

FREQUENTLY ASKED QUESTIONS

FEMA P-807 Weak-Story Tool

The purpose of this document is to log answers to questions raised by users. The following answers are addressed in this document, prepared on March 19, 2014:

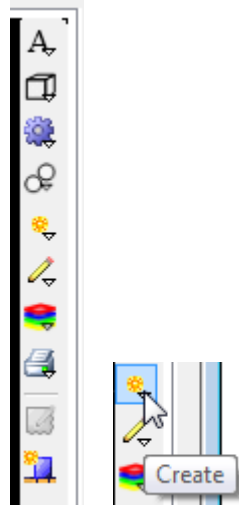
1. How do I enter a command in WST (CAD Interface)?
2. How do I zoom and pan in WST (CAD Interface)?
3. How should I draw reference geometry (CAD Interface)?
4. How do I set up reference lines in WST (CAD Interface)?
5. How do I set up reference image in WST (CAD Interface)?
6. How do I copy/paste entities from one level to another using a common base point (CAD Interface)?
7. What is the meaning of the point in brackets (CAD Interface)?
8. How do I make the background white (CAD Interface)?
9. How do I print?
10. Why are the *Analyze* and *Summary* buttons disabled?
11. Why are my retrofit walls making no effect?
12. What is the distinction between building weight and wall gravity load and where are they entered in WST?

If your question does not appear here, please send your question to the Applied Technology Council, atc@atcouncil.org.

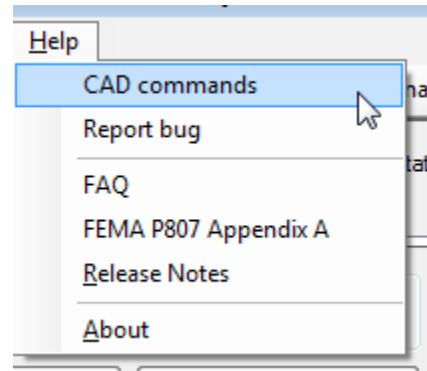
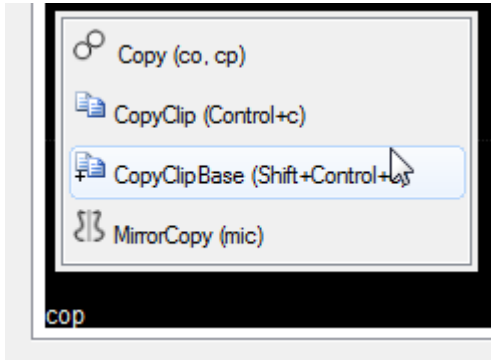
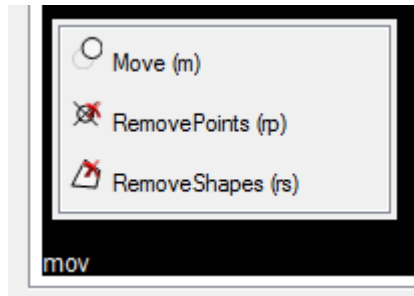
FAQ.1 How do I enter a command in WST (CAD Interface)?

Commands in the CAD interface may be entered in two basic ways, by either: clicking the command button on the right tool strip, or entering a command at the console.

The tool strip comprises several expandable menus representing command categories. For example, to create a new entity, expand on the *Create* drop-down, and select the entity you want to draw.



Enter a command at the console by starting to type a word associated with the desired command. A list of commands matching the entry will appear and will usually display the desired command. A list of all commands can be displayed by clicking Help/CAD commands.



FAQ.2 How do I zoom and pan in WST (CAD Interface)?

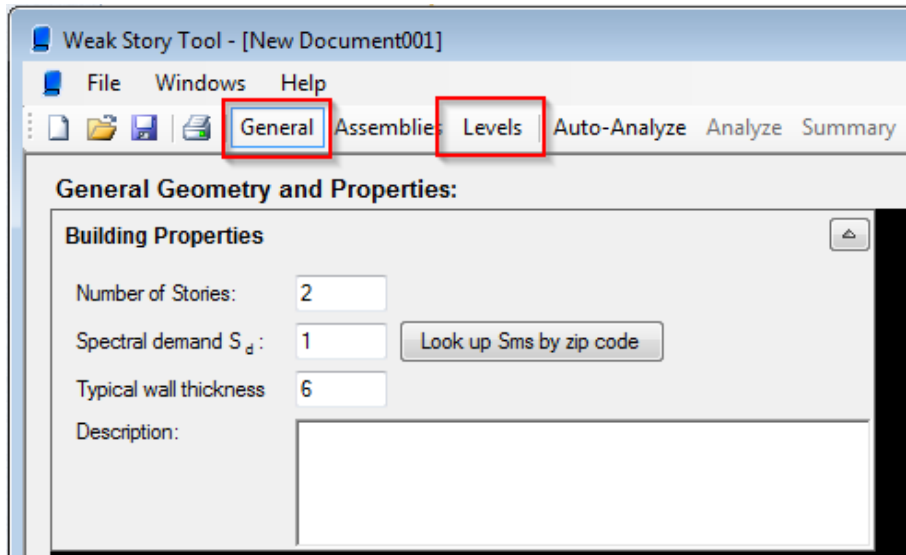
In WST, one may pan and zoom using the middle mouse button if it exists. This may require some configuration with Windows which is outside the scope of this FAQ; see Control Panel/Mouse.

There is also a *Zoom* command. Enter “z” at the CAD console and follow the prompts. Entering “e” in the Zoom command causes WST to zoom to the extents of all entities.



FAQ.3 How should I draw reference geometry (CAD Interface)?

In WST, there are two tabs in which the CAD interface appears: the *General* tab and the *Levels* tab. When you draw line-work in the *General* tab, those entities will appear on every level. If you are in the *Levels* tab, the line-work you draw will only appear on the level in which that line-work is created. To draw reference lines common to every level, draw on the General tab, to draw line-work relevant to only a specific level, draw on the *Levels* tab.

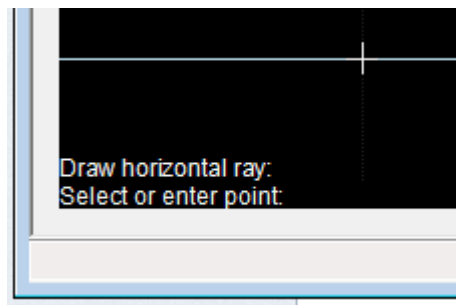


FAQ.4 How do I set up reference lines in WST (CAD Interface)?

Reference lines are the critical first step in laying out the shearwalls in the building. If done properly, they can help ensure that walls on various levels are located in their actual relative positions from floor to floor.

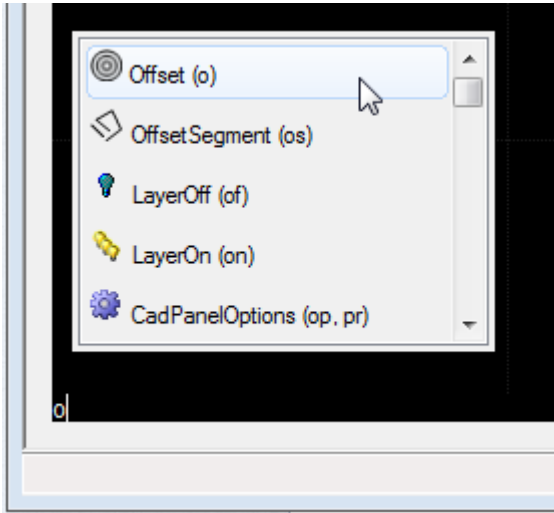
Let's assume we want to draw gridlines common to every level:

- Click the *General* tab.
- To the right, there are many drop-down menus; click the one that looks like a spark. Other buttons will appear below; the first four are buttons for drawing (1) a point, (2) a line (3) a horizontal ray, and (4) a vertical ray.
- We will draw a horizontal reference line. Click on the horizontal ray button.
- Follow the prompt at the bottom left of the CAD interface. Select or enter a point location. This can be done by click anywhere on the CAD interface or by entering a comma-delimited point. Enter the point by typing *0,0* and hitting the *Enter* key. This drops a horizontal line at the origin. We may enter as many points as we want, but we will stop with one and create other lines by copying the first one. Click the *Escape* key to exit the command.

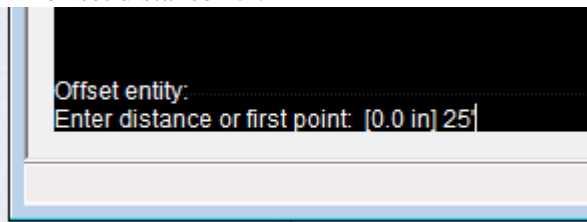


- We will create another reference line 25 feet above the first one using the *Offset* command. The offset command button can be found by clicking the copy drop-down button, or (like any command) by typing the command at the console. Begin to type the word "offset" and the bottom left of the CAD interface. When you start typing the program searches for commands that match what you've entered. When you see the

