

Everything You Ever Wanted to Know About Points, but Were Afraid to Ask

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CV210-5 Points for most projects are the cornerstone for your base plan. They are the basis for your ground surface as well as symbology for surface features. Many techniques are used in point creation, display, design, and export. This class will educate you and provide you with tips on squeezing the most out of your points.

About the Speaker:

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Contents

Point Styles	4
Marker	4
Size	4
3D Geometry	4
Display.....	5
Default Point Layer	5
Point Label Styles	5
Label Style Defaults	5
Creating Label Styles	6
Description Keys	7
Symbology.....	7
Full Description.....	7
Scaling	7
Importing / Creating / Converting Points	8
ASCII.....	8
Land Desktop	8
AECC_Points	8
AutoCAD Points	8
Alignment and Profile.....	9
Corridor	9
Manual.....	9
Point Groups	10
Naming format	10
Locking.....	10
Including Points.....	10
Surface.....	11
Styles	11
Overrides	11
XDREF's	12
Multi-View Blocks.....	13
Edit Points in a Drawing	14
Edit Point Labels.....	14
Protecting Points.....	15
Lock and Unlock	15
User-Defined Properties	15
Reports and Tables	16
Export to File	16
Survey Managed Points.....	17
Protecting.....	17
Importing from ASCII File	17
Sharing.....	17
Editing	17
Vault Managed Points	18
Adding to Vault	18
Editing	18
Sharing.....	18
Deleting from Vault	18
Connecting the Dots.....	19
Bonus	19
Connect Points.....	19

Point Styles

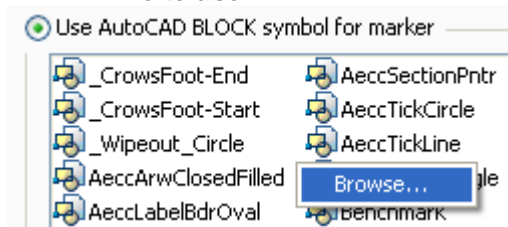
Points consist of 2 components, a Point and a Label. The Point, represented by the X, can be shown using nearly any symbol.

Marker



- *AutoCAD point marker.* Use the **DDPTYPE** dialog to set the symbol and its size.
- *Custom marker.* Choose one from the left and/or one from the right.
- *Block.* Choose from the list.

Hint: Right click and select Browse to select a drawing file to use.



There are four options for setting point marker size.

Size

- *Use drawing scale.* Specify a height in plotted units. It will be measured from the lowermost to uppermost point on the symbol. The symbol will always plot the same size regardless of viewport scale; like text labels.
- *Use fixed scale.* This is like the scale you would use to insert the block normally.
- *Absolute units.* Specify a model space size. If you have a tree with a canopy that is 8m wide and you always want it to scale 8m, use this option.

- *Relative to screen.* This is a percentage of total monitor height. Use this to keep the symbols the same size as you zoom in and out.

In the 3D Geometry tab there are 3 options. These are used when using OSNAP's with points.

3D Geometry

- *Use point elevation.* The point elevation will be used any time you OSNAP to a point
- *Flatten to elevation.* The fixed elevation specified here will be used when snapping to points.
- *Exaggerate.* The point elevation will be scaled by this factor when snapping. Be very careful with this option as it can yield very unexpected results.

Many people draw breaklines and other geometry using OSNAP's and snapping to points. Often 2D Polylines are desired. And it's advisable for all of those to be set to elevation 0. Using the "Flatten..." option would be correct in this case.

3D Polylines are also required from time to time. The "Use Point..." option is the one to use here.

I prefer to use the "Use point elevation" option for ALL my point styles. When I need to create 2D linework, essentially ignoring the point elevations I use the following technique.

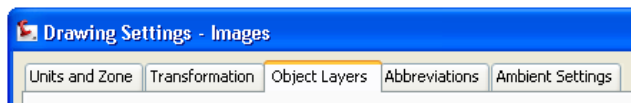
Hint: Set the AutoCAD variable OSNAPZ to 1. Civil 3D will ignore the Z value from any points and use the value from the ELEVATION variable instead, which should be set to 0 in most cases.

All Civil 3D object style dialogs have a display tab. It is used to turn on or off some or all of the components.

Display

- **Marker.** Leave on to show your point marker. Turn it off and your marker will disappear.
- **Label.** Regardless of which label style has been assigned to the point or point group, its visibility will be controlled by this selection.

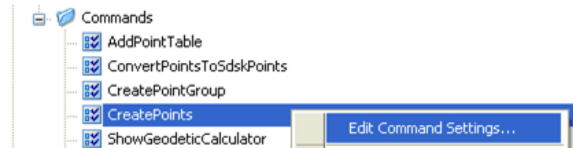
Points, like every other AutoCAD object, need to be placed on layers. Most Civil 3D objects, when they are created, get placed on the layer defined in the Object Layers tab of the Edit Drawing Settings dialog.



Points are not included in this list. How do we set the default layer for points?

Default Point Layer

Hint: The default point layer is set by right clicking as follows and setting the layer within.



Ever seen this and wanted the arrow to move to the middle of the X?



