	SPIDA Job Aid #14 Span Guys	**Revised** **May 31, 2018**

Updated 4/12/18

PRIMARY DEPARTMENT AFFECTED:

- Design Organizations
- Pole Program Management (PPM)
- Edison Carrier Solutions (ECS)
- Transmission Telecommunications (Trans Telecom)
- Joint Pole Organization (JPO)
- Maintenance, Performance & Reliability (MPR)
- Field Accounting Organization (FAO)

BACKGROUND

SPIDACalc allows for continuous pole lines to be analyzed by bringing wires from previous (or next) poles to the pole currently being assessed. In some cases, span guys will continue to support conductors across several poles until it can be guyed to an anchor. As a result, modeling the scenario has specific steps to achieve accuracy on transferring loads across multiple poles.

PURPOSE

The following will outline how to build various types of pole lines. To clarify some of the commands in the tool, the following will explain the differences between selecting a span guy from the anchors and guys tab versus selecting a guy wire from the wires tab.

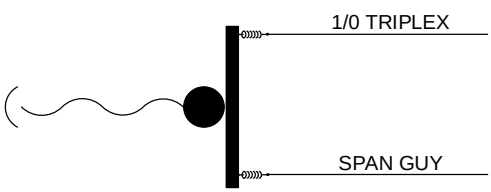
Span Guys from the Wires Tab

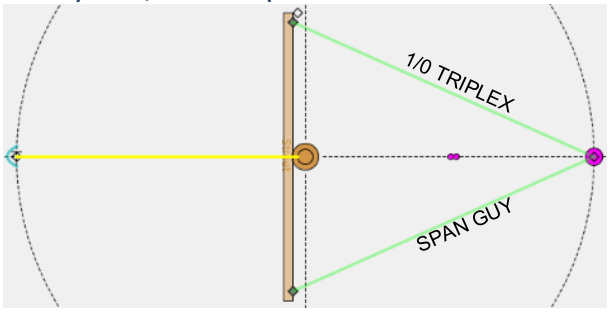
These selections are offered in the tool but there are very few circumstances where it is appropriate to use them. Inputting guy wires from the wires tab does not trigger SPIDA to calculate their tension based on the conductors they are backing up. It only puts it in at the tension value that particular wire has associated with it.

Arm Guys

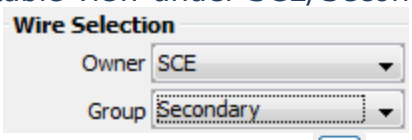
If a project includes wires that terminate on a crossarm, and a span guy is being used to offset the wire in the same direction, selecting a guy wire from the wires tab is appropriate. The wire should have a tension set to match the conductor it is offsetting.
The tool must be in the Table View to set guy tension to match the conductor tension.

Example:
A 7/32" guy is used to balance the load applied by a 1/0 Al Triplex wire.

