



Version 9

Tutorial and User Guide



Office: 01782 835764

Support: info@takeoffsoftware.co.uk

Web: www.takeoffsoftware.co.uk

Table of Contents

A.	Overview	4
B.	About the SiteWorx/OS Window	4
C.	File Types - Raster, Vector and PDF Files	5
D.	Project Tab	6
E.	Drawings Tab	6
	Step 1 - Open the drawing files	6
	Step 2 - Review the drawing files before starting	8
	Step 3 - Set the scale	8
	Step 4 - Align the drawings when multiple pages or files are opened.....	9
	Step 5 – Assign Reference Points when Importing or Exporting Elevations	10
	Step 6 – Save the File	10
F.	Takeoff Tab	10
	Step 7 – Understand the Takeoff Tab Toolbar	10
	Step 8 - Digitize the Project Boundary	15
	Step 9 - Digitize Contour Lines	17
	Step 10 - Record Points	19
	Step 11 - Record Sloping Design Lines	20
	Step 12 – Record Areas	20
	Step 13 – Record Topsoil Strip and Topsoil Respread regions.....	24
	Step 14 - Copy Selected Areas as Excluded Topsoil Respread regions	25
G.	Calculations Tab	26
	Step 15 - Calculate the results at the Calculations tab	26
H.	3D View Tab	28
	Step 16 – Review the models at the 3D View tab	28
I.	Review and make adjustments	29
J.	Cross Sections Tab	30
K.	Grid Data Tab	31
L.	Soil Analysis Tab	31

M. Trenches.....	32
N. Summary and review the reports	33
O. Boring Logs.....	33
P. Importing objects and elevations from DWG files.....	36
Q. Appendix - Sample Boring Logs.....	38

A. Overview

SiteWorx/OS models the existing and proposed surfaces from many file types. These surface models are used to calculate quantities of soil movement.

The SiteWorx/OS features available depend on the file type being used. Data from raster files (such as TIFF, many PDF files, scanned documents and others) are recorded by clicking the pixels on-screen. When using Vector PDF files, data is input into SiteWorx/OS by selecting the entity, such as a contour line, with a single mouse click. When working with CAD files such as AutoCAD DWG, all entities and elevations contained in a design layer can be quickly imported into the SiteWorx/OS file. In general, working with vector PDF and AutoCAD DWG files, are easier, faster and more accurate than working with raster files.

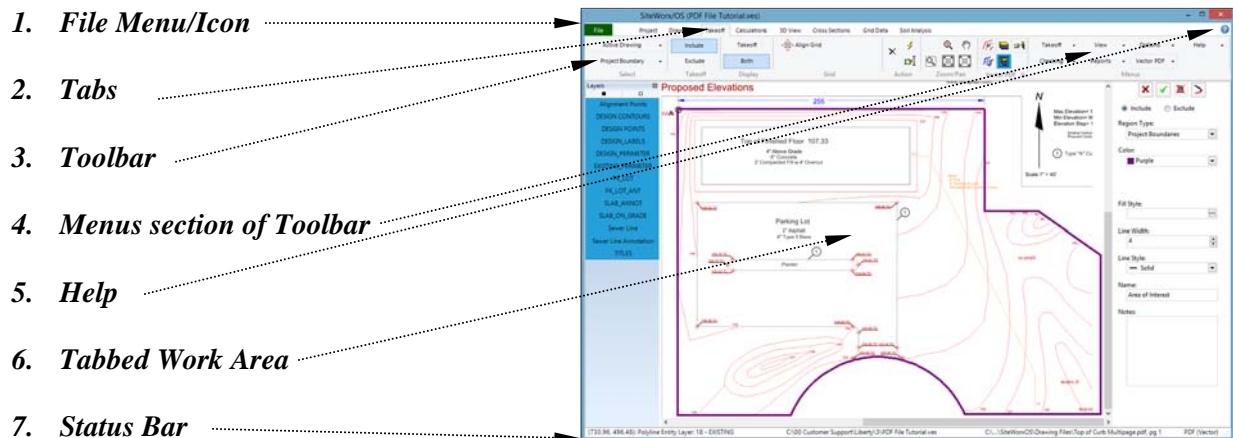
This tutorial will demonstrate a takeoff using a multipage PDF vector file. Information about trenches, bore logs and importing elevations from a DWG file are also covered in this tutorial.

To understand this software, we highly recommend working through this tutorial step by step. To access context sensitive help when working with SiteWorx/OS, click the small blue circle with the question mark in the far top right-hand corner of the window and then click the mouse when over a command on the toolbar. If you have any questions or problems whatsoever, please contact us at 800-989-4243, 214-340-9436 or support@vertigraph.com.

Wishing you the best of everything. Good luck.

B. About the SiteWorx/OS Window

The SiteWorx/OS window has the following parts:



1. File Menu/Icon

To open, save or start a new project, click on the file menu/icon found on the top left hand corner of the window.

2. Tabs

The tabs at the top of the window are named **Project**, **Drawings**, **Takeoff**, **Calculations**, **3D View**, **Cross Sections**, **Grid Data** and **Soil Analysis**. Work from left to right along the tabs. Start at the **Project** tab, where the project is defined. At the **Drawings** tab files are opened and the scale is set. The **Takeoff** tab is where elevations and areas are entered or imported from the plan file(s). Much of the work is done at the **Takeoff** tab. Each tab is covered in this tutorial.

3. Toolbar

The toolbar ribbon contains the program commands. Each tab will have a unique toolbar. Each toolbar is divided into sections; the section names are at the bottom of the toolbar.

4. Menu Section of the toolbar

The right side of the toolbar contains the SiteWorx/OS menus. To learn more about the commands on the menus, click the help question mark in the top right hand corner of the window, move the question mark pointer over the menu and click.

5. Help

The question mark in the top right corner of the window provides context sensitive help. Click the question mark and then click a menu or command for explanation. The **F1** keyboard key also provides context sensitive help.

6. Tabbed Work Area

The work area is the portion of the SiteWorx/OS window between the toolbar at the top and the status bar at the bottom. Data is entered and results are analyzed in the work area.

7. Status Bar

The status bar is at the bottom of the window. The status bar displays the following information from left to right: i) Important instructions and status messages pertaining to the current activity ii) Project file name iii) Drawing file name and iv) Notation that identifies how the image is rendered – RASTER, PDF, Vector PDF or CAD.

C. File Types - Raster, Vector and PDF Files

SiteWorx/OS works with both raster and vector files. Although somewhat technical, it is important to understand these file types.

Raster File Images

A raster graphic file displays the grading plan as a rectangular grid of small rectangular cells called pixels, or points of color. The image is built up from these tiny pixel cells. The smaller and closer the pixel cells, the better the quality of the image (i.e. higher resolution). Raster images are files with the following file extensions: some PDF, TIFF, JPEG, CMP, BMP et al. Photos and scanned blueprints are examples of raster images. When recording contour lines, points and areas from raster files, individual pixel cells are clicked with the mouse to record the item.

Vector File Images

A vector graphic image is different than a raster image. Vector files contain more information than the color coded pixels found in a raster file. A vector graphic uses geometric objects such as points, lines, curves and polygons that are based on mathematical expressions. A vector graphic contains geometric objects at certain locations. These geometric objects are organized in layers in a vector file. Vector files are computer aided design (“CAD”) files with the following extensions: AutoCAD DWG, DWF, DXF and some PDF.

When working with vector graphic images with layers, SiteWorx/OS can isolate the design layer and hide all irrelevant information. Additionally, the objects in vector graphic images are taken off by importing the objects or by snapping to the entity point or selecting the entire entity/object with a single click. Vector files provide increased speed, accuracy and ease of use. Most grading plans are created by the designer as a CAD file such as AutoCAD DWG. Often these CAD files are then distributed to the contractor as PDF files. The PDF file distributed can be either a raster type PDF file or, if the PDF file was created from the CAD file, a vector type PDF file. If the vector files such as AutoCAD DWG or vector PDF, are available, we recommend that you use the vector type file instead of the raster file.

PDF Files

PDF files are listed above as both a raster and vector file format. PDF files contain both pixel and vector data and some PDF files are highly complex. PDF files that contain layers indicate the PDF file was created from CAD software such as AutoCAD. PDF files that contain layers are known as “vector PDF files”. PDF files that do not contain layers are noted in this tutorial as “raster PDF files” which will display the PDF image using pixels. When working with a PDF vector file, SiteWorx/OS allows you to isolate the PDF layer and single click on the contour line for quick, accurate and easy takeoff.

How the takeoff is accomplished, and what options are available, are determined by the file type. When opening a file with SiteWorx/OS, how the file is rendered or displayed is disclosed on the bottom right corner on the status bar. The file will be rendered as one of the following:

- **PDF** for raster type PDF files
- **Raster** for non PDF raster files such as TIFF, JPEG, BMP and others
- **PDF (Vector)** for vector type PDF files
- **CAD** for DWG, DXF and other Computer Aided Design files which are vector files.
- If Adobe Acrobat is installed to your computer, you can use Acrobat to read PDF files. When **Use Acrobat** is turned on at the **Options | Setup** menu, **ACRO** will display on the status bar whenever any PDF file that is rendered using Adobe Acrobat.

This tutorial demonstrates a complete takeoff using a multipage PDF (Vector) file. Towards the end of the tutorial, importing objects from a DWG CAD vector file are also covered.

Now let's get started ...

D. Project Tab

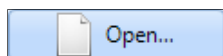
Start the takeoff at the **Project** tab. Here the project is defined. For this tutorial, simply input the project name as “**Tutorial Project**”. The information entered here appears on the reports. This project will not use bore logs.

The user defined fields displayed on this **Project** tab may be changed at the **Options** menu | **Setup | User Defined Fields/Reports** at any time. Working with boring logs is covered under the Boring Logs chapter towards the end of this tutorial.

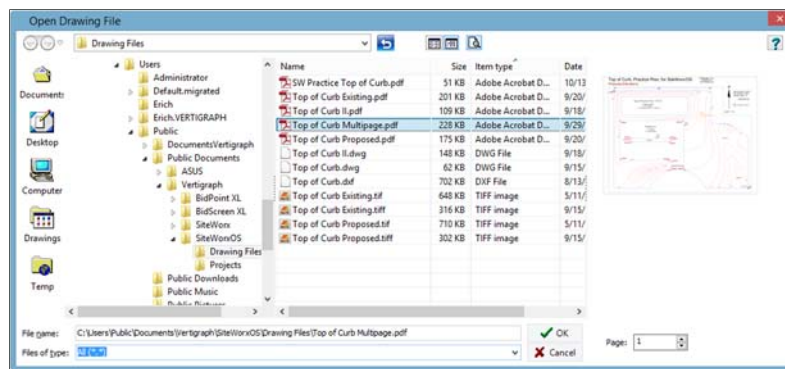
E. Drawings Tab


After entering information at the **Project** tab, the **Drawings** tab is where files and/or pages are opened. After clicking on the **Drawings** tab the user is asked to save changes to the current project. Answer **Yes** and enter “**Tutorial**” as the file name and click the **Save** button. This tutorial walks through a project using the installed **Top of Curb Multipage.pdf** file.


Step 1 - Open the drawing files



Click the **Open...** button on the left side of the **Drawings** tab toolbar to find and open page 1 of the file.



The tutorial drawing file named **Top of Curb Multipage.pdf** is found at **C:\Users\Public\Public Documents\Vertigraph\SiteWorxOS\Drawing Files**. Click the **Drawings** button on the far left side of the **Open Drawing File** window to display the files in this **Drawings** folder. After finding the **Top of Curb Multipage.pdf** file, click on the file name to display the preview image on the right side of the window. If the drawing preview does not display, click the **Show Preview** tool  on the top right side of the **Open Drawing File** window.

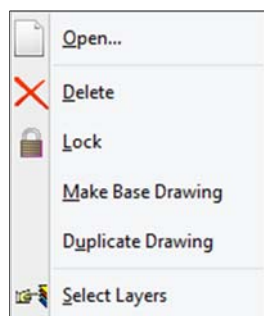
When working with files that contain multiple pages, the page number is displayed underneath the preview at the bottom right side of the window . Simply navigate through the pages using the up and down arrows to preview the desired page. This tutorial project uses one file with multiple pages. As a result, after the page 1 preview displays, click the **OK** button at the bottom to open and display page 1 of the drawing.

The active drawing file name and location are shown on the status bar at the bottom right hand side of the window. Additionally how the file is rendered (i.e. either as a PDF, Raster, PDF (Vector), CAD or ACRO) is also disclosed in the bottom right corner on the status bar. This multiple page file is a vector type PDF file and as a result, will display **PDF (Vector)** on the bottom, far right corner of the status bar.

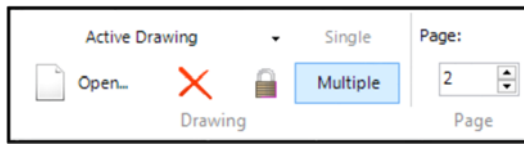
C:\Users\Public\Documents\Vertigraph\SiteWorxOS\Drawing Files\Top of Curb Multipage.pdf, pg 1 PDF (Vector)

Projects may contain a single drawing file or multiple drawing files or pages. In this tutorial, the proposed elevations are found on page 1 and the existing elevations are found on page 2. As a result, page 2 of the file must also be opened and this tutorial project will use **Multiple** drawings. To open page 2 of the file, click the **Open...** command on the **Drawing** section of the toolbar, select the same file and change page 2 at the bottom right hand corner of the window. In this tutorial, after page 2 is displayed, click **OK** to add page 2 to the **Active Drawing** list.