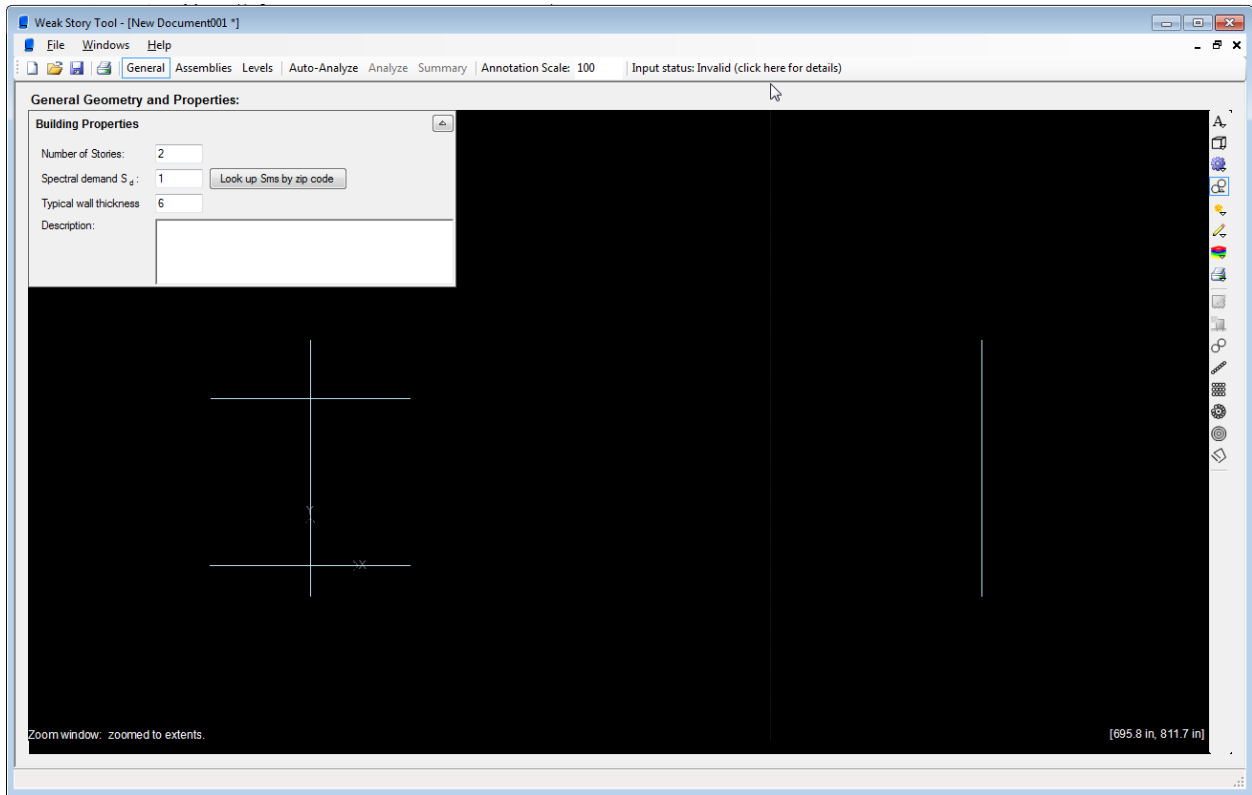
command you want, you may click it. If it is at the top of the list, hitting the *Enter* key starts the command. Click the *Offset* command.



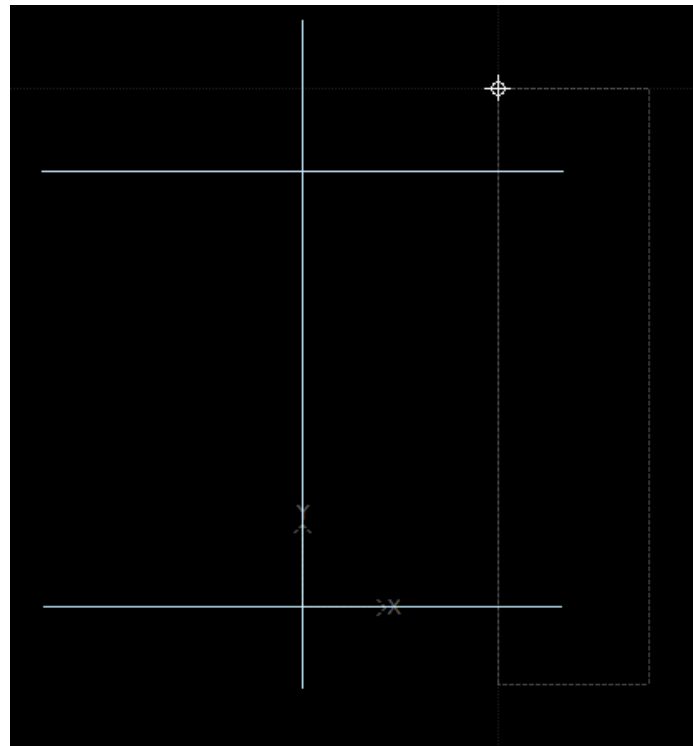
- Follow the prompt at the bottom left of the CAD interface. Enter the offset distance 25'.



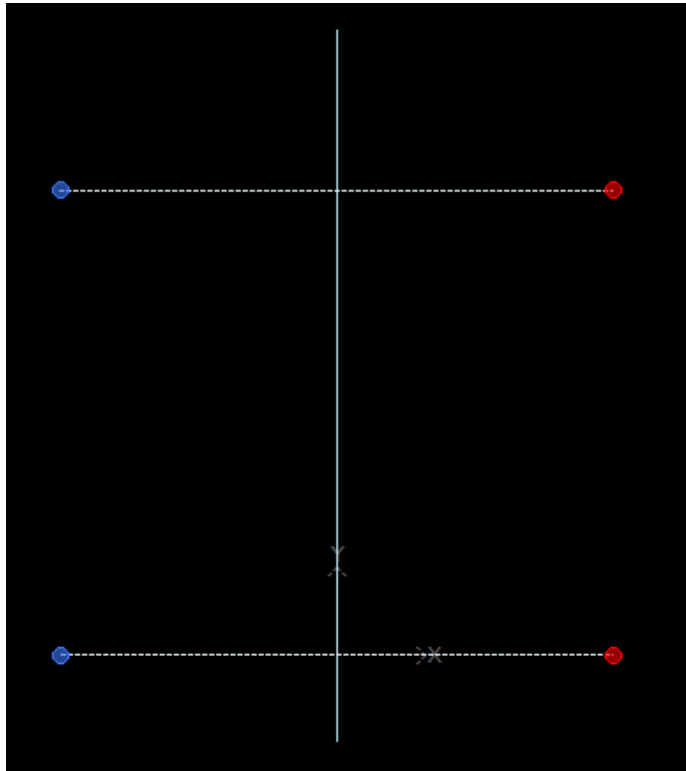
- Select the first line we drew.
- Select the side on which to offset the line.
- Hit the *Enter* key to close the command.
- The new line may not appear on the screen. Type "z" for the *Zoom* command, and hit *Enter*. Follow the prompt at the bottom left of the CAD interface: type "e" to zoom to the *Extents* of the entities drawn so far.
- Zooming may also be done using the middle rolling button on you mouse, and panning may be done by pressing the middle mouse button, if one exists.
- We follow the same process using the Vertical ray command and create vertical reference lines 100' apart.
- We want to stretch the horizontal lines to extend past the vertical gridline on the right.
- Select the two horizontal lines by clicking on the screen below and to the right of the horizontal lines, moving the cursor up and to the left, and

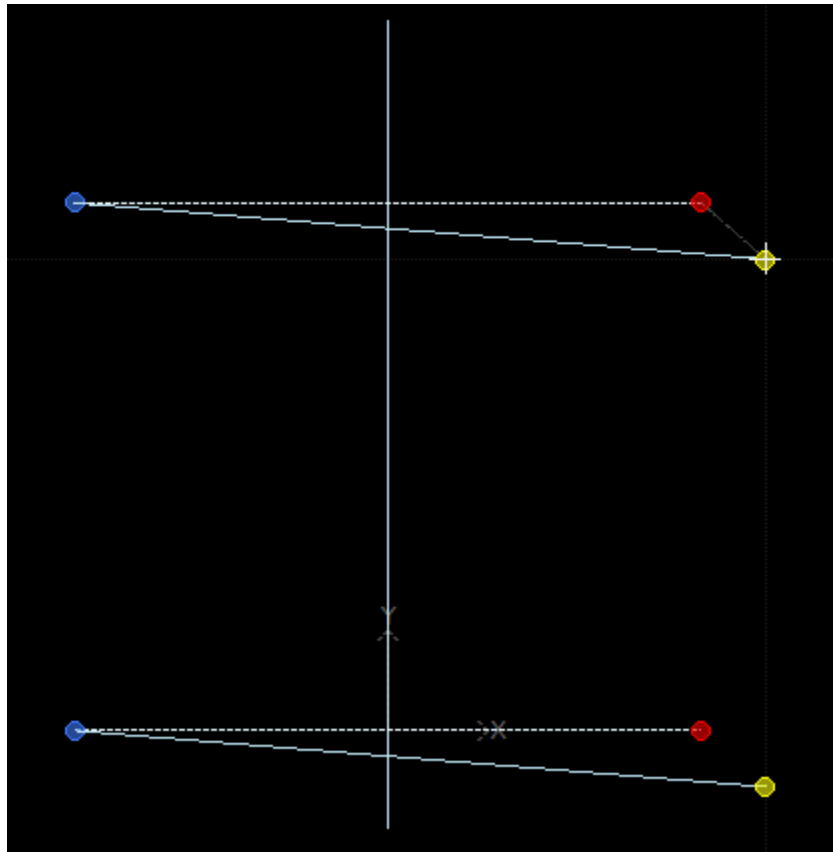


clicking. The horizontal lines should be dashed and the four round grips should show. Two of the grips will be red, indicating they are hot.