Hint: Edit the point style, in the Summary tab, change the Leader Stops at Marker setting

Marker	
Leader stops at marker	yes
Marker Rotation Angle	no
X PDMODE	yes

Point Label Styles

Point label styles, like every label style in Civil 3D, are defined using the Label Style Composer. Though not specific to Point Labels, there are some settings that should be considered before ever creating your label styles. I have included these here because they are THAT important.

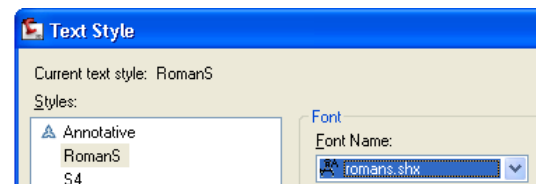
Label Style Defaults



In the *Edit Label Style Defaults* tab, thought should be given to a typical text style and height

Many companies use AutoCAD text styles with names such as L100, 2.5mm, S1 etc. These are typically defined with the same font, but different text sizes. When a text style is specified for a label style Civil 3D completely ignores the height defined in the text style. This is why there is a height setting for each label style.

- Use a single text style for each desired font. One for Roman Simplex, one for Arial etc.

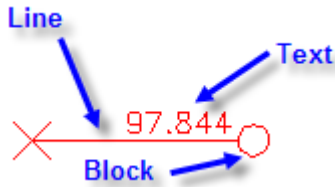


- Decide on a text height and style that is used for the majority of your labels and set them in the Label Style Defaults dialog.



Creating Label Styles

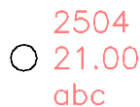
Point labels can be composed of any combination of Line, Text, and Block components.



I like to quickly sketch on paper what I need so I can organize my thoughts and plan the label accordingly.

For example, in the image above I think the line would be drawn first as it looks like it would be the controlling component. Both the circle and the text are based on its end point.

When you're adding lines, blocks, or text to a label style there are two settings that control attachment, anchors, and justification.. Let's investigate this scenario

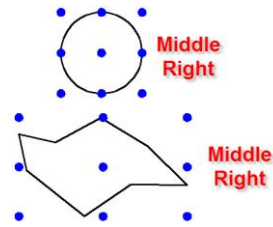


The elevation (21.00) is the controlling component. The other two components derive their positions relative to the elevation. But first we have to place that elevation.

Property	Value
General	
Name	Point Elev
Visibility	true
Anchor Component	<Feature>
Anchor Point	Middle Right

Anchor Component – To what component is this elevation anchored? The <Feature>, or the point itself.

Anchor Point – Where, relative to the point, will this component be placed? Middle Right. If you expand that box, you'll see all 9 of the choices; Top Left, Bottom Right etc. This has everything to do with which point style you're using. Regardless of the shape of the point style, those 9 points are measured around the perimeter.



We want to place the elevation component relative to the Middle Right of the point marker.

Attachment - The text component itself also has a choice of the 9 attachments points

Text	
Contents	<[Point Elevation(...
Text Height	2.00mm
Rotation Angle	0.0000 (d)
Attachment	Middle left

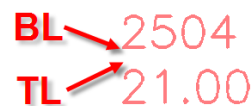
You have to decide which point on the text needs to be placed at the Anchor Point above. In this case, it's Middle Left



When adding the other two components the Anchor Point is not <Feature>, but the elevation component we just added since we want their positions to be relative to the elevation. In this case, the bottom left of the Point Number is anchored to the Top Left of the Point Elev.

Property	Value
General	
Name	Point Number
Visibility	true
Anchor Component	Point Elev
Anchor Point	Top Left

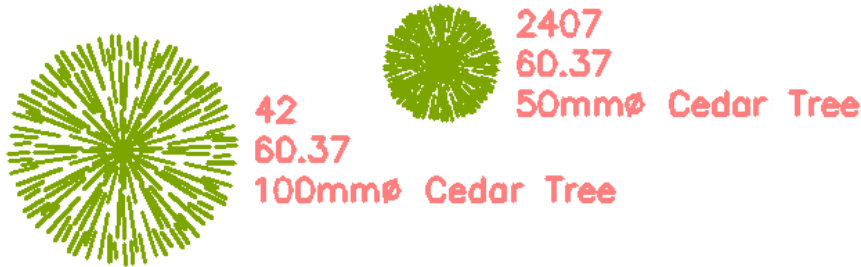
Text	
Contents	<[Point Number(S...)
Text Height	2.00mm
Rotation Angle	0.0000 (d)
Attachment	Bottom left



Description Keys

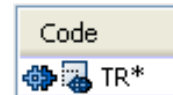
With description keys you can turn this:
42,5439515.106, 513888.671,60.372,TR 100 CEDAR

Into this:



Symbology

Symbols can be inserted into a drawing when points are created based on the Raw Survey Description. In this case the Raw Description is “TR 100 Cedar”. The description code is “TR*”. This means that any description that begins with “TR” will match and the description key will activate.



