Autodesk®
Civil 3D® 2025
Fundamentals

Visit the following websites to learn more about this book:

Survey, Points, and Linework

This chapter focuses on creating a correct existing topography, property lines and center line locations based on survey data collected in the field. You will learn how to import points and create points manually by providing information so the point can be properly displayed. Additionally, you will create a parcel from a legal description using the Autodesk® Civil 3D® Lines and Curves commands and the transparent commands.

Learning Objectives

- List the steps for typical survey workflow.
- Set the appropriate point creation settings and the next available point number.
- Create points manually using the *Create Points* toolbar.
- Import points from ASCII files created from the field survey.
- Generate a report for specific points.
- Group points together using common properties, such as name, elevation, description, etc.
- Review and edit points using the *Panorama* window to ensure accuracy.
- Draw a parcel from a legal description.

2.1 Survey Workflow Overview

Workflow

To create linework from coordinate files, use the following survey workflow:

1. Data needs to be entered into the data collector. The correct language, methodology, and basic rules regarding data entry into the data collector begin with an understanding of Figure Commands and Field Codes (raw descriptions).

2. Data can be transferred from the data collector to the computer using an ASCII file or an electronic field book. An ASCII file can be opened in Notepad and data can be separated or delineated by spaces or commas. The most popular transfer format is Comma Delimited Point Number, Northing, Easting, Elevation, Description (PNEZD) format.

3. If using an electronic field book file (a type of ASCII file), data needs to be converted from the raw coordinate file to a field book (*.FBK) using Survey Link or other methods of the Autodesk Civil 3D software. Autodesk has collaborated with major survey equipment vendors to develop API and drivers that interface their specific survey equipment (Trimble Link, TDS Survey Link, Leica X-Change, TOPCON Link, etc.) with the Autodesk Civil 3D software.

4. If following the **Linework Code Set** command format, you do not need to convert the coordinate file to a field book.

5. The Autodesk Civil 3D software needs to have all of the necessary Styles, Settings, and Figure Prefixes to create, sort, and place points and linework on the required layers.

2.2 Survey Figures

Survey figures consist of linework generated by coding and placed in a file that is imported into a Survey Database. A figure represents linear features (edge-of-pavement, toe-of-slopes, etc.).

A figure has many functions, which include:

- Acting as linework in a drawing.

- Acting as breaklines for a surface definition.

- Acting as parcel lines.

- Acting as a pipe run.

- Acting as targets for *Width* or *Offset Targets* in a corridor.

- Acting as targets for *Slope* or *Elevation Targets* in a corridor (e.g., limits of construction for a road rehab project might be to the face of walk, which exists in the drawing as a Survey Figure, hence a target).

The *Figure Prefix* database should be set up before importing any survey data to obtain the required entities in a drawing. As point and label styles and the Description Key Set need to exist before importing points, figure styles and entries in the *Figure Prefix* database need to exist before importing survey data.

Figure Prefix Database

The *Figure Prefix* database (found in the *TOOLSPACE>Survey* tab) assigns the figure a style, a layer, and defines whether the figure is a surface breakline and/or lot line (parcel segment). If you did not define any figure styles, you should at least assign a layer to correctly place the figure in the drawing. Toggling on the *Breakline* property, as shown in Figure 2−1, enables you select all of the tagged survey figures and assign them to a surface without having to insert or select from a drawing. Toggling on the *Lot Line* property creates a parcel segment from the figure in the drawing and, if there is a closed polygon or intersecting lines to form an enclosure, assigns a parcel label and creates a parcel in the designated site.

Name	Breakline	Lot Line	Layer	Style	Site
Trail	☑ Yes	☐ No	0	ASC-Road Cent	Survey Site
Building	☐ No	☐ No	0	ASC-Bldg-Foot	Survey Site
CL	☑ Yes	☐ No	0	ASC-Road Cent	Survey Site
EOS	☑ Yes	☐ No	V-ROAD-SHLD	Standard	Survey Site
EOP	☑ Yes	☐ No	0	ASC-Curb	Survey Site
DITCH	☑ Yes	☐ No	V-ROAD-DTCH	ASC-Standard	Survey Site
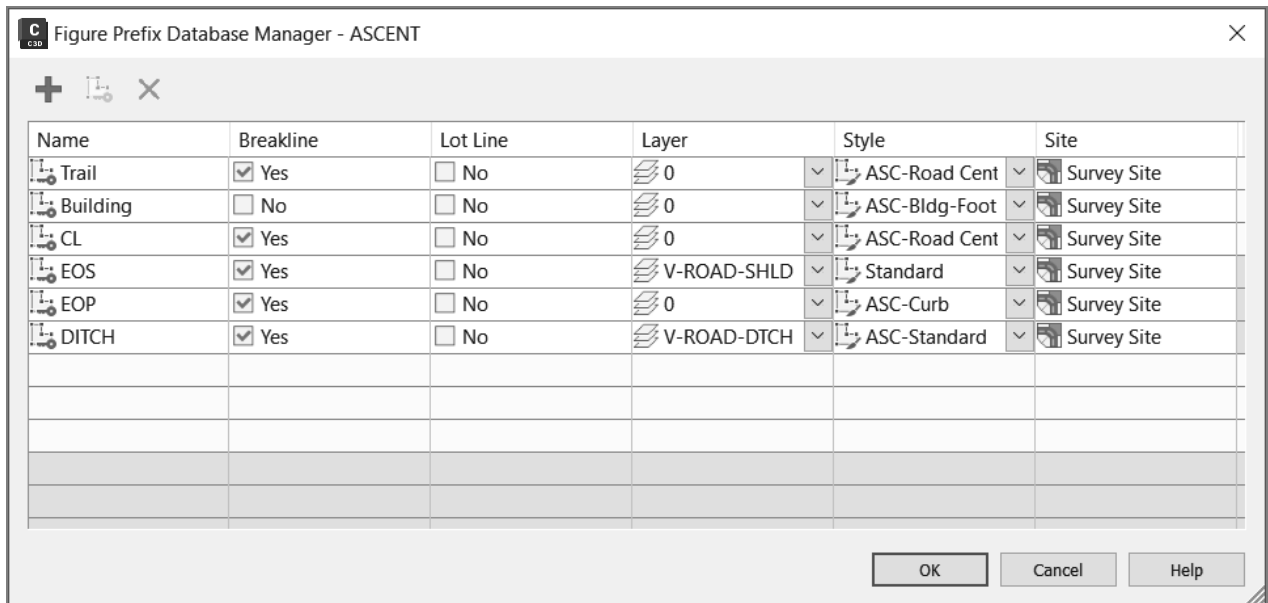
Figure 2−1

If the *Name* is **EOP** (as shown in Figure 2−1), any figure starting with EOP uses these settings. This is similar to using a Description Key Set, except that the entry in the Figure Prefix database does not need an asterisk (*). The entry Name matches EOP-R or EOP-West or EOP-Main-East. When inserting survey figures in the drawing, Survey checks the Figure Prefix database for style or layer values.

2.3 Points Overview

Survey points are often used at the beginning of a project and COGO points (for stakeout) at the end of a project. Surveyors collect data about existing site conditions (elevations, utilities, ownership, etc.) for the project. Their world is coordinates, which are represented by points. Each point has a unique number (or name) and a label containing additional information (usually the elevation of the coordinate and a short coded description).

There are no national standards for point descriptions in the Surveying industry. Each company or survey crew needs to work out its own conventions. There are no standards for symbols either. Each firm can have its own set of symbols. The symbols used in a submission set can be specified by the firm contracting the services.

Autodesk Civil 3D COGO/survey points are a single object with two elements: a point style and a point label style. A COGO/survey point definition is shown in Figure 2-2.
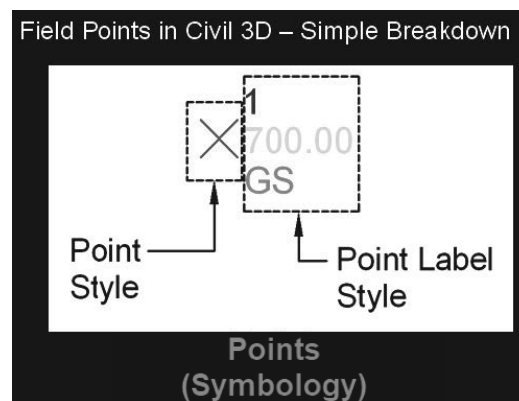
Figure 2-2

The following is important point information:

- A point style (no matter what it displays), an AutoCAD node, a custom marker, or a block is selectable with an AutoCAD **Node** object snap.

- A point label is not limited to the point's number, elevation, and description. A point label can contain lines, blocks, and other point properties. One can set up User-Defined point properties as well. For example, point labels might only display an elevation or description.

2.4 Point Settings

When creating new points, you must determine the next point number, and which elevations and descriptions to assign and how to assign them. To set the current point number, default elevations, descriptions, and other similar settings, you can use the expanded *Create Points* toolbar. Click ⬇ in the *Create Points* toolbar to display the *Points Creation* and *Point Identity* categories (shown in Figure 2–3), which contain the most commonly used values.
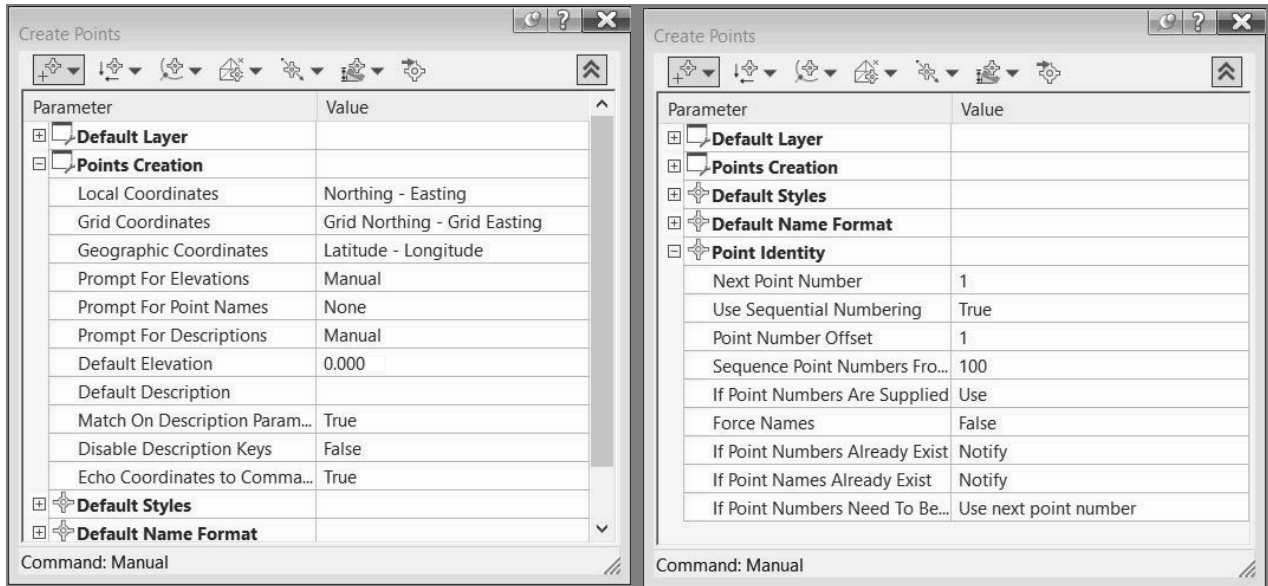

Figure 2–3

Points Creation Values

The *Points Creation* area affects prompting for elevations and/or descriptions. The two properties in this area are *Prompt For Elevations* and *Prompt For Descriptions*. These properties can be set as follows:

None	Does not prompt for an elevation or description.
Manual	Prompts for an elevation or description.
Automatic	Uses the **Default Elevation** or **Default Description** value when creating a point.
Automatic-Object	Creates points along an alignment whose description consists of the **Alignment name** and **Station**. This description is not dynamic and does not update if the alignment changes or the point is moved.

Point Identity Values

The *Point Identity* area sets the default method of handling duplicate point numbers. If there are duplicate point numbers, there are three ways to resolve the duplication:

1. Overwrite the existing point data.

2. Ignore the new point.

3. Assign it a new number.

This area's critical property is *Next Point Number*. It is set to the first available number in the point list. If a file of imported point data uses point numbers 1-131 and 152-264, the current point number is 132 after importing the file. This value should be set manually to the next required point number before creating new points with the *Create Points* toolbar.

You can also change these point settings by selecting the *TOOLSPACE>Settings* tab and expanding the *Commands* collection under the *Point* collection. Right-click on **CreatePoints** and select **Edit Command Settings...**, as shown on the left in Figure 2−4. In the *Edit Command Settings* dialog box, you can set the defaults for Point Creation, as shown on the right in Figure 2−4. **Note:** Ideally, this will be preset for you by your BIM manager, according to your organization's standards.
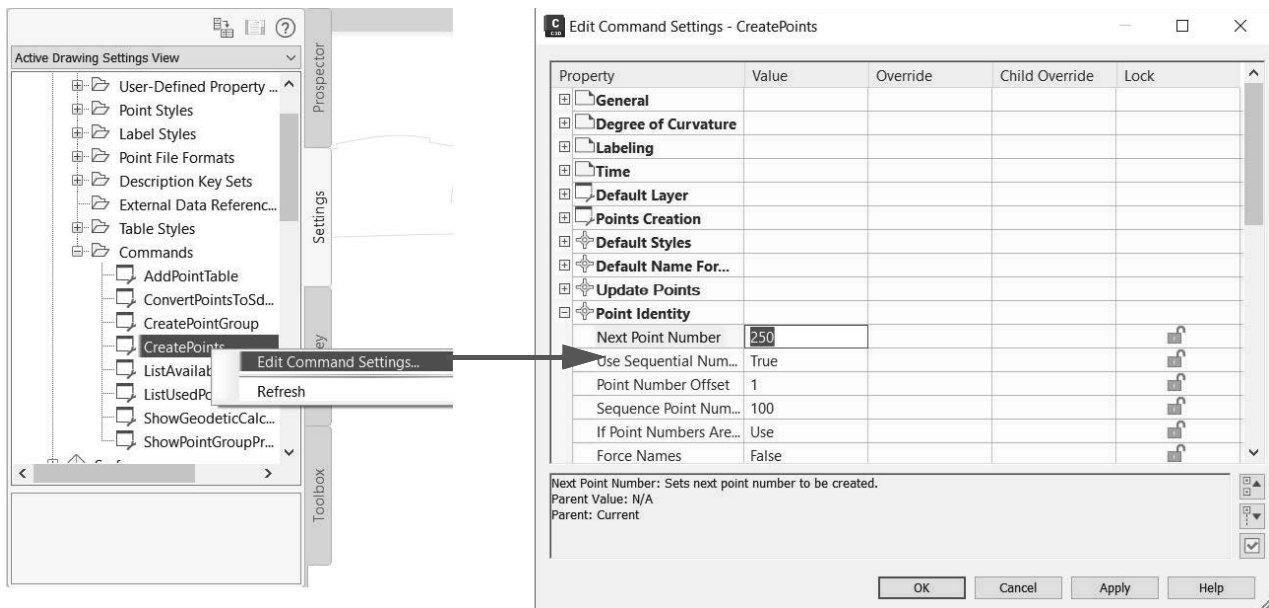
Figure 2−4

2.5 Creating Points

You can create points using the commands in the *Create Points* toolbar. These commands include:

- **Miscellaneous - Manual:** Creates a new point at specified coordinates.

- **Alignments - Station/Offset:** Creates a point at an alignment's specific station and offset. These points and their descriptions do not update if the alignment is modified or the point is moved. If you prefer a dynamic station and offset labels, consider using an Alignment label instead.

- **Alignments - Measure Alignment:** Creates point objects at a set interval, which is useful for construction staking. Again, these points do not update if the alignment changes.

- **Surface - Random Points:** Creates points whose elevation is from a specified surface. These points can update, but only if you manually force the update. If you prefer a dynamic spot label, which will always be up to date, consider a Surface label instead.