Please note there is another way to add pages to a multiple page project. After opening the first page, **right click** the mouse over the drawing to display the pop up menu:



To add a new page, click on **Duplicate Drawing** and then move the mouse up to the **Page** section of the toolbar and change the page number displayed on the toolbar to **2**.



The list of pages or drawings opened and available are displayed by clicking the **Active Drawing** button on the top left side of the **Drawings** toolbar. Page 1 and page 2 should now be shown on the **Active Drawing** list. Once the desired drawings or pages are opened and properly displayed on the **Active Drawing** list, **DO NOT** change the **Page** number since changing the page number will change the active drawing. To prevent changes to the page numbers on the **Active Drawing** list, click the **Lock** button. The page is automatically locked however once the scale is set or whenever the page is aligned to the other sheets. Once locked the page number cannot be changed unless it is first unlocked.

Step 2 - Review the drawing files before starting

After the desired drawings are opened, review the drawings by selecting the file or page from the **Active Drawing** list to obtain a basic understanding of the project. To review a page that is not on the active drawing list, **right click** on any drawing at the **Drawings** tab and select **Duplicate Drawing** from the popup menu and then change to the desired **Page** on the **Page** section of the toolbar.

IMPORTANT – Zooming and moving around (i.e. panning) the drawing quickly and easily is critical. Zooming in and out is done through the scroll wheel on the mouse. When zooming with the scroll wheel, the drawing will center on the screen wherever the mouse pointer is placed. The **Zoom to Selection** tool at the **Zoom/Pan** section of the toolbar is also a quick way to zoom. When zoomed in, move (i.e. pan) around the drawing by holding the **Ctrl** keyboard key down while moving the mouse with the left mouse button pressed. Holding down the scroll wheel while moving the mouse also pans the drawing.

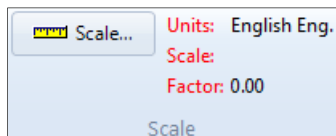
When reviewing the file, determine the area of interest or project boundary where cuts or fills will occur. Where are the existing and proposed elevations different? Are there excluded areas? Does anything need to be demolished and removed? Are project dimensions in meters or feet? Are there bore logs that need to be entered? Is there a known dimension available for auto-scaling? Are the areas flat or not flat? What subgrade material layers need to be placed under the areas? Does the grading information come from one file page or does the data come from multiple file pages? If there is more than one file or page, are there two common alignment points displayed on each drawing? If multiple files – are there match lines or common alignment points? In summary, gain a basic understanding of the project by reviewing the page file(s) before starting.

Step 3 - Set the scale

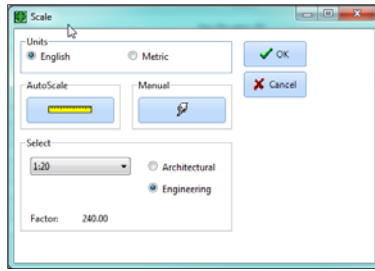
When working with multiple pages or files, the scale is set only on the first drawing opened which is the first drawing on the **Active Drawing** list found on the **Drawing** section of the toolbar.

This first drawing on the **Active Drawing** list is known as the **Base Drawing**. To change which page or file is the first, base drawing for scaling, select any drawing except the first from the **Active Drawing** list, **right click** the mouse over the desired drawing and select **Make Base Drawing** from the popup menu.

To set the scale, select the first drawing on the **Active Drawing** list and then click the **Scale** button on the **Scale** section of the toolbar.



After clicking the toolbar's scale button, a message may recommend autoscaling. Click **OK** and the scale dialog box disappears. To insure accuracy, Autoscale should be used on all drawings. Once understood, the **Show Autoscale Dialog** may be turned off under the **Options | Setup** menu.



The scale units are defined as either **English** or **Metric** units. For Metric Units, volumes are calculated as cubic meters rather than cubic yards and areas are reported as square meters instead of square feet.

To set the scale for this tutorial, select **English** and click the yellow ruler, **AutoScale** button, and the drawing appears. Single click (do not trace) the beginning and end points of the 255' blue line at the top of the drawing. After clicking the second point, enter the length of the line as **255** in the distance box on the toolbar and then click the green checkmark **OK** button on the **Scale** section of the toolbar. English scale lengths are entered in decimal feet. For example, 5 feet, 3 inches is always entered as 5.25 feet.

After entering the distance and clicking **OK**, the scale factor is displayed. For English scales, the scale factor is equal to the reciprocal of the scale times 12. Rarely does the scale factor created using **AutoScale** calculate the exact number however. For example, if the factor shows 479.87 after auto-scaling and the scale on the drawing shows 1:40, selecting the 1:40 scale from the drop down list will change the factor to an even 480 which is the true and proper factor for an image with a true 1:40 scale. It is recommended that the calculated scale factor be compared to the factor that would be generated if the scale disclosed on the drawing file was selected from the list.

Step 4 - Align the drawings when multiple pages or files are opened

Many projects consist of a single PDF or DWG drawing file or a single page of a multiple page file. A single file or page does not need to be aligned. Other projects may contain data from multiple files or pages. This tutorial uses two (i.e. multiple) drawing pages where the existing elevations are displayed on page 2 and the proposed elevations are on page 1. As a result of using multiple files, the files/pages must be aligned to each other.



To define the alignment points on page 1, click the **Align Dwg** command on the **Alignment** section of the toolbar at the **Drawings** tab. When the drawing appears, click on two common alignment points. For this tutorial project move to the top left corner of the drawing and single click the corner inside the conveniently placed **A** circle. Next, move to the bottom right corner and click inside the **B** circle. After clicking the two alignment points, move to the **Align** section of the toolbar and click the green checkmark **OK** button to complete. The alignment points are displayed ovetop of the drawing at the **Drawings** tab. The red mark reveals the first alignment point, the blue mark shows the second alignment point. After page 1 is aligned, change to page 2 by clicking **Active Drawing** on the **Drawing** section of the toolbar, click **Align Dwg**, and align page 2 to page 1 by clicking on the same two alignment points in the same manner.

Alignment points should generally be top left and bottom right of an identifiable object. In this tutorial the alignment points are conveniently noted as **A** and **B**. Sometimes alignment points are not as obvious as this tutorial. For other projects, the top left and bottom right corners of a slab, parking area or property limits may be ideal alignment points. The alignment points must be common on all of the drawing files or pages. Again, each project has unique alignment point locations that must be digitized when a project uses multiple files or pages.

The alignment points are required when there are multiple drawings with the same footprint. Sometimes multiple files/pages will display a match line with different footprints. For drawings with match lines, some customers use RasterStitch which stitches together multiple files along the match lines to create one large, single drawing file. The entire project will be taken off using this single large drawing file created with the RasterStitch software. Information on RasterStitch is found at <http://www.vextrasoft.com/rasterstitch.htm>. In addition to RasterStitch, there are other commercially available software products that stitch together multiple pages along the match lines.

Step 5 – Assign Reference Points when Importing or Exporting Elevations

Setting reference points are not required. However, if reference points are recorded to the drawing file at the **Import/Export** section of the **Drawing** toolbar, GPS information can be imported or exported. Reference points are used to link the drawing file to real world GPS coordinates when exporting surface model points, exporting the takeoff as a DWG file or importing GPS points from a CSV file.

Preferably, two reference points are defined. The points define the scaling and rotation information necessary for the export/import. If only one point is available, the North/South direction must be defined. For each reference point, the northing and easting distances from the origination point must be entered. Negative northing and easting values indicate a position due south and west of the origin, respectively.

Step 6 – Save the File

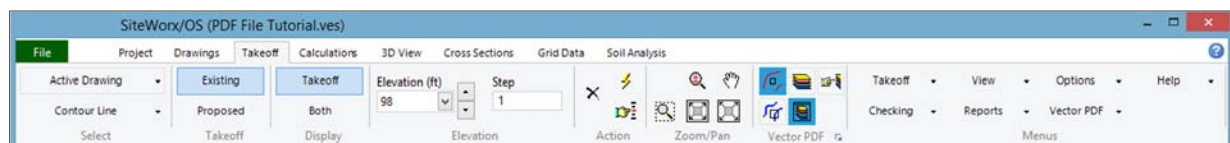
When done scaling and aligning the drawings at the **Drawings** tab, save the file by clicking the **File** menu/icon command found at the top left corner of the window followed by the **Save Project** command. Please note that changes to the project file are not automatically recorded. Data is initially stored in memory until the changes are saved to the file.

Please note that a backup file is created during calculations. This backup file will be located in the same folder as the original project file. The original SiteWorx/OS project file has a ves extension. The backup file will have the same name with a ~ves extension. When using the Windows File Explorer application (access File Explorer by right clicking on the Windows Start button) insure that **File name extensions** checkbox is checked under the **View** menu. To use the backup you'll need to rename the backup file. To rename the backup file, right click on the file in File Explorer and select **Rename** where you'll adjust the file name and delete the “~” character in the file extension.

F. Takeoff Tab

The **Takeoff tab** is where the data from the drawing files are input into SiteWorx/OS. When building the project file, the majority of time is spent at this **Takeoff** tab.

Step 7 – Understand the Takeoff Tab Toolbar



Understanding how the takeoff toolbar works is critical. The sections of the toolbar will be discussed moving from left to right. The various section names are written at the very bottom of the toolbar.

Select

The left side of the toolbar is where you change and select the **Active Drawing** from the list when using more than one file or page.

The button underneath the **Active Drawing** button with the drop down arrow displays the list of takeoff objects available for selection.



The takeoff process involves selecting the object from the list and then recording the relevant data from the drawing file pertaining to the selected object.

Takeoff

After selecting the object from the list, move to the right along the toolbar and select the **Takeoff** type. The takeoff type will be either **Include** or **Exclude** for regions (a region is a project boundary, topsoil strip or topsoil respread area). The **Takeoff** for all other objects will be either **Existing** or **Proposed**.

Display

Whatever is selected as the **Takeoff** to the left, the **Display** section of the toolbar provides the option to display only the selected takeoff type noted to the left or both takeoff types. When **Both** are selected for elevation items, the screen will display the existing and proposed elevations for the object at the same time. If a region object is selected (i.e. project boundary or topsoil), **Both** displays the included and excluded regions.

Elevation

For objects that require elevations (i.e. contour line, point elevation, design line and area elevation) the elevation of the object must be input on the toolbar whenever the **Options** menu | **Show Properties/Elevation Dialog** command is turned off. Normally the **Options** menu | **Show Properties/Elevation Dialog** command is turned on (i.e. checked) where a dialog box will be presented and the elevation and other information is recorded after clicking a point.


Next to the elevation box, a step value is entered and is usually input with a value of 1. When clicking the increase or decrease elevation command from the right mouse popup menu or by using the keyboard shortcut keys, the elevation will change by the value in the step box. The step value is useful for taking off contour lines. Instead of typing in the elevation for each new line, it is quicker to increase or decrease the elevation by the step value.

Action

Action tools on the toolbar are important.



Start Takeoff must be clicked to digitize objects. The mouse will change from a typical mouse pointer to one of the following:

 This mouse pointer is used to digitize pixels on screen and is the typical method to

record items from a raster file. This mouse pointer displays when working with raster files and both **Auto Trace** and **Easy Trace** are turned off. When working with Vector or CAD files, this cross-hair displays when the **Select Entity** and **Snap to Entity Point** commands are off.



The mouse pointer changes to this shape when **Auto Trace** is turned on under the **Raster/PDF** menu. **Auto Trace** is available only for raster type files and is not offered on vector type files. The background color must be defined by clicking on the file background after selecting the **Raster/PDF | Background Color** command. Auto Trace is useful when recording contour lines from raster type files. Auto Trace draws the line by clicking on three points along the contour line (start of line, direction indicator point along the line which is approximately 1" from the start of the line point and end of line point).



The mouse point changes to this shape when **Easy Trace** under the **Raster/PDF** menu is turned on. **Easy Trace** is a simplified way of tracing lines from raster files. When approaching an intersecting line using **Easy Trace**, simply click over the line. To use **Easy Trace**, the background color must be defined by clicking on the drawing background after selecting the **Raster/PDF | Background Color** command.



When working with vector files, the mouse pointer changes to a small selection box when **Snap to Entity Point** or **Select Entity** is turned on at the **Vector PDF** or **CAD** section of the **Takeoff** tab toolbar.





Stop Takeoff. When the **Start Takeoff** action is on, this button stops the takeoff and returns the pointer to mouse mode. The project can't be saved if **Start Takeoff** is activated. As a result, click this **Stop Takeoff** command before saving the file.



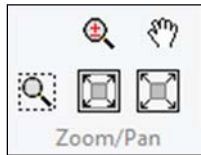
Delete last point. If a mistake is made, this button deletes one point with each click. Clicking this button ten times in a row deletes the last ten points. Pressing the **Alt + Backspace** keys on the keyboard also deletes the last point. You can change the many shortcut keyboard commands by selecting the **Options | Setup | Keyboard Shortcuts** menu.



Select an Object. To select an object for modification or deletion, click on **Select an Object** from the **Action** section of the toolbar and move the square mouse pointer over an actual point in the object. The object changes color whenever the square mouse pointer is over a point. When the object changes color, **left click** on the point to select the object. For lines, a point is always found at the beginning and end of the line. Please note that there may be no points in the middle of the line, the ends of the line always contain a point. For areas or regions, a point is always found on any corner. This command can also be activated by clicking the right mouse button.

After selecting, the chosen item's properties are deleted or changed on the far right side of the window. After changes are made on the right side of the window, click the green checkmark  on the top right side of the window to record the changes. Click the second red X , located to the immediate right of the green checkmark, to delete the entire object.