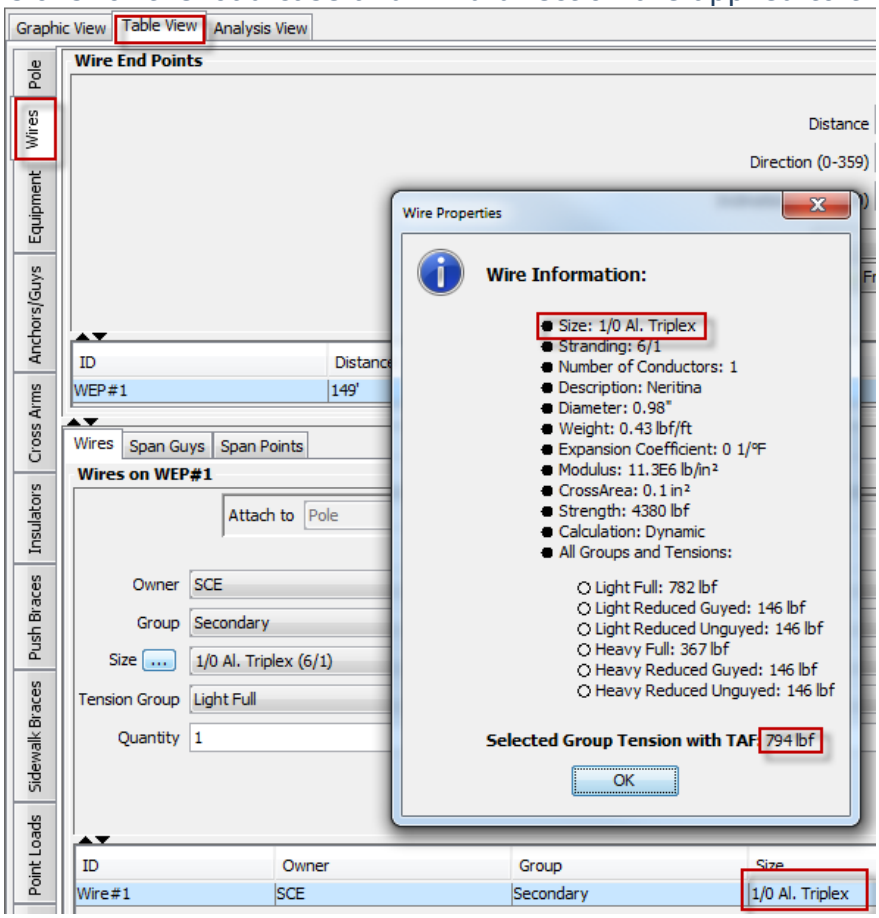




1. Select the triplex wire in table view under SCE/Secondary.



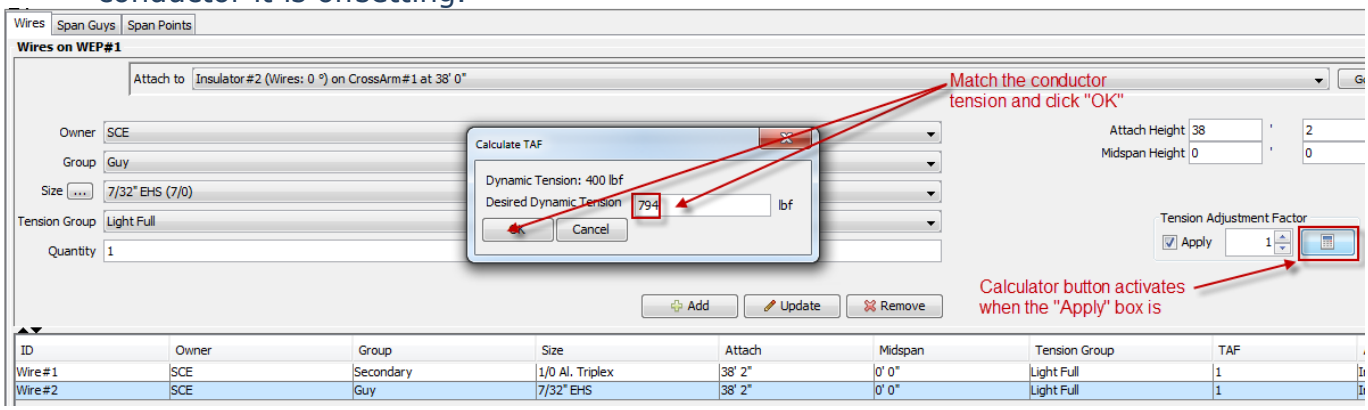
2. To find the tension to be balanced click on the … button next to the wire size input. In the wire information box, the tension value is displayed at the bottom of the box where it is labeled, "Selected Group Tension with TAF". The value for the 1/0 Triplex with 170' span sagged to Light Full Tension is 794 lbs.
   Note: With dynamic tensions in the current client file, these tensions are at 60 degrees without any wind or ice loading. The tensions will be less than the full specified maximum loaded tensions shown in the Distribution Overhead Construction Standards (DOH). Once the load and temperature are applied in the program, actual loaded tensions for the load case and wind direction are applied to the wires.