Each icon in the *Create Points* toolbar has a drop-down list. If you expand it, you can select a command from the list to run, as shown in Figure 2−5.
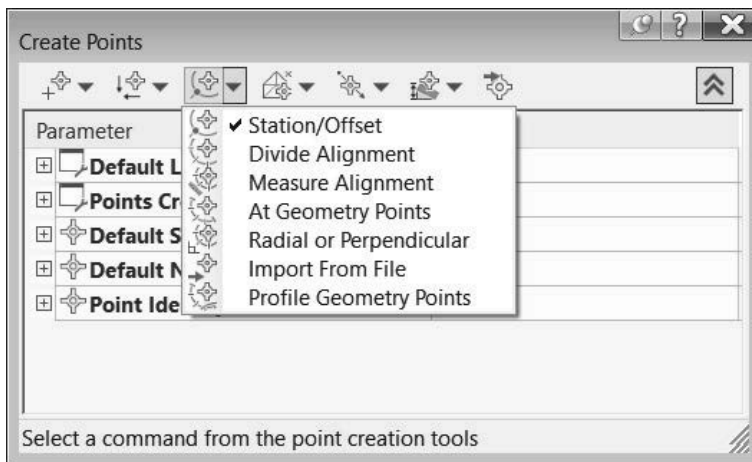
Figure 2−5

Practice 2a
Create Autodesk Civil 3D Points

Practice Objective

- Create a point manually, then zoom to it using transparent commands.

💡 Hint: Software configuration

For the practices in this chapter to work properly, the configuration changes as noted in the preface of this course must be made.

In this practice, a fire hydrant was located by GPS. You will add a point object to locate it manually.

1. Open **SUV-A1.dwg** from the *C:\Civil 3D Essentials\Working\ Survey* folder.

2. In the *Home* tab>*Create Ground Data* panel, select **Points>Point Creation Tools** to display the *Create Points* toolbar. Expand the toolbar by clicking ⩔.

3. In the *Point Identity* area in the dialog box, set the *Next Point Number* to **260**, then collapse the toolbar by clicking ⩓.

4. Select the **Manual** option in the miscellaneous group in the toolbar, as shown in Figure 2−6.
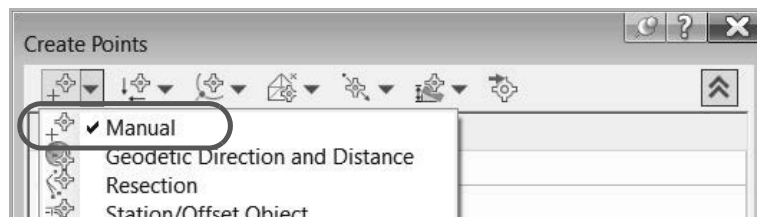
Figure 2−6

5. When prompted for a location, enter **6256069.30,2036634.25** and press <Enter>.

   - When prompted for a description, type **HYD** and press <Enter>.

   - When prompted for an elevation, press <Enter> to accept the default value of **<.>** (period), because it is unknown. The period is a placeholder for the elevation field. Typing zero is not correct because 0 is a valid elevation.

   - Press <Enter> again to finish the command and select **X** in the *Create Points* dialog box to close it.

6. In the *Transparent Commands* toolbar, click (Zoom to Point) and type **260**.

   - Note the description is labeled *Hydrant*, even though you typed *HYD*. *Hydrant* is the full description, *HYD* is the raw description. The ASCENT Description Key Set assigned the full description to the point label.

7. Save the drawing.

End of practice

2.6 Reviewing and Editing Points

Reviewing and editing point data occurs throughout the Autodesk Civil 3D environment. It is as simple as selecting a point in the drawing, right-clicking, and selecting **Edit Points....** You can also edit points using the shortcut menu in the *Points* heading in the *TOOLSPACE>Prospector* tab. Alternatively, you can select a point entry in the *Prospector* tab's preview area.

Repositioning Point Labels

Each point label style has **Dragged State** parameters. These parameters affect the label's behavior when moving the label from its original label position. Depending on the **Dragged State** parameters, a label can change completely (Stacked text) or display as it was originally defined (As composed). An example of a label is shown in Figure 2–7.
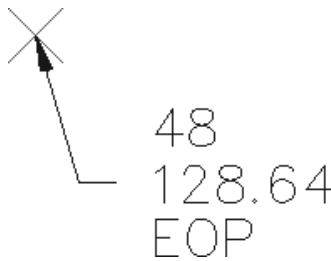
Figure 2–7

A point displays three grips when selected. Use the **Rectangle** label grip to Move, Rotate, and Toggle sub item grips and Reset the label. Use the **Diamond** point object grip to Move and Rotate both the label and marker, Rotate just the marker, reset marker rotation, and Reset all. The third grip is a plus symbol that enables you to add vertices to the leader, as shown in Figure 2−8.

> **Note:** When selecting a point, it displays multiple grips. Click the move grip when you want to relocate the label.
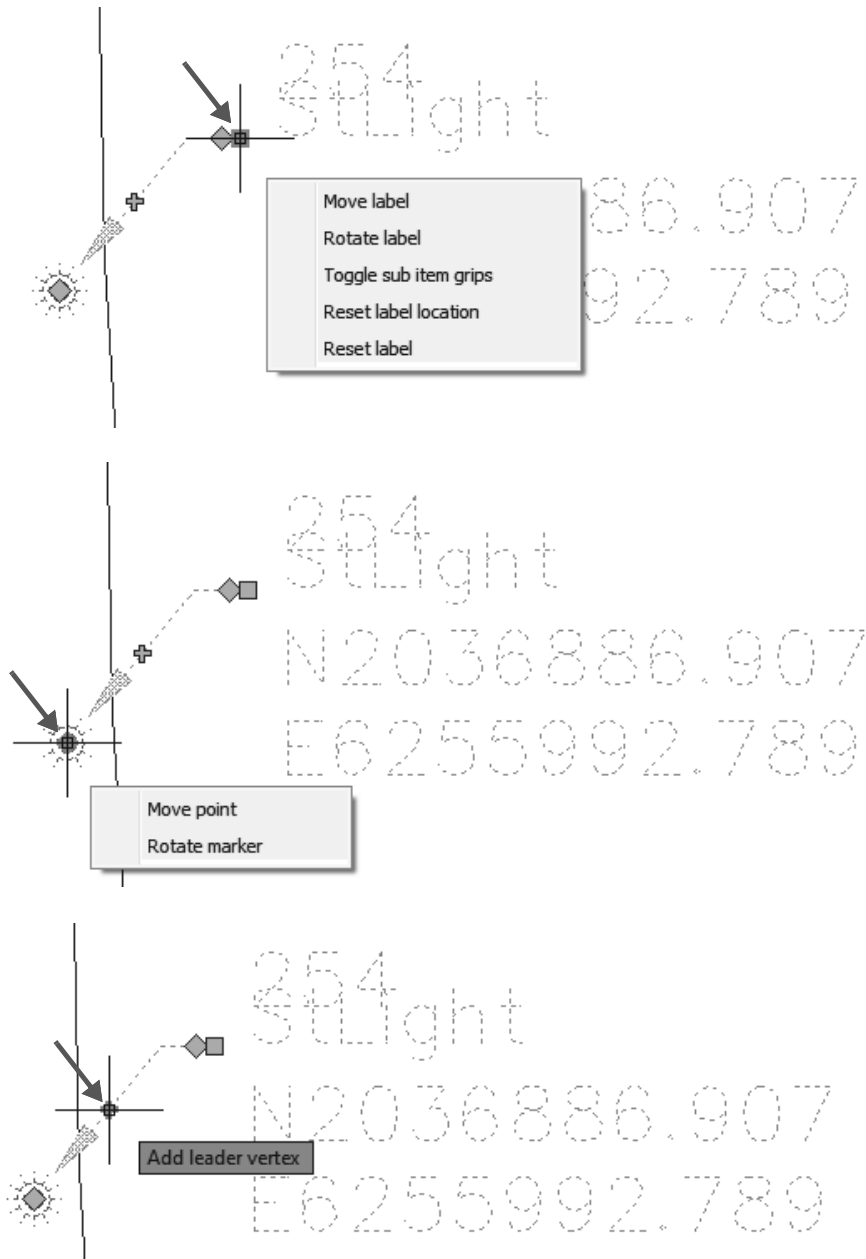
Figure 2−8

- Each label component can be modified and the change is only for that point.

- Point objects can be set to automatically rotate to match the current view using style settings. If this is not preferred, they can have a rotation assigned directly through the *AutoCAD Properties* dialog box.

- You can reset a label to its original position by selecting the point, right-clicking, and selecting **Reset Label**.

2.7 Point Reports

The surveyor needs to produce point reports. These can include a record list for the project, a checklist to find errors, reference for field crews, stakeout, etc. Incorporating survey data with an Autodesk Civil 3D engineering project is unique in that it relies on connection and communication with third-party survey equipment and software. Autodesk has collaborated with the major survey equipment vendors (TDS Survey Link, TOPCON Link, Trimble Link, Carlson Connect, and Leica X-Change) and they have developed applications that interface their equipment with the Autodesk Civil 3D software.

Autodesk Civil 3D points can be exported and then uploaded to the survey equipment. However, a documented point list might also be required, as an audit trial, for example. There are several ways to create reports about points.

Reports Manager

The *Autodesk Civil 3D Reports Manager* produces several point reports. To create reports from the *Reports Manager*, the *TOOLSPACE>Toolbox* tab must be available. To display the *Toolbox* tab, go to the *Home* tab>*Palettes* panel, and select **Toolbox**. Then select the *Toolbox* tab and expand the *Reports Manager* collection to display a list of object type reports, as shown in Figure 2−9.
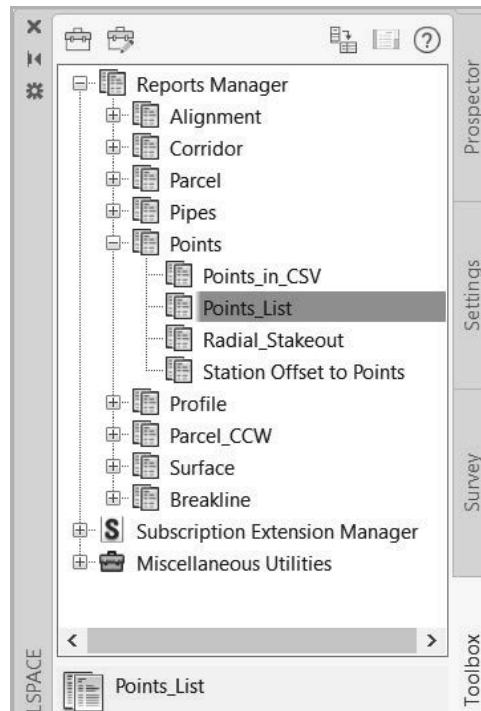
Figure 2−9
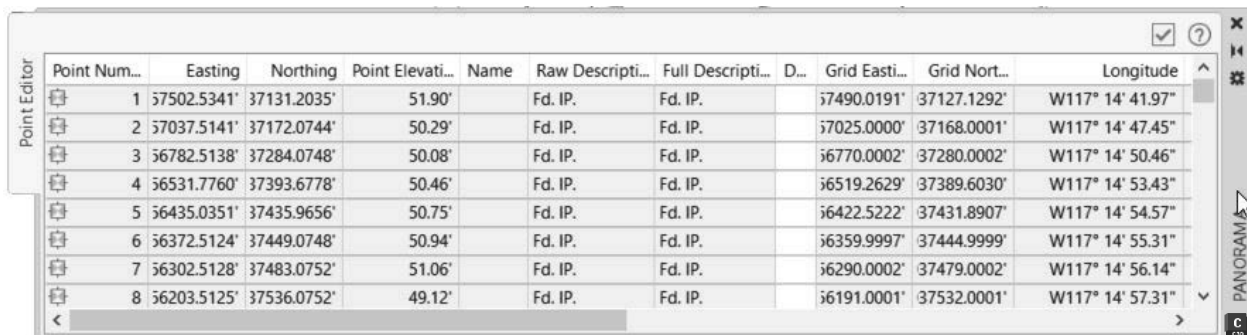
Points are easily organized into a convenient, legible list that displays the point number, northing, easting, elevation, and description (as shown in Figure 2−10). Another point report lists the points' station and offset values relative to an alignment. Another report calculates distances and angles from an occupied and a backsight. You can transfer points to Microsoft Excel spreadsheets using a CSV report. To create these reports, select the report's name, right-click, and select **Execute....**

Number	Northing (ft)	Easting (ft)	Elevation (ft)	Description
1	2037131.203	6257502.534	51.896	Fd. IP.
2	2037172.074	6257037.514	50.287	Fd. IP.
3	2037284.075	6256782.514	50.084	Fd. IP.

Figure 2−10

Point Editor Reports

Another report method is to use the *Point Editor* vista. In the *TOOLSPACE>Prospector* tab, select **Points**, right-click, and select **Edit...** to display the *Point Editor* vista, as shown in Figure 2−11.

Figure 2−11

In the vista, you can select individual points using <Ctrl> or select blocks of points using <Shift>. When done selecting points, right-click and select **Copy to clipboard**. You can then paste the copied points into Microsoft Excel, Notepad, or any application that accepts the points, as shown in Figure 2–12.

Figure 2–12

Practice 2b
Manipulate Points and Point Reports

Practice Objectives

- Modify the label position for points to ensure that the plan is readable.

- Rotate a point symbol.

- Share information about points used for error checking or staking out points using predefined reports.

Task 1: Modify the position of the point labels and rotate a point symbol.

1. Continue working with the drawing from the previous practice or open **SUV-A2.dwg**.

2. In the preview point list, scroll down until the point number **260** displays. Select it, right-click, and select **Zoom to**, as shown in Figure 2–13. This positions the point in the center of the screen.
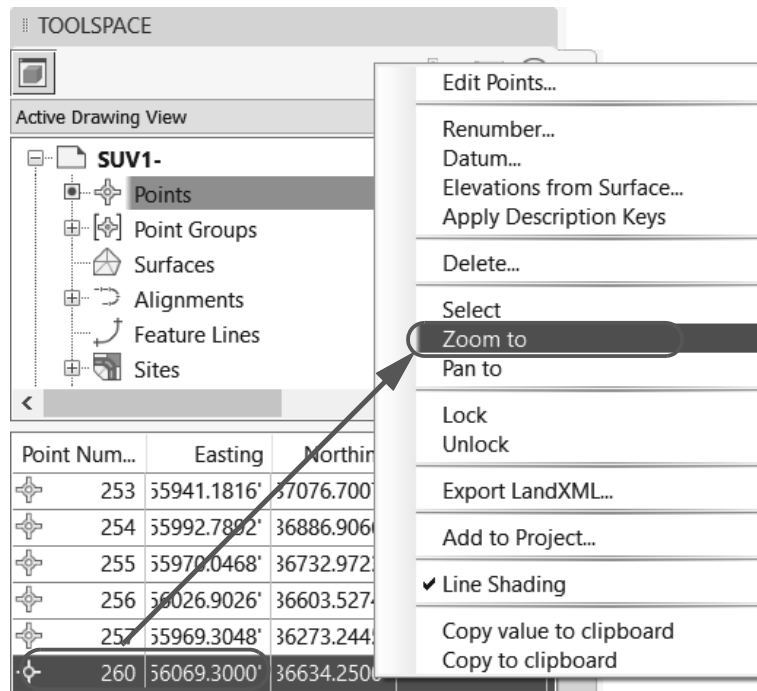
Figure 2–13

3. In a typical drafting workflow, points can overlap, making them illegible. Since the Point Style's text height is a function of the drawing scale, changing the *Annotation Scale* changes the text size. If need be, on the *Status Bar*, set the *Annotation Scale* to **1" = 40'**, as shown in Figure 2−14, to change the point size in the drawing.