Zoom/Pan



Zoom to selection zooms and enlarges the selected area. After clicking, hold down the left mouse button to zoom over a selected rectangle.



This command activates the zoom commands. After clicking this command, left click the mouse to zoom in, **right click** the mouse to zoom out. Click this tool again to turn off zooming. Zooming may be quicker using the scroll wheel on the mouse or by holding down the **Shift** key on the keyboard while clicking.



Pan enables movement around the drawing. The mouse pointer will change to a hand after selecting this tool. Once this tool is activated, click it again to turn off the pan command. Panning is usually easier by holding down the **Ctrl** key on the keyboard while dragging and dropping the mouse with the left mouse button pressed. Holding down the scroll wheel on the mouse also pans the drawing.



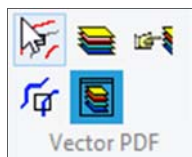
Fit Project in Window will resize the drawing so that the **Project Boundary** fits inside the window. A **Project Boundary** must be input for this command to work.



Fit Drawing in Window will fit the entire drawing inside the window.

Vector PDF Section of Takeoff Toolbar

The **Vector PDF** section of the toolbar displays whenever a vector PDF file is open and **Use Vector** is enabled at the **Options | Setup | Use Vector** menu. This **Vector PDF** toolbar section will not display when working with any other file type that is not a vector PDF. Remember, not all PDF files are vector, some PDF files are raster formats. A menu with similar commands, entitled **Vector PDF**, is also added to the **Menus** section of the toolbar.



The buttons found on the **Vector PDF** toolbar section include:



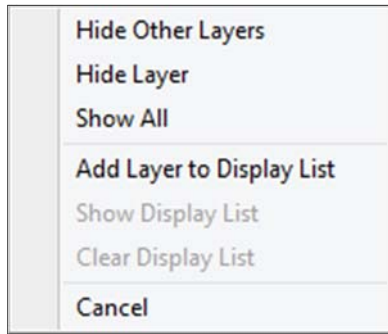
Display the Layer List button shows the vector file layers on the left side of the screen.



Display Layer Dialog presents a window of the layers. Normally, when the **Display the Layer List** button is turned on, the **Display Layer Dialog** is not needed.



Select Layers is used to identify and isolate a layer. After clicking on the **Select Layers** button move the red, square selection box over an object/entity point and once the entity is highlighted, click the right mouse button to display the popup menu.



Here you can hide all other layers except the selected layer. Layers may be added to a display list that contains a subset of layers. After using the **Select Layers** button to isolate the layers, you must turn off the **Select Layers** command on the toolbar before digitizing.

When working with vector PDF files, the user has three options in how the items are taken off from vector PDF files:



1) **Select Entity** should be turned on when working with contour lines. When clicking on the line, the entire contour polyline will be selected when **Select Entity** is depressed.



2) **Snap to Entity Point** snaps to a single point within the entity/object. **Snap to Entity Point** is ideal for taking off areas. **Snap to Entity Point** is often the best way to digitize areas from vector PDF files. If contour lines consist of many sections rather than a single polyline, this command is ideal for contour lines.

3) When **Select Entity** and **Snap to Entity Point** are both turned off, the items on the screen are digitized just like any other raster file.

CAD Section of Takeoff Toolbar when CAD, Vector files are opened

The **CAD** section displays whenever a Computer Aided Design (CAD), vector type file is opened. CAD file extensions include DWG, DWF and DXF. For other file types opened, the **CAD** section of the toolbar will not display. Whenever a CAD file is opened, a **CAD** menu is added to the **Menus** section of the toolbar.



The commands found on the CAD section of the toolbar are similar to the Vector PDF toolbar commands noted above except that an additional command is found on the CAD toolbar that imports the select layer information into the takeoff. This import from drawing command is extremely valuable when working with CAD files (i.e. DWG files primarily) and is covered in the chapter entitled [“Importing objects and elevations from DWG files”](#).


Raster/PDF Section of Takeoff Toolbar when raster files are opened



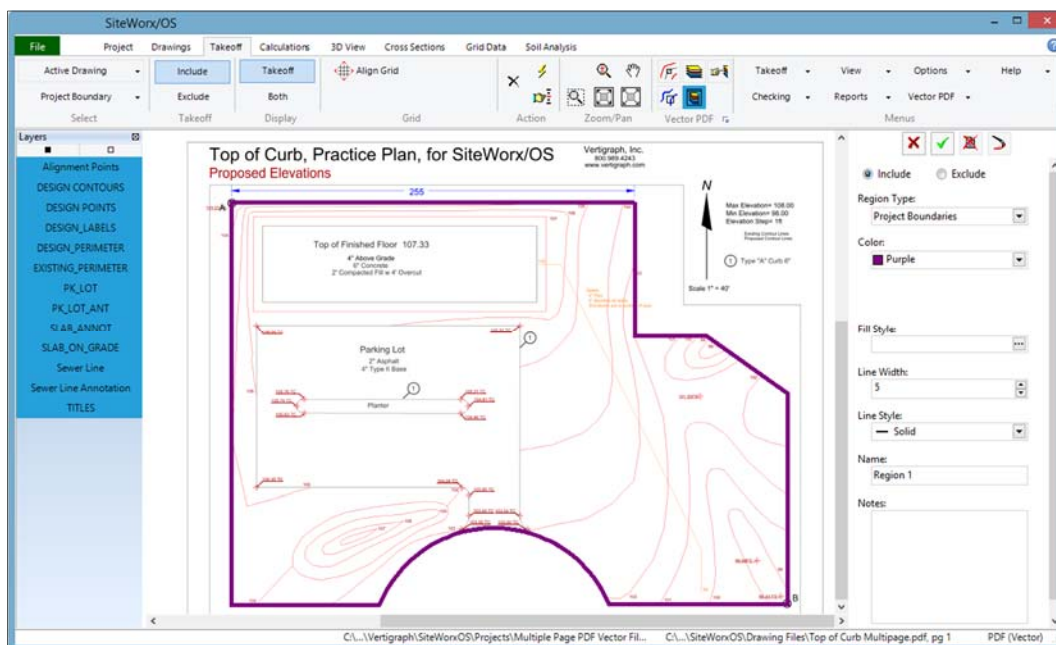
Three commands are found on the Raster/PDF toolbar: 1) Enable Auto Trace 2) Enable Easy Trace and 3) Select Background Color. These commands are useful when taking off contour lines from raster type files. SiteWorx/OS looks for the contrast between the line color and the background color. As a result, the background color must be defined before using Auto Trace or Easy Trace. Once the background color is defined, and with a little practice, Auto Trace takes off the whole line with three clicks: 1) start of the line 2) an inch away along the line to define the initial direction of the line and 3) end of line.

Easy Trace, on the other hand, matches the digitized line to the plan by dragging the mouse near the line with the left mouse button held down.

Menus

Eight menus may be available on the right side **Menus** section of the **Takeoff** tab toolbar: **Takeoff**, **View**, **Options**, **Help**, **Checking** and **Reports**. Additionally one of three file type menus will be added. A **Vector PDF** menu is added when a vector PDF file is opened. A **CAD** menu is added and available whenever a vector, type computer aided design file is opened such as AutoCAD DWG. And finally, a **Raster/PDF** menu is available when the file opened is a PDF type raster file or another type of raster file. Click on the menu with the mouse pointer to view available commands. As noted previously, click on the Help button  in the top right hand corner of the window and then click on the menu with the question mark mouse pointer to learn about the various sub-menus.

Step 8 - Digitize the Project Boundary





The process for defining the project boundary follows:

- ☐ Insure that Page 1 is the **Active Drawing** in the **Select** section of the toolbar. Select **Project Boundary** from the **Select** list box found underneath the **Active Drawing** button. Next, click on **Include** at the **Takeoff** section of the toolbar which is to the immediate right of the **Project**

Boundary selection. The cut and fill volumes are limited to the included area.

Please note: although there are no excluded project boundaries in this tutorial, SiteWorx/OS can exclude certain regions from the included project boundary by selecting **Exclude** and then digitizing the excluded region inside a previously digitized **Included** Project Boundary. Excluded regions must be contained within included regions.

- ☐ The Project Boundary is where the cuts and fills are calculated. Inside the project boundary existing elevations should be different from the proposed elevations. Again, no cuts and fills are calculated outside the included project boundary.
- ☐ The included project boundary is the region where the proposed elevations are different than the existing elevations. The project boundary is normally defined on the file or page that contains the proposed elevations.
- ☐ To digitize the project boundary, click the lightning bolt **Start Takeoff** button  located at the **Action** section of the toolbar. The mouse pointer will change to a cursor crosshair when **Select Entity** and **Snap to Entity Point** are not selected on the **Vector PDF** section of the toolbar.
- ☐ Now, click on any corner of the blue project boundary line and click on each change of direction (i.e. corners) while moving around the project boundary either clockwise or counterclockwise. A **Region Properties** dialog box will display after clicking the first point where information about the project boundary is entered. At the dialog box, change the line width to **4** and click the **OK** button. Please note, this dialog box displays only when **Show Properties/Elevations dialog** is checked under the **Options** menu on the toolbar.
- ☐ To digitize around a curve, simply click in small increments around the curve or press the right mouse button and select the **Arc** command followed by a click along the curve and another click at the end of the curved line. The Arc command is also activated by the keyboard shortcut of **Alt + A** which is defined under the **Options | Setup | Keyboard Shortcuts...** menu.
- ☐ When done digitizing the last corner of the project boundary, press the right mouse button **Stop Takeoff** command. The area will close to the first point digitized and the mouse pointer will change to a typical mouse pointer rather than a crosshair cursor.
- ☐ After stopping the takeoff, information about the project boundary is found on the right side of the screen.
- ☐ After digitizing the project boundary it is a good idea to verify that the project boundary is properly placed over all the drawing files. Change the drawing files by clicking on the **Active Drawing** selection on the toolbar.
- ☐ The **Align Grid** button at the **Grid** section of the toolbar is not used with this tutorial. For future knowledge and use, the **Align Grid** button aligns the grid to a side of the project boundary or to a selected point. Aligning the grid may be required when exporting stake or GPS data. If the grid is not shown overtop the drawing, click on the **View** menu | **Takeoff Grid** to display. The grid size spacing is set at the **Calculations** tab. After clicking the **Align Grid** button, the project boundary can be aligned with the grid lines or to a selected point, such as a slab corner. If aligning the grid to a point, make sure the desired point has been recorded as a **Point Elevation** at the **Select** section of the **Takeoff** tab toolbar. Then at the **Point Elevation** window select the desired point using the **Select an Object** tool from the toolbar . After selecting the point, select the **Project Boundary** and press the **Align Grid** button to align the grid to this selected point.

Step 9 - Digitize Contour Lines

After digitizing the Project Boundary over the proposed elevations on Page 1, click the **Active Drawing** button on the toolbar to change the drawing to page 2. The existing contour lines on the drawing file and the project boundary should now display.

Select **Contour Line** from the list box on the **Select** section of the toolbar. Next, select **Existing** as the **Takeoff** and type in **98** in the **Elevation** box with a **Step** value of **1**. The Display section of the toolbar should be set to **Takeoff**, not **Both**.

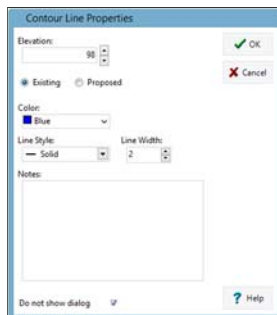
When working with a vector file, the contour lines can be taken off in three different ways:

- 1) Click along the line with the mouse by clicking on the change in direction inflection points.
- 2) Use the **Select Entity** tool where the contour line from a vector file is taken off with a single click.
- 3) Use the **Snap to Entity Point** tool with vector files where the mouse pointer will snap to points contained in the line.

This tutorial will demonstrate all of the methods noted above. Item 1) is often used when working with raster files. Additionally, when a raster file is loaded, you can also takeoff contour lines by using the Auto Trace or Easy Trace features. When performing the takeoff you'll determine which method is best for the specific drawing file. On many projects, employing more than one method is common.

Method 1 – Click along the line

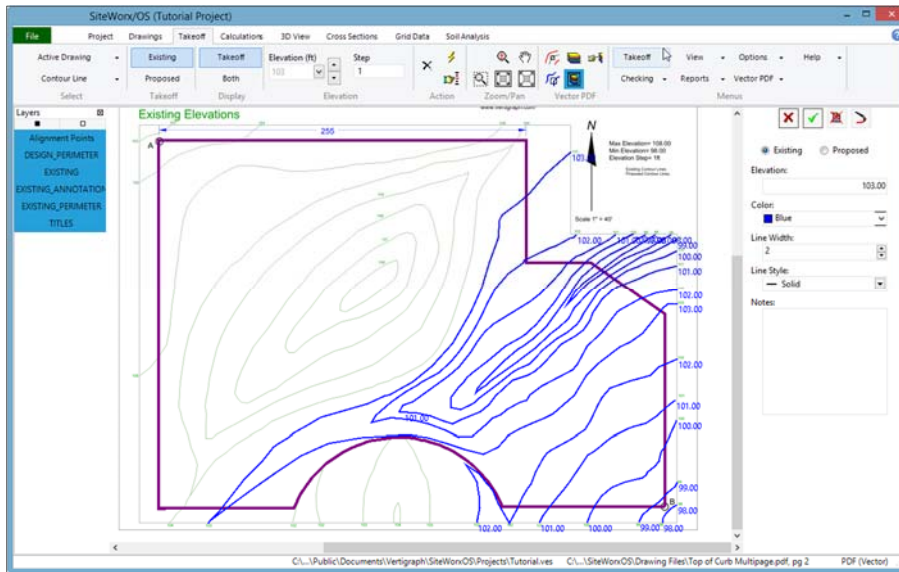
First, using method 1 noted above, please insure that the **Select Entity** and **Snap to Entity Point** buttons are not on or depressed at the **Vector PDF** section of the toolbar. Also the **Elevation** should be at **98** and the **Step** should be **1** at the **Elevation** section of the toolbar. Next click the ⚡ **Start Takeoff** button on the **Action** section of the toolbar to begin digitizing. Click the end of the 98 existing contour line located at the bottom right corner, and the **Contour Line Properties** dialog box will display whenever the **Options** menu | **Show Properties/Elevation dialog** is checked.