3. While still in table view, select the guy wire and click the box next to "Apply" for the Tension Adjustment Factor (TAF).

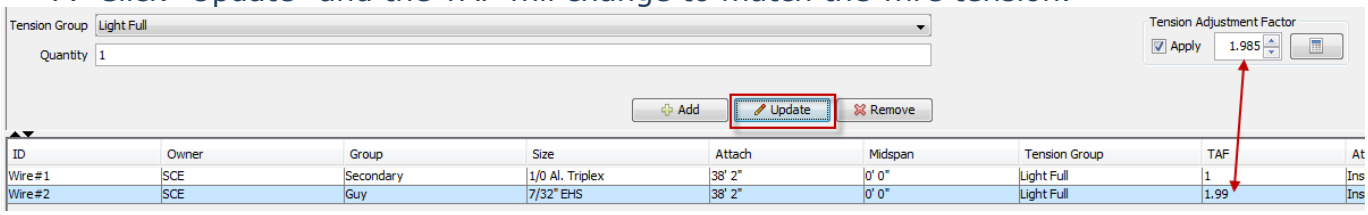
4. Navigate to table view and locate the wire. Select the box next to 'Apply' in the Tension Adjustment Factor (TAF) and the small calculator button will activate.

5. Click the calculator button and change the tension to match the tension of the conductor it is offsetting.



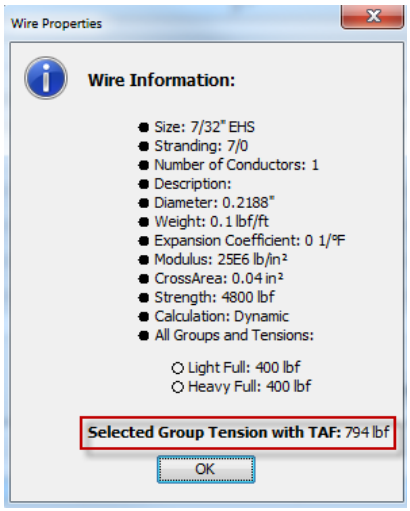
6. Click OK.

7. Click "Update" and the TAF will change to match the wire tension.



Note: It is necessary to complete this final step to update the wire properties.

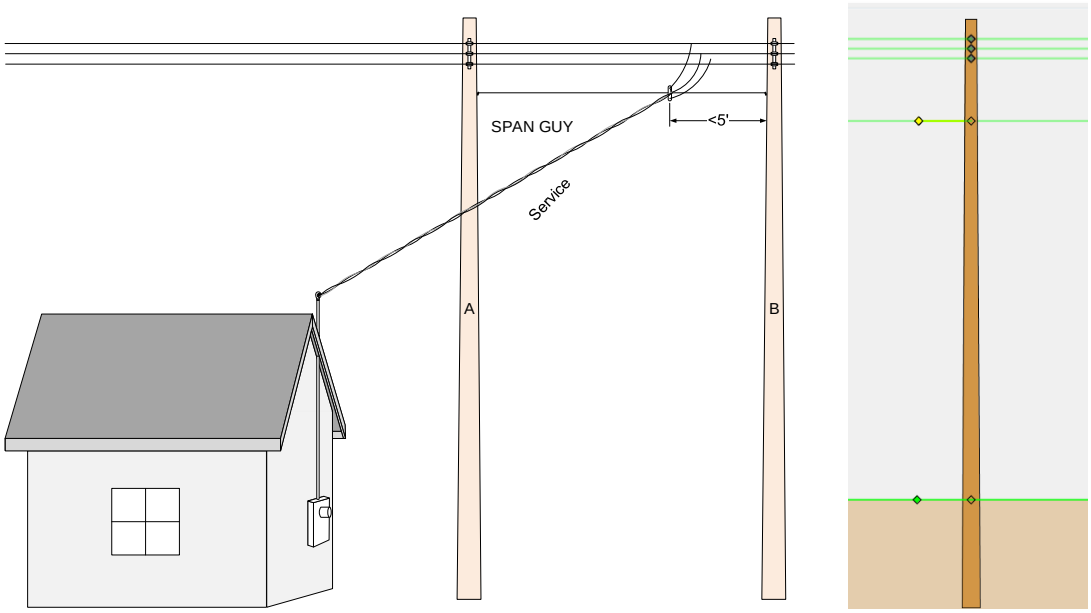
8. Perform a final check after updating. With the guy wire still selected in the table view, click on the "…" box and the wire information box for the guy will open. Validate that the Selected Group Tension with TAF for the guy matches the conductor.