Figure 2−14

4. Select point 260 to display its grips. Select the Drag Label grip, as shown in Figure 2−15, to relocate the label.

Figure 2−15

5. With the label still displaying grips, hover on the Rectangle grip and select **Reset Label**.

6. With the label still displaying grips, hover over the Square label grip to display the options for moving, rotating, and additional sub item grips, as shown in Figure 2−16. Select **Rotate label** and rotate the label. Type **45** to rotate the label 45° counter-clockwise.
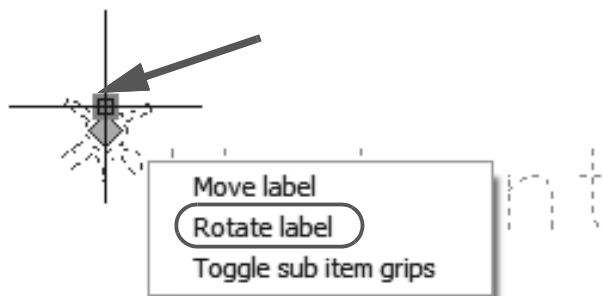
Figure 2−16

7. With the label still displaying grips, hover over the diamond point grip to display the options to Move point, Rotate label and marker, and Rotate marker, as shown in Figure 2–17. Select **Rotate marker** and rotate the marker. Enter **45** to rotate the marker 45° counter-clockwise.
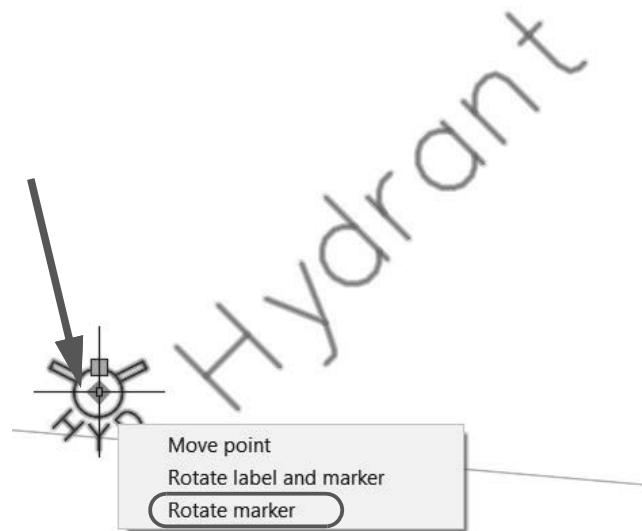
Figure 2–17

8. With the label still displaying grips, hover over the diamond point grip again and select **Reset all**, as shown in Figure 2–18.
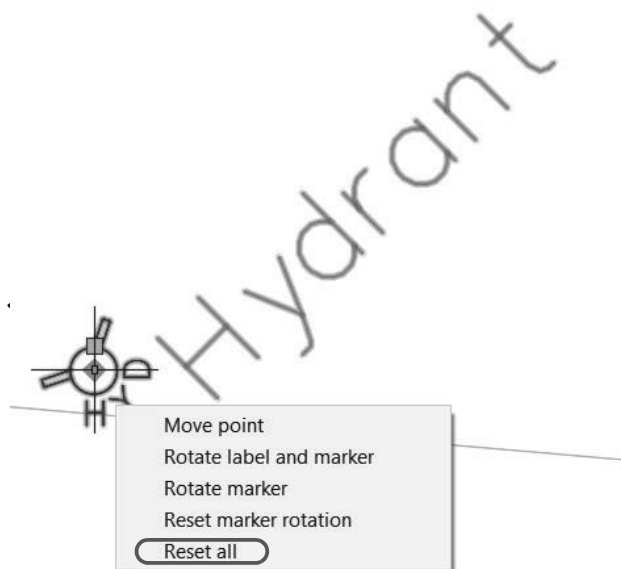
Figure 2–18

9. No need to save the drawing since you reset all the changes.

Task 2: Create point reports.

1. If the *Toolbox* tab is not displayed in the Toolspace, select the *Home* tab and click

    (Toolbox) to display it.

2. Select the *TOOLSPACE>Toolbox* tab and expand the *Reports Manager* collection to display the list of object type reports. Expand the *Points* collection, as shown in Figure 2−19.
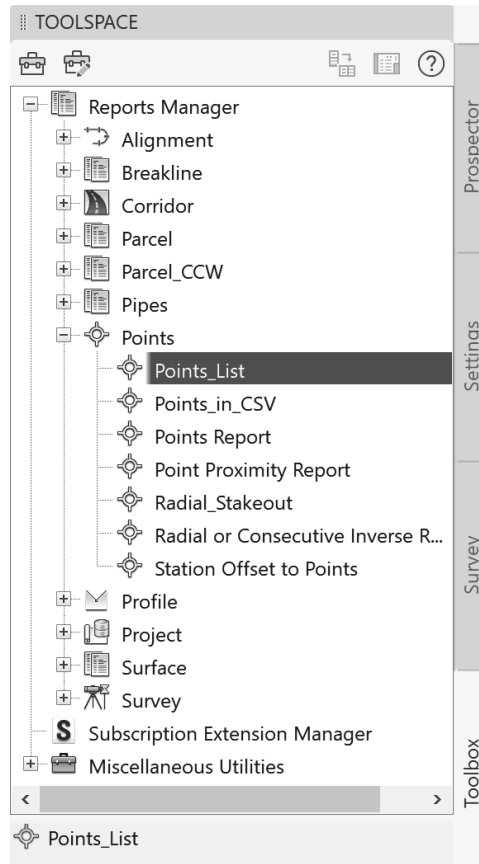
Figure 2−19

3. Select **Point List**, right-click, and select **Execute**.

4. In the *Export to LandXML* dialog box, click **OK** to generate the report. In the *Save As* dialog box, browse to the *C:\Civil 3D Essentials\Documents\Reports* folder and type **<Your Initials>-Points.html**, and save the file.

5. The point list displays in Internet Explorer. Review the report and when done, close it.

6. No need to save the drawing, for no changes were made to it.

End of practice

2.8 Importing Survey Data

The Autodesk Civil 3D software has methods to import point data from ASCII text files to Autodesk LandXML files, as well as methods to convert AutoCAD points to Autodesk Civil 3D points. The *TOOLSPACE>Survey* tab also inserts points from a survey to a drawing.

Import Points Only

There are two methods of launching the import point feature - one is by using the *Insert* tab and the other is by using the **Points** creation tool in the *Home* tab>*Create Ground Data* panel or the *TOOLSPACE>Prospector* tab.

How To: Use the *Insert* Tab Method

1. In the *Insert* tab, click ![icon] (Points from File).This opens the *Import Points* dialog box.

2. In the *Import Points* dialog box, set the file format, select the files to import, set any

   advanced options, and click **OK** to import the points. Alternatively, you can click ![icon] (Import Points) in the *Create Points* toolbar.

How To: Use the Point Creation Tools Method

1. Open the *Create Points* dialog box by expanding *Points* in the *Home* tab, expanding the drop-down list and selecting a **Create Points** option, as shown on the left in Figure 2−20. Alternatively, in the *TOOLSPACE>Prospector* tab, select **Points**, right-click and select **Create...**, as shown on the right.
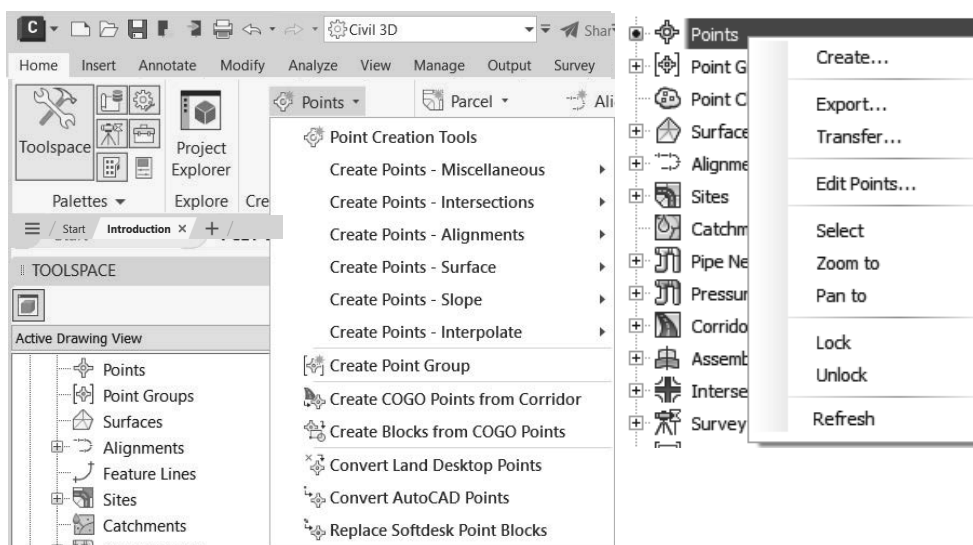

Figure 2−20

- All commands in the *Points* drop-down list can also be accessed in the *Create Points* toolbar, as shown in Figure 2–21.
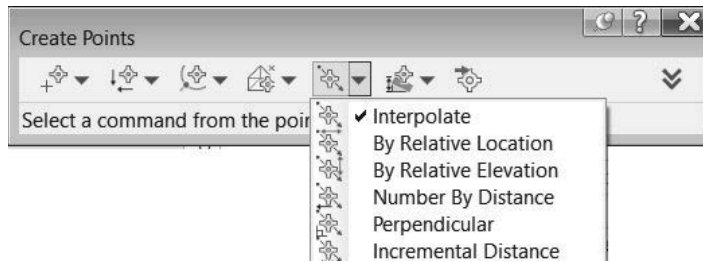

Figure 2–21

2. Click (Import Points) to open the *Import Points* dialog box (shown in Figure 2–22).
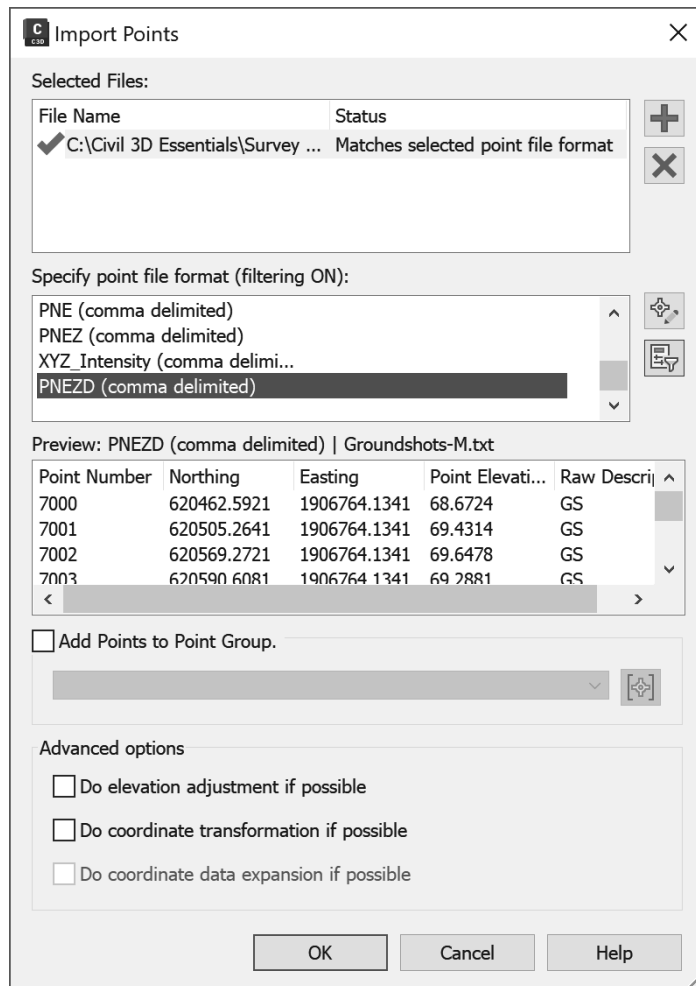

Figure 2–22

3. In the *Import Points* dialog box, under the *Specify point file format* area, select the required format.

4. After setting the format, click ✚ on the right to open the *Select Source File* dialog box.You can select multiple files if they have the same file format.

5. In the *Select Source File* dialog box, browse to the import point file, select it, and select **Open**. Assign the imported points to a new or existing point group by selecting the **Add Points to Point Group** option and selecting the point group in the drop-down list. Select **Advanced options** as required.

Duplicate Point Numbers

If an imported file creates duplicate point numbers, the Autodesk Civil 3D software overwrites, merges, or reassigns them during the import process. When encountering duplicate point numbers, the Autodesk Civil 3D software can assign the next available number, add an offset value (add 5000 to each point number that conflicts), overwrite points (replaces the current point values with the file's values), or merge points (add the file's values to an existing point's values). If using the offset method, the new point numbers are kept unique in the drawing. If using the next available number method, the new points blend into the original points and are difficult to identify.

The offset method is preferred when resolving duplicate point numbers. When importing points that will potentially duplicate point numbers, the *Create Points* toolbar's *Point Identity* settings, as shown in Figure 2–23, is the default when handling duplicate point numbers.
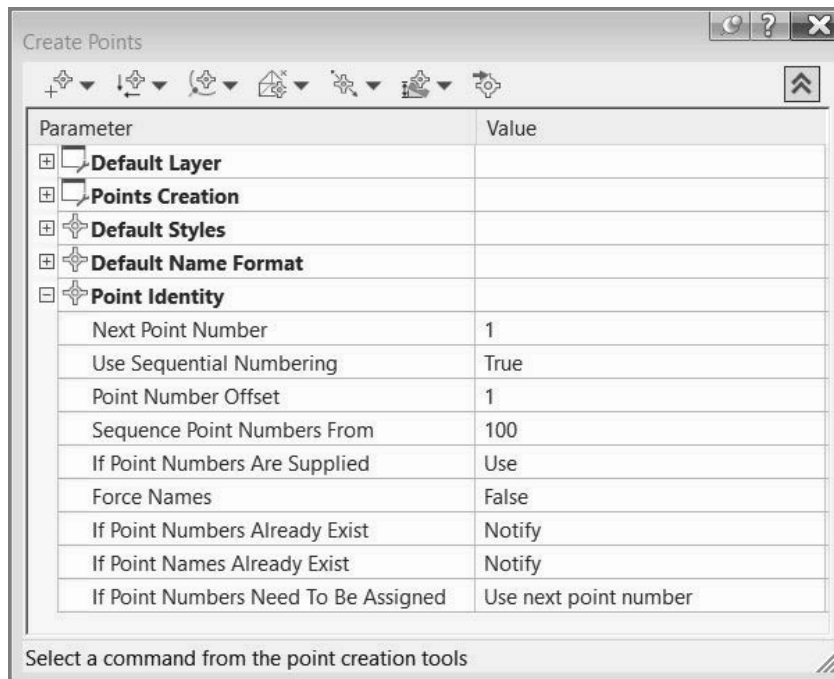

Figure 2–23

In the *Point Identity* settings, set the duplicate point resolution method for the *If Point Numbers Already Exist* variable. The four methods are **Renumber**, **Merge**, **Overwrite**, and **Notify**, as shown in Figure 2−24. The import process never overwrites point data unless you specify that it should do so.

If Point Numbers Are Supplied	Use
Force Nanes	false
If Point Numbers Already Exist	Notify
If Point Names Already Exist	Renumber
If Point Numbers Need To Be Assi...	Merge
	Overwrite
	Notify

Figure 2−24

When encountering a duplicate point, the *Duplicate Point Number* dialog box opens. After you define a resolution, it can be assigned to the current duplicate point or to all encountered duplicate points.

Survey Toolspace

The *TOOLSPACE>Survey* tab displays a panel through which all surveys are processed. Survey uses graphics to display field book imports, figure and network previews, and points. If you toggle off these graphics, you can process a survey without a drawing being open. If you want to display these graphics, you need to have a drawing open. Survey prompts you to open a drawing if you do not have one open.

The *Survey* tab contains Survey settings, Equipment defaults, Figure Prefixes, and Linework Code Sets. Survey's settings can be on a local or network folder. It is preferred to use a network folder in larger offices because all users can then standardize the file values.

How To: Display the Survey Tab in the Toolspace

If your Toolspace does not display the *Survey* tab, click (Survey) in the *Home* tab>*Palettes* panel, as shown in Figure 2−25.
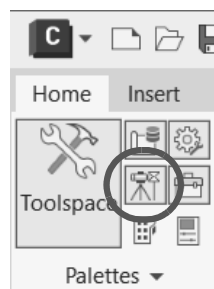

Figure 2−25

Import Points and Figures Using the Survey Database

After collecting and coding the data, and then downloading and converting it, the next step in Survey is to import the survey data, review it, and place the survey points and figures into a drawing. A working folder defines where the local Survey Database is located. The preferred location is a network folder, in which you place the local Survey Databases. The *Survey User Settings* dialog box sets the defaults for all new Survey Databases. You should set these before starting Survey. The Survey Working Folder is the location for all of the Survey Databases and can be local or on the network. The default working folder is *C:\Users\Public\Documents\Autodesk\Civil 3D Essentials*.

How To: Set the Working Folder for the Survey Database

1. In the *TOOLSPACE>Survey* tab, select **Survey Databases**.

2. Right-click and select **Set working folder...,** as shown in Figure 2−26.
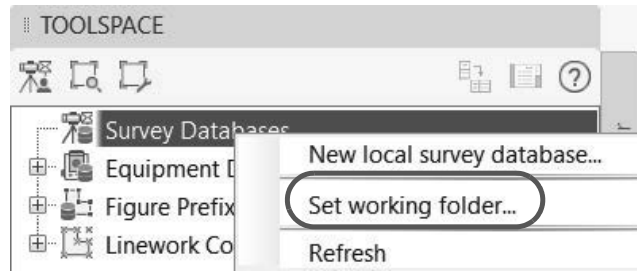
Figure 2−26

Survey Database

A Survey Database is a subfolder in the working folder. The Survey Working Folder contains the Survey's settings and observation database. This database contains the Survey's Networks, Figures, and Survey Points.