The tree symbol is not a block, but a point style. In fact, point styles must be created for every survey description that is required to have symbology. The description key is configured like this:

Point Style	Point Label Style
<input checked="" type="checkbox"/> Tree	<input checked="" type="checkbox"/> <default>

Full Description

Raw Description “**TR 100 Cedar**” can be converted to the Full Description “**100mm∅ Cedar Tree**” using these parameters:

TR is the base description
 100 is parameter 1 - **\$1**
 Cedar is parameter 2 - **\$2**

The rest is just arbitrary text, whatever you need. The parameters in the Raw Description must be separated by spaces.

Format
\$1mm%%c \$2 Tree

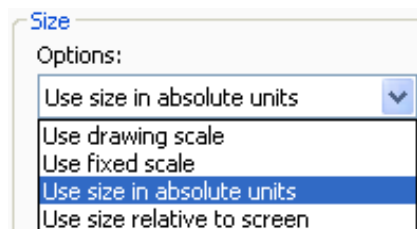
Scaling

Symbols can be scaled automatically using one of the description parameters.

Scale Parameter	Fixed Scale Factor	Use drawing scale	Apply to X-Y
<input checked="" type="checkbox"/> Parameter 1	<input checked="" type="checkbox"/> 0.001	<input type="checkbox"/> no	<input checked="" type="checkbox"/> yes

Here, Parameter 1 (100) is being used to scale the tree. Since the drawing is drawn in metres, yet the parameter is millimetres, a Fixed Scale Factor of 0.001 is required to do the conversion. **Apply to X-Y MUST be checked** for the scaling to happen.

One more thing **MUST** happen before scaling will work properly. The point style size has to be set to Absolute units.



Importing / Creating / Converting Points

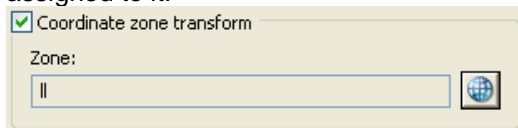
There are a number of methods for importing points; ASCII files, Land Desktop, XML.

ASCII

Importing points from an ASCII file is probably the best known method, since this is probably the most common way to get points in your drawing. Use the Import Points tool in the Points menu. There are, however, a few things to consider after you click that button.

- **Format** - You must know how the point file is organized. The file is organized into columns, but what information does each column represent? PNEZD is Point number, Northing, Easting, Elevation, Description. If you get this wrong your points will not be imported into the correct place. Also, is the file space or comma delimited?
42,5439515.106, 513888.671,60.372,TR
100 CEDAR or
42 5439515.106 513888.671 60.372 "TR 100"
Your import will fail if you choose the wrong one.
- **Elevation adjustment** – You can add or subtract an elevation value to all points as they are imported.
- **Coordinate Transformation** – Points can be transformed from one coordinate system to another. Say the point file contains Lat Long points, but the drawing is NAD83. Your Point File Format (PNEZD, or other) must contain the following adjustments for this to work:

- It must have a coordinate system assigned to it.



- Instead of Northing and Easting, you must specify Grid Northing and Grid Easting



Land Desktop

Most Land Desktop data is imported using either XML or the Import Data from Land Desktop tool in the File menu. Points do not import this way, however. Use the usual Import Point tool, but when prompted for the Format choose the **External Project Point Database** and browse for the **Points.mdb** file in your Land Desktop project folder.



AECC_Points

Land Desktop points (AECC_POINTS) are sometimes present in a drawing. If you don't have the LDT point database you need to convert these into Civil 3D points.

Use the *Convert Land Desktop Points* tool in the points menu. All LDT points will be converted.

AutoCAD Points

AutoCAD point objects can be converted to Civil 3D points using the *Convert From AutoCAD Points* tool in the Points menu. You have to ask yourself "Do I really need to convert these points? Why do I need Civil 3D points?"

Hint: A surface can be created directly from AutoCAD Points

- Prior to running the conversion command open the points toolbar and click the double arrow on the right



- Under Point Creation make sure that you set "Prompt for Descriptions" to Automatic
- Specify any Default Description

If you don't do this Civil 3D will prompt you for a description for each and every point as it is being converted. Not a happy thing if you have 1000+ points to convert.

Alignment and Profile

Points can be created along alignments at horizontal points like BC (Begin Curve) or EC (End Curve). They can also be created at Profile Geometry Points as well like BVC (Begin Vertical Curve). Use the desired tool in the points creation toolbar, but before you do, make sure of the following:

- Prior to running the command open the points toolbar and click the double arrow on the right



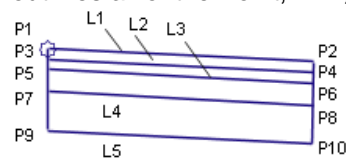
- Under Point Creation make sure that you set "Prompt for Descriptions" to Automatic - Object
- Set "Prompt for Elevations" to Automatic

By doing so, the BC, EC, BVC information will be included as part of the point description. As well, the profile elevations will be assigned to the new points.

Corridor

Often, especially for layout, points are required from the proposed design; the corridor. Corridors are full of useful data. To understand how we can get points from a corridor we need to understand how points (markers) work within subassemblies.

Each subassembly has a help file page. On that page, at the bottom, there is a diagram that outlines all of the Point, Link, and Shape codes.



We need to consider the marker codes (P1, P2 etc). Each marker code has an alphanumeric value. This value appears just above this diagram on the help page.