Midspan Taps

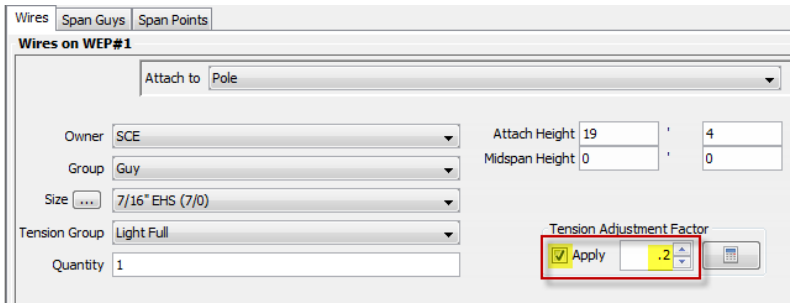
On an open wire secondary span, a span guy is utilized to achieve a mid-span service. The span guy is not supporting either pole it is attached to, however, it is lightly pre-tensioned when installed and it has wind area. Therefore, it is necessary to pole load these span guys.

Mid-span Service



For this scenario, it is acceptable to enter the span guy as a wire with a tension adjustment factor of 0.2. With dynamic tensions the light and heavy loading tension values for guy wire were determined for the wire used as bare communications messenger which is much tighter than the pre-tension for this application. In this case a tension adjustment factor of 20% should be applied to the tension values. To apply this, in graphic view select wires, then select Guys under Group. Select the appropriate guy and before dragging it onto the pole, click the "Apply TAF" checkbox and enter 0.2 for the TAF. Then drag the guy from the wires tab onto the pole.

Note: After dragging a guy wire to the pole, deselect the TAF checkbox before selecting any additional wires or the adjusted TAF will still be applied.



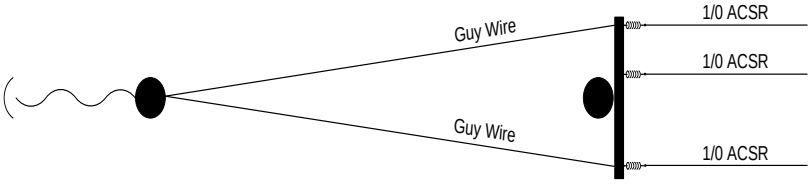
If the service is attached within 5’ of the pole, attach it directly to the pole and proceed with setting up the Wire End Point as it appears in the field. If the service is attached 5’ or greater from the pole, do not include it in the calculation.

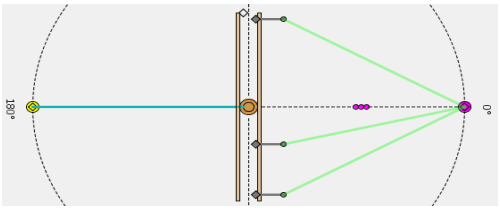
Wizzars

In instances where wizzars are found or applied, utilize the service conductor size for the full length of the span (pole to pole) and place it in the tool as a full tension secondary. Do not use service tension.

Span Guys from the Anchors and Guys Tab

If your project includes wires that terminate on a crossarm, and arm guys are used to offset the wire in the opposite direction, select a guy(s) wire from the “Anchors/Guys” tab. Attach the span guy(s) to the pole at the attachment point of the crossarm and follow the standard process for span guys.

