2

Figure 2-69 shows the final result for the points created using the provided data.

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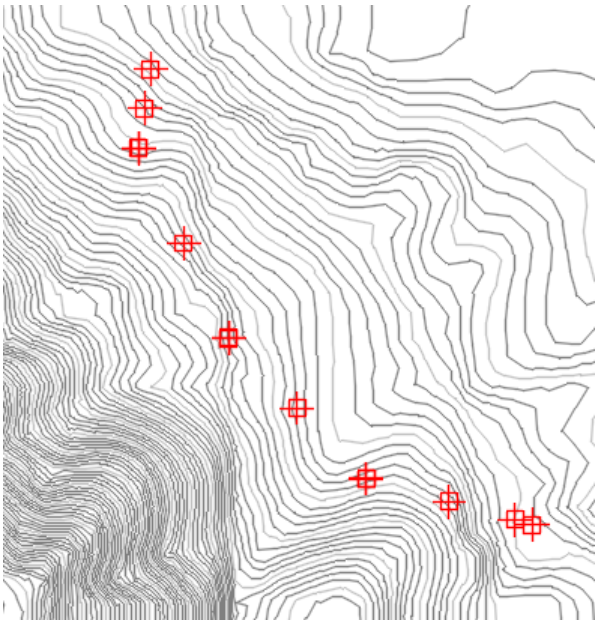


Figure 2-69 *COGO points created using the* ***Slope/Grade - Elevation*** *tool*

Saving the File

1. Choose **Save As** from the **Application Menu**; the **Save Drawing As** dialog box is displayed.

2. In this dialog box, browse to the following location:

   C:\c3d_2020\c02_c3d_2020_tut

3. In the **File name** edit box, enter **c02_tut03**.

4. Choose the **Save** button; the file is saved with the name *c02_tut03.dwg* at the specified location.

Self-Evaluation Test

Answer the following questions and then compare them to those given at the end of this chapter:

1. Which of the following tools is used to create points by specifying the distances along the X and Y axes of the grid?

   a) **Along Polyline/Contour** b) **Direction/Direction**
   c) **On Grid** d) None of these

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2. Which of the following properties is used to specify the orientation of the point label?

a) **Plan Readable** b) **Orientation Reference**
c) **Forced Insertion** d) None of these

3. Which of the following properties is used to specify a reference to position the component of the point label?

a) **Anchor Component** b) **Anchor Point**
c) **Attachment** d) None of these

4. Which of the following categories is used to create points by selecting the point location manually in the drawing?

a) **Create Point - Miscellaneous** b) **Create Point - Intersections**
c) **Create Point - Alignments** d) None of these

5. Which of the following tools is used to create a point at the intersection of two grades or slopes?

a) **High/Low Point** b) **By Relative Location**
c) **Slope/Grade Distance** d) **Direction/Direction** 1.

6. Points specify the _____of different features.

7. The two main components of a Civil 3D point are _____ and _____.

8. The _____ category has the most commonly used options for creating points.

9. Besides controlling the visibility and display of points, _____ help you manage the workability of points.

10. Point styles control the shape, size, color, location of the point marker as well as the _____ of the point label.

11. To calculate geodetic information, choose the _____ tool from the **Analyze** panel in the **COGO Points** contextual tab.

12. To import points to AutoCAD Civil 3D, choose the _____ tool from the **COGO Point Tools** panel in the **COGO Points** contextual tab.

13. Points are the building blocks of all civil engineering projects and designs. (T/F)

14. For creating points, you need to invoke the **Create Points** toolbar from **Home > Create Ground Data > Points** drop-down. (T/F)

15. For editing a point in a drawing, you need to invoke the **Edit/List Points** tool from the **COGO Points** panel in the **Modify** tab. (T/F)

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Review Questions

Answer the following questions:

1. The _____ option is used to create points by using the point data contained in point files.

2. The _____ dialog box displays various file formats supported by Civil 3D.

3. There are two main types of file formats, _____ and **User Point File**.

4. The _____ window displays all points in the drawing and is also used to edit them.

5. The _____ dialog box is used to export points from AutoCAD Civil 3D.

6. The _____ tab is used to specify criteria to include points in a point group based on their properties.

7. You cannot import points from file. (T/F)

8. In Civil 3D, each point is an individual object with different information. (T/F)

9. You cannot convert AutoCAD points into Civil 3D points. (T/F)

10. Locking the points prevents you from changing the point style of the points. (T/F)

EXERCISES

Before starting the exercises, you need to download and save the exercise files on your computer. To do so, follow the steps given below:

1. Log on to *www.cadcim.com* and browse to *Textbooks > Civil/GIS > Civil 3D > Exploring AutoCAD Civil 3D 2020*. Next, select *c02_c3d_2020_exer.zip* file from the **Exercise Files** drop-down list. Choose the corresponding **Download** button to download the data file.
2. Now, save and extract the downloaded folder to the following location:

C:\c3d_2020



Note

*While opening the exercise files, the **PANORAMA** window may appear with an error message. Close this window to proceed further.*

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Exercise 1

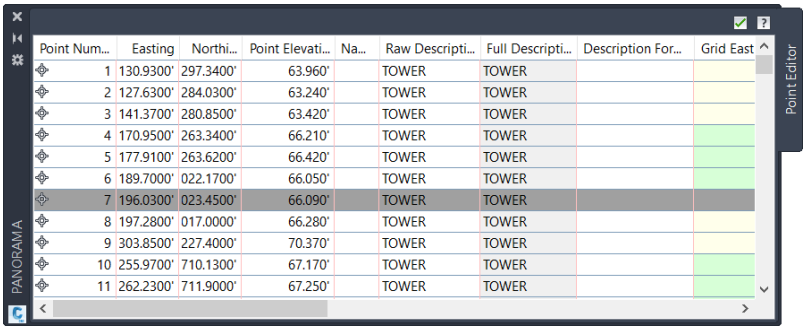
Open the *c02_c3d_2020_ex01.dwg* file and create a point style and label style for points. Next, assign these styles to points using the following parameters: **(Expected time: 30 min)**

Point Style name: **New Style**
Marker Style: **default**
Marker Color: **blue**
Point Label Style Name: **New Label Style**
Color of all the label components: **blue**
Save the file as *c02_ex01a.dwg*.

Exercise 2

Using the *c02_ex01a.dwg* file, create a point group and edit the points in the point group using the **Point Editor**. Use the following parameters: **(Expected time: 30 min)**

Point Group Name: **Tower points**
Raw Description to include Points: **Tower**
Edit the elevation of the first five points, as shown in Figure 2-70
Save the file as *c02_ex02a.dwg*.



Point Num...	Easting	Northi...	Point Elevati...	Na...	Raw Descripti...	Full Descripti...	Description For...	Grid East
1	130.9300'	297.3400'	63.960'		TOWER	TOWER		
2	127.6300'	284.0300'	63.240'		TOWER	TOWER		
3	141.3700'	280.8500'	63.420'		TOWER	TOWER		
4	170.9500'	263.3400'	66.210'		TOWER	TOWER		
5	177.9100'	263.6200'	66.420'		TOWER	TOWER		
6	189.7000'	022.1700'	66.050'		TOWER	TOWER		
7	196.0300'	023.4500'	66.090'		TOWER	TOWER		
8	197.2800'	017.0000'	66.280'		TOWER	TOWER		
9	303.8500'	227.4000'	70.370'		TOWER	TOWER		
10	255.9700'	710.1300'	67.170'		TOWER	TOWER		
11	262.2300'	711.9000'	67.250'		TOWER	TOWER		

Figure 2-70 *The* ***Point Editor*** *window showing the edited elevations*

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Answers to Self-Evaluation Test

1. c, **2.** b, **3.** a, **4.** a, **5.** a, **6.** location, **7.** marker, label, **8. Miscellaneous**, **9.** point styles, **10.** visibility, **11. Geodetic Calculator**, **12. Import Points**, **13.** T, **14.** T, **15.** T

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