Point, Link, or Shape	Code
P1	Crown
P2	ETW
P3	Crown_Pave1

Begin the Create COGO Points from Corridor tool in the Corridor menu. When you select the corridor from which to import points, we will be shown a list of all marker codes that exist in that corridor. Select any number of the codes and points will be created anywhere there is an assembly insertion within that corridor.

Select point codes to create:

Point codes	Select
Crown	<input checked="" type="checkbox"/>
Crown_Base	<input checked="" type="checkbox"/>
Crown_Pave1	<input checked="" type="checkbox"/>

The Lane Outside and Inside Super subassemblies have a toggle for Crown Point. Set either the right or left side to yes, but not both.

Hint: Setting both sides to Yes will result in duplicate points at the Crown for every station

Manual

There are far too many tools for creating points manually to show in this handout, however there are a few settings to be aware of. The tools below that blue double arrow do some very important things.



- Default description and elevation
- Toggle to turn on and off Description keys
- Point numbering options

Among others.

Have you ever tried to create points manually, entered a location, description, and elevation only to have nothing appear?

Hint: When creating points manually, ensure that the Next Point Number setting is not set to a point that already exists, or no points will be created

Creating points from corridor introduces this discrepancy in the Next Point Number Setting.

Point Groups

There are many reasons for using point groups. Organizing points from different surveys, points for different surfaces, separating points based on properties. Once your point group has been created you have choices to make regarding styles, which points are included, even style overrides. We'll examine many of these choices in this chapter.

Naming format

Your point group needs a name and you should decide on a standard way of naming them. For example, when I import points from a surveyor I will name the group like this:

"2008-12-03 Surveyor"

The date and the surveyor's name. In the future I will be able to discern which points were from which survey and who to blame if there is a problem ☺

Locking

You'll find an "Object locked" toggle in the Point Group information tab. **Note this does not points.** It locks the point group only, preventing erasure of the group.

Including Points

In order for a point group to be useful you have to include points in it.

- *Point Groups Tab* – points from selected groups will be included in this group.
- *Raw Description Matching* – this is used to easily select points used with description keys.
- *Include* – points can be included based on number, elevation, name, and raw and full descriptions. When including points based on **elevation**, you can this to include points with elevations greater than or equal to 0.

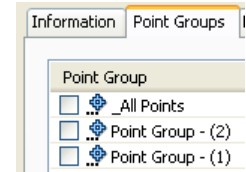
With elevations matching:

Including points by **Raw Descriptor** you can include as many descriptions as you like as long as they are separated by commas.

With raw descriptions matching:

Sometimes you may have many descriptions with similar values. **Wildcards** can be used for these. Benchmarks often have a unique description based on its number. BM* will include all points that begin with BM. A full list of wildcards can be found by

searching the Help menu for "Wildcard Characters"



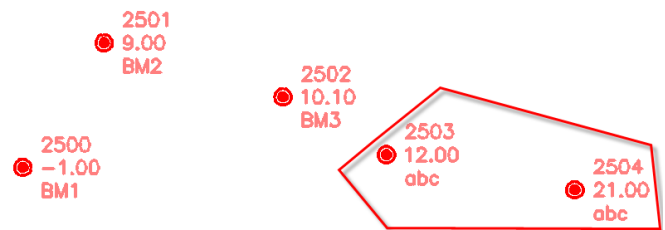
- *Exclude* – sometimes it's not about what you want to include, but what you don't want to include. The options are the same as the Include tab.
- *Query Builder* – A good way to begin to understand how this works is to populate the include and exclude tab and then look at this tab.

Occasionally you may need to create a point group based on points with no description at all.

Hint: Enter this into the Exclude tab – With Raw Descriptions Matching

With raw descriptions matching:

Another scenario that is often problematic is this: Points within a selection (2500-2504) that have description abc.



Hint: "Include" and select the 5 points by selection. Then "Exclude" with raw description "~abc"

The tilde "~" matches anything **Except** what follows. In this case, point numbers 2500-2504 are being included, then everything BUT abc is being Excluded

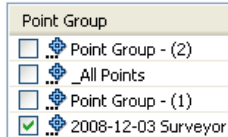
Surface

First and foremost, **NEVER use the _All Points group to create a surface.** On May 5 all the points in the drawing are required for the surface. On April 1 someone adds some temporary points to the drawing. These points will be added automatically to the _All Points group and thus added to the surface. Not good.

Nothing new here, no special techniques, just a personal workflow I use to make a surface. Many people create their surface from the very same point group that was defined when the points were imported. While this CAN be a good thing, most times there are points in the survey not suitable for a surface; Monuments, Traverse Hubs, etc are good examples.

Many users will simply edit the surface and remove the offending points. This is usually an inefficient method.

- Make a new point group and name it "Points for Surface" or something similar.
- In the **Point Groups** tab toggle on the point group with the survey points you need. This "Includes" all those points.



- In the **Point List** tab click the Raw Description heading to sort. Start from the top and scroll down until you see a description that doesn't belong in your surface.
- In the **Exclude** tab, type in that description in the Raw Description tab. Use wildcards if necessary.