Since the contour lines are changing in foot increments, it is quicker to change the elevations by using the step value defined on the toolbar rather than typing the elevation in the contour line properties box for each line. As a result, check the “**Do not show dialog**” check box at the very bottom of the window then click **OK** to close the window. Click on the change of direction along the 98 foot and when done digitizing along the 98 line, increase the elevation value by the step value by **right clicking** the mouse and selecting, on the right side of the popup menu, **Increase Elevation**. The elevation is also increased by the step value by pressing the **F11** keyboard shortcut key. Elevations are decreased by the step value by pressing the **F12** keyboard shortcut key. Whenever the elevation is changed the line will end. Next, click on the beginning of the 99 elevation contour line and click along the line and repeat the above same steps.




Practice digitizing the contour lines using method 1 from the bottom right corner up to the 103 elevation

line while using the right mouse button or F11 and F12 keyboard keys to increase and decrease the elevations.




Please remember, zooming is best done using the scroll wheel on the mouse and moving around the drawing (i.e. panning) is performed by holding the keyboard **Ctrl** key while dragging the mouse. Practice moving around, panning, changing elevations and recording contour lines.

Please note that if you digitize incorrect points, click the **Delete last point** button on the **Action** section of the toolbar or press the **Alt+Backspace** keyboard shortcut keys. To end one line and start a new line with the same elevation, **right click** the mouse and select **New Object** from the popup menu. After digitizing the 103 contour line, **right click** the mouse and select **Stop Takeoff** or click the red X  in the **Action** section of the toolbar.

The properties for the last item digitized are shown on the right side of the window. Here the elevation and/or other properties can be changed or the entire line can be deleted. To record any changes made on the right side of the window, click the green checkmark on the top right side of the window . To select a contour line for modification or deletion, click on a point within the line (please note that points are always found at the beginning and end of every contour line) using the **Select Object** tool  from the **Action** section of the toolbar. To delete the selected line displayed on the right side of the window, click the red X button  located to the right of the green checkmark on right side of the window.

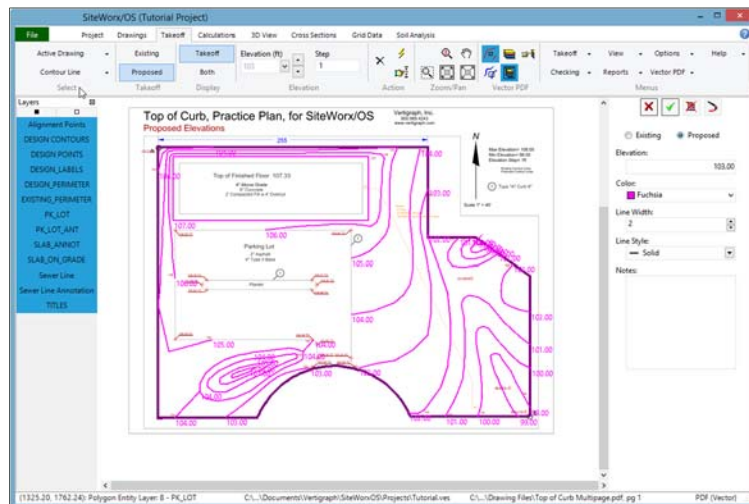
Method 2 – Select Entity

When done with the 103 elevation line **right click** the mouse and select **Stop Takeoff**. The remainder of the existing contour lines will be digitized using the **Select Entity** feature as noted in method 2) listed previously. Now that some of the existing contour lines have been recorded using the raster file takeoff method, the remaining contour lines will use the select entity, vector file method.

To digitize the proposed contour lines with the **Select Entity** setting, insure **Select Entity**  is clicked on the **Vector PDF** section of the toolbar. Finally, type in the elevation at the **Elevation** section of the toolbar and make sure the **Step** value is set to 1. Now click **Start Takeoff** on the **Action** section of the toolbar to begin.

The mouse pointer will display a box when **Select Entity** is turned on. Move the box over the 104' contour line and left click on the line to takeoff the entire line. When done, **right click** and select **Increase Elevation** or use the **F11** keyboard key to increase the elevation by the set value to 105'. Click the 105' contour line to takeoff the entire line. Continue to increase or decrease the elevations using the right mouse button popup menu or by using the **F11** and **F12** keyboard shortcut keys. Once the proper elevation is defined at the **Elevation** section of the toolbar, single click on the desired

contour lines to takeoff the entire line. You'll find that using the **Select Entity** tool from the **Vector PDF** section of the toolbar is more accurate, faster and much better than digitizing pixels on-screen.



When done with all of the existing contour lines, click **Stop Takeoff** from the right mouse button popup menu or from the **Action** section of the toolbar and then change the Active Drawing to Page 1 and digitize the proposed contour lines. Remember the Takeoff should be changed to **Proposed** on the toolbar ribbon.

When the contour lines are a collection of segmented lines rather than a single polyline, the **Snap to Entity Point** command should be turned on at the Vector PDF toolbar.

Method 3 – Snap to Entity Point

When taking off contour lines from vector files, **Select Entity** is usually the preferred method. Sometimes however, the creator of the drawing file improperly creates a collection of section lines along the contour line rather than a single polyline. If you come upon a contour line that contains many small lines or entities, change from **Select Entity** to **Snap to Entity Point** on the **Vector PDF** section of the toolbar. Additionally, the **Append line segments** command at the Vector PDF section of the toolbar can also be used with the **Select Entity** command when digitizing line segments.

Snap to Entity Point is also the preferred method to takeoff areas from vector files. As a result, this **Snap to Entity Point** takeoff method will be demonstrated when recording the proposed areas.

Step 10 - Record Points

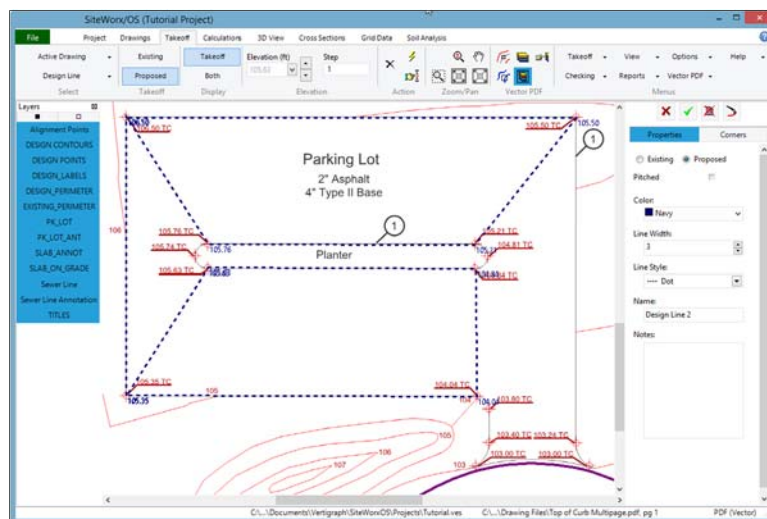
The page 1 of the Active Drawing contains point elevations. Select **Point Elevation** from the **Select** section of the **Takeoff tab toolbar**. Click **Proposed** as the **Takeoff** type. Turn off the **Select Entity** and **Snap to Entity Point** commands on the **Vector PDF** section of the toolbar. When taking off points, please turn on the **Options** menu | **Show Properties/Elevation Dialog**. Finally, click the **Start Takeoff** button to begin digitizing.

The 103.23 point elevation is located in the top left corner of the window below the A alignment point. Simply click on the point and then enter the elevation followed by the **Enter** key on the keyboard. Using the keyboard, rather than the mouse, to record elevations into the Properties/Elevation Dialog generally increases your data entry speed. Digitize the top of curb elevation points around the parking lot. When done digitizing all of the point elevations, click the **right mouse** button **Stop Takeoff** command to return to mouse mode.

Step 11 - Record Sloping Design Lines

Design lines define slopes and smooth out the site. A design line is a sloping line where the end points will have different elevations. Between the end points, a series of increasing or decreasing elevation points will populate along the design line. Points found in contour lines and point elevations that are closest to the design line will connect to the points created along the design line. In this tutorial, design lines are being used to define the slope of the parking lot. On many projects, design lines are not needed since the contour lines and point elevations will properly model the surface. Users may determine that design lines are needed in certain locations after looking at the 3D model noted at the 3D View tab.

When recording a **Design Line**, the **Show Properties/Elevation Dialog** under the **Options** menu should be checked on. After selecting **Design Line** and **Proposed** Takeoff from the **Takeoff** tab toolbar, click the **Start Takeoff** button and after clicking on the end point of the line, type in the elevation, change the color, line style and increase the width and press the **Enter** key on the keyboard. Click on the other end point of the line and enter a different elevation followed by the **Enter** keyboard key. Design lines are often used to define the parking lot slopes. Design lines should not cross.



When recording design lines with the **Options | Show Properties/Elevation Dialog** checked, the sloped elevation of the end point may be calculated based on a slope by checking the **Pitched** check box. After clicking the **Pitched** check box, enter either a rise and run value or a percentage. For lines the slope downwards, the slope % or rise value will be negative. This tool is helpful in determining the end point elevations of a line with a constant slope.

Step 12 - Record Areas

Please note there are four area types: **Surface**, **Basement**, **Subgrade Only** and **Other**. Before digitizing an area from the plan, please determine the area type.

1. A **Surface** area, such as a building slab, is for flat areas that are at or above grade at a specified elevation.
2. A **Basement** area type is for flat areas below grade. **Surface** and **Basement** areas are the same except that a contour line is drawn around the perimeter of a **Surface** area where the elevation points generated from the contour line will slope to the closest elevation points outside of the **Surface** area. A **Basement** area, on the other hand, will be dropped down to the specified elevation, and the walls will be straight up. The perimeter of a **Basement** does not slope or connect to the closest elevation points like a **Surface** area.

3. A **Subgrade Only** area identifies non-flat areas, such as parking lots and sidewalks. The elevations over a **Subgrade Only** area are reduced by the subgrade layer depths. The varying elevations of a **Subgrade Only** area are defined by the elevation points (i.e. contour lines, point elevations or design lines) previously recorded.
4. An **Other** area type is used to calculate areas, perimeters and layer volumes. Other areas have NO effect on the 3D model or the cut and fill volumes. **Other** is used for measuring only.

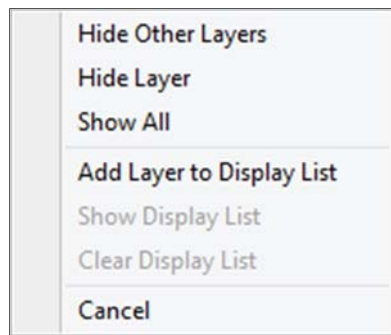
Again, before digitizing the area, determine the type of area being taken off. Is it a **Surface Area** or a **Subgrade Only** area? Again, flat slab areas are **Surface** areas, flat areas below grade are **Basement** areas and non-flat areas are usually **Subgrade Only** areas. The **Show Properties/Elevation Dialog** should always be checked under the **Options** menu whenever recording areas.

Digitizing a Flat Surface Area

Select Page 1 as the **Active Drawing** on the **Select** section of the **Takeoff** tab toolbar to display the proposed elevations drawing file.

Isolating design layers from vector files eliminates drawing information that is not needed or relevant to the current takeoff. Being able to isolate drawing layers are a key advantage of vector type files. To isolate a vector layer (e.g. the slab on grade) please insure that **Display the Layer List** is turned on at the **Vector PDF** toolbar. The width of the layer list on the left side of the window is adjusted by moving the mouse pointer to the edge of the list and once the pointer changes to a double headed arrow, drag the edge of the layer list window to resize.

Click the **Select layers** button on the **Vector PDF** toolbar and then move the red square mouse pointer over a corner of the building slab. When the perimeter line is highlighted, **right click** the mouse to obtain a popup menu of layer commands.



To display the selected layer only, select the **Hide Other Layers** command from the popup menu.

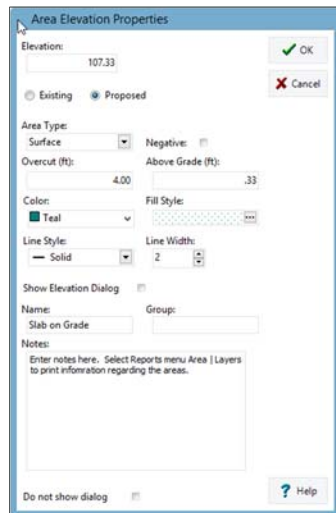
Please note that a subset of layers could be added to a display list by clicking on the **Add Layer to Display List** command. After the desired layers have been added to the Display List, click **Show Display List** to show this collection of layers. The created display list is often used when you want to show two or more layers at the same time. For example, a display list could be created for the proposed contour lines and elevations.