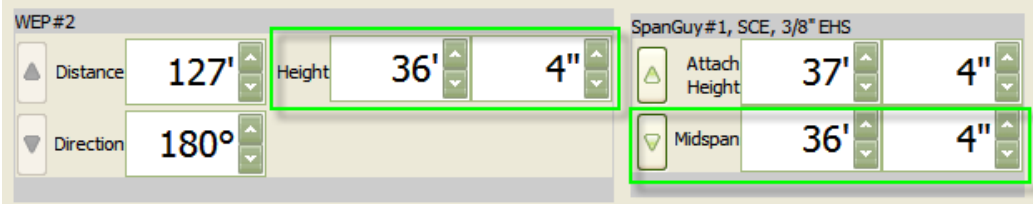




Span guys utilized from this tab allow the application to assess the actual tension on the span guy by calculating what wires it is/are supporting. As such, the subsequent pole, if pole loaded, will only show a point load from the span guy based on this calculation. This will help in assessing the stresses actually seen on the pole and the analysis will be more in line with the actual field condition.

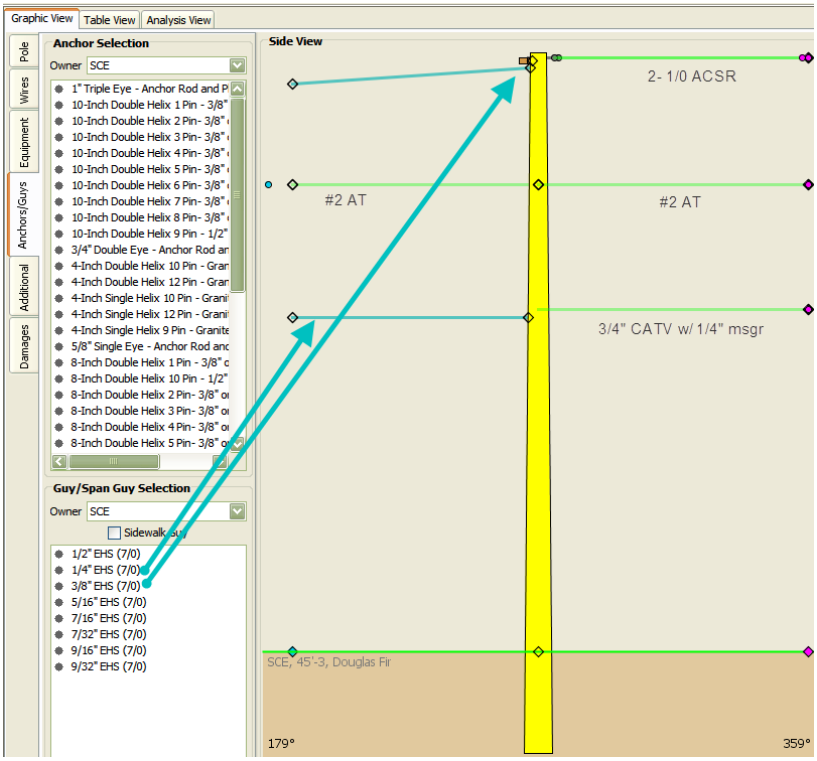
In the application, span guys selected from the Anchors and Guys tab will show up turquoise in color. This means that the guy is supporting the pole. Down guys will always show up in the same color (turquoise) because they are supporting the pole as well. If unsure about what impact the guys or wires are having on the pole, this is a quick way to identify if the attachment is supporting or tensing (wires shown in lime green) the pole.

The other unique thing about attaching guys from this tab is that it allows for the attachment point at the wire end point to be manipulated. At the bottom of the screen, options for height and midspan are given.

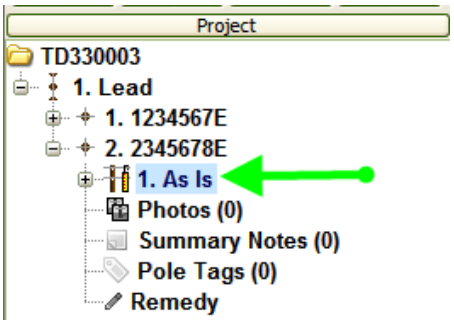


These allow for additional inputs based on the consideration of additional measurements taken in the field.