With raw descriptions matching:
- Go back to the Point List tab and scroll down until you see the next offending description. Add this to the Exclude tab, and so on.
- You'll end up with a point group that has all the points you want and none that you don't want.

Styles

By default, when you create points, the point and label styles are controlled by the point group. When description keys are used, styles can be "assigned" to each individual point.

Point Num...	Point Style	Point Label Style	Raw Description
2444			abc
5000			abc
2505	Benchmark		HUB1
2507	Benchmark		HUB3

Points 2505 and 2507 have been "assigned" the Benchmark style. In this instance these 2 points will always display the Benchmark style regardless of which style has been set in the point group.

Unless...

Overrides

These are used to override Styles, Descriptions, and Elevations. 2 main reasons for this:

Overriding the "assigned" styles set by using description keys.

Hint: Set styles in the Overrides tab to negate the styles "assigned" by description keys.

Property	Override
<input type="checkbox"/> Raw Description	<input type="text"/>
<input type="checkbox"/> Point Elevation	<input type="text" value="0.00m"/>
<input checked="" type="checkbox"/> Point Style	<input type="text" value="Basic"/>
<input checked="" type="checkbox"/> Point Label Style	<input type="text" value="Elevation and Description"/>

External Data References (XDREF's). Not to be confused with DREF's or XREF's. XDREF's are typically used to override Elevations and Descriptions of points.

XDREF's

With XDREF's you can create several surfaces using the same points. The difference being, the elevations for each surface are controlled by an External MS Access Database.

Say you have a drawing with 250 points numbered 1-250, each with a ground elevation; a normal survey. And you have a database with 250 rows, one for each point. Those rows have the following columns.

SampleTable1 : Table							
	PNO	DESC1	ELEV1	DESC2	ELEV2	DESC3	ELEV3
	1	g	95.24	Clay	94.7	Rock	94
	2	g	92.01	Clay	91.5	Rock	90
	3	g	94.59	Clay	94	Rock	93
			0		0		0

The first is the most important column, its number relates to the corresponding point number in your drawing. DESC1 and ELEV1 match the points in the drawing.

DESC2 and ELEV2 represent the Clay elevation at the same XY position.

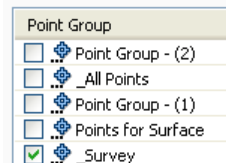
DESC3 and ELEV3 are elevations of Rock also at the same XY position.

The geotechnical engineer has bore holes that were used to calculate these elevations. Essentially, for each surveyed point location, there are 3 different elevations.

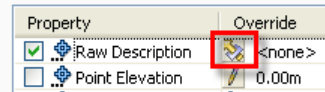
This database MUST be formatted in a specific manner. You can read about it in Help if you search for "Creating an External Point Database with Microsoft Access". Luckily there is a sample database you can copy and modify so you know you're getting it correct. It can be found here: *C:\Program Files\AutoCAD Civil 3D 2009\Sample\Civil 3D XDRef*

Now that the database is done, we can concentrate on the point groups. When you import points in the usual manner, you will create a typical point group. This will be used to create the Original Ground surface.

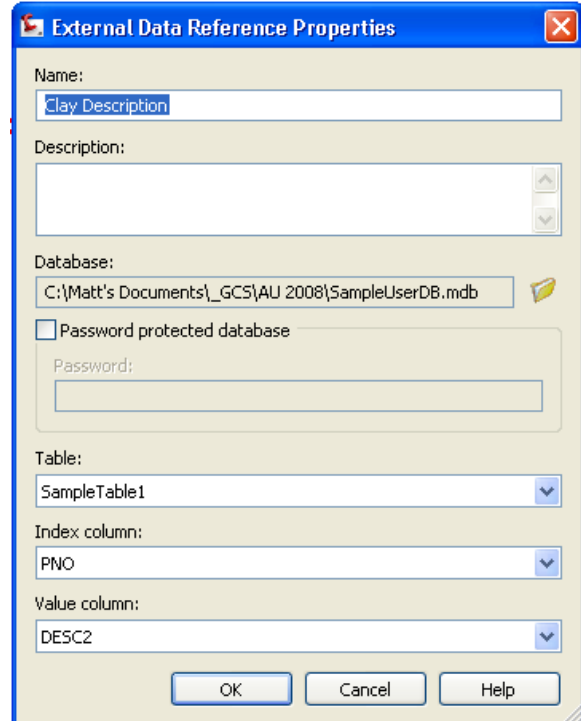
Make a new point group and name it Clay. In the Point Groups tab toggle on the original imported group.



In the Overrides tab Toggle Raw Description and click the icon until it becomes the yellow arrow



Click where it reads <none> and create a new connection. Set up the values as follows. The index column is the very important first column. In the value column are the descriptions that will be used for this point group.



Do the same for the elevation. Except that you will need to create a new connection with a different value column.