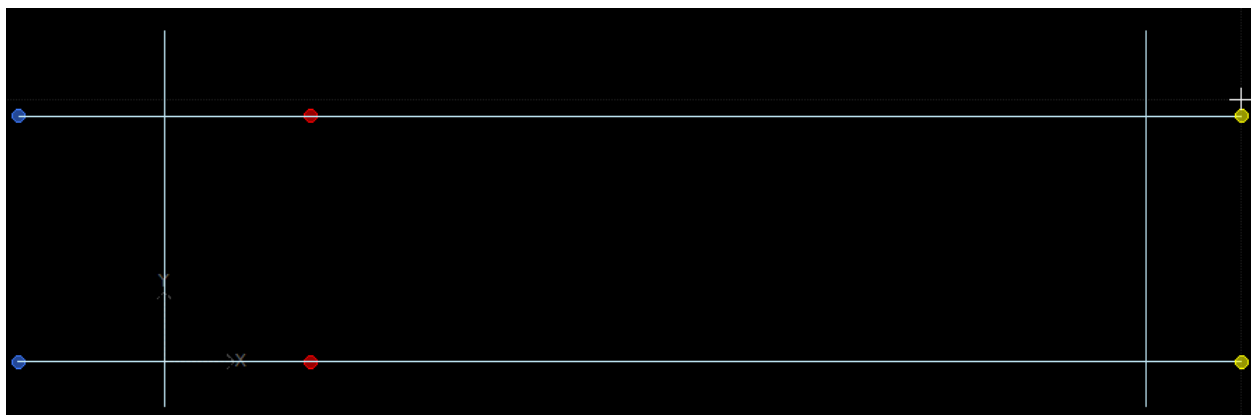


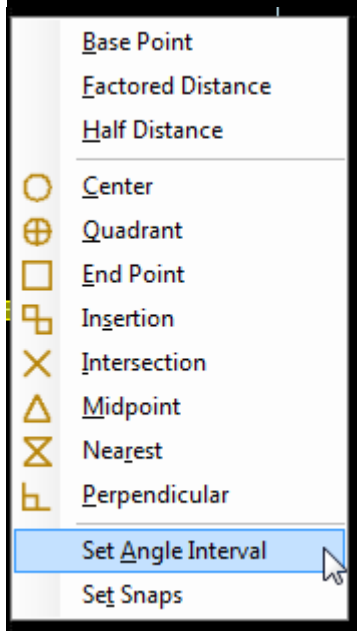
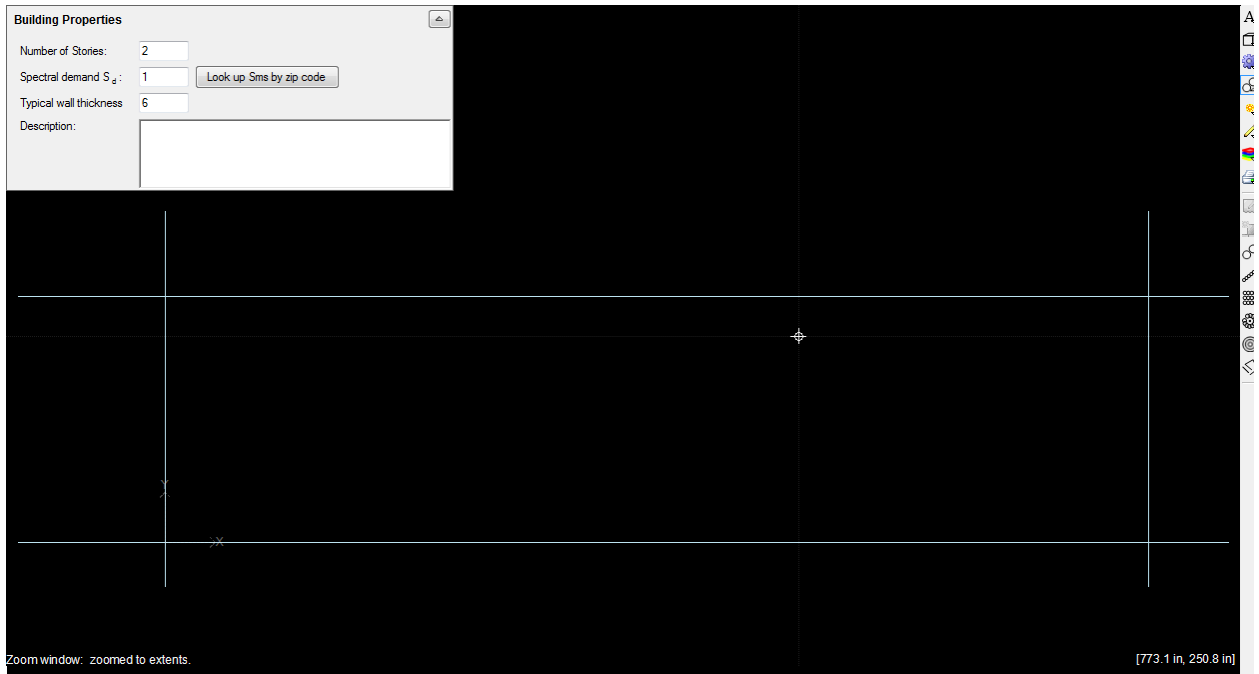
- Click on one of the red grips to stretch the lines. The grips being moved will turn yellow.





- Click on one of the red grips to stretch the lines. The grips being moved will turn yellow.
- Stretch the lines to the desired location and left-click to fix the new location of the grips.
- You may want to constrain the operation to keep the lines horizontal; hitting *F8* toggles the angle constraint. By default, this is set to increments of 15 deg., but this may be changed by holding the *Shift* key and right-clicking.
- These reference lines will now appear on every level.



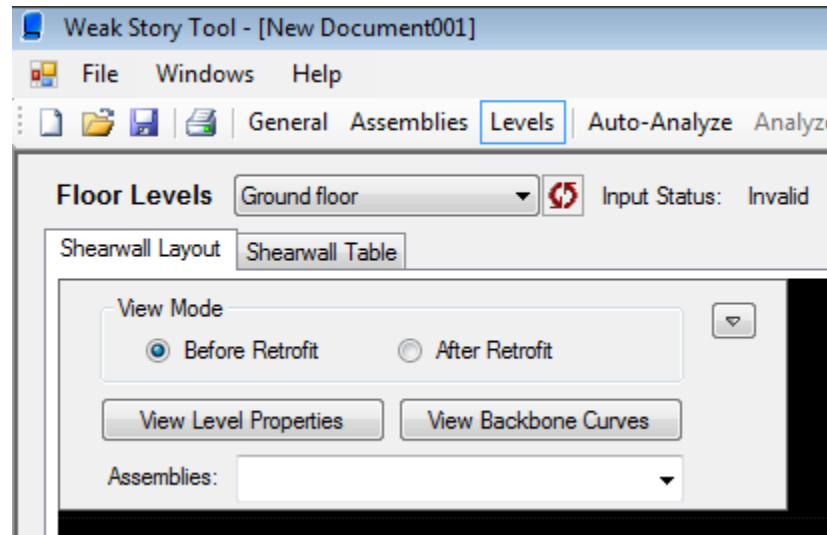


FAQ.5 How do I set up reference image in WST (CAD Interface)?

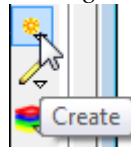
Similar to drawing reference lines, inserting an image is a valuable way of ensuring walls are placed in the correct locations and to the proper scale.

Let's assume we want to insert an image representing the wall layout at the Ground floor:

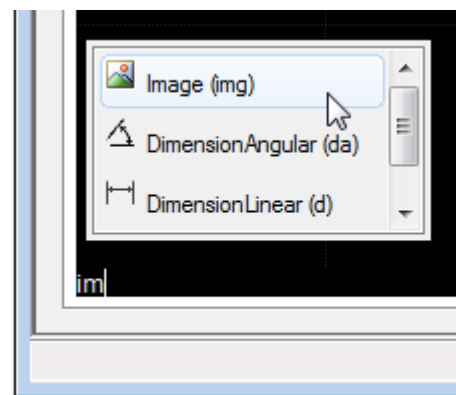
- Click the *Levels* tab and select *Ground floor* in the list of floor levels.



- Insert an image using the *Image* command. This may be done by



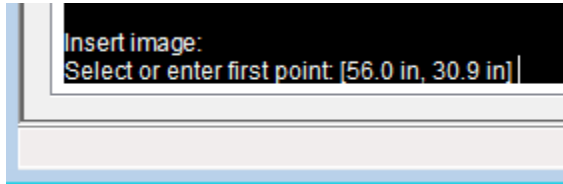
expanding the *Create* drop-down button on the right and finding the *Image* button, but the quickest way is to start typing "image" at the command console.



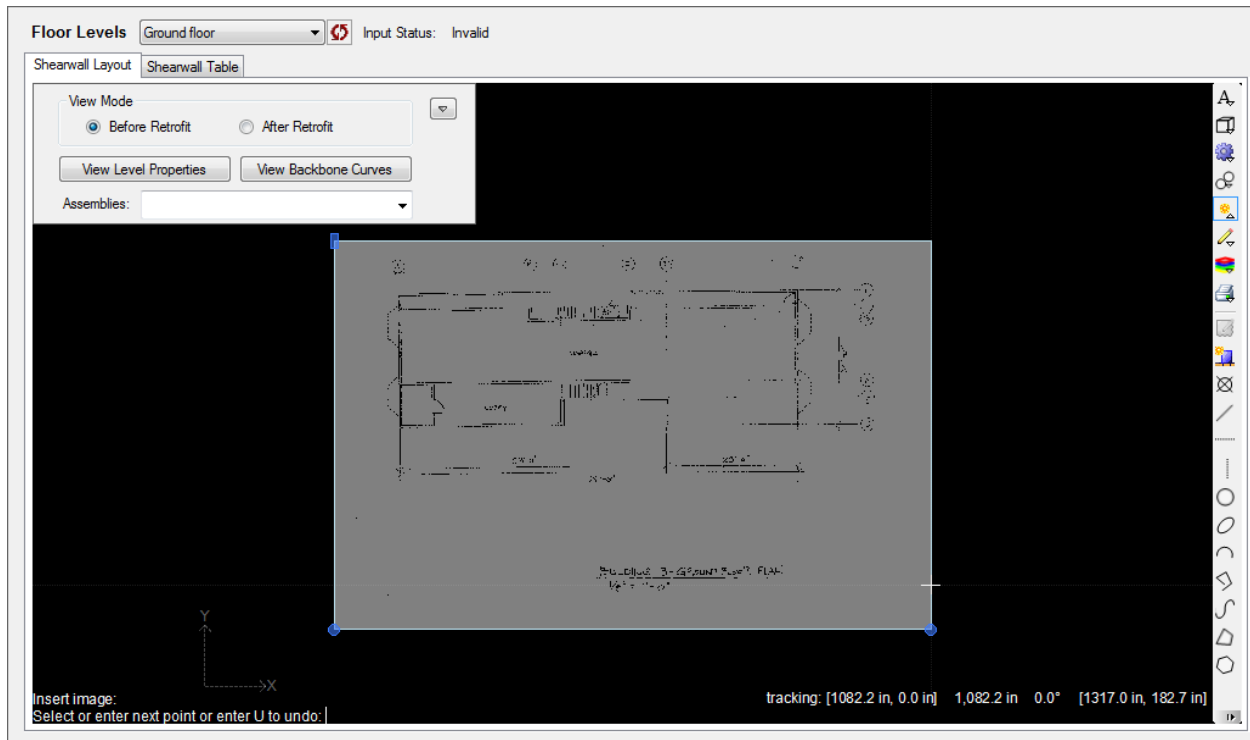
- A file browser will appear. Find the image file you want to insert and click the *Open* button. WST supports many image file types, including

JPEG, PNG, TIF, GIF, BMP, WMF, and EMF. If you want to insert an image from a PDF file, first export the pages of the PDF file as images.