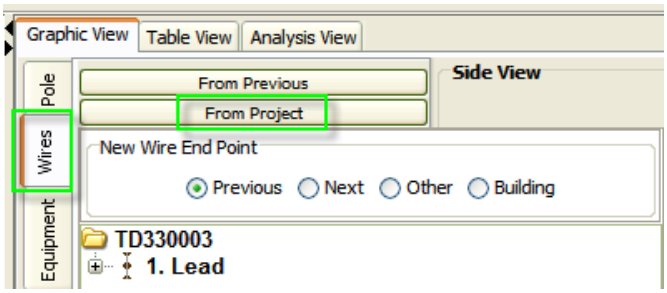
The drawing below shows two span guys input from the anchors and guys tab. They are shown in turquoise. One is supporting the 1/0 ACSR primary and the other is supporting ¾" CATV w/ ¼" messenger. Prior to importing a point load, you must analyze the source pole. Then, when transferring the point load that a guy is backing up, it shows on the previous pole (in this case, 180 degrees), as a green arrow. To do this, it is necessary to 'Add a Location to Current Lead'. This is done by clicking the button shown below:



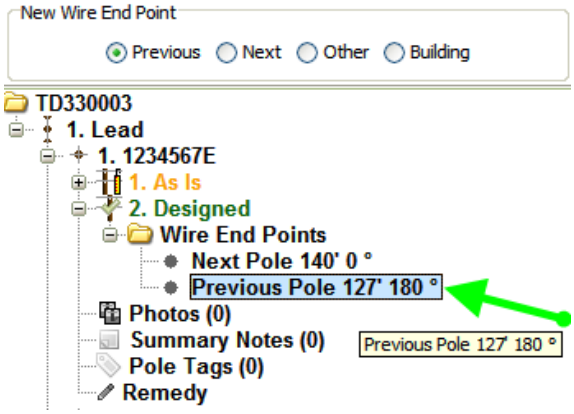
Once the location is added, change the Location name to reflect the pole number. Depending on the situation, it may be necessary to change the design layer to 'as designed' (if this is a new pole set). Keep this design layer highlighted.



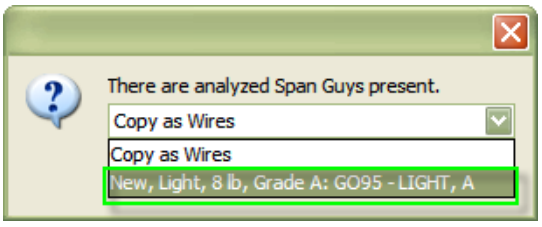
The next step is to bring the point loads from the pole currently being worked on to the next pole being pole loaded. On the Graphic View, select the Wires Tab, then press From Project. It will populate with the poles and their respective design layers.