Survey Database Folders cannot be deleted in Autodesk Civil 3D Survey. If you want to delete the working folder, this process must be done through the Windows File Explorer, external to the Autodesk Civil 3D software.

To import a field book, you use the Survey's *Import Events* collection. *Import Events* provides access to an *Import* wizard, which guides you through the steps of importing a file.

1. To open the *Import* wizard, select **Import Events** in the Survey, right-click, and select **Import survey data....**

2. The *Specify Database* page is shown in Figure 2–27. It sets the survey, creates a new survey, and edits the Survey's settings.
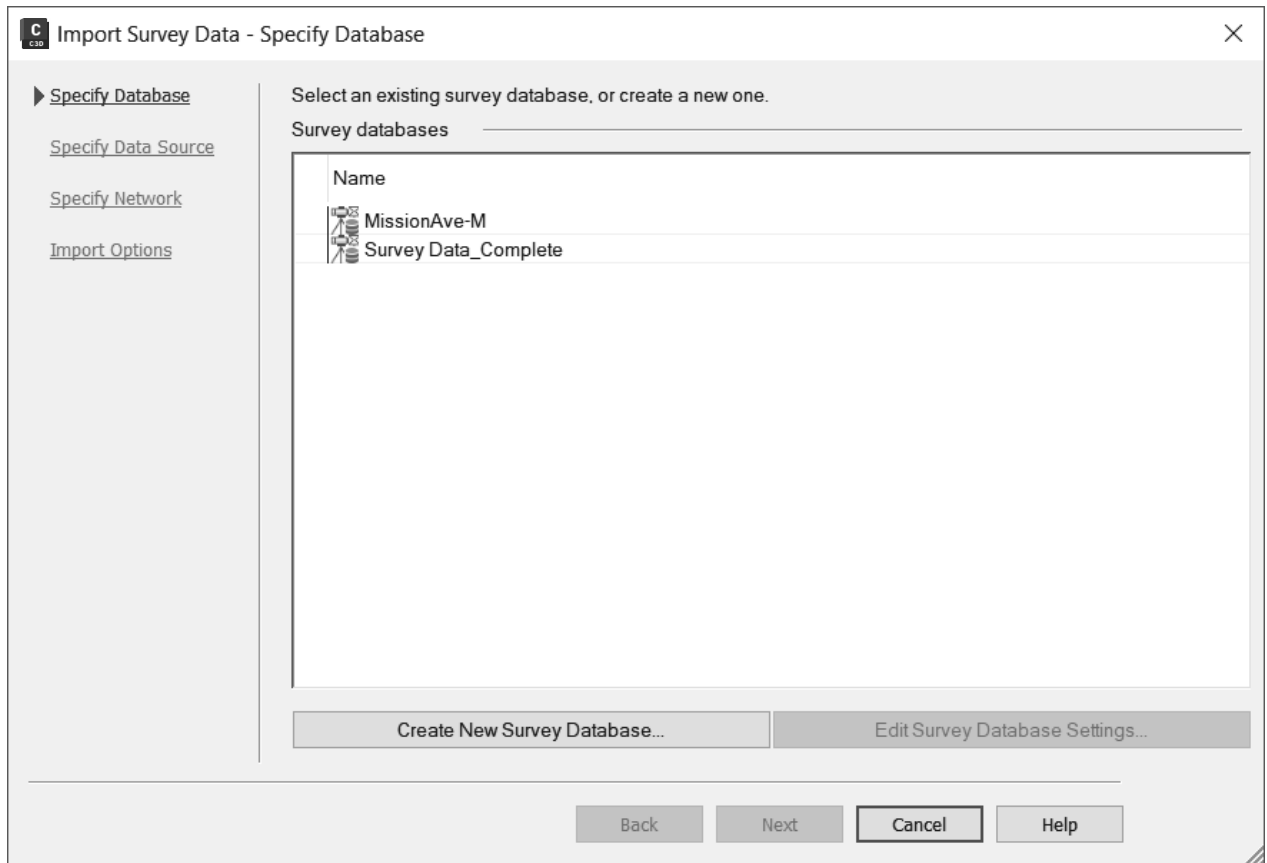

Figure 2–27

3. Click **Next**. The *Specify Data Source* page (shown in Figure 2−28) defines the file import type, the file's path, and its format (if it is a coordinate file).
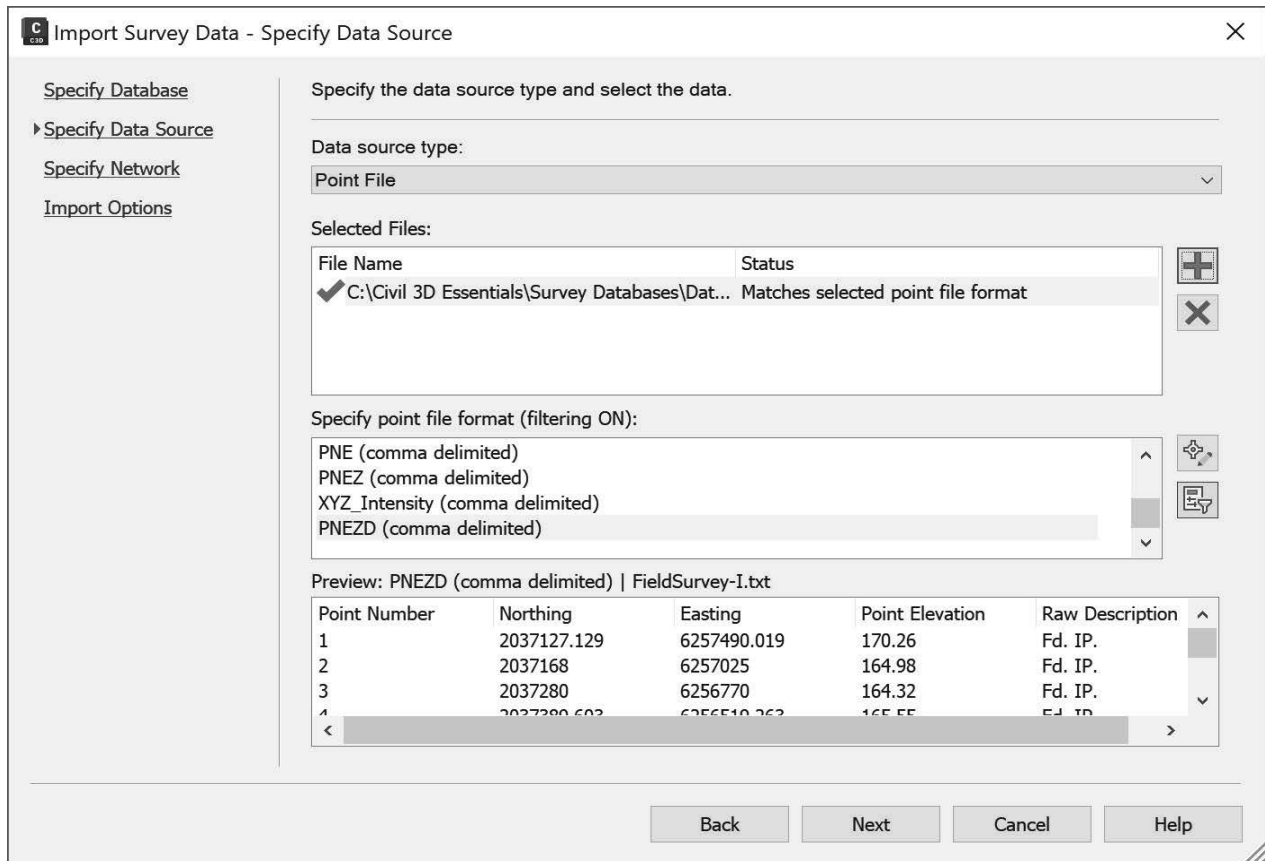

Figure 2−28

4. Click **Next**. The *Specify Network* page (shown in Figure 2–29) enables you to change the network or create a new one. If importing a Field Book, a *Network* must be assigned. If Importing a Point File, a *Network* is optional.
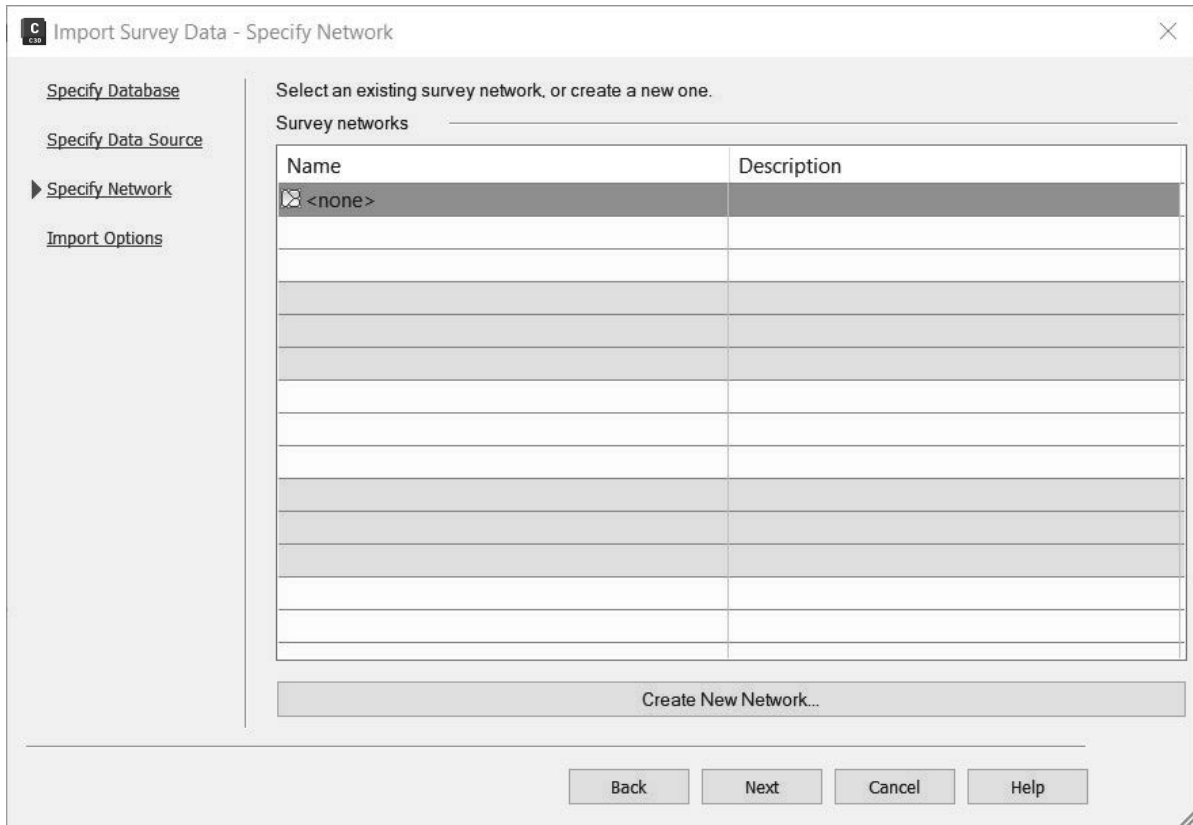
Figure 2–29

5. Click **Next**.

6. The *Import Options* page (shown in Figure 2−30) sets the values for the import. These settings affect what the import does and which support files it uses.

Import Survey Data - Import Options		✕
Specify Database	Specify the import settings for the selected data source.	
Specify Data Source	**Import settings**	
Specify Network		
▸Import Options		

Property	Value
Point file format	PNEZD (comma delimited)
Point file name	C:\Civil 3D Essentials\Survey Database...
Point type	
Current figure prefix database	⬚ ASCENT
Process linework during import	☑ Yes
Current linework code set	ASCENT
Process linework sequence	By import order
Import event name	FieldSurvey-l.txt
Import event description	
Assign offset to point identifiers	☐ No
Point identifier offset	
Insert network object	☐ No
Insert figure objects	☑ Yes
Insert survey points	☐ No

Back   **Finish**   Cancel   Help

Figure 2−30

If the field book has figure coding from a conversion, you do not need to toggle on the *Process linework during import* property. This is for Point files other than field books that have **Linework Code Set** commands included in the point's description.

Inserting figures requires entries to be in the *Figure Prefix* database and figure styles to be in the drawing. This is required to point the figure and linework to the correct drawing layers and to specify whether the figure is also a breakline in a surface.

When inserting points, it is necessary to have a Description Key Set defined to assign points, point label styles, and layers, and to translate raw descriptions to full descriptions.

Open a Survey Database for Editing

Only one Survey Database can be edited at a time. When opened for editing, this prepares the survey for reading and writing. There are options to set the path or location for the Survey Database project files, and for all of the settings. When you create a new Survey Database, a Windows folder is created with the same name. If you close a drawing with a survey open, the Survey Database closes automatically. You must start a new drawing or open an existing drawing, and then open the required Survey Database. You can only have one Survey Database open at a time.

How To: Open a Survey Database

1. In the *TOOLSPACE>Survey* tab, expand the *Survey Database* collection.

2. Select the survey database that you want to open, right-click, and select **Open for edit** or **Open for read-only**, depending on your requirements, as shown in Figure 2−31. Contrary to most Civil 3D functions, where double-clicking invokes an edit function, double-clicking on a survey database will open it as read-only.
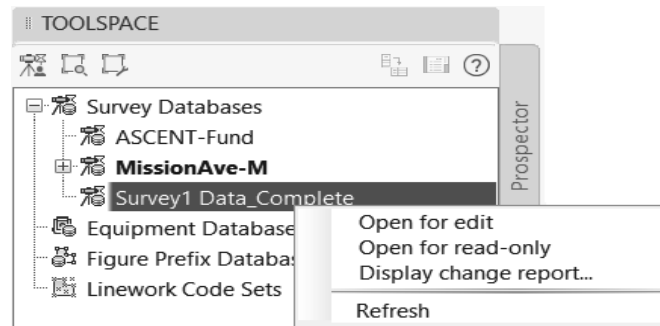

Figure 2−31

Hint: Survey Database Migration to 2020 and Above

The Survey Database format changed in the 2020 release. If you have existing Survey Databases created in an earlier format, they will be marked and must be migrated. Right-click on the *Survey Database* and select **Migrate....**You will need to select a new location for the updated Survey Database, as shown in Figure 2−32.
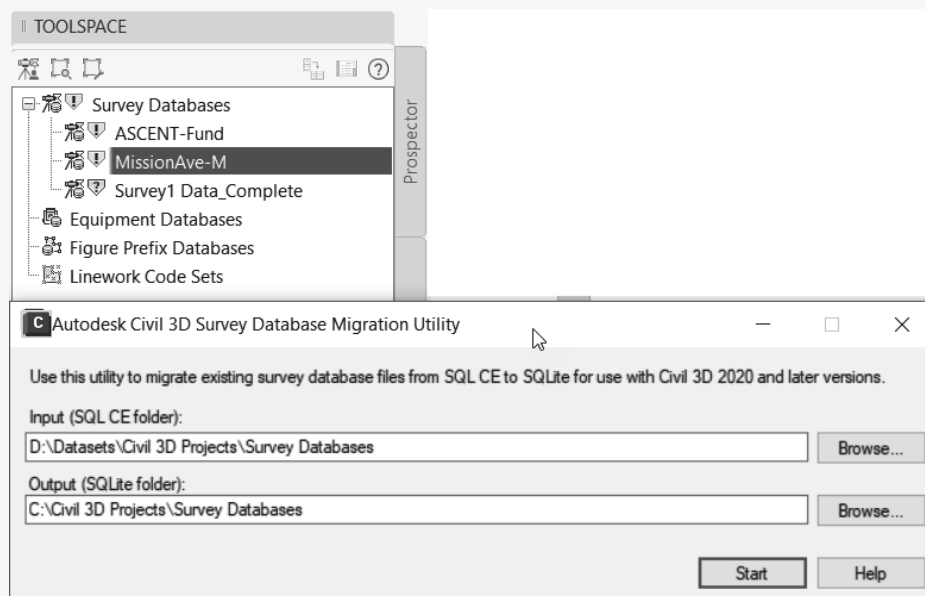
Figure 2−32

2.9 Point Groups

Point groups organize points that share common descriptions and characteristics (such as existing storm, gas lines, building corners, etc.). If you consider the points in the project to be a database, then point groups can be considered a means of querying the point database.

Point groups also enable points to display different point or label styles. For example, a landscape architect needs to display different symbols for each tree species, while an engineer only needs to display a generic tree symbol. The Description Key Set enables you to assign the tree species symbols for the landscape architect, and a point group enables generic tree symbols to override the symbols for the engineer. Another function of a point group is to hide all of the points.