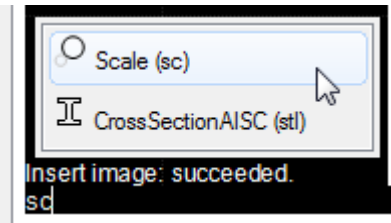
- Follow the prompt at the bottom left of the CAD interface. Select or enter the location of the insertion point of the image.



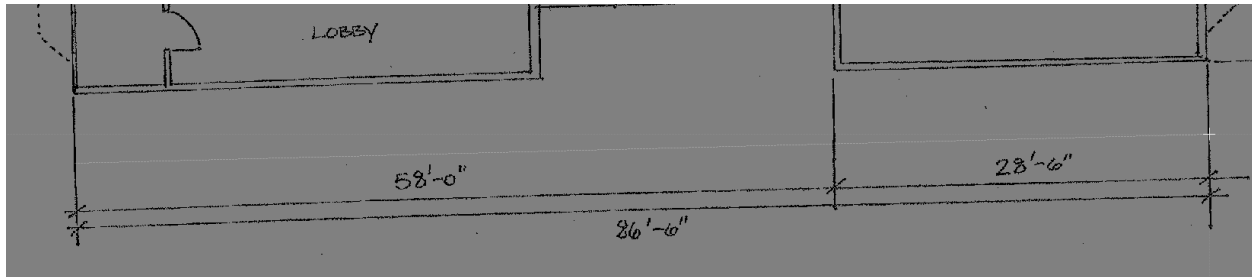
- After the first point is entered, the image should appear with its blue grips showing. The prompt asks for another point which defines the initial scale of the image. Click a location to close the command; we will fine-tune the scaling and orientation next.



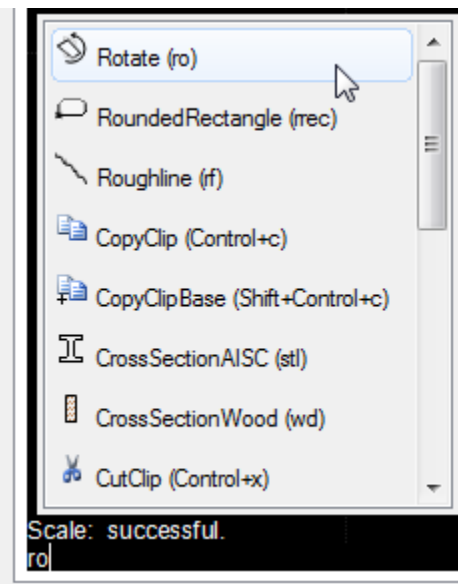
- An alternative to inserting the image from a file is by taking a screenshot (which puts an image onto the clipboard) and pasting this into WST by hitting CTRL+V. The image will appear and the prompt will ask you to select the location of the image.
- We need to scale the image in WST so that one inch of length represented by the image corresponds to one inch of length in WST.
- Run the scale command by starting to type "scale" at the console and clicking the scale command when it shows.



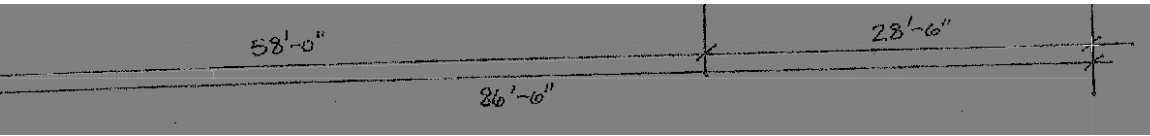
- Select the image and hit *Enter*.
- Type "r" and hit *Enter* in order to set the reference length represented on the image.
- Select a distance on the image that represents a known distance in the building. If multiple distances are known, select the largest one to minimize error. In this example, the image has dimension lines set up; we select the distance of 86'-6" by picking two points on the image.



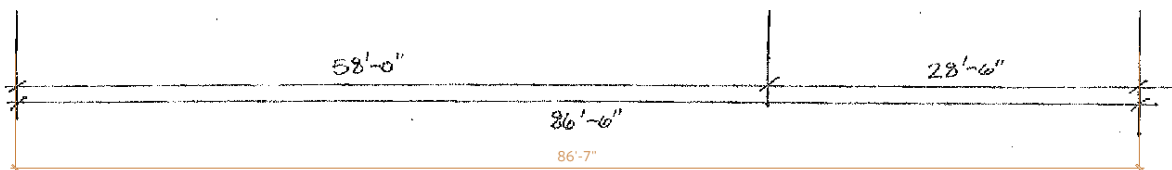
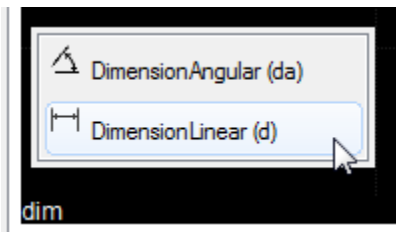
- Pick a reference point on the image (arbitrary) from which to scale.
- Enter the length (in the CAD interface context) that corresponds to the distance represented by the image. In this example, we enter 86'6" which is interpreted by WST as 86'-6".
- We now need to orient the image properly using the *Rotate* command. Start the *Rotate* command by selecting the image and typing "ro" at the console.



- Type "r" and hit *Enter* in order to set the reference angle represented on the image.
- Select an angle on the image. In this example, we select an angle that we want to become horizontal, which happens to be along the previously referenced dimension string.



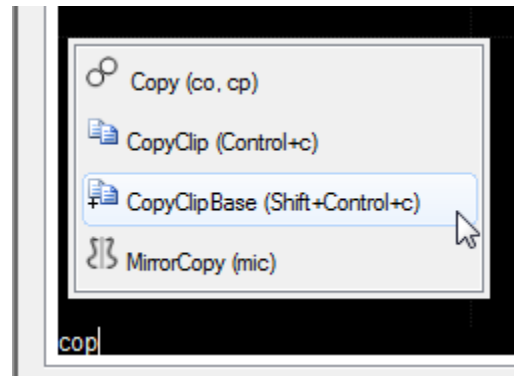
- Pick the base point about which to rotate (arbitrary).
- Select the desired orientation. In this example, we want the horizontal direction, which may be achieved using the angle constraint (toggled with *F8* key).
- The image is now scaled and oriented. It may be moved to another location with the *Move* command.
- To check that the scaling is correct, start the *DimensionLinear* command by starting to type "dim". Follow the prompts to complete the command. If the measured distance has less than 5% error, than it's good enough. In this example, the measured distance is 86'-7" compared with 86'-6", which is less than 1% error.

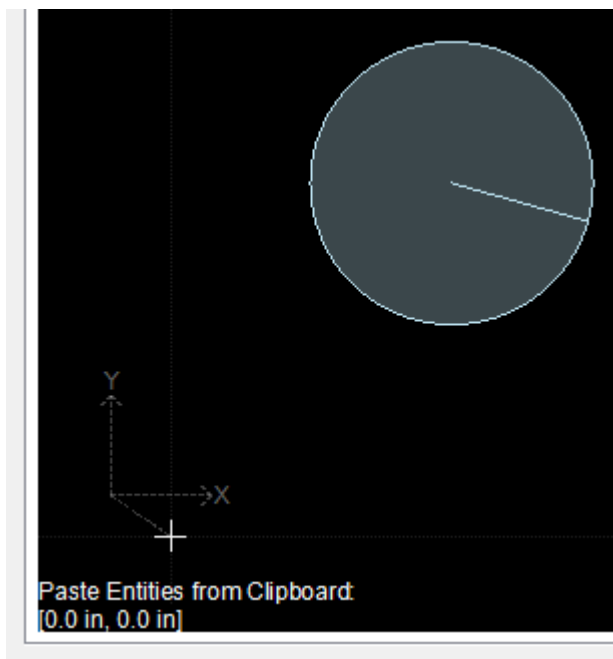
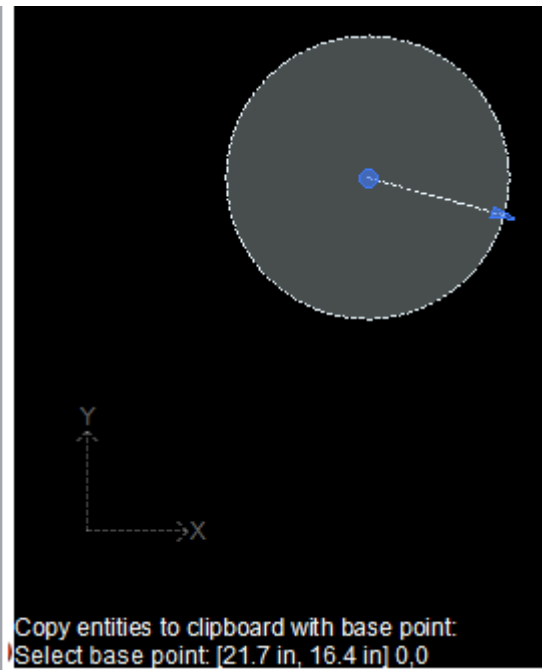


FAQ.6 How do I copy/paste entities from one level to another using a common base point (CAD Interface)?