After the building slab displays, move to the layer list on the left side of the window and turn on, by clicking, the check boxes for **Slab Annotation**, **Pkg lot** and **parking Lot Annotation** layers. Four layers should now be displayed. Please note, the black square on the top of the left side layer list displays all of the layers. The white box at the top, turns off all layers.

When done selecting the desired layers, turn off the **Select Layers** command on the **Vector PDF** section of the toolbar and click on the **Snap to Entity Point** command. This area takeoff will demonstrate how the **Snap to Entity Point** method works with a vector file.

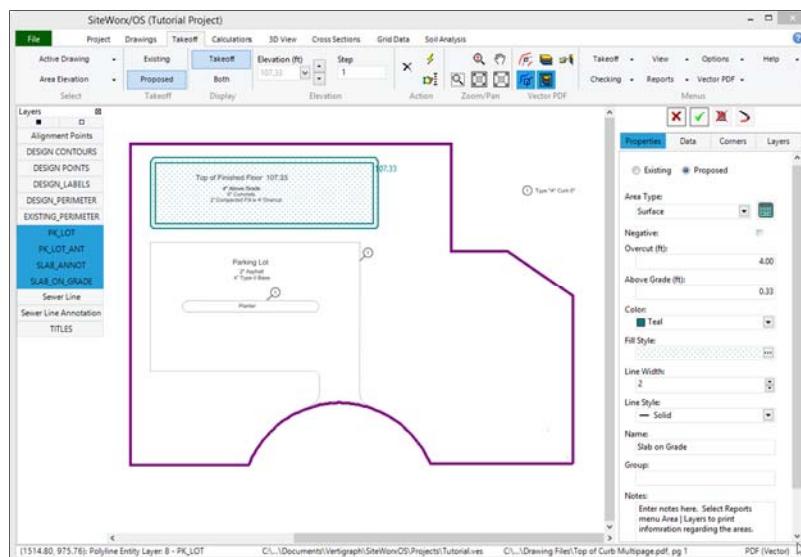
To digitize areas, select **Area Elevation** from the **Select** section of the toolbar at the **Takeoff** tab. Next, select **Proposed** as the **Takeoff**. Click **Start Takeoff** on the **Action** section of the toolbar and then click the first corner of the slab to display the **Area Elevation Dialog**.


At the **Area Elevation Dialog** type in **107.33** as the elevation, click **proposed** and select **Surface** as the **Area Type**, enter **4** as the **Overcut** length in feet, enter **.33** as the **Above Grade** value, change the color and fill pattern, and finally, **Name** the area as “**Slab on Grade**” and then click **OK**.



The 'Area Elevation Properties' dialog box is shown. It has a title bar and a close button. The 'Elevation' field is set to 107.33. There are 'OK' and 'Cancel' buttons. The 'Existing' radio button is selected, and the 'Proposed' radio button is also selected. The 'Area Type' is set to 'Surface'. The 'Overcut (ft)' is 4.00 and the 'Above Grade (ft)' is .33. The 'Color' is set to 'Teal' and the 'Fill Style' is a cross-hatch pattern. The 'Line Style' is 'Solid' and the 'Line Width' is 2. There is a 'Show Elevation Dialog' checkbox. The 'Name' field is 'Slab on Grade' and the 'Group' field is empty. The 'Notes' field contains the text: 'Enter notes here. Select Reports menu Area | Layers to print information regarding the areas.' There is a 'Do not show dialog' checkbox and a 'Help' button.

To digitize the building area, click on four corners, which will snap to the corner point, either clockwise or counter clockwise around the slab, and then press the right mouse button and select **Stop Takeoff** to complete. It is not required to digitize back to the starting point. When stopping the area takeoff, the area will automatically close to the first point.



Any of the information improperly recorded at the **Area Elevation** dialog may be changed on the right side after the area is completed. To save any changes made on the right side, click the green checkmark  found on the top right hand side of the window. The entire area can be deleted by clicking the red X to the right of the green checkmark.

The material layers under the slab are input by clicking the **Layers** tab on the right side of the window.

Click the layers tab and create two layers: Concrete and Select Fill should be typed in the Material boxes. The depth of the concrete should be .5 and the depth of the select fill should be 2 feet. The select

fill should also be applied to the overcut area by checking the Include Overcut box.

Layer	Depth (ft)	Material	Volume (CY)	Include Overcut
3	0.50	Concrete	154.03	<input type="checkbox"/>
4	2.00	Select Fill	751.12	<input checked="" type="checkbox"/>

Please note the following regarding the **Layers** tab:

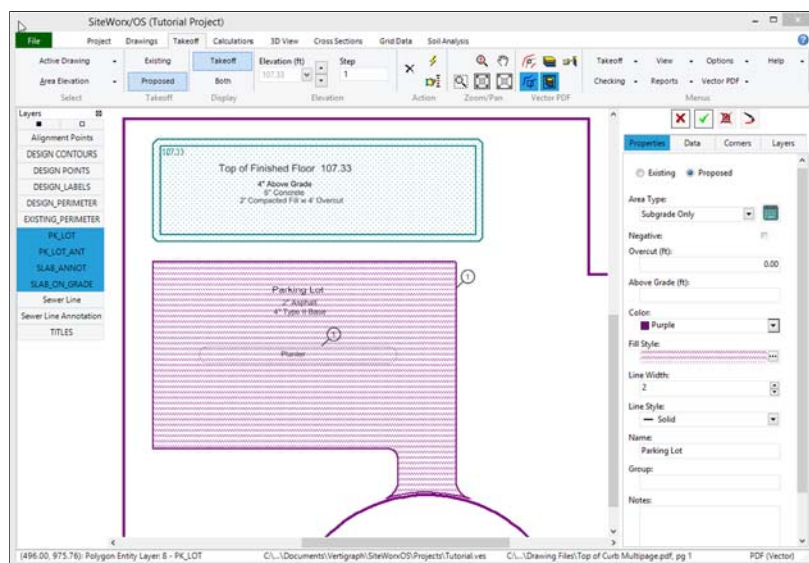
- ☐ The width of window is changed by moving the mouse pointer to the left edge of the window near the up and down scroll bar. Once the pointer changes to a double headed arrow, drag and drop the window width.
- ☐ To add, delete and record layers, use the buttons at the bottom.
- ☐ If the layers are spelled consistently, the layers for all of the areas will be totaled under the **Reports** menu.
- ☐ If an area has an overcut value recorded at the **Properties** window, the material layer can be applied to the larger overcut area by checking the **Include Overcut** checkbox. When **Include Overcut** is checked, the backfill required will also be calculated.
- ☐ The layer and backfill volumes are not included in the fill volumes shown at the **Calculations** tab.
- ☐ The **Reports | Area | Layers** report discloses the layer volumes that need to be added to the site.
- ☐ Layer details may be copied from the last area digitized by clicking on the **Options** menu | **Copy Area Layer Info | Always**.

Digitizing a Non-Flat Subgrade Only Parking Area


To digitize a non-flat area, such as the parking lot or sidewalk, select **Area Elevation** from the drop down list box at the top of the **Takeoff** window. Next, select **Proposed** as the **Takeoff**, click the **Start Takeoff** from the **Action** section of the toolbar, and click the first corner of the parking lot to display the **Area Elevation Properties** dialog box.

When recording non-flat areas like parking lots, the elevation of the digitized area will be reduced by the subgrade layers depth. As a result, elevations are not needed or used for **Subgrade Only** areas. At the **Area Elevation Properties** dialog box ignore the elevation box and change the proposed **Area Type** to **Subgrade Only**, change the color, fill pattern and name the area as "**Parking Lot**".

Simply click on the change in direction as you move clockwise or counterclockwise around the parking lot. Click in small increments around the curve at the bottom of the parking lot or input the curved line using the **Arc** command. To activate the **Arc** command, **right click** the mouse and select **Arc** or press the **Alt + A** shortcut keyboard keys. After activating the **Arc** command, click anywhere along the curve followed by a click on the end of the curve. To correct a mistake, press the keyboard **Alt+Backspace** keys. When done, click on the **Stop Takeoff** command on the toolbar to complete.



Please note the following about Subgrade Only areas:

- ☐ If changes need to be made, select the area and change any of the information on the right side. After changing information on the right side click the green checkmark at the top right  to record the changes.
- ☐ Click the **Layers** tab on the far right to enter the layers. Since the elevation points were recorded at the top of curb elevations, a layer is required for the height of the curb of .5 feet to bring the elevations down to the top of pavement. Another layer will be added for the 2" Asphalt (.17 depth in feet) and a third layer of .33 depth in feet for the 4" Type II base. When done with the layers, click the checkmark at the bottom of the layers window to record the changes. With three layers that are a total of 1 foot deep, the proposed subgrade elevations previously digitized will be reduced by 1 foot over this area.
- ☐ Excluded areas (e.g. planter islands) must also be digitized. After clicking **Start Takeoff**, digitize a point at the dialog box will be displayed. Here, check the **Negative** box on the **Area Elevation Properties** dialog, insure **Subgrade Only** is the area type and click around the planter island area. When done, **right click** the mouse and select **Stop Takeoff**. Again, if anything was not entered properly at the **Area Elevation Properties** dialog, move to the right side after the area is completed and change the properties on the right side. For this negative area, click on the **Layers** tab on the right and record the exact same layers that were entered for the parking lot (i.e. .5 height of curb, .17 Asphalt and .33 Type II Base). The layer volumes disclosed for this negative area will be subtracted from the parking lot's layer volumes.
- ☐ There is no demolition and removal on this project. If you encounter a job with demolition, removing a parking lot or sidewalk from an existing site for example, the area should be taken off as an **Existing Subgrade Only** area and a layer called "**remove or demo payment**" must be added at the **Layer** tab on the right with the depth of the material to be removed. The volume of the parking lot to be removed will be disclosed under the **Reports | Area | Layers** menu. The cuts and fills shown on the **Calculations** tab are the volumes after the parking lot was removed.

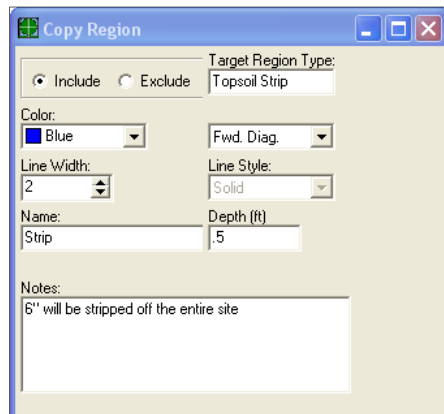
Step 13 – Record Topsoil Strip and Topsoil Respread regions

If the project requires topsoil to be stripped or respread, these topsoil regions must be identified. If borings are input, the topsoil strip volume is always calculated from the boring log data.

There are two ways to enter topsoil regions: 1) digitize with the mouse the topsoil region and enter the depth at the displayed dialog window or 2) select **Project Boundary** from the **Takeoff** tab, and

copy the entire project boundary as a topsoil region and then exclude areas if required.

In this tutorial the project boundary will be copied as a topsoil strip and topsoil respread region. At the **Takeoff** tab **Project Boundary** selection, select the corner of the project boundary using the select an object tool; after selecting, click the right mouse button when the mouse pointer is inside the project boundary and select **Copy as Topsoil Strip**. The **Copy Region** dialog appears.



The above dialog will copy the entire project boundary as a topsoil strip area. Enter a **Depth** in decimal feet or meters (.5 for 6 inches) with a **Fwd Diag.** fill pattern. When done filling out the dialog box, press the **OK** button.

Then copy this same project boundary as a topsoil respread region by pressing the right mouse button inside the project boundary and select **Copy As Topsoil Respread**. Enter a depth of .5 and click the **OK** button.

The slab and parking lot previously digitized at the **Area Elevation** selection will be copied as Excluded Topsoil Respread regions as noted in the following steps to arrive at the proper topsoil respread volumes.

These copied regions may be edited at any time by selecting **Topsoil Strip** or **Topsoil Respread** from the **Select** section of the **Takeoff** tab toolbar.

Step 14 - Copy Selected Areas as Excluded Topsoil Respread regions

Since topsoil is not re-spread over the building and parking lot, these areas will be copied as excluded topsoil re-spread regions by performing the following:

- ☐ At the **Takeoff** tab, select **Area Elevation**. Click the **Select an Object** tool from the **Action** section of the toolbar, and left click on the corner of the slab to highlight and select.
- ☐ After the area is selected, **right click** the mouse, and select **Copy as Topsoil Respread**.
- ☐ A copy region dialog box is displayed. Change **Include** to **Exclude** on the dialog box, and click **OK**.
- ☐ When done with the slab, select the parking lot and perform the same steps to exclude the parking lot as a topsoil respread region.
- ☐ This excluded topsoil re-spread region is displayed when **Topsoil Respread** is selected and the **Display** section of the toolbar is set to **Both**.