In the Autodesk Civil 3D software, point groups can be defined in the template along with a Description Key Set. When you create a new drawing from this template and import points, they are assigned their symbols and can be sorted into point groups.

All points in a drawing belong to the **_All Points** point group. Consider this point group as the point database. It cannot be deleted and initially is not in a drawing until you add points. All new point groups include all drawing points or a subset of drawing points (referenced points from the **_All Points** point group).

Point groups can be created when importing points. When importing points into a survey database, a unique point group is automatically created.

Defining Point Groups

To create a new point group, select the *TOOLSPACE>Prospector* tab, right-click on the *Point Groups* collection and select **New….** Alternatively, in the *Home* tab, expand *Points* and select **Create Point Group**.

When you select **New…** or **Create Point Group**, the **Point Group Properties** dialog box opens. It has nine tabs, each affecting the point group's definition.

The *Point Groups*, *Raw Desc Matching*, *Include*, and *Query Builder* tabs add points to the point group. The *Exclude* tab removes points from a point group.

The *Information* tab defines the point group's name. The *Point style* and *Point label style* should remain at their defaults, unless you want to use either style to override the assigned styles of the points in the point group. The points in the point group display their originally assigned styles until you toggle on the override. A point group can be locked by toggling on the **Object locked** option to prevent any changes to the group. The Point Group Properties dialog box is shown in Figure 2−33.
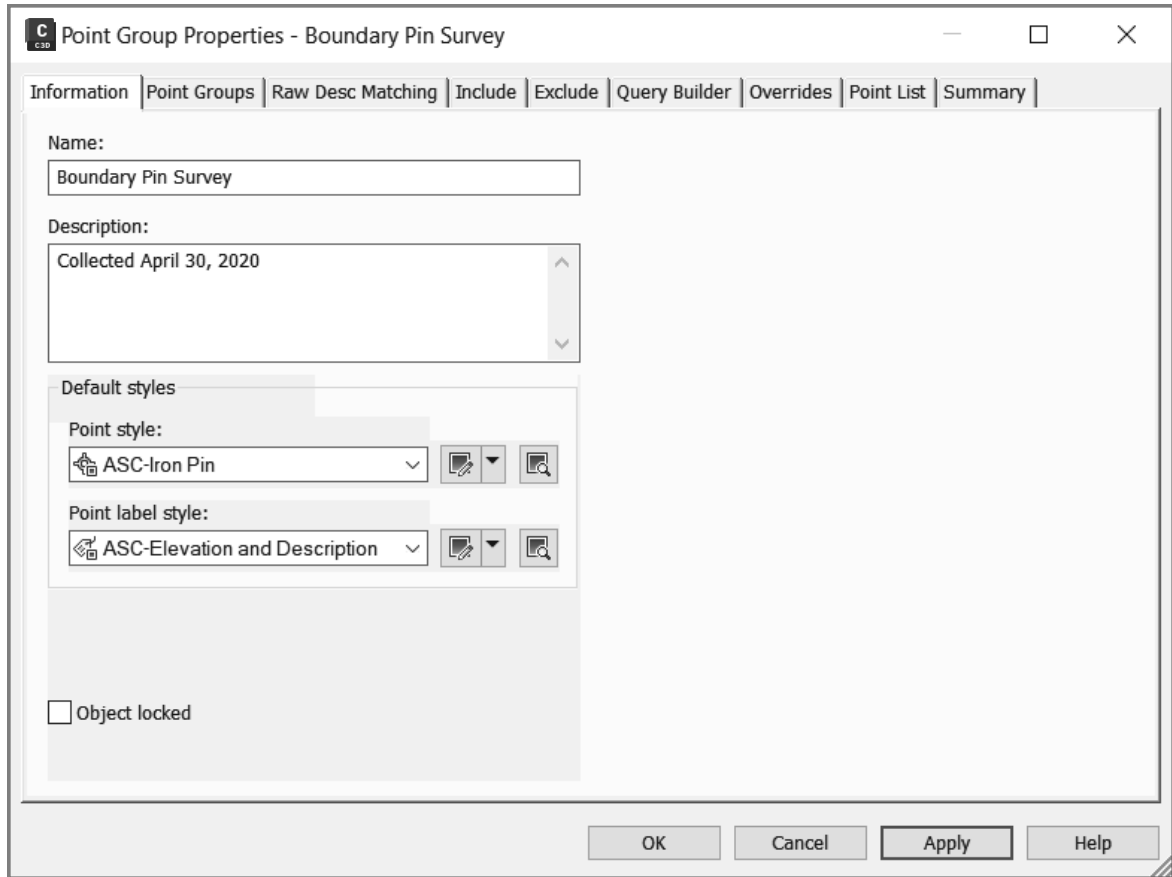
Figure 2−33

The *Point Groups* tab lists the drawing's groups. A point group can be created from other point groups, thereby creating a hierarchy of Point Groups. When you select a point group name, the group and its points become members of the new point group. For example, the point group **Trees** is created from the point groups *Maple*, *Walnut*, *Oak*, etc.

The *Raw Desc Matching* tab lists codes from the Description Key Code set. When you toggle on the code, any point matching the code becomes part of the point group.

If you cannot select a point with the previous two methods, the *Include* tab enables you to include points by specifically entering in the selection criteria. The criteria include the point number (point number list or by selection), elevation, name, raw description, full description, and all points.

- **With numbers matching:** Selects points by a point number range or list. When creating a list, sequential point numbers are hyphenated (1-20) and individual numbers are in a comma delimited list. A point list can include sequential and individual points (1-20, 14, 44, 50-60). Select **Selection Set in Drawing** to select the points in the drawing and list their point numbers at the top of the *Include* tab.If using the **Selection Set in Drawing** method, keep in mind that a Point Group defined by exact numbers will not be dynamic since it is fixed on individual point numbers.

- **With elevations matching:** Enables you to select points by entering a specific elevation or by specifying a minimum and/or maximum elevation. For example, valid entries include >100, <400, and >100. The first entry only includes points whose elevation is above 100, but less than 400. The second entry only includes points whose elevation is greater than 100. A point without an elevation cannot be selected using this method. An elevation range, defined by separating the start and end numbers with a hyphen, includes points whose elevation falls in the range (1-100). This can be combined with greater or less than symbols.

- **With names matching:** Selects points based on matching their point names. Enter one or more point names separated by commas.

- **With raw/full descriptions matching:** Selects points based on matching an entered raw or full description. Enter one or more descriptions separated by commas. You can use the same wildcards as the Description Key Set. Generally, this method uses the asterisk (*) as the wildcard after the description (e.g., PINE*, CTV*, CL*, etc.). By default, this is not case-sensitive.

- **Include all points:** Assigns all points in the drawing to the point group. When this option is toggled on, all other **Include** options are disabled.

The *Exclude* tab has the same options as the *Include* tab, except for the **Include All Points** option.

The *Query Builder* tab creates one or more expressions to select points. Each query is a row selecting points. As with all SQL queries, you combine expressions using the operators AND, OR, and NOT. You can also use parentheses to group expressions. It is here where you can make the criteria case-sensitive.

The *Overrides* tab overrides the points in the point group's raw description, elevation, point style, and/or point label style. For example, you can override specific tree species symbols with a generic tree symbol, override a label style when displaying this group, or override the point and label style with none (to hide all points).

The point group display order affects points and their overrides. To change how the point groups display, modify the Point Group display order.

The *Point List* tab displays the point group's points. This tab enables you to review points that are currently in the point group.

The *Summary* tab displays the point group's settings. You can print this tab as a report by cutting and pasting it into a document.

Updating Out-of-Date Point Groups

After defining point groups and adding points to a drawing, the group becomes out of date

before assigning the points to the group. The point group will have an Alert symbol (▼) next to it for easy recognition in the *Prospector* tab, as shown in Figure 2−34.
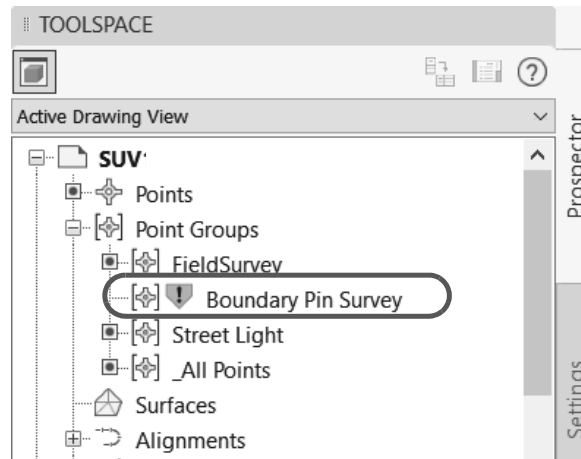
Figure 2−34

This enables you to verify that the point(s) should become part of the group. To review why a group is out of date, select the group, right-click, and select **Show Changes...** If the changes are correct, select **Update** to add the points to the group. If you know that all of the groups displaying as out of date should be updated, right-click on the *Point Groups* collection and select **Update**. At this level, the command updates all of the point groups.

Unlike other Civil 3D objects (such as Surfaces and Corridors), you cannot set Point Groups to be *Rebuilt Automatically*.

Overriding Point Group Properties

When working with points, you might want them to display different labels, not be displayed, or display different symbols. Each required change is a function of a point group override. A point group that contains all of the points and overrides their symbols and labels with none does not display any points. This is similar to freezing all of the layers involved with points. A point group that changes the symbols that a group displays overrides the label styles assigned to the point in the point group. To display a different symbol, the point group overrides the assigned point styles. To set the style and override the assigned styles, toggle on the point group in the *Overrides* tab and set the styles in the *Override* column of the point group, as shown in Figure 2−35.
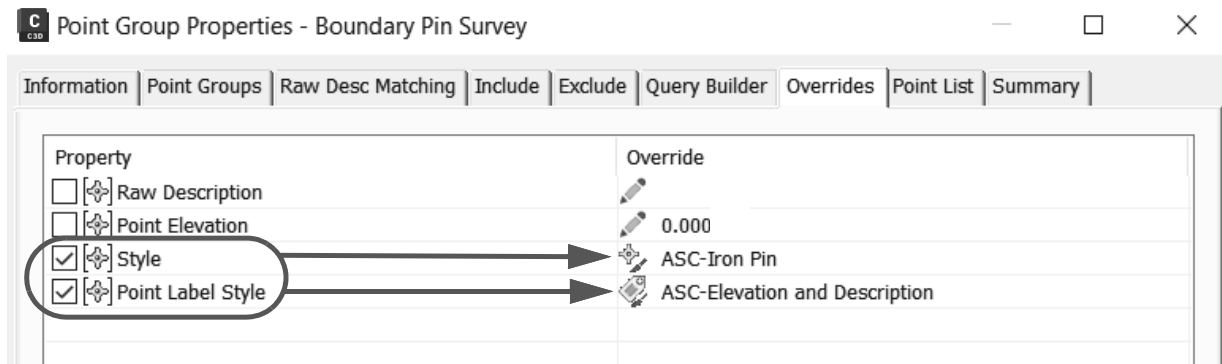
Figure 2−35

Point Group Display Properties

When creating a point group, it is placed at the top of the point group list. The point group list is more than a list of point groups; it is also the Autodesk Civil 3D's point draw order. The Autodesk Civil 3D software draws the point groups starting from the bottom of the list to the top. If **_All Points** is the first drawn point group and the remaining point groups are subsets of all points, the individual point group does not display, but all of the points display.

To display point groups that are a subset of all points, you must create a point group whose purpose is to hide all points. This popular point group is commonly called *No Display*. With this group, any point group drawn after it displays its members without *seeing* the other points.

The Autodesk Civil 3D software draws point groups from the bottom to the top of the list. To manipulate the display order, right-click on the *Point Groups* collection in the *TOOLSPACE>Prospector* tab and select **Properties**. The *Point Groups* dialog box opens, enabling you to modify the point group display order using the arrows on the right, as shown in Figure 2–36.
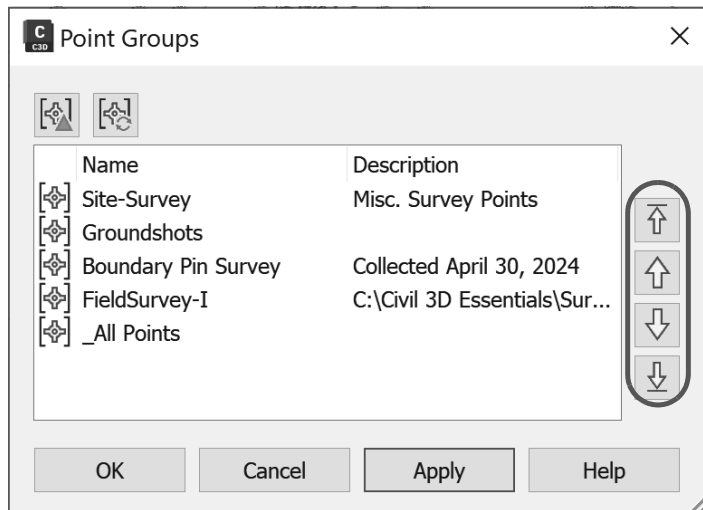
Figure 2–36

These arrows enable you to select the required point group and move it up or down (or all the way to the top or bottom with one click, ⬆/⬇) in the hierarchy for display purposes. The *Point Groups* dialog box has two additional icons at the top. The first icon displays the changes that need to occur in the point groups and the second icon updates them.

If you use Description Key Sets, a point displays the assigned point and label style when it is part of any point group. The only time the point displays another style is when you override the style (in the *Point Group Properties* dialog box, in the *Overrides* tab).

With the Description Key Set and display order shown in Figure 2–37, the points display their originally assigned point label styles.

Figure 2–37

The *No Display* point group includes all of the points, but overrides the originally assigned point style and point label styles with **<none>**. When *No Display* is moved to the list's top, no points display. The *Point Groups* dialog box is shown in Figure 2−38.
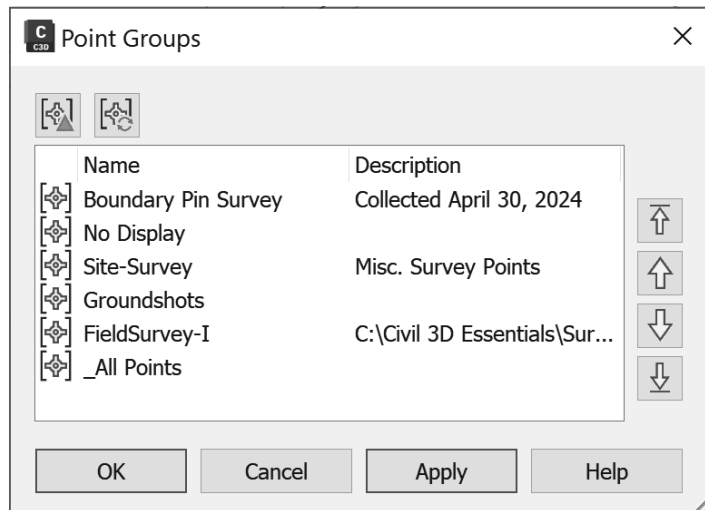
Figure 2−38

Practice 2c
Importing Points

Practice Objectives

- Insert points from a point file.
- Import points from an ASCII file created from the field survey.

💡 Hint: Software configuration

For the practices in this chapter to work properly, the configuration changes as noted in the preface of this course must be made.

Task 1: Importing points from a point file.

In this task, you will import points directly into the drawing. They will come in as COGO points.

1. Continue working on the previous drawing, or open **SUV-B.dwg** from the *C:\Civil 3D Essentials\Working\Survey* folder.

2. On the *Insert* tab, *Import* panel, select ⊹ (Points from File), as shown in Figure 2−39.
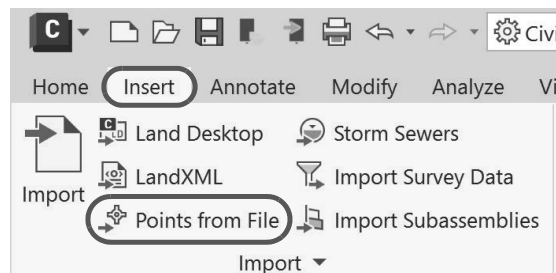
Figure 2−39

3. In the *Import Points* dialog box, do the following, as shown in Figure 2–40:

- Click ✚ on the right to open the *Select Source File* dialog box.

- In the *Select Source File* dialog box, browse to *C:\Civil 3D Essentials\Survey Databases\ Data* and select **Groundshots-I.txt**, and select **Open**.