WST supports common clipboard actions like copy (CTRL+C) and paste (CTRL+V). In addition, there is a *CopyClipBase* (CTRL+SHIFT+C) command which is similar to the effect of the conventional clipboard-copy command, but it asks the user to select a base-point for the copy operation.

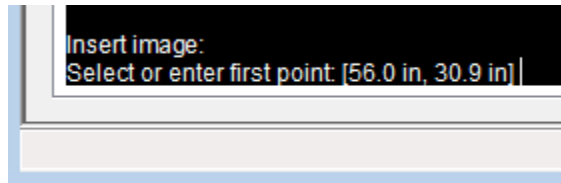
- Select the entities at the level you wish to copy and start the *CopyClipBase* command.
- Follow the console prompts; select the desired base-point. Normally, this is the origin, which may be entered as *0,0*. Hit the *Enter* key to complete the command.
- Select the level to which the entities are to be pasted and press CTRL+V to paste.
- Follow the console prompts; select the base-point on the current level to drop the new entities. To make them align with the level from which they were pasted, enter the same base-point that was entered when they were copied, typically *0,0*.





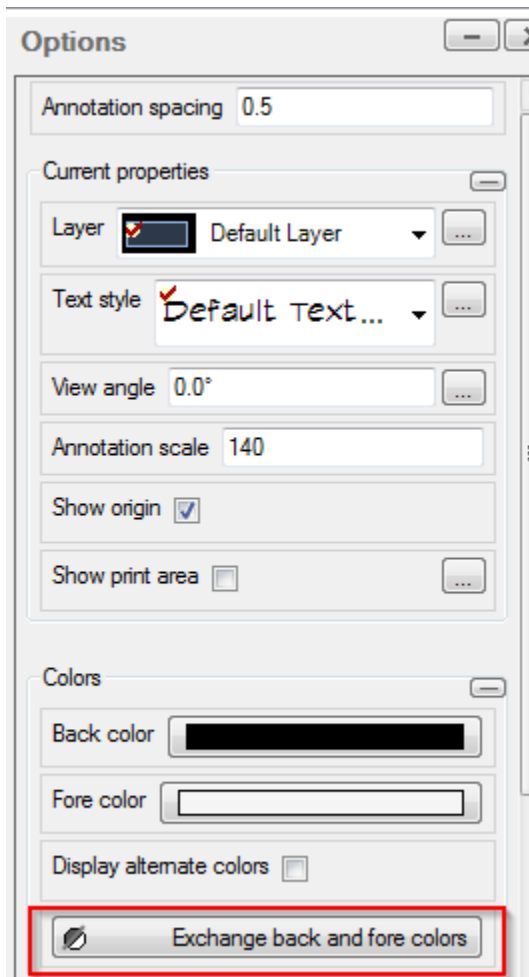
FAQ.7 What is the meaning of the point in brackets (CAD Interface)?

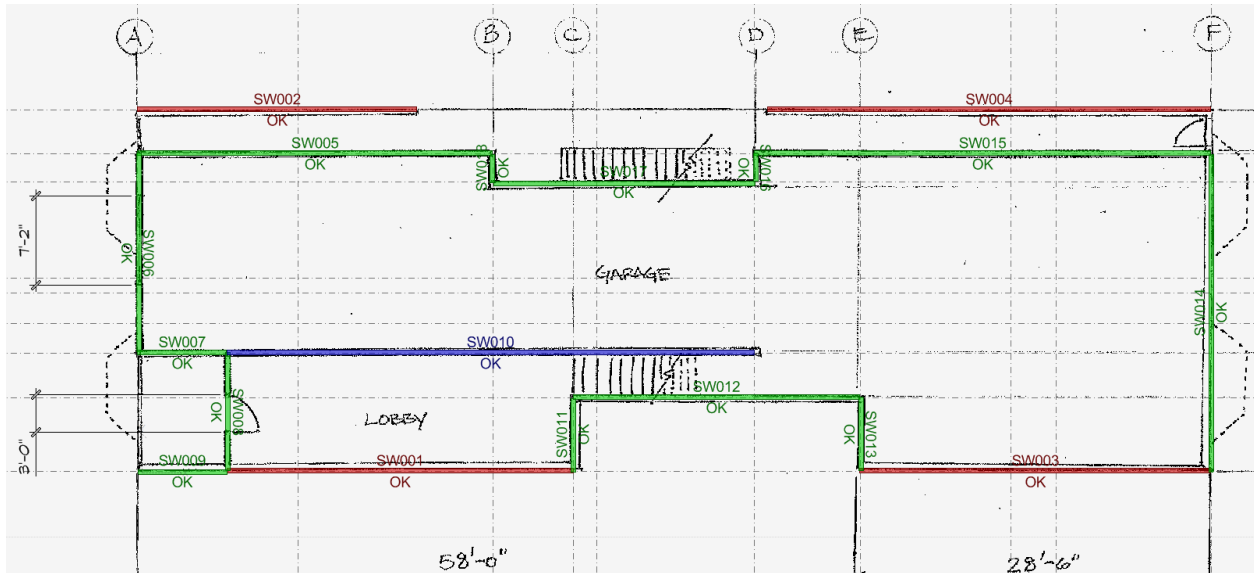
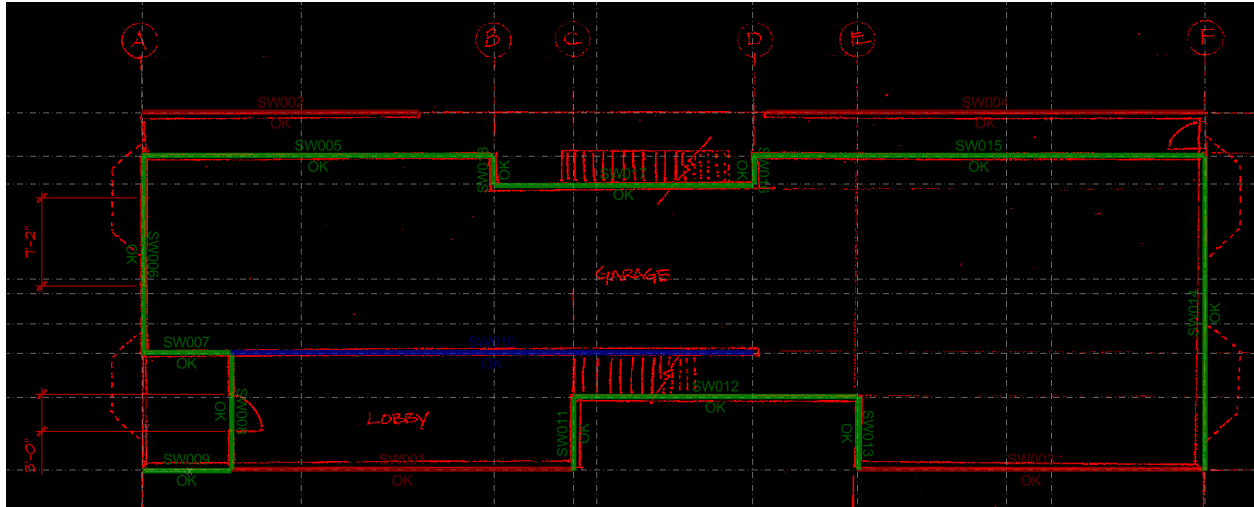
Many commands in WST require entering a point. The most recent point entered by the user is saved by the program and offered in the brackets in the console prompt at the bottom left of the CAD interface. Hitting the *Enter* key with no other input information entered is equivalent to re-entering the point shown in brackets.



FAQ.8 How do I make the background white (CAD Interface)?

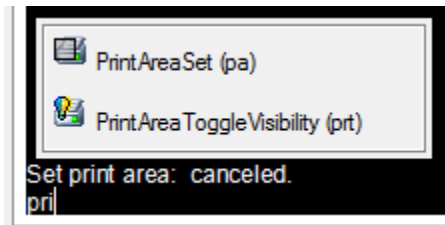
The WST CAD interface has many options for display of and interaction with entities both analytical and non-analytical. These options are displayed when you type the *Options* command. One of the options available is to change the background and foreground colors (e.g. console text and cursor colors).