Original point group

~~1~~ 95.24 ~~2~~ 92.01
G G

Clay point group

~~1~~ 94.70 ~~2~~ 91.50
Clay Clay

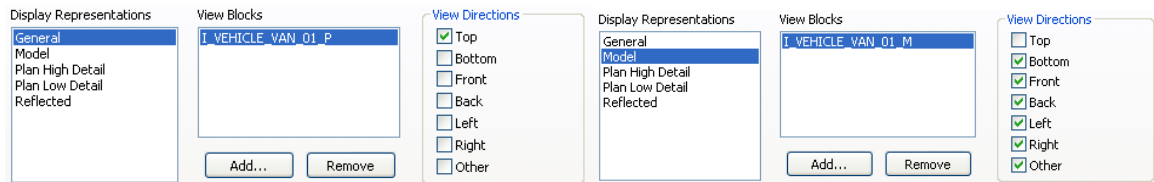
You now have a new point group with new elevations for a Clay surface. You can do the same for each type of information contained in the database.

Multi-View Blocks

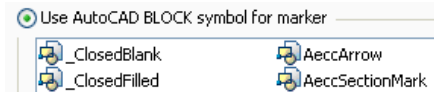
These blocks are extremely useful for a variety of reasons. They look the same as always in plan view, but they instantly change to a 3d model when viewed in 3d.



I'm not going to go into detail about how to create a dynamic block except to say that they are typically made from 2 blocks. The plan representation (above left), and the model (above right). They are combined into a single entity using the MVBLOCK command. You specify which block is to be viewed from the different views, Top, Bottom etc.



Multi-view blocks can be used within a point style, but not in the usual way. MVBlocks are not selectable as a marker in the point style dialog because they are not normal blocks.



In order to use an MVBlock within a point style you must embed an MVBlock inside a normal block.

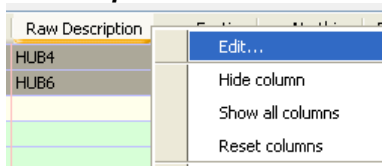
- Insert an MVBlock using the **MVBLOCK** command and **Add** an instance.
- Create a new block and select that MVBlock as the object.
- Assign the new block to your point marker.

Edit Points in a Drawing

Once points have been created in a drawing they often need to be edited in some way. Moved, Elevations, Descriptions wrong etc. There are several methods for editing points. The one you use depends on the task at hand.

- To make the same edit for multiple points you can see on the screen, use the properties palette or the right click “Edit Points” option. If you “Edit Points” and want to change a property for multiple points at once you can’t pick one cell and edit like you might in MS Excel.

Hint: You must right click on the property name at the top and select Edit



- These same edits can be performed in the Prospector Item View by clicking on Points or selecting a Point Group.

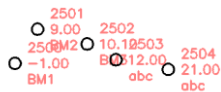
There are 3 additional edits you can make that can be found in the right click menu. These edits can be performed in the Item View or by right clicking points on the screen.

- Renumber* – Points can be renumbered by using an additive factor.
- Datum* – Points can be raised or lowered with this tool.
- Elevations from surface* – Points will be assigned an elevation based on the surface you select. **Note:** the elevations are not dynamic. If your surface elevation changes, your points will not reflect that change. You’re welcome to run this tool again however.

Edit Point Labels

Point labels often need to be dragged away from their default position for better visibility.

Before



After

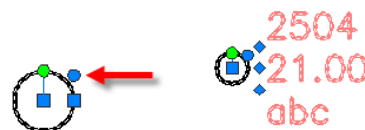


To accomplish this simply use the square grip just to the right of the point marker. To put them back, right click and elect Reset Label.

Note that in the After image the description is at the top, but in the Before image it is at the bottom.

Hint: When labels are dragged and the Stacked option is used, the label components draw in the order in which they were created.

The label components can be moved independently of one another, but only if the label style supports it. Click the circular grip up and to the right of the marker. One grip for each component will appear. If one component is dependant on another one, both may move at the same time.



Protecting Points

Lock and Unlock

There are a few ways to protect your precious point data from accidental deletion within your drawing. Two methods, Freezing and Locking layers are obvious AutoCAD methods. The Civil 3D user has an extra solution. Points can be locked or unlocked directly by selecting the appropriate option when right clicking any number of points.

To make selecting the points a little easier you can right click a Point Group in the Prospector and pick Lock or Unlock Points. This procedure locks the points individually, meaning they will be locked regardless of the Point Group in which they reside.

Note: Do not confuse this with the Object Locked toggle in the Point Group information tab. This merely locks the points group so it can't be deleted.

Object locked

User-Defined Properties

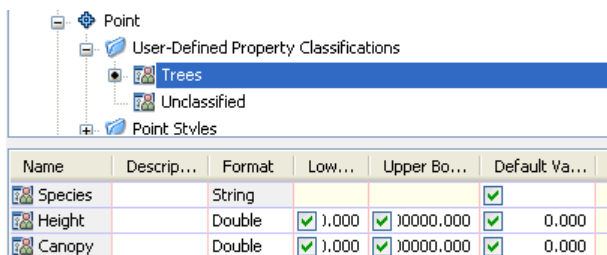
If you ever have more information than the typical PNEZD in your point file you are probably a candidate for UDP (User Defined Properties).