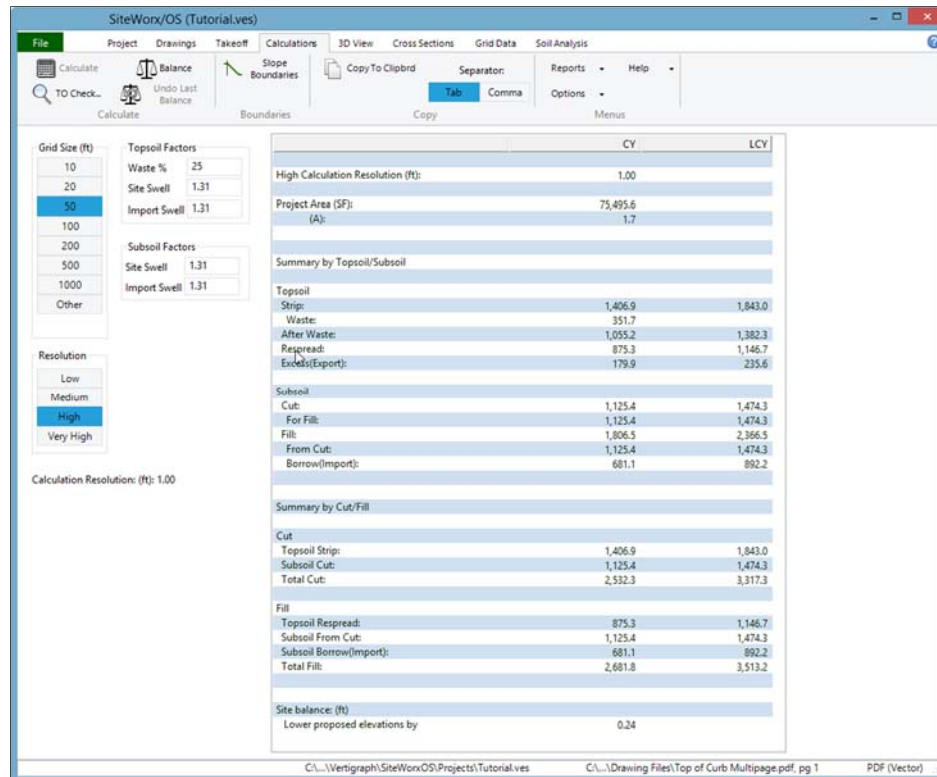
The takeoff for this limited tutorial is now complete. Calculating the results, reviewing the information and printing the reports will be done next. Once the review is completed, the user may need to return to the **Takeoff** tab to select certain items for modification. To change items, select by clicking on the desired object first (i.e. contour line, point elevation, etc.) then use the **Select an Object** tool from the

Action section of the toolbar to select the item. Make changes on the right side of the window followed by the green checkmark to post the changes. You can also select items for editing by using the **Checking | Examine** menu from the Takeoff toolbar to scroll through all of the number objects displayed on the top right side of the window.

To calculate the results, click on the **Calculations** tab...

G. Calculations Tab

Step 15 - Calculate the results at the Calculations tab



Comments about the Calculations tab's toolbar:

- ☐ Click the **Calculate** button located at the top left of the **Calculation** tab toolbar to compute.
- ☐ The **TO Check** button on the toolbar checks the takeoff for certain errors.
- ☐ At the very bottom of the calculated information, the site balancing adjustment is shown. If the proposed elevations are adjusted by this value, the site balances where the subsoil cut volume will equal the fill volume and there will be little subsoil import or export. To balance the site and change the proposed elevations, click the **Balance** button on the toolbar.
IMPORTANT - save the project file as a different name prior to clicking the **Balance** button since the proposed elevations will change and will no longer agree to the proposed elevations noted on the drawing file when this **Balance** button is clicked. For this tutorial, do not balance the site.
- ☐ The calculated information may be copied to the clipboard in order to paste this information into other programs such as Word or Excel. To copy, click the **Copy to Clipboard** button on the toolbar. Many estimators use Microsoft Excel to apply costs to the quantities (i.e. estimate the costs). Open Excel, click on a cell and then paste this information from the clipboard to Excel.
- ☐ The separator button on the toolbar should be set to **Tab** when pasting this information into Excel. For other programs, a comma delimited separator may be ideal. If the information does

note paste properly after clicking the **Copy to Clipboard** button, change the selection to **Tab** from **Comma** or vice versa.

Comments about the Calculations tab work area:

- ☐ The actual grid lines are displayed at the **Takeoff** tab when the menu **View | Takeoff Grid** is turned on. The cut and fill volumes for each grid are disclosed at the **Grid Data** tab. A smaller grid results in a more detailed calculation of volumes. Grid size also affects the resolution of the 3D image shown at the **3D View** tab. The smaller the grid size, the higher the resolution displayed at the **3D View** tab.
- ☐ Topsoil and subsoil expansion and compression factors are recorded at the **Calculations** tab. The **Site Swell** factor relates to expansion and the **Import Swell** factor relates to compression. Normally these factors are greater than 1 and less than 2. The **Site Swell** factor is multiplied by the bank or tight volumes to arrive at loose cubic yards (LCY). The **Import Swell** factor is divided into the loose volumes to arrive at compressed yards. The **Discard %** for topsoil is deemed to be waste. The percentage of topsoil recorded as waste may be green material that dies or topsoil that disappears from the topsoil strip volumes. If you desire no swell or compression simply set the factors to 1. For no topsoil waste, set the percentage to 0.
- ☐ Topsoil volumes are displayed at the **Calculations** tab only for jobs that do not use boring logs. If boring logs are setup at the **Project** tab, the topsoil strip volumes, as defined by the boring logs, are shown at the **Reports | Cut by Soil Type** menu.
- ☐ The Resolution setting affects the size of the each square on the **3D View** and the amount of calculations that are performed. Calculations are performed for each grid square. Each grid is subdivided into smaller calculation squares. As a result, more squares result in more calculations. The total number of squares increases when the grid size is reduced. The number of squares also increases when the resolution setting is increased. The following are the number of squares for each grid box for the resolution settings:
 - **Low** – 100 squares per grid box (10 x 10)
 - **Medium** - 625 square per grid box (25 x 25)
 - **High** – 2,500 squares per grid box (50 x 50)
 - **Very High** – 10,000 squares per grid box (100 x 100)

Very High resolution is only available in the 64 bit version of SiteWorx/OS. The resolution setting truly affects the detail and number of calculations. As you can see, **Very High** resolution creates 100 times more detail and calculations than **Low** resolution.

For speed and ease of use, first calculate using the **Low** or **Medium Resolution** setting. After calculating, review the results and look at the **3D View** tab to verify the takeoff. If the **3D View** tab and numbers look reasonable, recalculate using **High** or **Very High** resolution for final results. The higher the resolution, the more calculations performed in SiteWorx/OS and the longer it takes. If the grid size is too small with **Very High** resolution, the calculation time may be excessive. To speed up the process, increase the grid size and/or reduce the resolution setting.

The Grid Size and Resolution interact to have an effect on the accuracy of the calculated volumes. Increasing Resolution decreases the size of each square calculated. With a 50' grid, Low Resolution calculates on 5' X 5' squares. High Resolution calculates on 1' X 1' squares.

- ☐ Calculated results are shown to the right of the screen. Information is broken out by topsoil and subsoil volumes. The left column displays the tight, bank volumes before swell factors. The right column shows the loose volumes after applying the swell factors.
- ☐ Total Cut = Subsoil Cut + Topsoil Strip
- ☐ Total Fill = Subsoil Fill + Topsoil Respread
- ☐ **IMPORTANT PLEASE READ** – At least one existing and proposed elevation point must be entered in order to properly calculate the volumes. An elevation point is either a contour line (a contour line generates a series of equidistant points along the line with the same elevation), a point elevation or a sloping design line. SiteWorx/OS calculates volumes and develops a 3D model of the existing and proposed site based on the elevation points entered.

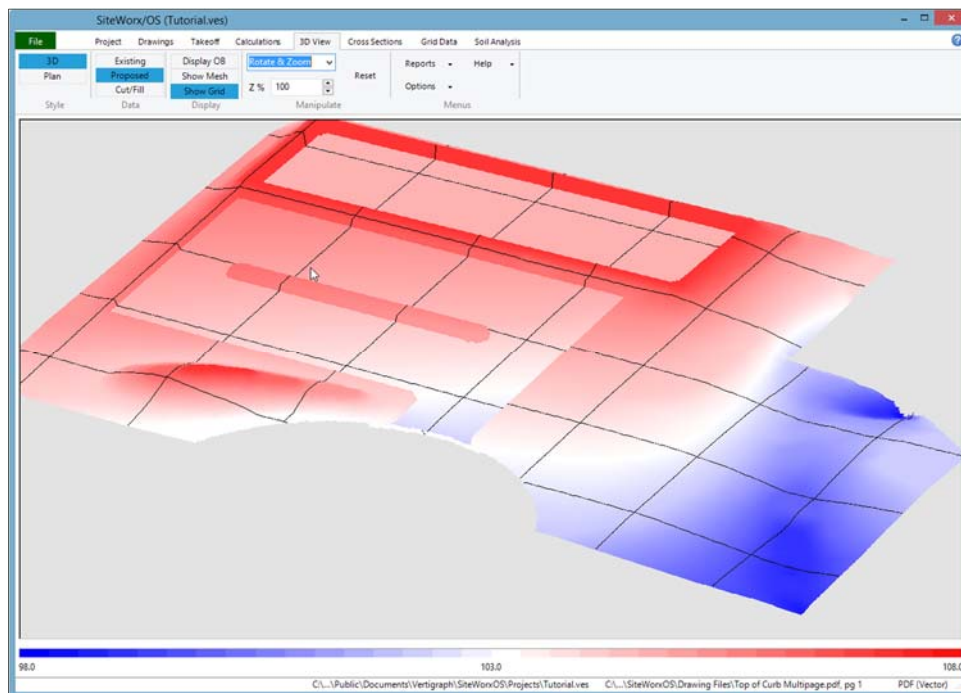
The elevations points, created from the contour lines, point elevations or design lines, are connected to each other to develop the 3D model. Areas are then placed on top of this 3D model as a plane. SiteWorx/OS develops an existing and proposed surface model from the items digitized. Again, at least one existing and proposed point must be input. And areas don't count.

- ☐ The total cut and fill volumes are calculated based on the differences between the existing and proposed elevations (i.e. differences between the existing and proposed surface models). If the proposed elevation is higher than existing for a grid square, the volume for that square is calculated as a fill volume. Likewise, if the proposed elevation is lower than existing elevations for a resolution grid square, the volume for that square is defined as a cut volume. After calculating the cut and fill volumes, the topsoil strip and topsoil re-spread volumes are subtracted to arrive at the Subsoil cut and fill volumes.
- ☐ At the bottom of the window, SiteWorx/OS discloses the site balancing adjustment required that balances the site where the subsoil cut volume equals the fill volume.

After calculating, click on the **3D View** tab to review the models...

H. 3D View Tab

Step 16 – Review the models at the 3D View tab



- ☐ The quality and resolution of the 3D view is determined by the grid size and resolution setting at the **Calculations** tab. A smaller grid size and a higher resolution setting increases the quality of the 3D view.
- ☐ When Manipulate is set to none, clicking on any point on the 3D model will display existing and proposed elevations at that point along with the cut or fill depth.
- ☐ The **3D** style is best for displaying the **Existing** and **Proposed** data. The **Plan** style is ideal for showing the **Cut/Fill** data.
- ☐ **Display OB** will show the image outside the project boundary. Existing elevations can go



outside the project boundary. Proposed elevations stop at the boundary line. When **Display OB** is depressed with the **Proposed Data**, the proposed site will be placed on top of the existing site to show how the proposed elevations affect the existing site at the project boundary.



- ☐ **Show Mesh** displays the square lines. When using a high resolution setting, the image may be dark due to the many squares. To improve the view, increase the size of the 3D view by zooming using the manipulate commands or turn off the **Show Mesh** setting.
- ☐ The drop down list box in the Manipulate part of the toolbar allows the rotation and resizing of the 3D view. If the **Rotate and Zoom** manipulate option is selected, zoom the image by holding down the right mouse button while slowly dragging the mouse from the center. Rotate the image by holding down the left mouse button while slowly moving the mouse.
- ☐ The **Z%** exaggerates the Z scale when increased. The **Z%** should be set to 100 to display the 3D view to scale. To display the elevations disproportionately, increase the **Z%** value to 200 or more.
- ☐ The reset button resets the image to the default values.
- ☐ Elevation errors are clearly displayed at the **3D View** tab. Look at the legend at the bottom of the screen. Are there any spikes? Is the existing or proposed site all one color and is the range of elevations on the bottom legend reasonable? A 0 elevation on the left side of the legend often indicates that an item was digitized without an elevation. Click the **Checking | Examine** menu at the **Takeoff** tab to find incorrect elevations.
- ☐ On any project, click on the **3D View** tab periodically to insure that the existing and proposed sites look reasonable.

I. Review and make adjustments

Occasionally incorrect elevations and data may be recorded. The **3D View** tab will clearly display problems. Does the **3D View** tab show spikes? Does the range of elevations on the legend at the bottom of the **3D View** window look correct? Does the existing, proposed and cut/fill models look reasonable? If any of the 3D models do not appear proper, something is wrong. If there is an error, try to determine if the error is due to an incorrect elevation point, contour line, area, or design line? The **Review** selection at the **Takeoff** tab displays the data in relationship to other selected objects.