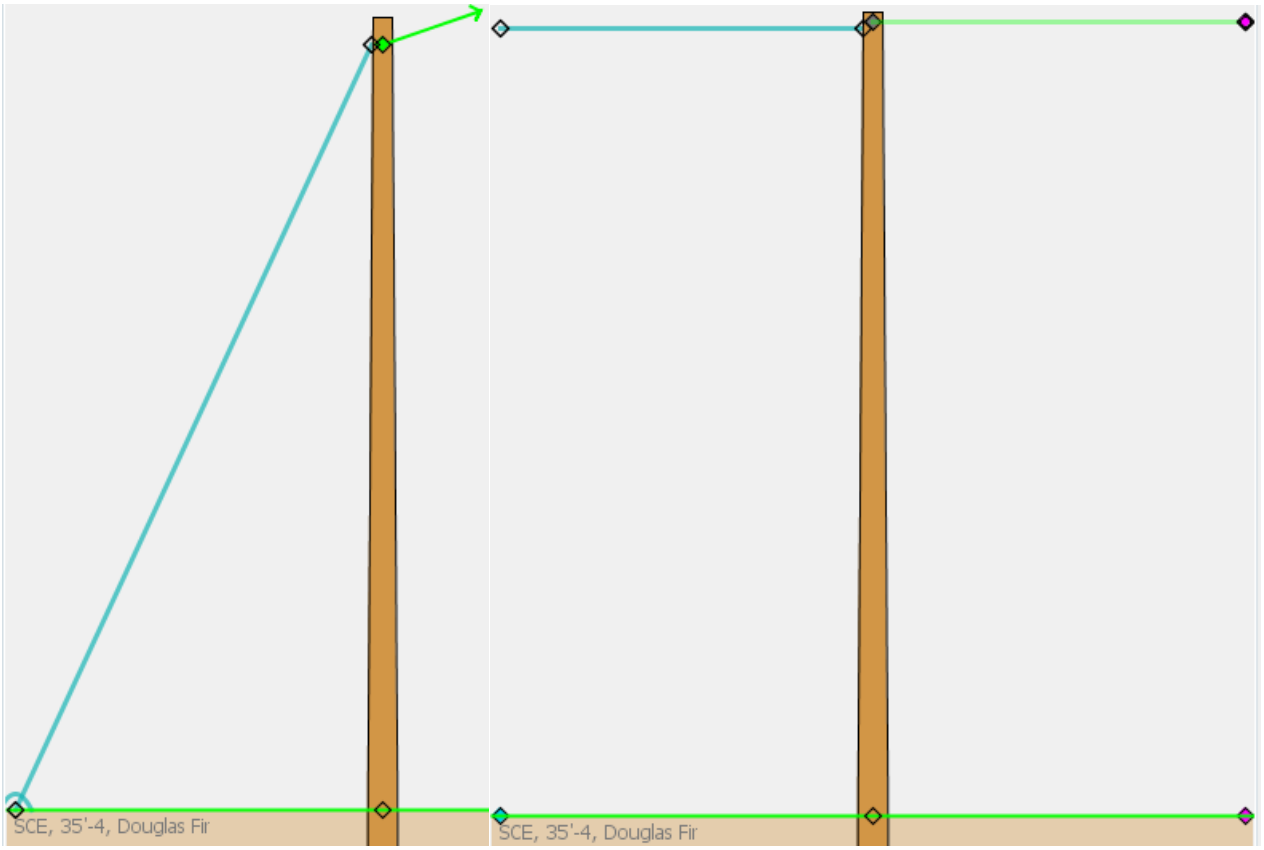
By clicking the '+' sign next to the design layer of the pole just loaded, it will provide another drop down called Wire End Points. From here, click the '+' sign again, and all the wire end points will be listed. In this case, the previous pole at 180 degrees has span guys going to it, and will need to be selected.



Upon doing so, a box will present two options for selection. Because we are transferring point loads based on what the span guy is backing up, the loading case will be selected.