- Under the *Specify point file format* area, select the **PNEZD (comma deliminated)** format (which is typically at the bottom of the list).

- Assign the imported points to a new point group by selecting the **Add Points to Point Group** option and clicking on 🔲 (Create Group).

- In the *Create Group* dialog box, enter **Groundshots** as the name of the new point group and click **OK**. All points coming in will belong to this point group.

- In the **Advanced options**, clear all the checkboxes.

- Click **OK** to close the dialog box and import the points.
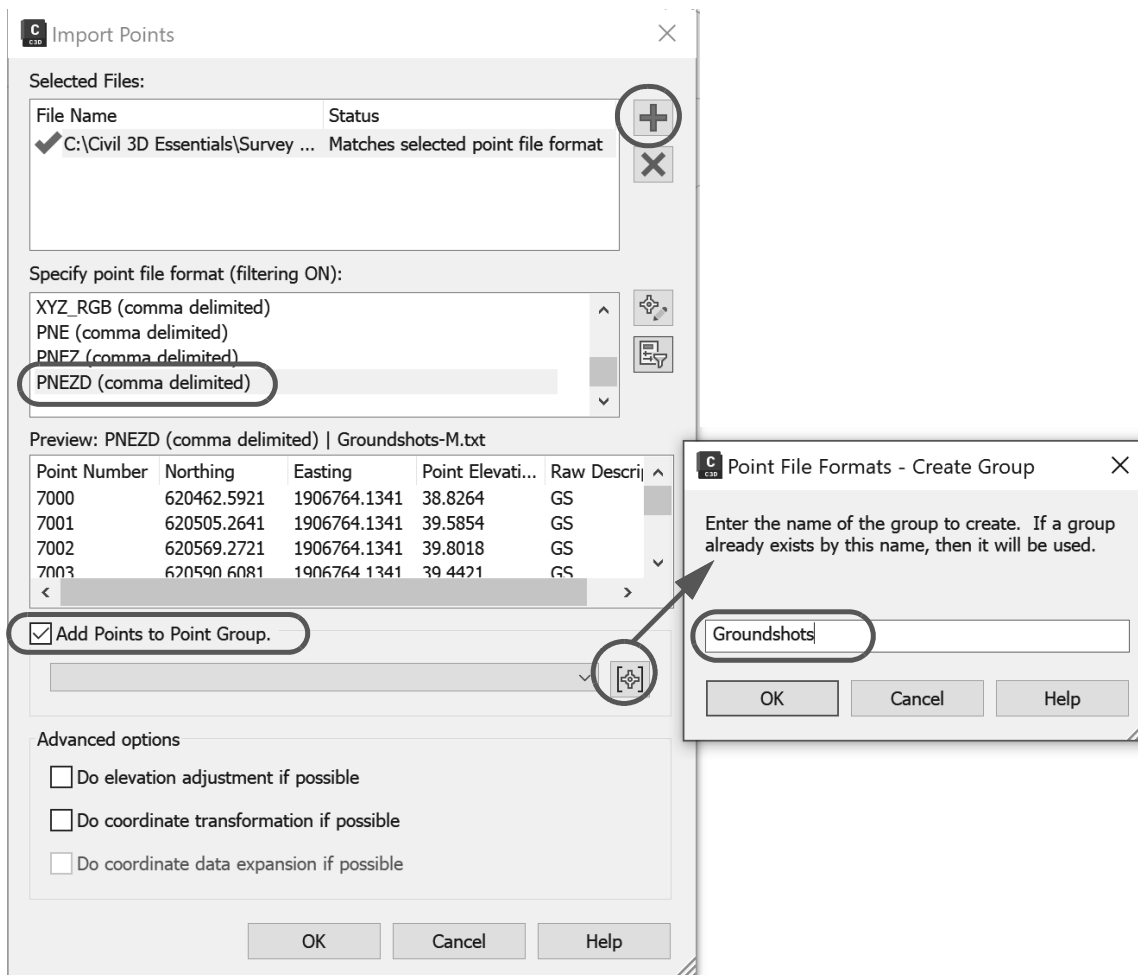
Figure 2–40

4. The points are imported into the drawing. A new point group has been created. Zoom to the extents of the drawing to see the points.

5. In the *View* tab>*Named Views* panel, select the preset view **Point-Inspect**.

6. Expand the *Point Groups* branch in the *TOOLSPACE>Prospector* tab and click on the **Groundshots** point group. Note all the points listed in the preview area of the *Prospector* tab, as shown in Figure 2–41. Note the symbol of the points – they are COGO points.

    Note: *The nuances of description key sets and figures prefix databases are beyond the scope of this Essentials learning guide and are covered in other guides by ASCENT.*
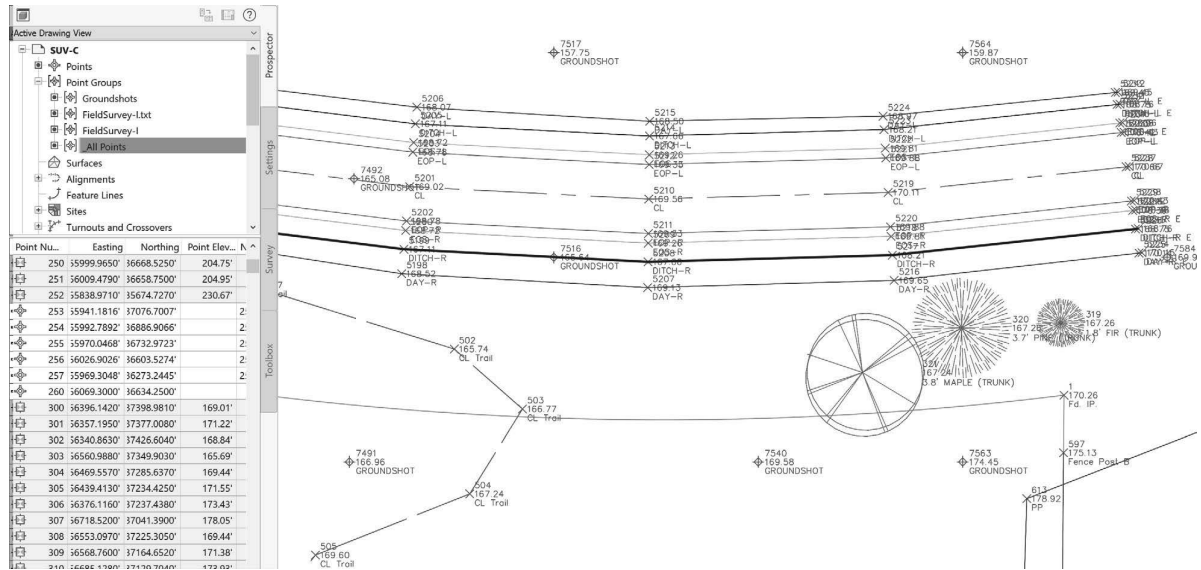
Figure 2–41

7. Save the drawing.

Task 2: (Optional) Import points into a survey database.

In this task, you will create a survey database and then import an ASCII file created in the field into the database, which also display in the drawing.They will come in as survey points.

1. Continue working on the drawing from the previous task.

2. On the *Survey* tab, right-click on **Survey Databases** and select **Set working folder**, as shown in Figure 2−42.
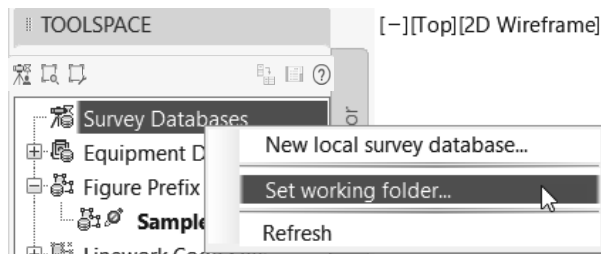
Figure 2−42

3. Browse to C:*Civil 3D Essentials\Survey Databases* and click the **Select Folder** button in the lower right corner.

4. In the *Home* tab>expanded *Create Ground Data* panel, click 🗔 (Import Survey Data).

5. On the *Specify Database* page, click **Create New Survey Database...**, as shown in Figure 2−43.
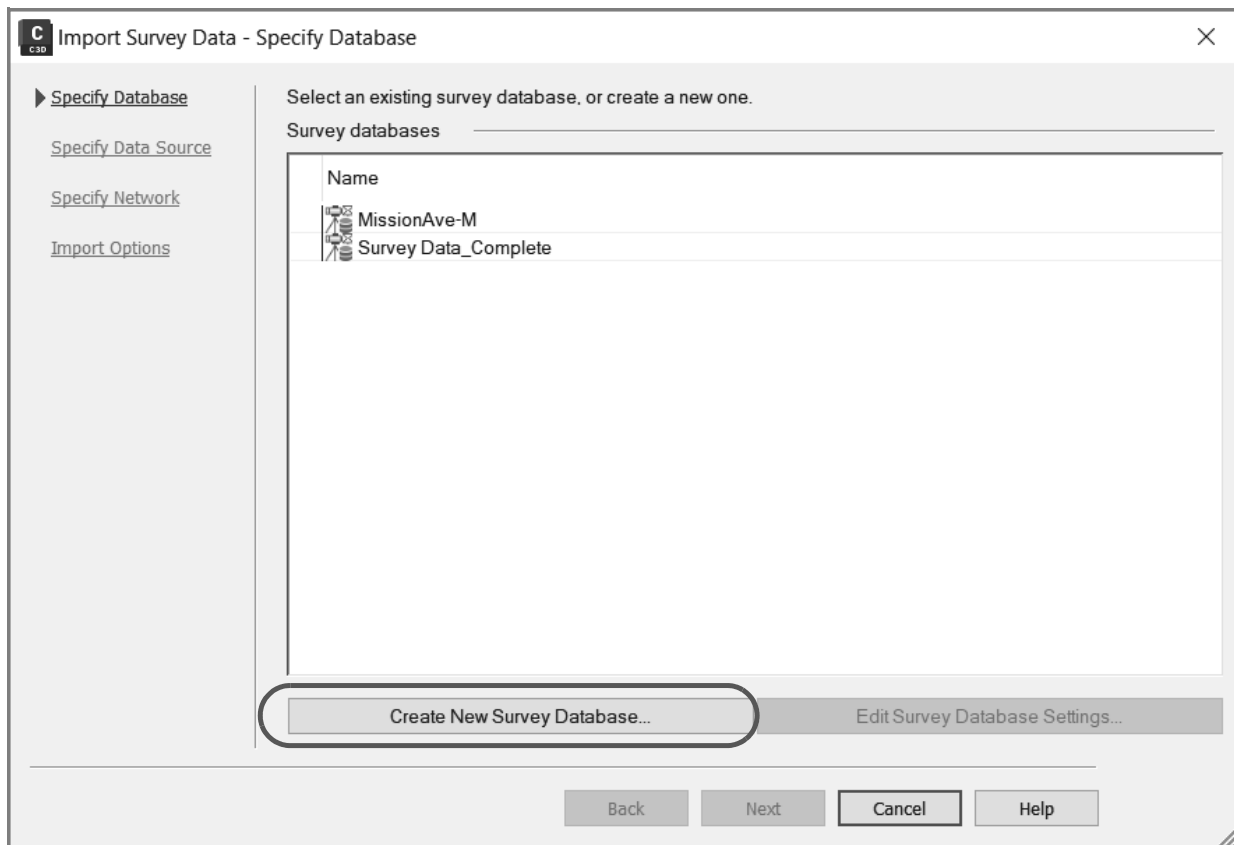
Figure 2−43

6. Type **ASCENT-Essentials** for the name and click **OK**.

7. Click **Edit Survey Database Settings...** as shown in Figure 2−44.
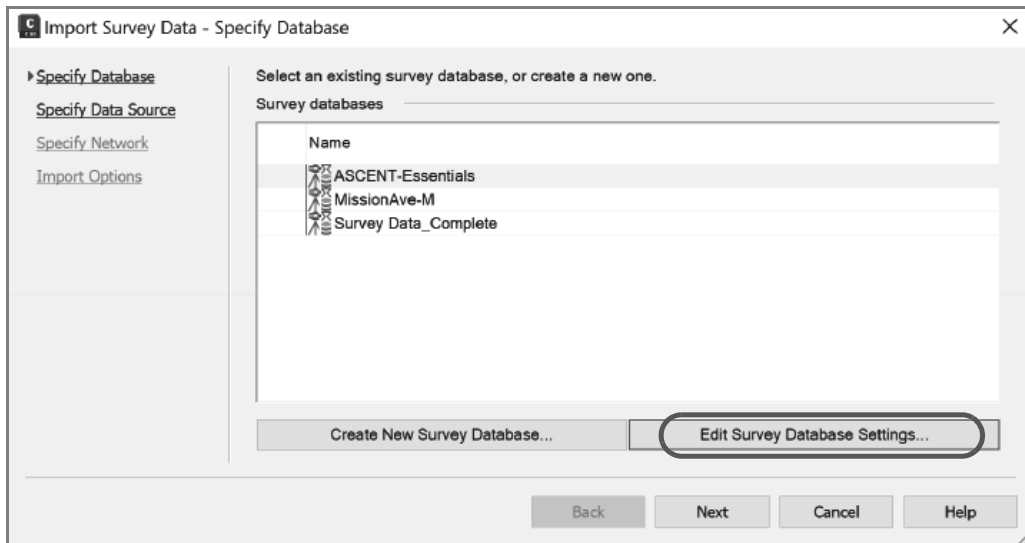
Figure 2−44

8. Under *Units* in the *Survey Database Settings* dialog box, for the *Coordinate Zone*, click the **Browse** icon.

9. In the *Select Coordinate Zone* dialog box, from the *Categories* drop-down menu, select **USA, California**.

10. From the *Available coordinate systems* drop-down, select **NAD83 California State Planes, Zone VI, US Foot** (as shown in Figure 2−45).
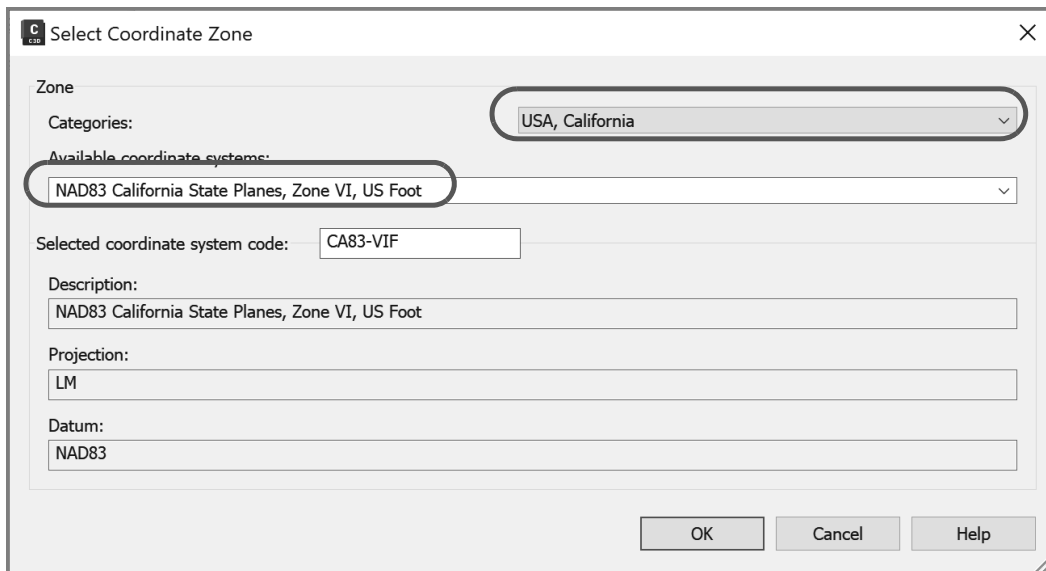
Figure 2−45

11. Click **OK** twice and then click **Next**.

12. On the *Specify Data Sources* page, do the following, as shown in Figure 2−46:

   • Expand the *Data source type* drop-down list and select **Point File**.

   • Click ✚ (Add file) and browse to *C:\Civil 3D Essentials\Survey Databases\Data*. Select **Field-Survey-I.txt** and open it.

   • For the file format, select **PNEZD (comma delimited)**.