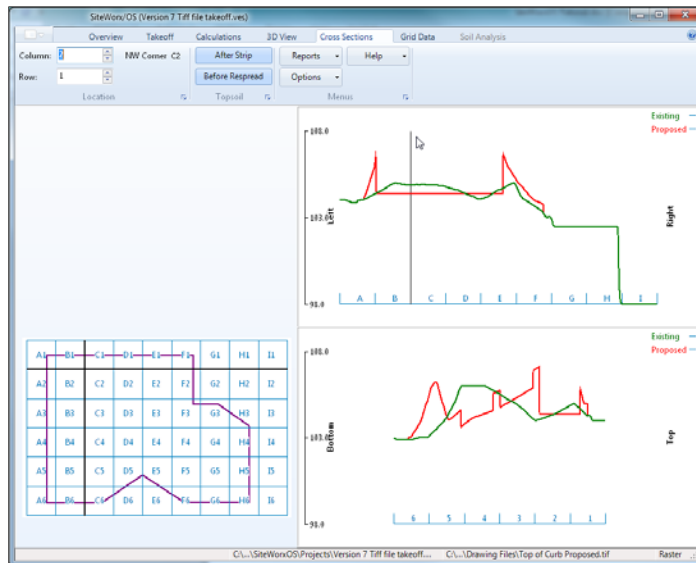
To find and correct the error, perform the following:

- i. Go the **Takeoff** tab, select and display any of the takeoff objects (i.e. Contour Line, Point Elevation, Area Elevation, etc.).
- ii. If the error is obvious, select the object by clicking on an object's point (end of contour line or corner of area) using the **Select an Object** tool  and then change the incorrect data on the right side.
- iii. At the **Takeoff** tab, the **Checking | Examine** menu is helpful for finding unreasonable elevations and errors. Click **Checking | Examine** menu and then **Checking | Above Maximum** and **Below Minimum** to find items that are above or below the max and min settings. The min and max settings are set at the **Checking** menu | **Min** or **Max Elevation**.
- iv. If the item causing the error is not obvious, look at all of the digitized objects by clicking the **Checking | Examine** menu. All objects are assigned a number with SiteWorx/OS. When **Checking | Examine** is turned on, the object's number will be displayed on the top right side of the window. Simply scroll through the numbered objects by clicking the arrow buttons to find the object causing the problem.
- v. After selecting the object, the right side of the window will display the properties of the selected object which may be changed and deleted. Click the  green checkmark to save any changes.

- vi. To delete an object, click the  **Delete selected object** tool located on the right side of the window and to the right of the  green checkmark.
- vii. The width of the properties window on the right side may be resized by holding down the left mouse button while dragging the mouse once the mouse pointer changes to a double headed arrow at the left edge of the properties window (i.e. between the drawing and the properties data).
- viii. When reviewing the objects, please insure that the elevations are accurate, the takeoff type is correct (i.e. existing or proposed) and the areas are properly defined. Areas that are not flat are normally **Subgrade Only** areas; flat areas are either **Surface** or **Basement** areas. When looking at Surface and Basement **Area Elevation** objects, the actual elevations are shown at the **Corners** tab. Also insure the subgrade materials are properly recorded at the **Layers** tab for each area.

After making the changes, save the file and look at the effects at the **3D View** tab.

J. Cross Sections Tab



- ☐ The project boundary with the grid lines are displayed on the left side of the **Cross Sections** tab. As noted previously, the grid spacing is set at the **Calculations** tab. To display the existing and proposed elevations at the northwest corner of each grid, simply click on the grid box.
- ☐ The top right image shows the location of the cross section line running from left to right.
- ☐ The bottom right image displays the cross sections from bottom to top.
- ☐ The existing and proposed lines meet at the project boundary.
- ☐ The existing elevation line may be shown before or after the topsoil strip depth by clicking the **After Strip** button on the toolbar. The proposed elevation line can also be set before or after the topsoil respread depth.

K. Grid Data Tab

To the right of the **Cross Sections** tab is the **Grid Data** tab.

Location	Total Cut	Total Fill	Topsoil Strip	Topsoil Respread	Subsoil Cut	Subsoil Fill	Height	Width	Stake NW	Stake NE	Stake SE	Stake SW
G5	64.6	180.4	46.3	46.3	18.3	134.1	50.00	50.00	3.61	0.10	-0.92	0.64
H5	199.7	46.3	46.3	46.3	153.4	0.0	50.00	50.00	0.10	-0.59	-0.99	-0.92
I5	27.5	15.8	15.7	15.7	11.8	0.0	50.00	50.00	-0.59	O.B.	O.B.	-0.99
A6	0.0	0.0	0.0	0.0	0.0	0.0	50.00	50.00	O.B.	O.B.	O.B.	O.B.
B6	35.1	56.9	33.3	33.3	1.8	23.6	50.00	50.00	O.B.	-0.39	0.33	O.B.
C6	53.5	154.2	46.3	46.3	7.2	107.9	50.00	50.00	-0.39	0.88	0.59	0.33
D6	32.3	118.8	32.3	32.3	0.0	86.5	50.00	50.00	0.88	1.47	O.B.	0.59
E6	12.5	12.4	11.1	5.0	1.4	7.3	50.00	50.00	1.47	1.33	O.B.	O.B.
F6	27.3	49.2	24.1	24.0	3.2	25.2	50.00	50.00	1.33	0.64	-0.02	O.B.
G6	62.9	47.5	46.3	46.3	16.6	1.2	50.00	50.00	0.64	-0.92	-0.07	-0.02
H6	138.9	46.3	46.3	46.3	92.6	0.0	50.00	50.00	-0.92	-0.99	-0.46	-0.07
I6	36.8	15.8	15.7	15.7	21.0	0.0	50.00	50.00	-0.99	O.B.	O.B.	-0.46
A7	0.0	0.0	0.0	0.0	0.0	0.0	50.00	50.00	O.B.	O.B.	O.B.	O.B.
	2321.1	2610.5	1404.9	0.0	916.2	2610.5						

- ☐ The cut and fill volumes for each grid is shown at the **Grid Data** tab. The grid is displayed on otopert of the drawing file at the **Takeoff** tab by clicking on the **View | Takeoff Grid** menu. The grid size is set at the **Calculations** tab. Two different data displays are available, **Cut/Fill** and **Stake**.
- ☐ The **Cut/Fill** display is shown above. The Cut and Fill volumes consists of the topsoil volumes and the subsoil volumes. Like the calculations window, Total Cut = Topsoil Strip + Subsoil Cut and Total Fill = Topsoil Respread + Subsoil Fill.
- ☐ The stake height adjustments for each of the four corners of the grid may be before or after topsoil strip. To change the stake heights, click on **Before Strip** or **After Strip** on the toolbar. The notation of **O. B.** for an individual corner indicates the corner is outside the boundary.
- ☐ The **Stake** report provides the coordinates of the northwest corner of each grid. At this point, the existing elevation, proposed elevation and the depth of the cut and/or fill is provided. As noted previously, the grid can be aligned to the project boundary or to a specific point. To align the grids with a certain coordinate, see Step 8 - Digitize the Project Boundary.
- ☐ The data on the Grid Data tab may be exported to a number of formats by clicking the Export button.
- ☐ Surface points may be exported as a DWG file by clicking the **Export Surface** command. Prior to exporting GPS data, assign two reference points at the **Drawings** tab. The Export DWG command, creates a DWG file of the contour lines, points and areas previously recorded.

L. Soil Analysis Tab

Since this tab relates to boring logs, this **Soil Analysis** tab will be covered under the Boring Logs chapter.

M. Trenches

SiteWorx/OS also calculates trench volumes. The cut and backfill volumes from trenches are reported separately and are NOT included in the cut and fill volumes displayed at the **Calculations** tab. After digitizing the trenches, view the trench information and volumes, by selecting **Trench** and **Trench definition** from the **Reports** menu.

SiteWorx/OS develops a model of the proposed site based on the proposed elevations digitized. The trenches are then dug from the proposed elevations to arrive at the trench volumes.

To digitize a trench, select **Trench** from the list of objects on the **Takeoff** tab toolbar and insure the **Show Elevations/Property Dialog** and the **Show Trench Definition Dialog** are turned on under the **Options** menu. Next, at the top of the screen, enter the invert elevation for the beginning of the trench. The invert elevation is the trench elevation at the bottom of the trench. Click the Start takeoff, lightning bolt button and the Define Trench dialog box appears.

Define Trench

Inverse Elevation: 95.00

☐ Calculate Inverse Elevation

Schematic **Actual**

Name: Trench

Line Color: Fuchsia Line Width: 3

Line Style: Solid

Trench Type

☐ V Bottom Drain ☒ Pipe/Conduit Trench ☐ Flat Bottom Drain

Except as noted, all dimensions are in.

Sloped Wall Rise: 48 Pipe Diameter: 24

Sloped Wall Run (ft): 4 Bottom Bedding:

OK Cancel

Please note:

- ☐ Define the line colors, width and type of trench. SiteWorx/OS handles three types of trenches: V Bottom Drain, Flat bottom Drain and Pipe Conduit trenches. After selecting the trench type, click on the dimension boxes and enter the various dimensions.
- ☐ When clicked on a dimension box, the measurement required will be displayed in red on the left side under the **Schematic** tab.
- ☐ After all dimensions have been entered at the **Schematic** tab, the cross section of the trench based on the dimensions actually entered will be displayed at the **Actual** tab. Once the trench has been defined, press the **OK** button. Next, digitize the next point along the trench line.
- ☐ Whenever any two invert elevation points are recorded, SiteWorx/OS can calculate the invert elevations of the other points digitized by applying the calculated slope between those two points. A trench requires a minimum of two bottom of trench points with elevations. The elevations of all other points can be calculated based on the slope between the two known points. This is accomplished by checking the **Calculate Invert Elevation** checkbox found

on the elevation dialog box. In summary, enter the actual inverse elevation in the **Inverse Elevation** box or calculate the elevation by checking the **Calculate Inverse Elevation** checkbox. To use the **Calculate Invert Elevation** checkbox, the actual elevation must be entered in two places along the line: at the start of the trench and anywhere else along the trench line. In this example, click the **Calculate Invert Elevation** check box on all trench line points except the first and last points on the trench line. At the end of the trench, the actual invert elevation will be entered at that point and the calculate invert elevation checkbox will be unchecked.

- ☐ After digitizing or calculating the elevations of the trench, press the right mouse button and select Stop Takeoff to complete.
- ☐ Once complete, view and print the trench reports under the **Reports** menu. Again the trench volumes appear only on the **Reports** menu | **Trench ...**. The trench volumes are not included in the site excavation cut and fill volumes displayed on the **Calculations** tab or on the other reports.

N. Summary and review the reports

In summary the takeoff process with SiteWorx/OS works as follows:

1. Complete the **Project** Tab
2. Open the Drawing(s), scale and align at the **Drawings** tab
3. Click on the **Takeoff** tab define the project boundary and input elevations and areas. Depending on the file type, there are five different takeoff methods: i) digitize the item with the mouse ii) use auto or easy trace iii) select the entire entity from vector files iv) snap to an entity point within the object using vector files and v) import all of the items from a selected layer from an AutoCAD DWG file.
4. Click on the **Calculations** tab and set the grid size, resolution and then calculate.
5. Review the calculated results at the **3D View**, **Cross Sections**, **Grid Data** and **Soil Analysis** tabs.
6. If changes need to be made, select the object or use the **Checking | Examine** menu to edit the information on the right side of the **Takeoff** tab
7. Once the data appears reasonable, recalculate the project with **High** or **Very High** resolution.
8. Finally, print the desired reports found under the **Reports** menu on the toolbar.

O. Boring Logs

Boring logs must be setup and taken off when cut volumes by soil type are required. SiteWorx/OS uses the data from boring logs to model the soil layers (strata) found on the site. The data entry process involves digitizing the boring location and entering the data for the soil types found in the boring log.

Entering Borings for the Tutorial Project

To enter boring log data to the tutorial project recently completed, perform the following:

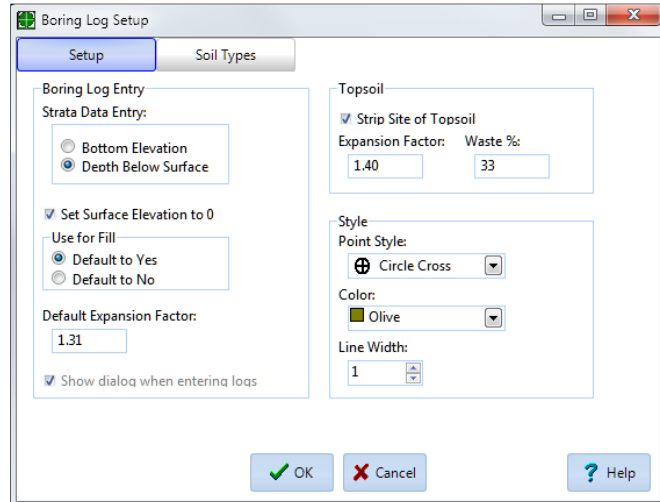
1. Save the tutorial project as a different name. **Tutorial with borings.ves** for example.

2. At the **Takeoff** tab, Select **Topsoil Strip** and delete the topsoil strip area since the topsoil is defined by the boring logs. The delete object button is found on the right side of the window to the immediate right of the green checkmark.
3. At the **Drawings** tab, right click the mouse overtop the drawing and select **Duplicate Drawing**. Change the page number on the toolbar to **3**. Finally click the **Align Dwg.** button to align page 3, the Boring log drawing, to pages 1 and 2.
4. Print or view on a second monitor the boring logs found as an Appendix at the end of this tutorial.
5. At the **Project** tab, click on **Yes** at the Borings section of the toolbar and click on **Setup**.
6. Setup the boring log data entry and soil types as noted on the **Sample Project Boring Logs** found at the end of this tutorial.
7. After setting up the borings at the **Project** tab, digitize the borings and soil types by selecting **Boring Log** at the **Takeoff** tab.
8. When done entering the borings and soil depths, calculate the project and look at the **Soil Analysis** tab and **Reports | Cut by Soil Type** to review the results.