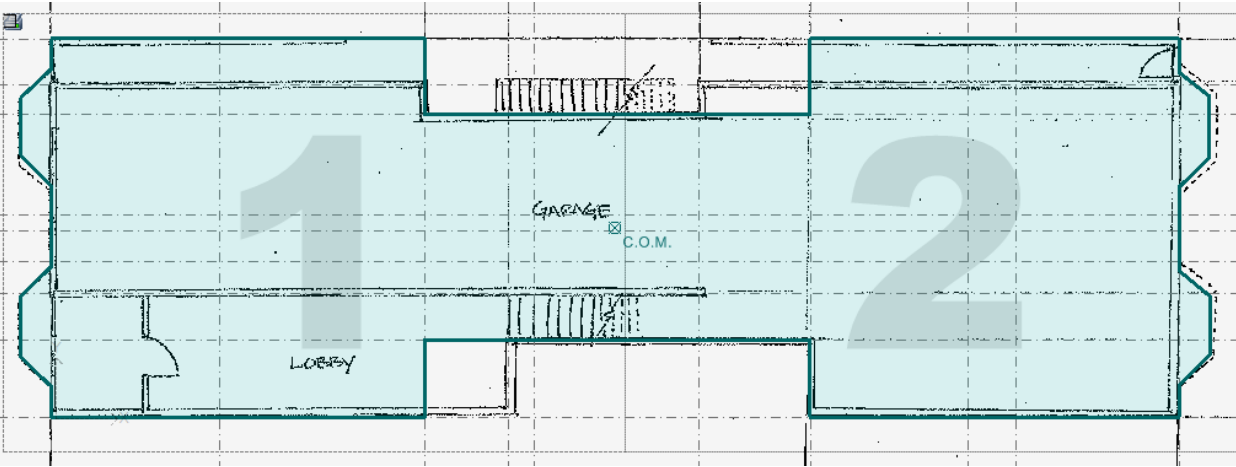





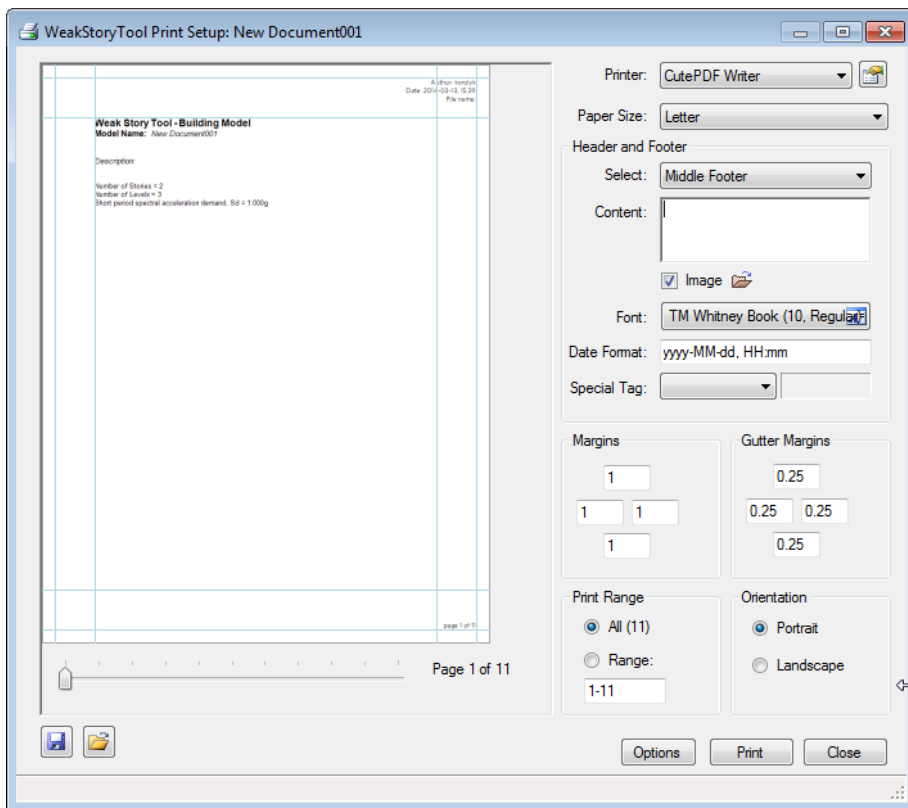
FAQ.9 How do I print?

By default, the print area of the CAD interface is set to the full extents of the drawing. Set the print area to a smaller area by beginning to type "print area" at the console. Pick two points representing the corner points of the print area extents. The selected print area will be shown with the number of pages required for the CAD area indicated. The number of pages required depends on the paper settings and the annotation scale.

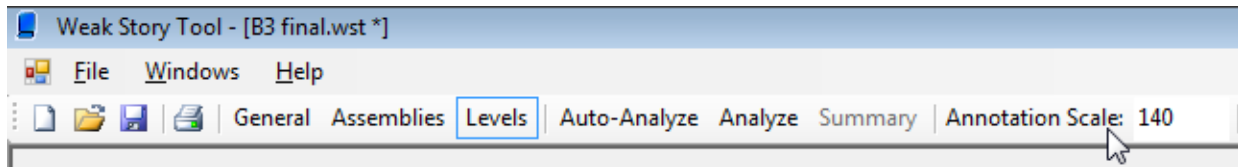




To edit the paper settings click on the printer icon . This brings up the *Print* form which allows you to choose many options including paper size, printer, margins, enter header and page numbers. By clicking the button labeled *Options* at the bottom, one may set what is included in the report.

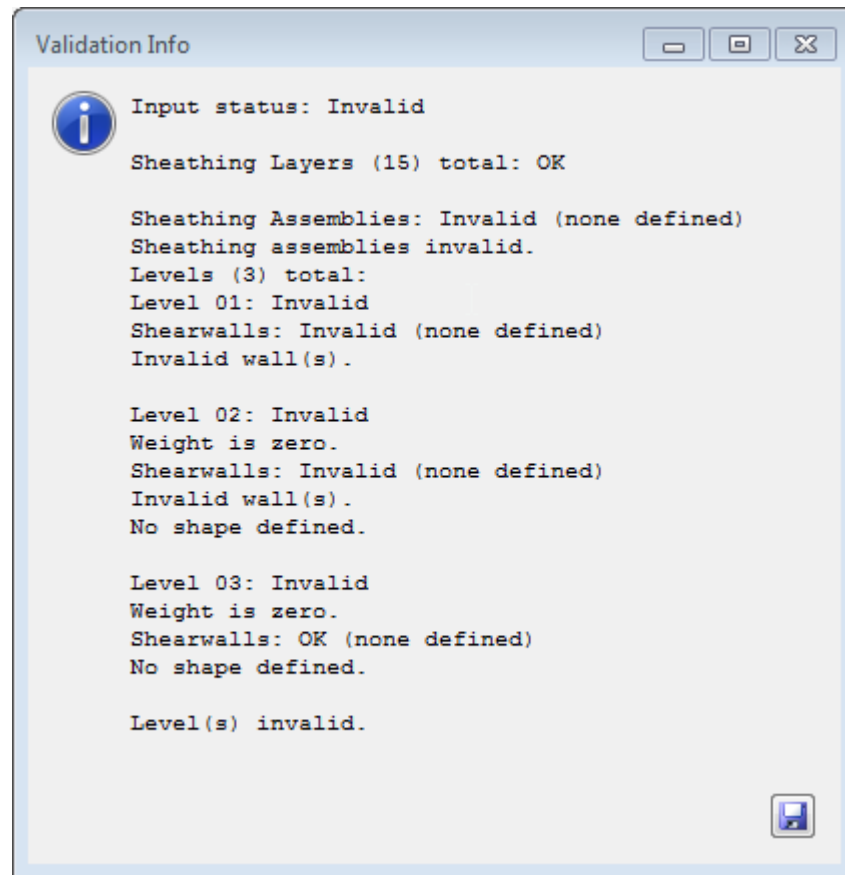
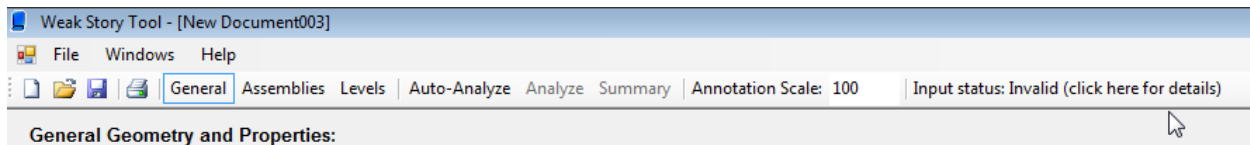


The annotation scale may be entered near the top of the program.

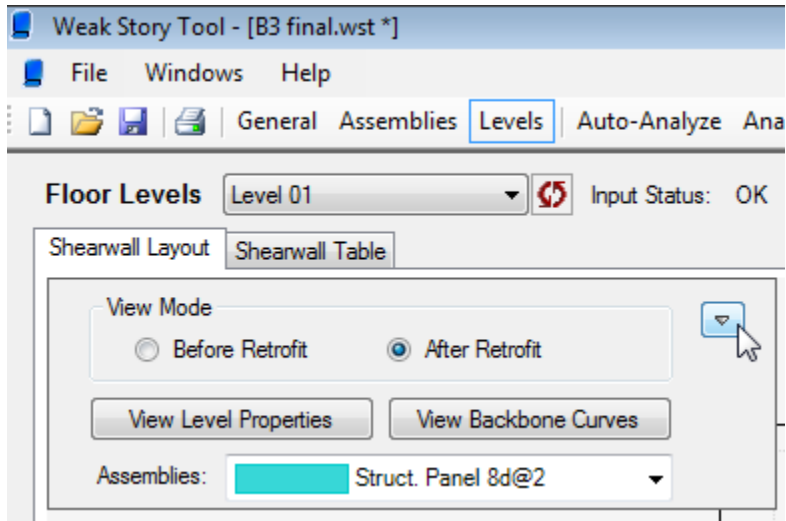


FAQ.10 Why are the *Analyze* and *Summary* buttons disabled?

The *Analyze* and *Summary* buttons at the top of the program are disabled until the data input by the user is valid. Before the input is valid, one may click at the top of the program where it says "Input status: Invalid (click here for details)". Clicking there brings up a dialog explaining what is not valid.