Let's say this additional information comes in the form of a few extra columns in your ASCII file. The usual PNEZD plus:

Species	Height	Canopy
Castanea dentata)	3.9	2.1
Prunus americana	2.2	3.0

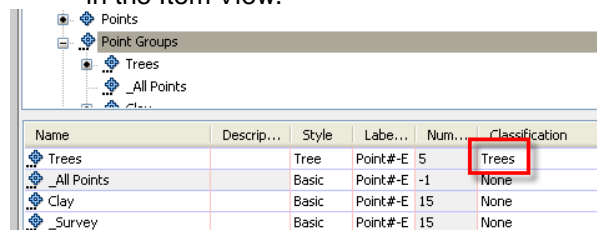
This information needs to appear in a label at some point and you have to use UDP to get it there.

- Create the ASCII file as usual and add those extra columns
- Create a new UDP class by right clicking UDP Classifications in the settings tab
- Add three Properties, Species, Height, and Canopy



- Copy the PNEZD (or equivalent) Point File Format. You'll find this in the settings tab under Points

- Pick the column after Raw Desc <unused> and select Species. As the Column Name. Any UDP you have added will appear in this list.
- Do the same for Height and Canopy
- Save the Point File Format and import your points normally using this new format. You will see the extra columns in the point list, but not within a Point Group.
- To show the new properties in a point group click the desired group in the Prospector and choose the classification in the Item View.



Rot...	Species	Height	Canopy
<input checked="" type="checkbox"/>	Prunus americana	3.100	5.000
<input checked="" type="checkbox"/>	Prunus americana	2.700	2.900

- All that remains is to add those properties to your label style. You'll now find three new properties available to add in the label style composer.

Reports and Tables

Points sometimes need to be shown in a meaningful format; a table, HTML file, ASCII file. You can use the Points-> Add Tables tool in Civil 3D to create a dynamic list of selected points in your drawing.

Point Table				
Point #	Elevation	Northing	Easting	Description
2500	-1.00	10.62	112.22	BM1
2501	9.00	12.51	113.45	BM2
2502	10.10	11.69	116.16	BM3

You can select points by group or individually and add them to this table. And you can include nearly any information about any point in this table, including the User Defined Properties we examined earlier.

Any change to any of the points will be reflected dynamically in this table.

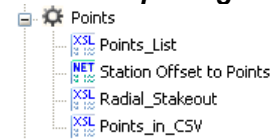
Maybe the format of this table doesn't suit your needs. Try some of the Reports instead. In fact, there are some reports that can output information that a table can't possibly do.

General-> Reports Manager... to display the Toolbox. You'll find an additional tab in the Toolspace called **Toolbox**.

There are a few different report tools here for points and they are editable...if you know how to code XSL style sheets, VBA, or .NET.

I often hear users ask how to create a table that shows stations and offsets to selected points.

Hint: Use the Station Offset to Points reporting tool.

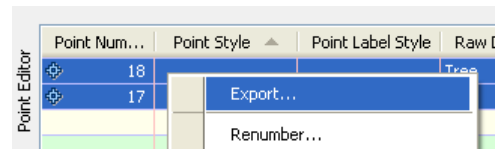


Export to File

So you've imported points, edited some of their properties like X, Y, or Z, modified a few descriptions, and made some new styles. You have also created points from a Corridor or other points from your design. Now it's time to Export them for stakeout, or maybe someone just needs the points for something else.

There are a few methods for exporting points:

- Right click any point group and select Export Points.
- Select any number of points in the Item View of the Prospector and select Export.
- While editing points in the Panorama, right click any number of points and select Export.



Whichever method you choose you will be required to select a Point File Format (PNEZD or equivalent), and a destination file.

Hint: Do not check any of the Advanced options unless you're familiar with how they work. We will look into some of these later.

The format file that you choose depends on what the recipient needs. If you want to include your User Defined Properties make sure you select an appropriate format with those columns added.

Survey Managed Points

If you're not a surveyor you may think that using Civil 3D's survey tools do not have a place in your workflow. While you may not make full use of the tools at hand, there are a few reasons to consider using survey to manage your points.

Protecting

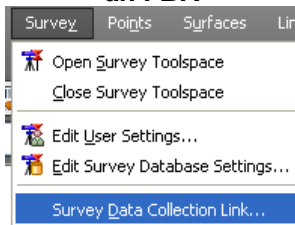
Earlier we discovered how points can be protected in a given drawing. Layers can be thawed, points can be unlocked. Leaving your data unprotected.

Points managed using survey tools are actually stored outside of the drawing environment in a database and only displayed in the drawing. You can erase points without fear of losing them forever. They can simply be imported from the database.

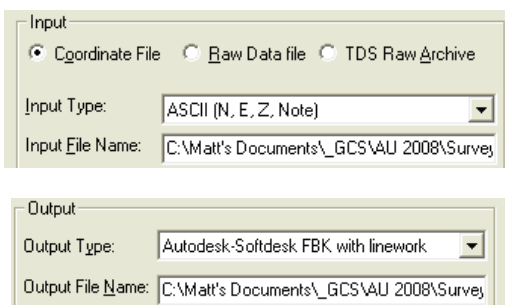
Importing from ASCII File

You probably know that you need an FBK file to use Survey and you're right. But your workflow consists of the tried and true ASCII file. No problem.