   • Click **Next**.
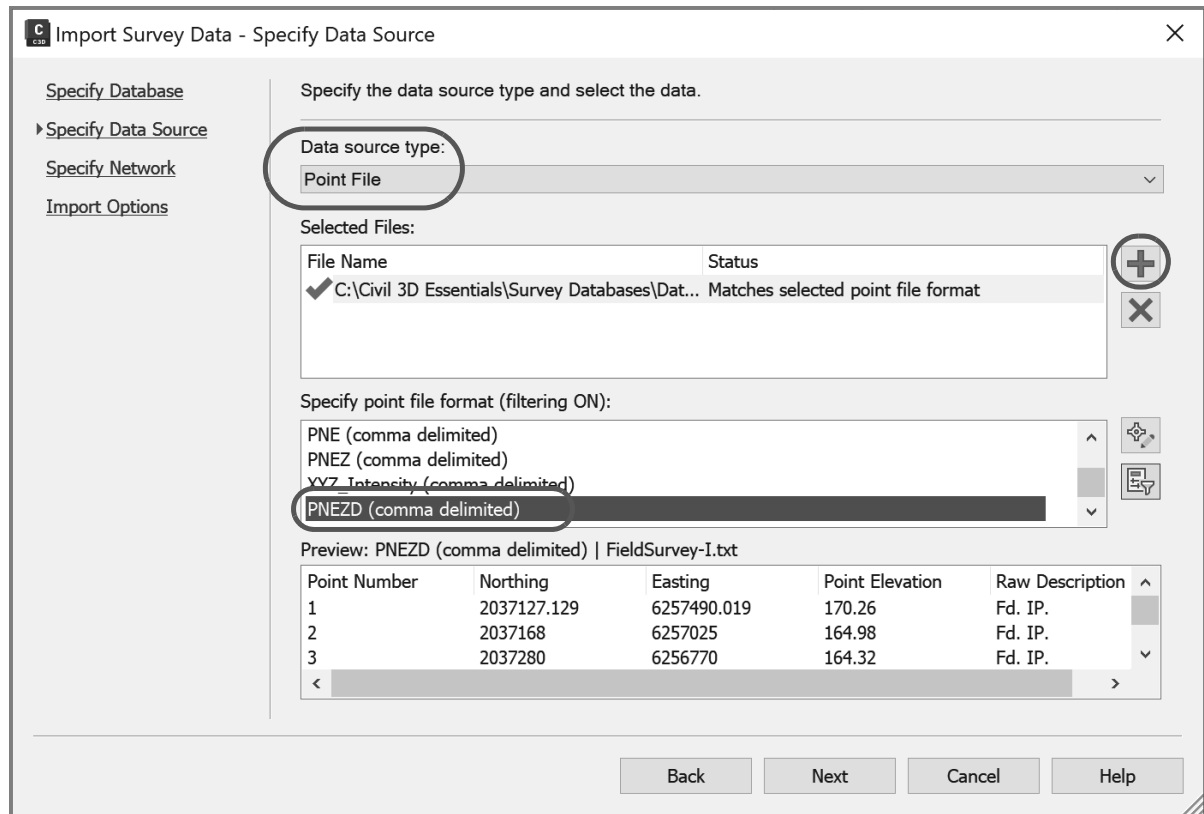
Figure 2−46

13. On the *Survey Network* page, click **Next** (do not make any changes).

14. On the *Import Options* page, select **Process linework during import**, **Insert figure objects**, and **Insert survey points**, as shown in Figure 2–47. Click **Finish**.

Import Survey Data - Import Options		
Specify the import settings for the selected data source.		
Property	**Value**	
Point file format	PNEZD (comma delimited)	
Point file name	C:\Civil 3D Essentials\Survey Database...	
Point type		
Current figure prefix database	ASCENT	
Process linework during import	☑ Yes	
Current linework code set	ASCENT	
Process linework sequence	By import order	
Import event name	Field-Survey-I.txt	
Import event description		
Assign offset to point identifiers	☐ No	
Point identifier offset		
Insert network object	☐ No	
Insert figure objects	☑ Yes	
Insert survey points	☑ Yes	

Figure 2–47

15. The points are imported into the drawing. A new point group named **Field-Survey-I** has automatically been created.

16. In the *View* tab>*Named Views* panel, expand the drop-down list and select **Point-Inspect**. This zooms into an area located east of the existing road, as shown in Figure 2–48. Note that when this view is restored, the viewing scale also changes to **1" = 20'**, for that is stored in the view definition.
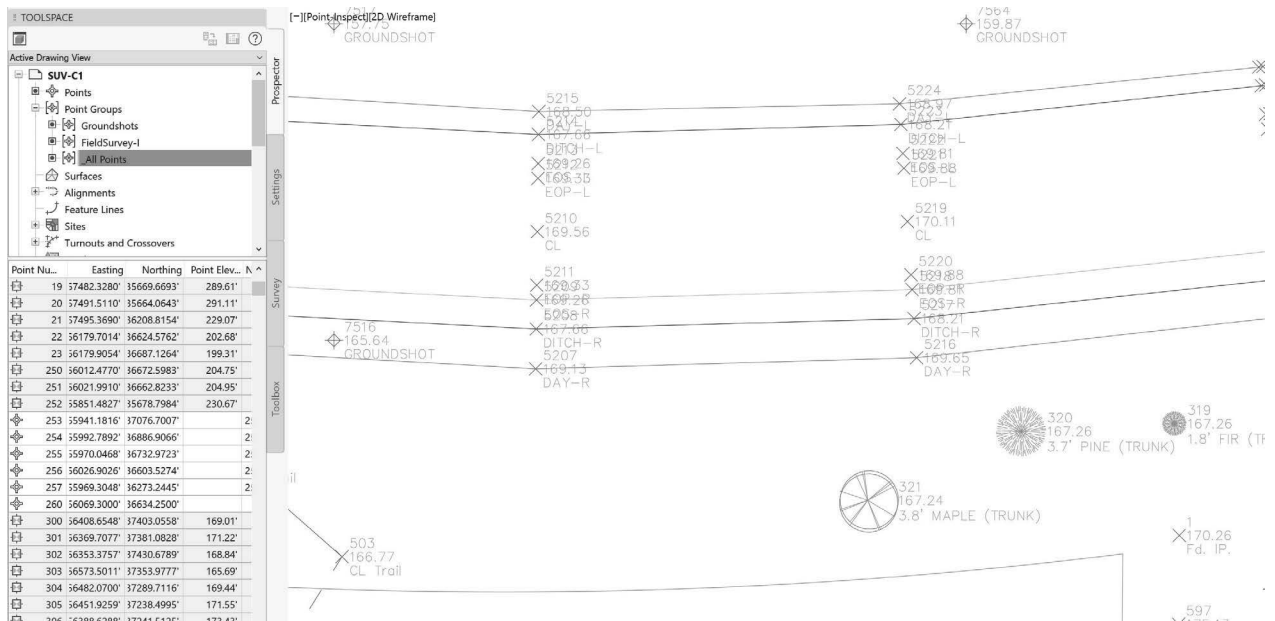
Figure 2–48

17. Expand the *Point Groups* branch in the *Prospector* tab and note the new point group, **Field-Survey**-I, that has been created.

18. Click on the _**All Points** point group. Notice all the points listed in the preview area of the *Prospector* tab. Note the symbol of the new points (250 - 252) are survey points, whereas the previous points (253 - 260) are COGO points.

19. Also note the trees come in at different sizes based on their trunk diameters (based on the description key set), and a variety of linework has been created based on the *Figure Prefix* database settings.

20. Save the drawing.

End of practice

Practice 2d
Creating Point Groups

Practice Objective

- Create point groups and control the visibility of the points within the groups.

In this practice, you will create point groups.

Task 1: Create survey point groups.

1. Continue working with the drawing from the previous practice or open **SUV-C1.dwg**.

2. In the *Transparent Commands* toolbar, click ⊕ (Zoom to Point), and enter **4,9,10**. This will zoom to the drawing area containing these 3 points.

3. In the *TOOLSPACE>Prospector* tab, select **Point Groups**, right-click, and select **New...**, as shown in Figure 2−49.
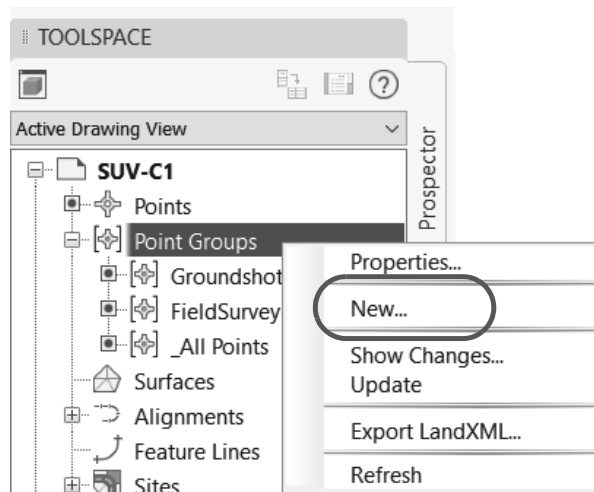
Figure 2−49

4. In the *Point Group Properties* dialog box, in the *Information* tab, type **Boundary Pin Survey** in the *Name* field, type **Collected April 30, 2024** as a *Description*, set the *Point style* to **ASC-Iron Pin**, and set the *Point label style* to **ASC-Elevation and Description**, as shown in Figure 2−50.

Figure 2−50

5. Select the *Include* tab. Select the **With raw description matching** option. Type ***IP.** in the field to select all of the points that have the last three characters *IP.* (iron pin). (Verify that a period follows IP. By default, this is NOT case sensitive.) You can confirm this in the *Point List* tab, as shown in Figure 2−51.This will also select other Iron Pin descriptions beyond the "Found" ones, which the surveyor may use to determine Iron Pins.

Figure 2−51

6. Click **OK** to close the dialog box and apply the changes.

7. Note that the point symbols have changed from an X marker to an Iron Pin symbol, as shown in Figure 2–52. This is because the **Boundary Pin Survey** is at the top of the Point Group list.

   Note: If the symbols do not change, first regenerate the drawing. If there are still no changes, ensure that the point group is on top, as explained in the next task.
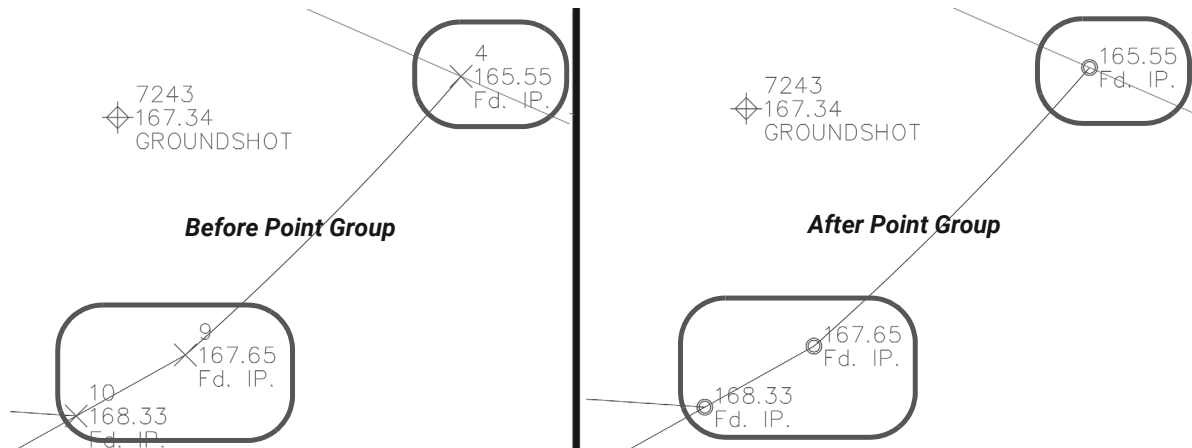
Figure 2–52

8. Create another point group as follows:

   - *Name:* **Site-Survey**
   - *Description:* **Misc. Survey Points**
   - *Point Style:* **ASC-Basic**
   - *Point Label Style:* **ASC-Elevation and Description**
   - *Include Tab: With numbers matching:* **1 - 1000**
   - *Exclude Tab: With raw description matching:* **StLight***

9. Save the drawing.

Task 2: Create *No display* point group.

In this task, you will use the point group to control the points display. Not only will you be able to display the same point differently, but you will also be able to control the visibility of the points. This eliminates needing to use the **Layer** command to thaw and freeze layers.

1. Continue working with the drawing from the previous task or open **SUV-C2.dwg**.

2. In the *View* tab>*Named Views* panel, select the preset view **Start**. This changes the *Annotation Scale* to **1"=40' automatically**.

3. As in Task 1, select **Point Groups**, right-click, and select **New...** to create a new point group. In the *Information* tab, type **No display** for the *Name*.

4. Select **<none>** for both the *Point style* and the *Point label style*, as shown in Figure 2−53.
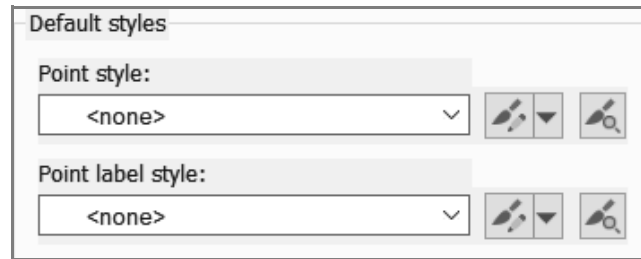
Figure 2−53

5. Select the *Include* tab and select **Include all points** to set it to **True**. Select the *Point List* tab to confirm that all of the points have been included.

6. Select the *Overrides* tab and select **Style** and **Point Label Style**, as shown in Figure 2−54.
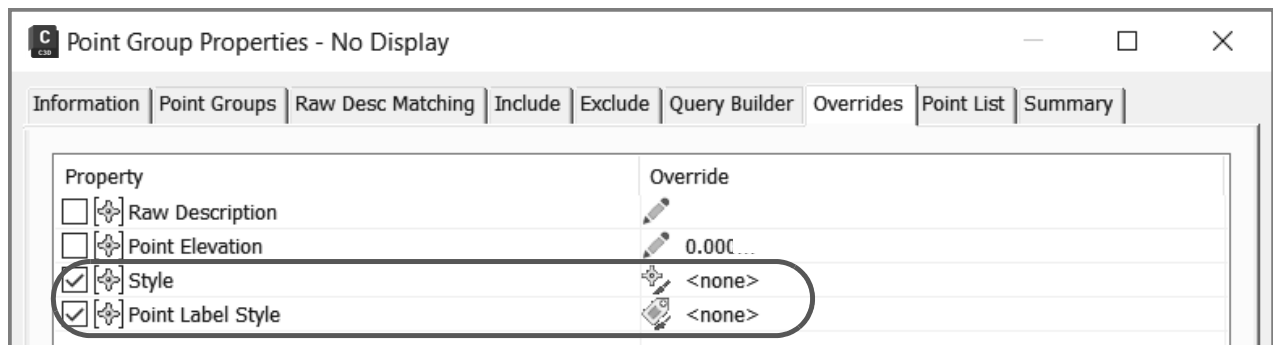

Figure 2−54

7. Click **OK** to create the point group. Note that the points have disappeared. This is because the newly created **No display** point group is at the top of the list and sets the priorities.

8. To control the hierarchy and the display of the point group style, select the *TOOLSPACE>Prospector* tab, select **Point Groups**, right-click, and select **Properties**.

9. In the *Point Groups* dialog box, select the **Boundary Pin Survey** point group and move it to the top of the list by clicking ⬆, as shown in Figure 2−55.
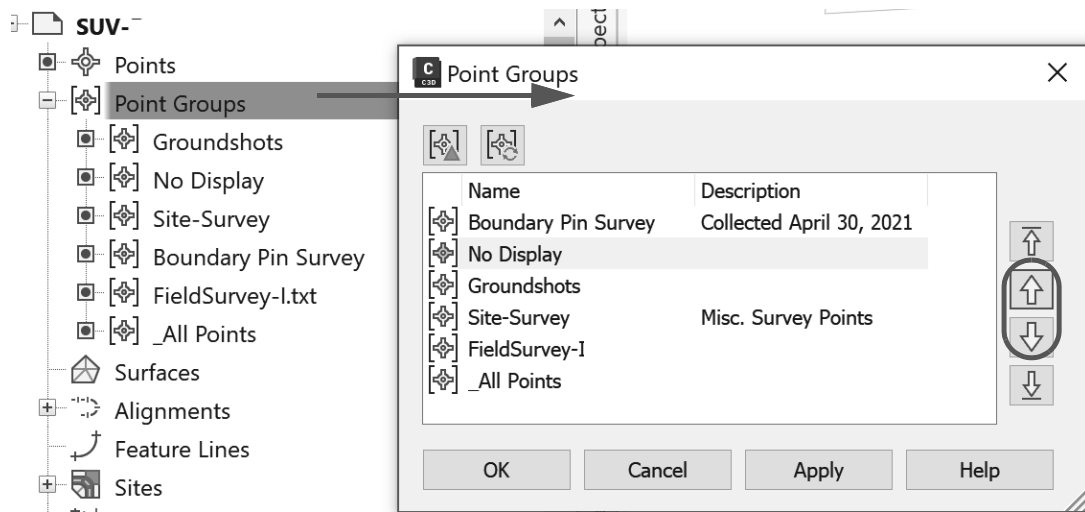
Figure 2−55

10. Click **OK** to apply the changes. Only the points in the *Boundary Pin* point group display. If the property pins are not displayed, you might need to **regen** the drawing (type **RE** and press <Enter>).