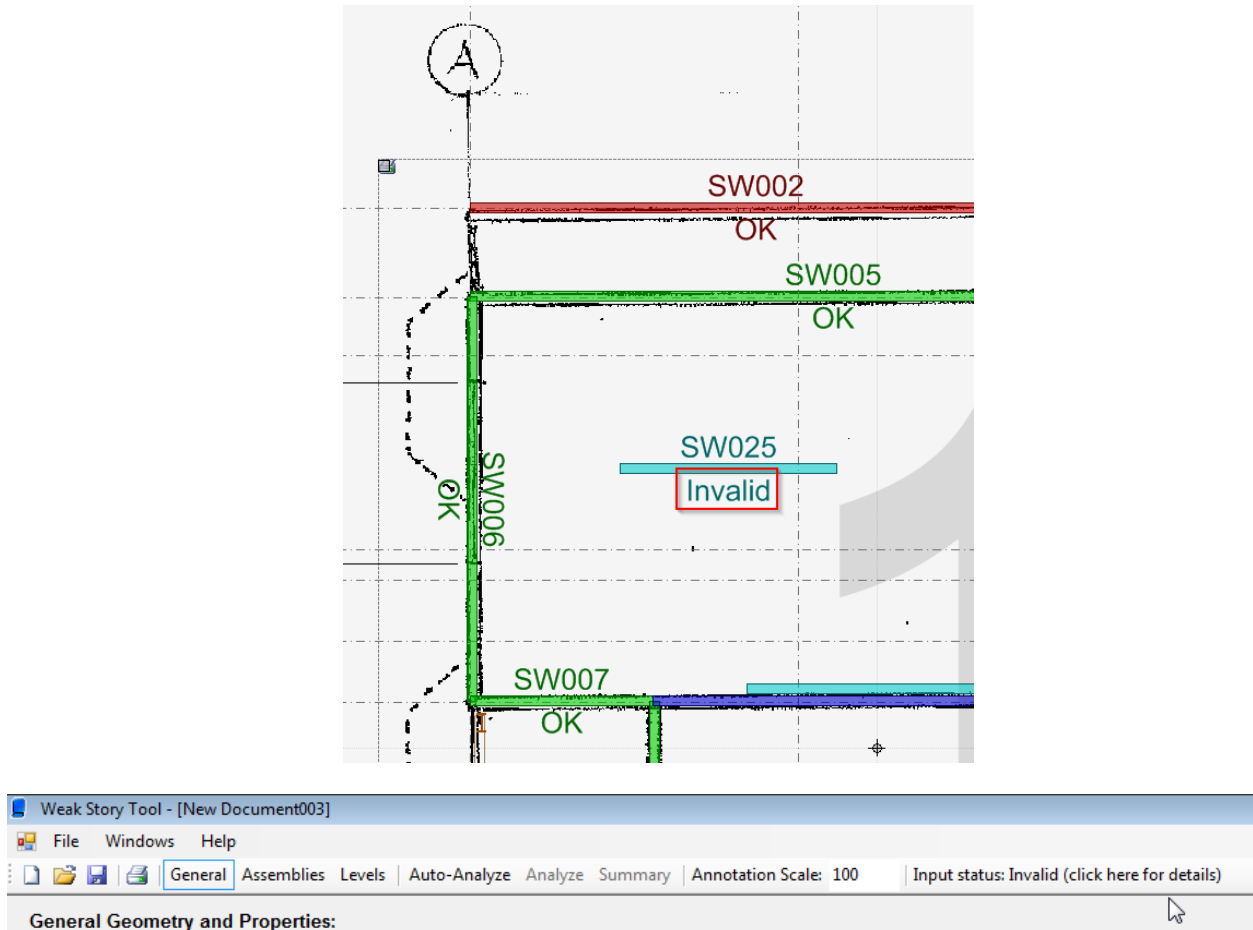


The status of individual walls may be displayed by clicking the drop-down button in the *Levels* tab and selecting from the list of available labels.

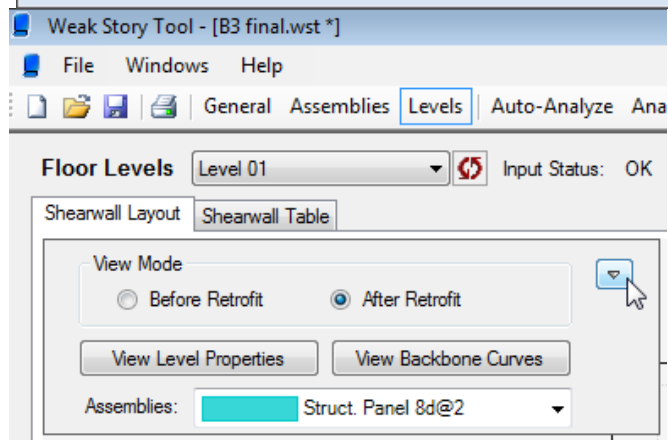
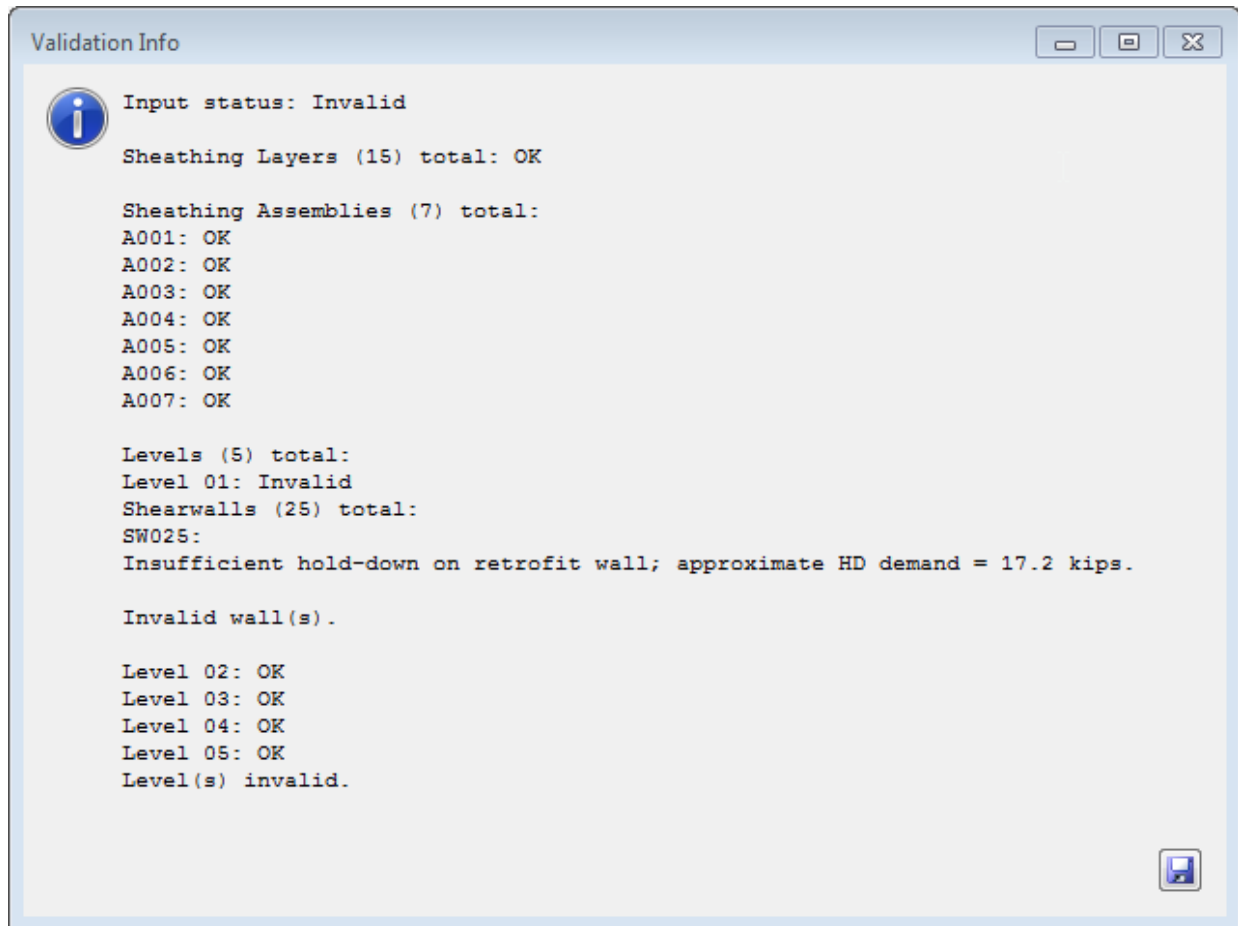


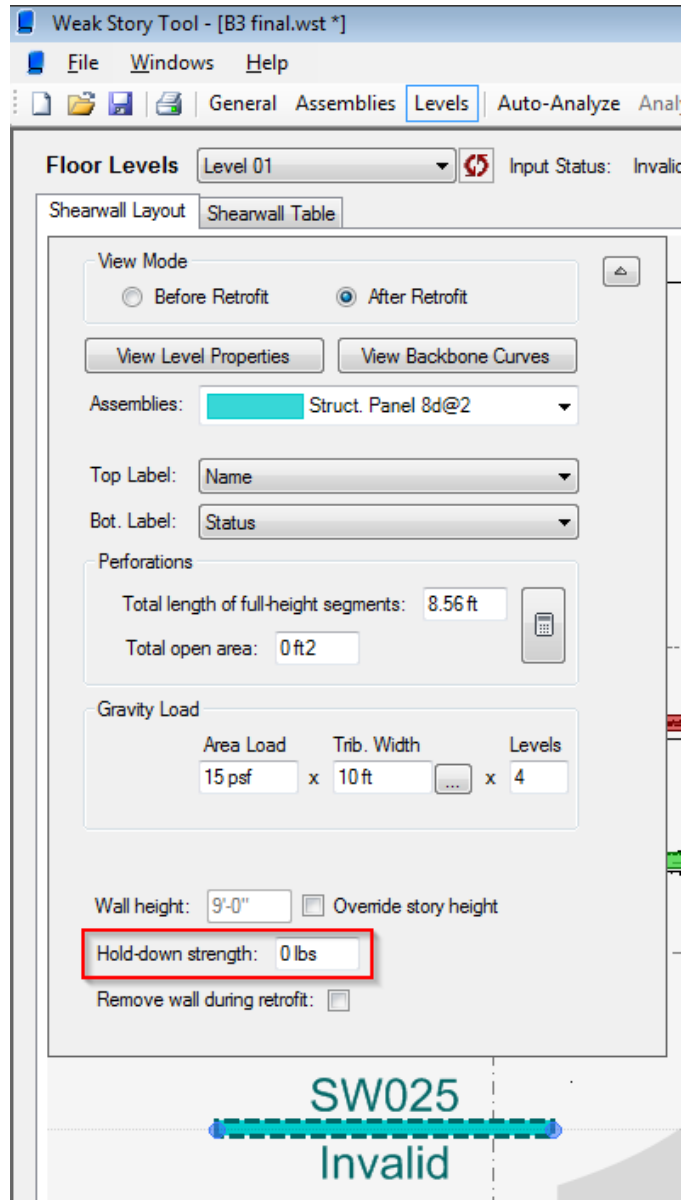
FAQ.11 Why are my retrofit walls making no effect?

Check to make sure the input status of the retrofit walls is valid. If one is invalid, click at the top of the program where it says "Input status: Invalid (click here for details)". Clicking there brings up a dialog explaining what is not valid.