Entering Boring logs is a three step process:

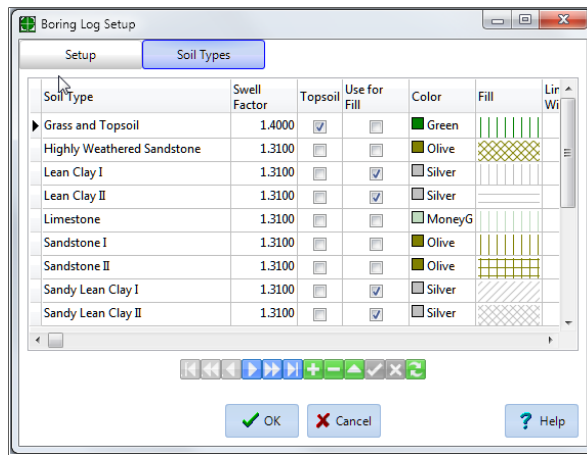
1. Look at the logs and set up the data entry at the **Project** tab. Boring logs present the soil strata depths several ways. Sometimes the log shows no surface elevation. Sometimes the elevation at the bottom of the strata and/or depth of the strata below the surface may be provided for each stratum. The choice of which number to enter depends on the actual boring log and is defined at the **Setup** tab shown below.

At the **Project** tab **toolbar**, click **Yes** for boring logs and then click on **Setup...** to define the boring log information setup.



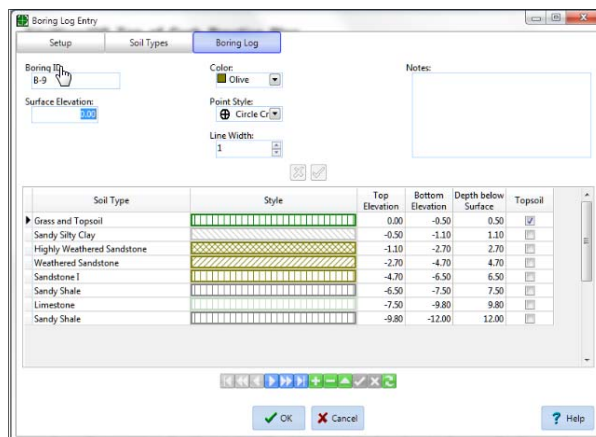
Again, before setting up the bore log data entry, look at the boring logs and see how the strata depths are shown on the logs. Defining how the strata data will be entered from the bore logs is important. How are the elevations displayed? Is the surface elevation set to 0?

2. Go through the boring logs and enter the different soil types. Click the **Soil Types** tab to enter the soil types.



At the **Soil Types** tab, name the soil type and define its colors, fill patterns and swell factors. If a soil type must be exported and removed, do not check the **Use for Fill** checkbox. Only one layer, (i.e. the top layer) can be defined as the topsoil layer. The colored buttons at the bottom of the window are for additions, deletions and recording this tabular information.

- Go through the boring logs and enter the strata by clicking the **Takeoff** tab, **Boring Log** selection, and record the location of the bore holes along with the strata depths.



Like the Soil Type setup, the colored buttons at the bottom of the window are for additions, deletions and recording this tabular information.

Boring Log Results

When using boring logs, SiteWorx/OS calculates the cut volumes for each soil type. These results can be viewed at **Reports** menu | **Cut by Soil Type**. Additionally, a graphic presentation of the soil strata is shown on the **Soil Analysis** tab.

Notes about Boring Logs

Using Boring Logs changes some aspects of SiteWorx/OS:

- Topsoil Strip Areas are not used. Check the **Strip Topsoil** box in Boring Log Setup to strip the site of the topsoil layer.
- Topsoil Swell Factor at the **Calculations** tab is not used.
- Site balancing is not available.
- Subsoil Report is not available.

P. Importing objects and elevations from DWG files

SiteWorx/OS imports objects from AutoCAD DWG files. If you have a DWG file, much of the information can be imported directly from the file rather than using the mouse to digitize the objects. To import objects from a DWG file:

- a) Click on the **File** menu/icon | **New Project**. Click on **Drawings** tab, save and name the project file **DWG Import** and then **Open... Top of Curb.dwg** file and select foot as the CAD drawing after clicking the **Scale** button. This Top of Curb.dwg file is located at **C:\Users\Public\Public Documents\Vertigraph\SiteWorxOS\Drawing Files**.
- b) At the **Takeoff** tab, the Included Project Boundary must be digitized using the mouse before importing CAD objects. Before digitizing the Project Boundary, insure that **Select Entity** and **Snap to Entity Point** on the **CAD** section of **Takeoff** tab toolbar are turned off. After digitizing the perimeter of the project boundary, click the **Stop Takeoff** command.
- c) Since contour lines will be imported from the DWG file, select **Contour Line** and then **Existing** as the Takeoff type from the toolbar. Next, the exiting contour lines will be isolated. When working with CAD layers, show the layers on the left side of the **Takeoff** tab window by turning on the **Display the Layer List** command from the **CAD** section of the toolbar. The width of the layer list on the left side of the window is resized using the mouse. As noted previously, to isolate a layer, click the **Select Layers** button from the **CAD** section of the **Takeoff** toolbar, move the mouse pointer overtop an existing contour line, **right click** the mouse and click **Hide Other Layers** from the popup menu. Only the existing contour lines should display after hiding the other layers. After selecting the desired layer, turn OFF the select layers command on the **CAD** section of the toolbar.
- d) SiteWorx/OS imports contour lines and points with elevations directly from DWG files. Before importing, insure that the **CAD** menu | **Use Z axis for Elevation** is turned on (i.e. checked) so that the elevations associated with the entity will also be imported. Importing entities is a process where the appropriate object is selected at the **Takeoff** tab, the drawing layer pertaining to the object is displayed, and the data for the selected object is imported by clicking the **Import from drawing into takeoff** command on the **CAD** section of the **Takeoff** toolbar. Please note:

To import Existing Contour Lines:

- On the **Takeoff** tab, select **Contour Line** and **Existing**.
- Insure that **CAD** | **Use Z Axis for Elevation** are turned on.
- Click the **Display the Layers list** command from the **CAD** section of the toolbar and display the existing contours by clicking on the **EXISTING** layer on the left side, layer listing. Or, isolate the contour line layer by clicking the **Select layers** command from the **CAD** section of the toolbar, move the square mouse pointer over a green existing contour line, **right click** the mouse and click on **Hide Other Layers** from the popup menu.
- Once the proper layer is displayed, turn off the **Select layers** command on the **CAD** section of the toolbar and then click the **Import from drawing into takeoff** button from the **CAD** section of the toolbar. If the **Contour Lines Properties** dialog box appears, click **OK** and all of the existing contour lines will automatically import from the DWG file.
- When done with the existing contours, click the small black box at the top of the layers list on the left side and isolate the proposed contour lines. Change the takeoff type to Proposed and perform the same steps for the proposed contour lines.

To import Point Elevations:

- On the **Takeoff** tab, select **Point Elevation** and **Proposed**.
- Insure the **CAD** menu | **Use Z Axis for Elevation** is turned on.

- Insure the **Display the layers** list is on from the **CAD** section of the toolbar, and turn off all of the layers on the left side except for the layer named **DESIGN POINTS**. The proposed point elevation layer can also be isolated by clicking the **Select layers** command from the CAD section of the toolbar, moving the square selection pointer over a proposed point and right clicking the mouse to select the **Hide Other Layers** command.
- Once the proper point layer is displayed, insure the **Select layers** command is turned off and click the **Import from drawing into takeoff** button from the **CAD** section of the toolbar to import the proposed points.

To record Area Elevations:

- Sometimes areas are not properly closed to the first point by the creator of the DWG file. As a result, area elevations are often digitized from the DWG file using the **Snap to Entity Point** command from the **CAD** section of the toolbar rather than importing the areas. Click the **Snap to Entity Point** command on the **CAD** section of toolbar to turn on this feature.
- To digitize areas insure that **Options | Use Z Axis for Elevation** is not on and **Options | Show Properties/Elevation Dialog** is clicked on.
- Use the **CAD | Layers** menu to display the desired areas or isolate the layer from the drawing using the **Select Layers** command from the **CAD** section of the toolbar. Please display the **SLAB_ANNOT**, **SLAB_ON_GRADE**, **PK_LOT** and **PK_LOT_ANT** layers.
- Once the proper layers are displayed, click the **Start Takeoff** action and click a corner of the slab and the **Area Elevation Properties** dialog should display. In the dialog box, record a **Proposed Elevation** of **107.33**, insure that the **Area Type** is **Surface**, enter a **4** for **Overcut**, **.33** for **Above Grade**, change the **Color**, select a **Fill Style** by clicking the three dot lookup button, name that area “**SLAB**” and finally, click the **OK** button. Click on the next three corners and when completed, right click the mouse and select **Stop Takeoff**. On the right side of the window, click the **Layers** tab and input the material layers of concrete with a depth of .5 and Select fill with a depth of 2 which is applied to the overcut area by checking the Include Overcut checkbox. When completed, click the checkmark at the bottom of the window to record the changes to the material layer list.

After importing the contour lines and points, and after digitizing the areas, insure that all elevations are properly recorded and within range by looking at the **3D View** tab. Sometimes, and depending on the how the file was created, some elevations will be recorded with a zero value. At the **Takeoff** tab, select the object (e.g. **Contour Line**) and then click **Checking | Examine** followed by **Checking | Below Minimum** to insure that all elevations are properly recorded. The **Max** and **Min Elevations** are defined under the **Checking** menu. After clicking the **Checking | Below Minimum** command, the initial item found that is below the minimum elevation will display on the right side of the window. Click on the **Delete selected object** button on the right side of the window to delete this incorrect elevation item and move to the next item.

Congratulations, you’re now ready for a real project.

Any questions, comments or suggestions, please contact us at any time. We wish you the best of everything.

Vertigraph, Inc.
12959 Jupiter Road, Suite 252
Dallas, TX 75238
214-340-9436
800-989-4243
support@vertigraph.com
www.vertigraph.com

Q. Appendix - Sample Boring Logs

Boring Results for SiteWorx/OS Sample Project

Listing of Soil Types (assume all soil types have a swell factor of 1.30):

Soil Type	Topsoil	Use for Fill
Grass and Topsoil	Yes	No
Highly Weathered Sandstone		No
Lean Clay I		Yes
Lean Clay II		Yes
Limestone		No
Sandstone I		No
Sandy Lean Clay I		Yes
Sandy Lean Clay II		Yes
Sandy Shale		No
Sandy Silty Clay		No
Shale		No
Silty Sand		Yes
Weathered Sandstone		No
Weathered Sandy Shale		No
Weathered Shale		No

List of Borings:

Boring ID: B-1 Surface elevation: 104.10

Soil Type Description	Elevation at top of strata	Depth in feet below surface
Grass and Topsoil	104.10	.50
Silty Sand	103.60	1.20
Weathered Sandstone	102.90	3.00
Weathered Shale	101.10	4.80
Shale	99.30	8.00

Boring ID: B-2 Surface elevation: 104.20

Soil Type Description	Elevation at top of strata	Depth in feet below surface
Grass and Topsoil	104.20	.50
Sandy Silty Clay	103.70	1.20
Weathered Sandstone	103.00	3.00
Sandstone I	101.20	5.00
Limestone	99.20	8.00

Boring ID: B-3 Surface elevation: 104.50

Soil Type Description	Elevation at top of strata	Depth in feet below surface
Grass and Topsoil	104.50	.50
Sandy Lean Clay II	104.00	1.30
Weathered Sandstone	103.20	2.50
Sandstone I	102.00	3.50
Limestone	101.00	8.00

Boring ID: B-4 Surface elevation: 105.00

Soil Type Description	Elevation at top of strata	Depth in feet below surface
Grass and Topsoil	105.00	.50
Sandy Silty Clay	104.50	1.30
Weathered Sandstone	103.70	2.80
Sandstone I	102.20	5.00
Weathered Sandy Shale	100.00	8.50
Limestone	96.50	12.00

Boring ID: B-5 Surface elevation: 107.40

Soil Type Description	Elevation at top of strata	Depth in feet below surface
Grass and Topsoil	107.40	.50
Sandy Lean Clay II	106.90	1.30
Weathered Sandy Shale	106.10	3.00
Sandstone I	104.40	8.50

Boring ID: B-6 Surface elevation: 101.00

Soil Type Description	Elevation at top of strata	Depth in feet below surface
Grass and Topsoil	101.00	.50
Sandy Lean Clay II	100.50	1.00
Sandy Shale	100.00	5.00
Sandstone I	96.00	8.00

Boring ID: B-7 Surface elevation: 100.60

Soil Type Description	Elevation at top of strata	Depth in feet below surface
Grass and Topsoil	100.60	.75
Sandy Lean Clay II	99.85	1.50
Weathered Sandstone	99.10	3.00
Weathered Sandy Shale	97.60	4.00
Sandstone I	96.60	10.00

Boring ID: B-8

Surface elevation: 99.20

Soil Type Description	Elevation at top of strata	Depth in feet below surface
Grass and Topsoil	99.20	.75
Sandy Lean Clay II	98.45	1.20
Sandy Lean Clay I	98.00	1.70
Lean Clay I	97.50	3.00
Lean Clay II	96.20	4.00
Weathered Shale	95.20	8.00
Sandstone I	91.20	10.50

Boring ID: B-9

Surface elevation: 104.20

Soil Type Description	Elevation at top of strata	Depth in feet below surface
Grass and Topsoil	104.20	.50
Sandy Silty Clay	103.70	1.10
Highly Weathered Sandstone	103.10	2.70
Weathered Sandstone	101.50	4.70
Sandstone I	99.50	6.50
Sandy Shale	97.70	7.50
Limestone	96.70	9.80
Sandy Shale	94.40	12.00