Hint: Use the Survey Link to convert your ASCII file to an FBK



- Start Survey Link
- Conversions-> Convert File Format and set it up like this. Note that even though the Input type reads (N,E,Z,Note) the format it requires is PNEZD (comma)



- Create your survey database as usual and import the FBK file. Your points will appear in your drawing. If they don't you may have to import them. In the survey tab, right click Non-Control points and select Points-> Insert into drawing.

Sharing

Points cannot be shared using Data Shortcuts, so how can we use the same points in multiple drawings? Just use the survey database. Any drawing that connects to the database will have access to all of the points therein.

If you edit points in any drawing they can be updated in any other drawing that is using them.

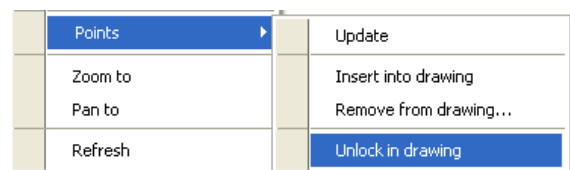
Warning: points shared in this manner **DO NOT** synchronize automatically like data shortcuts. You must manually **UPDATE** points in all drawings if you make edits.

Editing

Points can be edited in the survey database by modifying Northing, Easting, Elevation, and Description values in the table.

Points can be editing in the drawing, but only all at once and only using the Survey-> Translate Survey Database tool. The database can be moved, rotated, or a global elevation change. You just can't use the move command on survey managed points.

One option that is available in the survey database is to Unlock Points in Drawing. You will be able to move the points, but the link to the survey database has been severed. Your edited points are no longer protected or sharable.



Vault Managed Points

Points are managed in Vault for the same reasons as survey. Protection and sharing. There are some significant differences however.

Adding to Vault

After creating your Vault project and adding your drawing to the Vault, you need to add the points.

- Right click on points in the item view or right click any point group and select Add to Project.
- Choose check in and Protect when prompted. This makes the points read-only in your drawing AND Vault.

Editing

- Select all the points in Vault, right click and select Unprotect.
- Right click again and Check Out
- Make any required edits using standard point editing tools.
- Select all points in Vault again and check them back in; choosing Check in and protect when prompted.
- Even if they are not checked out, at any time you can delete as many points as you like in the drawing. You can get them back by selecting them in Vault and selecting Get from Project.

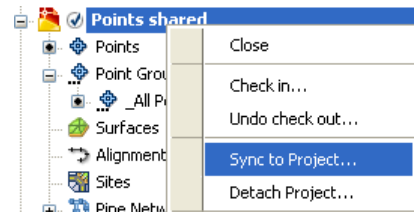
Sharing

Since points are managed in Vault, they can be shared somewhat similar to Data Shortcuts.

- Open a drawing with no points and add it to the Vault project.

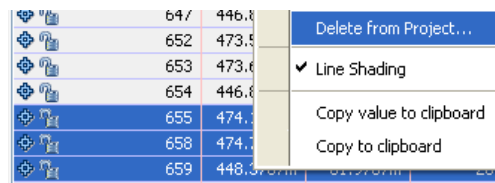
- Select all points in Vault, right click and select Get from Project. The points will be read-only unless they are unprotected and you check them out.
- Points can be edited in any drawing and those edits can be reflected in any other drawing that is using them

Warning: Like the survey database, points shared in this manner **DO NOT** synchronize automatically like data shortcuts. You must SYNC to Project for edits to be reflected in the current drawing.



Deleting from Vault

Points can easily be deleted from the Vault by right clicking, but two things MUST happen before this can be done.



- They must be unprotected
- They must be checked out

Connecting the Dots

Once all of your points have been imported, stored, and protected it's probably time to begin connecting some of them with polylines destined for use as breaklines or other linework. Set your OSNAP to "node" and go to town clicking one point at a time. This can be tedious.

There are other ways. Civil 3D's 'PN (Point Number) transparent command that can help us with this.

- Enter a point number and hit enter
- Type a new point number, enter, and so on
- Alternatively, enter a range of point numbers 1000-1030. This will connect all of those points inclusive.

A problem with this method is the points have to be sequential. Most surveyors will survey cross sections down a road making this tool unusable.

- Start the Pline command
- Enter 'PN at the command line, or select the PN transparent command from the toolbar

Bonus

As promised, I am supplying all attendees with a productivity tool that fills the "Connect the Dots" niche. This is a VBA routine. To run it in Civil 3D use **VBALOAD** to load then and **VBARUN** to run.

Connect Points

I got the inspiration and some of the logic for this tool from Mr. Jeff Mishler. If you spend any time at the Swamp or the Civil 3D discussion group, you'll probably recognize the name. His routine was written in LISP, but I wanted to add a dialog interface and some new functionality, so I started from scratch using VBA.

- Select one or more of the descriptions in the list and hit OK. A separate 3d polyline for each of the codes will be drawn connecting the points in order of point number.

If you toggle Selection instead of All, only the points within the selection window will be connected.

- Start the routine and you'll see the dialog.
- Hit the Select button and pick a few points. The list box will populate with all the different descriptors within your selection