11. Experiment with moving point groups up and down the list to control the display of points.

12. Save the drawing.

End of practice

2.10 Lines and Curves

A typical land development project commences with plotting out the property being subdivided, based on the legal description. Planners need to enter lines and curves representing the property boundaries into the computer from legal text description. The Autodesk Civil 3D software makes this task easy with the many options under the **Lines** and **Curves** commands in the *Home* tab>*Draw* panel. Expanding the Lines or Curves commands displays several options that are not found in the ordinary AutoCAD® software, as shown in Figure 2−56.
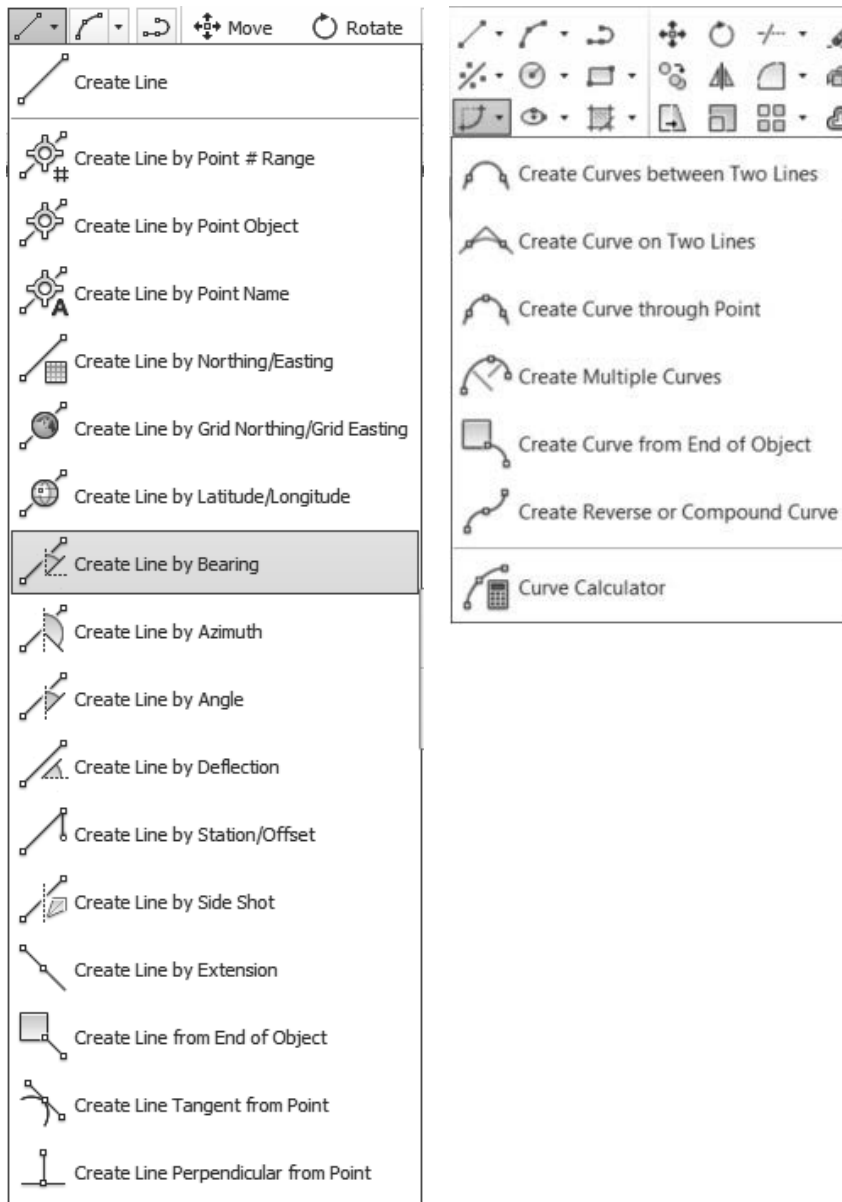
Figure 2−56

A second option is to use transparent commands. These are similar to Object Snaps in that they are only accessible while in another command that is searching for a point.

Once the required command has been started, you can select the transparent commands as follows:

- From the *Transparent Commands* toolbar
- From the *Transparent* ribbon tab
- By typing an apostrophe letter combination in the Command Line
- From the right-click menu>**Transparent Commands**

| Icon	Command Line	Description
	'AD	**Angle Distance:** Specifies a point location at an angle and distance from a known point and direction.
	'BD	**Bearing Distance:** Specifies a point location at a bearing and distance from a known point (or the last point occupied).
	'ZD	**Azimuth Distance:** Specifies a point location at an azimuth and distance from a known point (or the last point occupied).
	'DD	**Deflection Distance:** Specifies a point location at an angle and distance from a known point and previous direction.
	'NE	**Northing Easting:** Specifies a point location using northing and easting coordinates.
	'GN	**Grid Northing Grid Easting:** Specifies a point location using a grid northing and grid easting. (Note: You must have the drawing zone, coordinate system, and transformations set for grids.)
	'LL	**Latitude Longitude:** Specifies a point location using latitude and longitude. (Note: You must have the drawing zone, coordinate system, and transformations set.)
	'PN	**Point Number:** Specifies a point location using a point number found in the drawing or active project.
	'PA	**Point Name:** Specifies a point location using a point name found in the drawing or active project.
	'PO	**Point Object:** Specifies a point location by picking any part of an existing COGO point in the drawing.
	'ZTP	**Zoom to Point:** Zooms to a point in the drawing or active project by specifying the point number or name.
	''SS	**Side Shot:** Specifies a point location at an angle and distance from a known point and direction (uses the last two entered points to set the reference line).

Icon	Command Line	Description
	'SO	**Station Offset:** Specifies a point location at a station and an offset from an alignment in the current drawing.
	.g	**Point Object Filter:** Specifies a point location by picking any part of an existing COGO point in the drawing.
	'STAE	**Profile Station from Plan:** Specifies a profile view point location by specifying an alignment station in plan and an elevation.
	'SSE	**Profile Station and Elevation from Plan:** Specifies a profile view point location by specifying a surface, an alignment station, and a point in plan view.
	'SPE	**Profile Station and Elevation from COGO Point:** Specifies a profile view point location by specifying a COGO point and an alignment station in plan view.
	'PSE	**Profile Station Elevation:** Specifies a profile view point location by specifying a station and an elevation.
	'PGS	**Profile Grade Station:** Specifies a profile view point location using grade and station values from a known point.
	'PGE	**Profile Grade Elevation:** Specifies a profile view point location using grade and elevation values from a known point.
	'PGL	**Profile Grade Length:** Specifies a profile view point location using grade and length values from a known point (or the last point occupied).
	'MR	**Match Radius:** Specifies a radius equal to that of an existing object.
	'ML	**Match Length:** Specifies a length equal to that of an existing object.
	'CCALC	**Curve Calculator:** Calculates curve parameters based on input.

The benefit to using these transparent commands to draw parcels over the **Lines** and **Curves** options (shown previously in Figure 2–56) is that a **Polyline** command can be used to create one entity rather than using many individual lines that would need to be joined later.

Practice 2e
Begin a Subdivision Project

Practice Objective

- Draw a parcel from a legal description.

In this practice, you will use the legal description below to draw a parcel. Later, you will create a parcel from the linework.

From the **POINT OF BEGINNING**; thence, S 00° 26' 42.2" W for a distance of 922.4138 feet to a point on a line. Thence, S 00° 24' 20.8" W for a distance of 508.3493 feet to a point on a line. Thence, S 66° 03' 35.8" W for a distance of 92.1845 feet to the beginning of a curve.

Said curve turning to the right through 42° 35' 49.2", having a radius of 627.1788 feet, and whose long chord bears S 87° 21' 30.4" W for a distance of 455.6165 feet to the beginning of another curve.

Said curve turning to the left through an angle of 19° 13' 40.4", having a radius of 154.4828 feet, and whose long chord bears N 80° 57' 25.2" W for a distance of 51.6000 feet.

Thence, S 89° 25' 44.6" W for a distance of 724.9442 feet to a point on a line. Thence, N 00° 11' 09.9" E for a distance of 1904.2647 feet to a point on a line. Thence, S 61° 50' 15.3" E for a distance of 135.9034 feet to a point on a line. Thence, S 64° 05' 35.8" E for a distance of 77.8201 feet to a point on a line. Thence, S 78° 09' 29.2" E for a distance of 63.8821 feet to a point on a line. Thence, S 66° 23' 19.5" E for a distance of 379.2248 feet to a point on a line. Thence, S 66° 17' 17.4" E for a distance of 278.5122 feet to a point on a line. Thence, S 84° 58' 37.7" E a distance of 466.8116 feet to the **POINT OF BEGINNING**.

1. Open **SUV-D.dwg** from the *C:\Civil 3D Essentials\Working\Survey* folder.

In effect, you will be tracing over the green perimeter in the drawing, using the legal information provided, as shown in Figure 2−57.
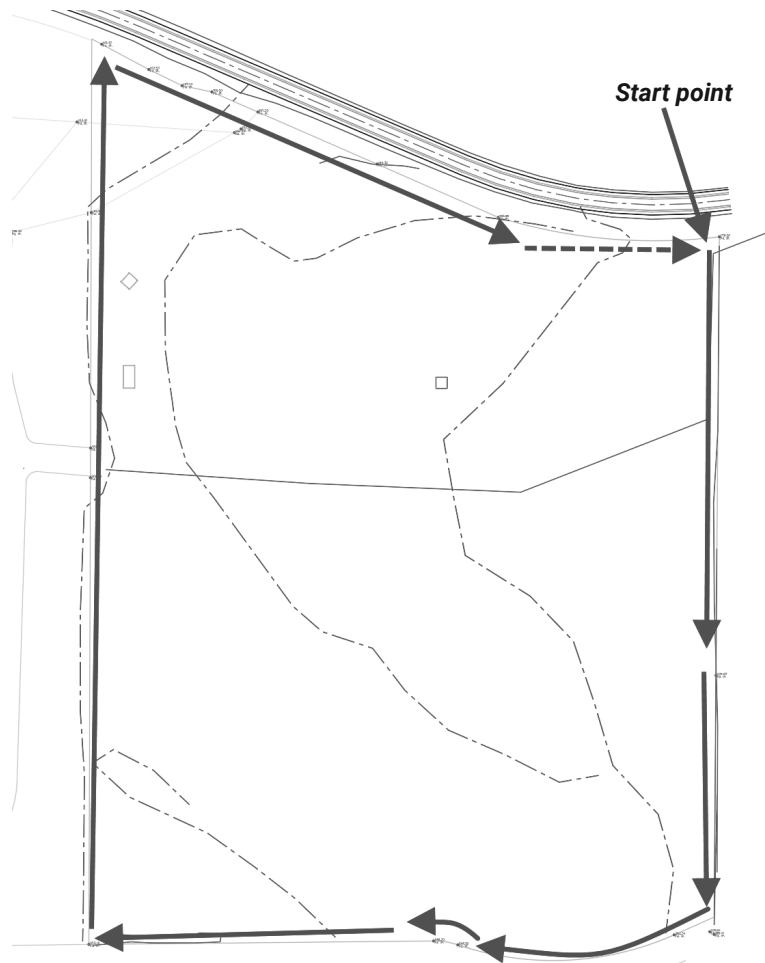

Figure 2−57

2. Make the **C-PROP-LINE** layer current.

3. Start the **Line** command. For the starting point, type **6257490.0191,2037127.1292** and press <Enter>.

4. In the ribbon, in the *Transparent* tab, click (Bearing Distance).

5. For the first line, type the following:

    *   *Quadrant:* **3** (for the southwest quadrant)

    *   *Bearing:* **0.26422**

    *   *Distance: 922.4138*

Stay in the **Line** command with the **Bearing Distance** transparent command running for the next few lines.

6. For the next two line segments, use the following values:

Quadrant	Bearing	Distance
3	0.24208	508.3493
3	66.03358	92.1845

7. Press <Esc> twice to end the command.

8. In the *Home* tab>*Draw* panel, expand the *Curve* drop-down list and select ⬜ (Create Curve from End of Object). Select the last line that was drawn using the **Bearing Distance** command. Remember to press <Enter> after you input a value.

9. From the command options, select **Radius**. Set the radius to **627.1788**.

10. From the command options, select **Chord**. Set the chord length to **455.6165**.

11. In the *Home* tab>*Draw* panel, expand the *Curve* drop-down list and select ⌒ (Create Reverse or Compound Curve). Select the last curve drawn.

12. From the command options, select **Reverse**. Set the radius to **154.4828**.

13. From the command options, select **Chord**. Set the chord length to **51.6**.

14. Start the **Line** command. For the starting point, pick the endpoint of the last arc drawn.

15. In the *Transparent* tab or the *Transparent Commands* toolbar, click ⬡ (Bearing Distance).

16. For the remaining line segments, use the following values:

Quadrant	Bearing	Distance
3	89.25446	724.9442
1	0.11099	1904.2647
2	61.50153	135.9034
2	64.05358	77.8201
2	78.09292	63.8821
2	66.23195	379.2248
2	66.17174	278.5122

17. Press <Esc> once to exit the **Bearing Distance** transparent command.

18. Rather than entering the last segment, you will simply draw the final line going back to the start point. Hold <Ctrl> as you right-click and select **Endpoint**, then select the starting point of the parcel to close on the point of beginning.

    Note: *The values of the last segment will probably not form a perfect closure. Closure and balances can be calculated, however this is beyond the level of this course.*

19. Start the **Polyline Edit** command by typing **PE**. In the model, select one of the lines or curves you just created and press <Enter> to turn it into a polyline. This prevents closure errors from occurring later.

20. Select the **Join** option and then select all of the lines and curves you just created. Press <Enter> to create one closed polyline. Press <Esc> to end the command.

21. Save and close the drawing.

End of practice

Chapter Review Questions

1. If you need linework, which method should you use to import survey data?

    a. Import survey data using the Survey Database.

    b. Import survey data using the **Import Points** command.

    c. Import survey data using the Map Explorer.

    d. Create points using the *TOOLSPACE>Prospector* tab.

2. Which of these is not a type of point object within the Autodesk Civil 3D software?

    a. COGO Point

    b. North Point

    c. Survey Point

    d. AutoCAD Point

3. How do you control the next point number to be used in a drawing?

    a. The **Point Identity** parameters located in the expanded area in the *Create Points* toolbar.

    b. Under Label Styles in the *TOOLSPACE>Settings* tab.

    c. In the *TOOLSPACE>Survey* tab, right-click on *Survey Points*.

    d. In the *TOOLSPACE>Prospector* tab, right-click on *Survey Points*.

4. Can the **_All Points** point group be deleted?

    a. Yes

    b. No

5. Can a point group be made out of point groups?

    a. Yes

    b. No

6. How do you draw a parcel boundary from a legal description in the most efficient way possible?

   a. Calculate the Cartesian coordinate angle for each bearing or azimuth within the legal description and type (distance)<(angle) for each line or curve.

   b. Calculate the Cartesian coordinate angle for each bearing or azimuth within the legal description, place the cursor in that direction, and type the distance.

   c. Use the extended **Lines** and **Curves** options in the *Home* tab>*Draw* panel or transparent commands in the **Line** or **Polyline** command.

   d. There is no fast way to do this.

Command Summary

Button	Command	Location
	Create Points	• **Ribbon:** *Home* tab>*Create Ground Data* panel
	Import Points from File	• **Ribbon:** *Insert* tab>*Import* panel • **Toolbar:** *Create Points* • **Command Prompt:** ImportPoints
	Bearing Distance	• **Toolbar:** *Transparent Commands* • **Command Prompt:** 'BD
	Create Curve from End of Object	• **Ribbon:** *Home* tab>*Draw* panel • **Command Prompt:** CurveFromEndOfObject
	Import Survey Data	• **Ribbon:** *Home* tab>*Create Ground Data* panel • **Command Prompt:** ImportSurveyData
	Survey	• **Ribbon:** *Home* tab>*Palettes* panel
	Zoom To Points	• **Toolbar:** *Transparent Commands* • **Command Prompt:** 'ZTP