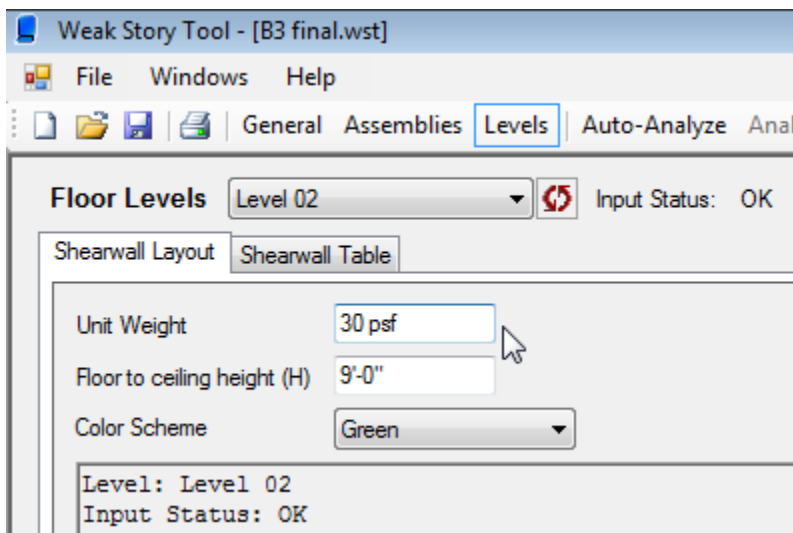
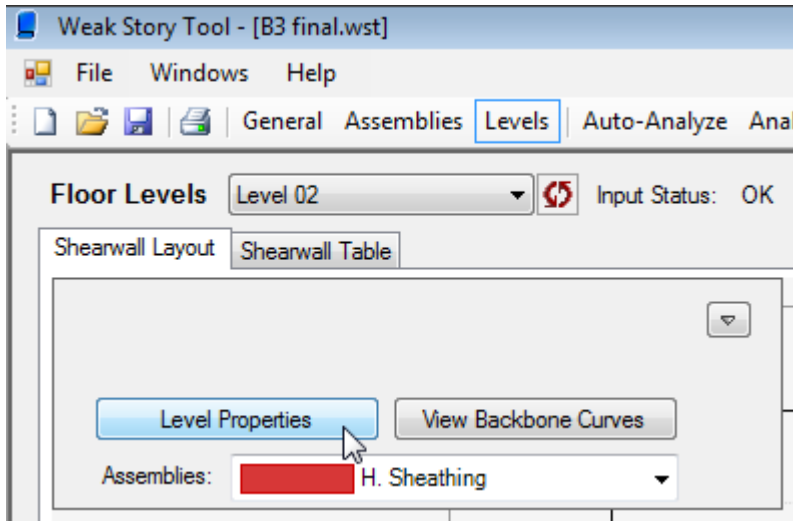
As indicated in the dialog, retrofit walls need to be provided with sufficient hold-down capacity. This may be entered by selecting the wall and entering an appropriate value in the shearwall properties drop-down form.





FAQ.12 What is the distinction between building weight and wall gravity load and where are they entered in WST?

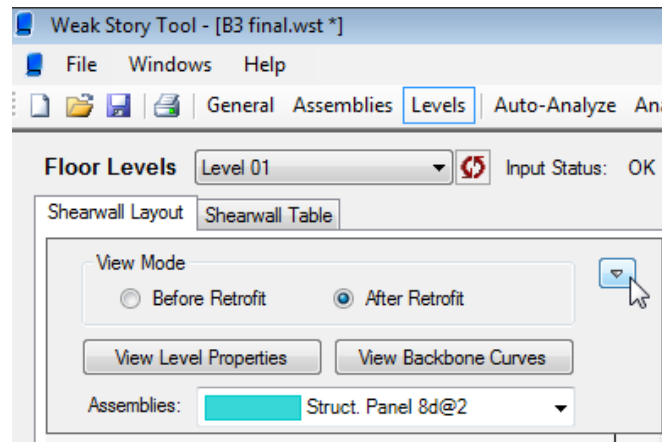
The weight of the building is calculated by WST using the unit weight specified by the user for each level in psf. *Note that the unit weight must include all contributions to seismic mass including partition walls.* In the Levels tab, click the button labeled *Level Properties*. This brings up the form where the unit weight may be entered for the current level. The user defines the shape of the diaphragm to which the unit weight is applied by running the *Level* command by clicking the *Level* button  on the right tool strip or by starting to type "level" at the console. Once the shape and unit weight of the diaphragm are set, WST automatically calculates the total weight of the level and the center of mass (COM) of the diaphragm. This is the weight used in determining the normalized backbone curves.

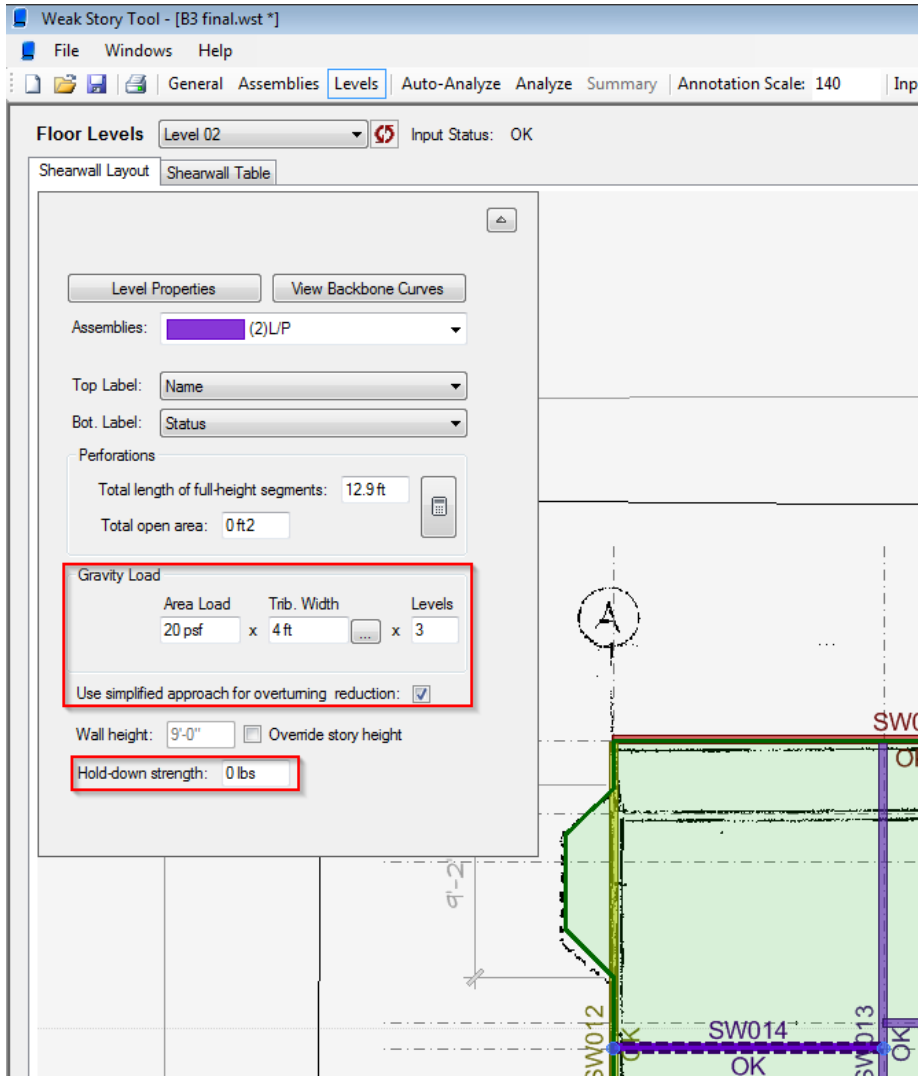


In order to determine the lateral strength of a wall, the overturning resistance must be known. The *Guidelines* allow using a simplified overturning

adjustment Q_{ot} for upper level walls, not for ground level walls. Whenever the simplified factor is not used, the user must be sure to account for overturning resistance due to gravity load. This is done by assigning to each wall a gravity unit load in psf and a tributary width. Wall length is calculated automatically, and the total gravity load for the wall is assumed to act at the center of the wall. Once may also enter hold-down capacity in addition to overturning resistance from gravity load.

Gravity load data may be entered in the shearwall table or in the CAD interface. In the CAD interface in the *Levels* tab at the desired level, expand the drop-down options form. Select the desired wall(s) and enter the desired gravity load and hold-down data.





Weak Story Tool - [B3 final.wst *]
 File Windows Help
 General Assemblies Levels Auto-Analyze Analyze Summary Annotation Scale: 140 Input status: OK

Floor Levels Level 02 Input Status: OK

Shearwall Layout Shearwall Table

Name	Input Status	Assembly	Point0	Point1	Length	Angle	Override Story Height	Height	Removed During Retrofit	Open Area	Length Full-Height	Hold-Down Strength	Gravity Levels	Used Simplified OT Reduction	Gravity Area Load	Gravity Trib. Width
SW001		A001	4", 29'-3"	28'-4", 29'-3"	28'-8"	0°	<input type="checkbox"/>	9'-0"	<input type="checkbox"/>	0 ft2	28'-8"	0 lbs	3	<input checked="" type="checkbox"/>	20 psf	4'-0"
SW003		A005	28'-4", 23'-5"	57'-11", 23'-5"	29'-7"	0°	<input type="checkbox"/>	9'-0"	<input type="checkbox"/>	0 ft2	29'-7"	0 lbs	3	<input checked="" type="checkbox"/>	20 psf	4'-0"
SW005		A001	57'-11", 29'-3"	86'-3", 29'-3"	28'-4"	0°	<input type="checkbox"/>	9'-0"	<input type="checkbox"/>	0 ft2	28'-4"	0 lbs	3	<input checked="" type="checkbox"/>	20 psf	4'-0"