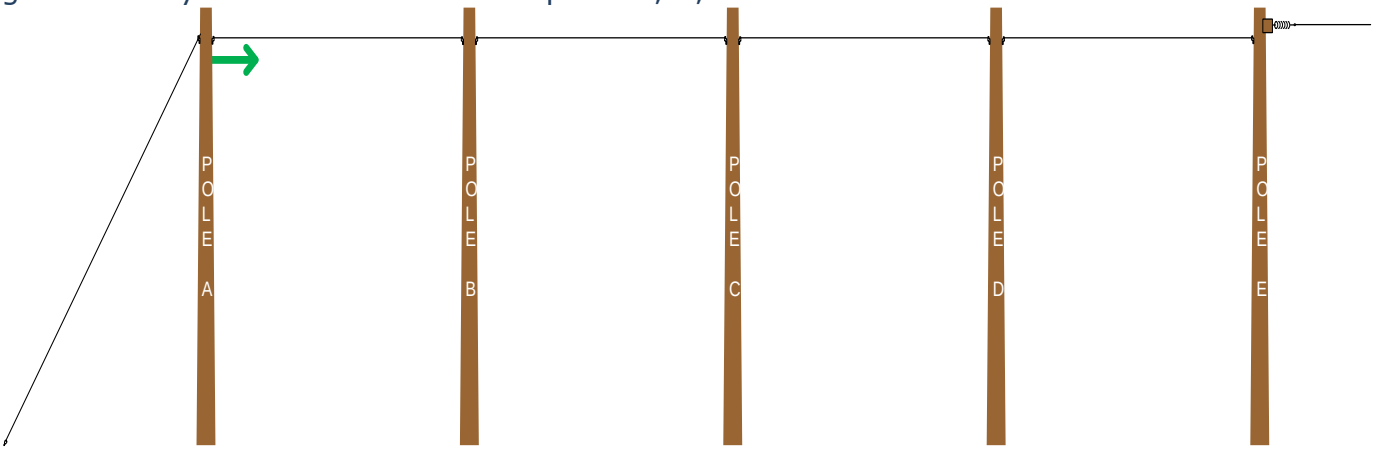


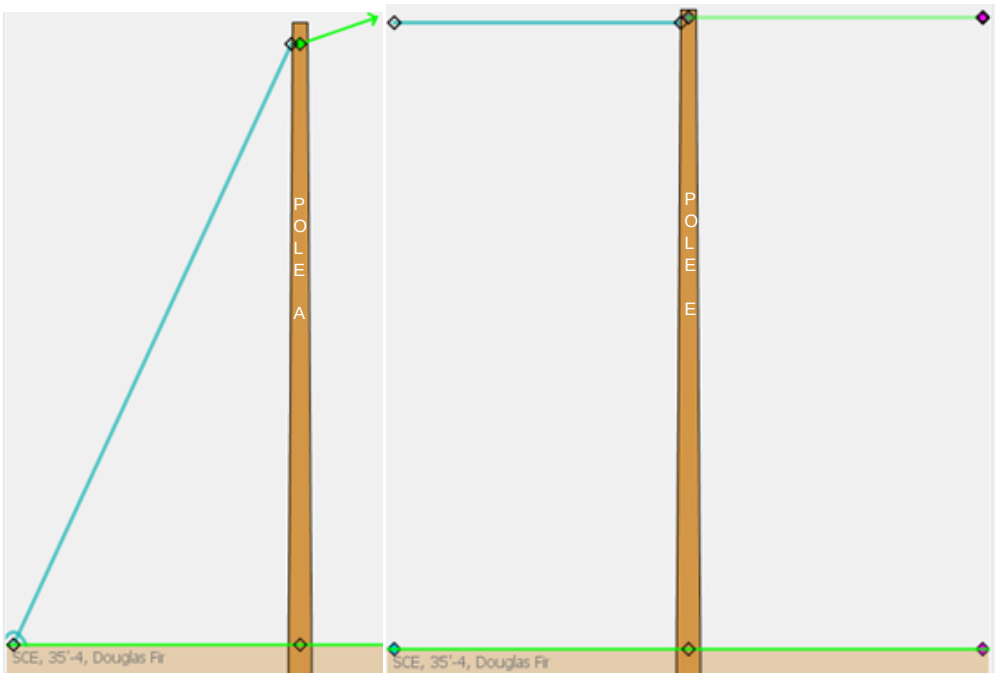
The result of this selection will be that the span guys bring over point loads equivalent to the conductors they are backing up.



In-line Pole Line

When loading a pole with span guys more than one pole away from the source pole, do not generate point loads on poles that only transfer the wire load through span guys. Transfer wire tensions as wires and ignore all but one span guy between the source pole and the down guy pole. Generate the point load from the source pole for the last span guy directly from the down guy pole. In the example below, a point load is assigned to Pole A generated by source Pole E. Interior poles B, C, and D are removed from the calculation.



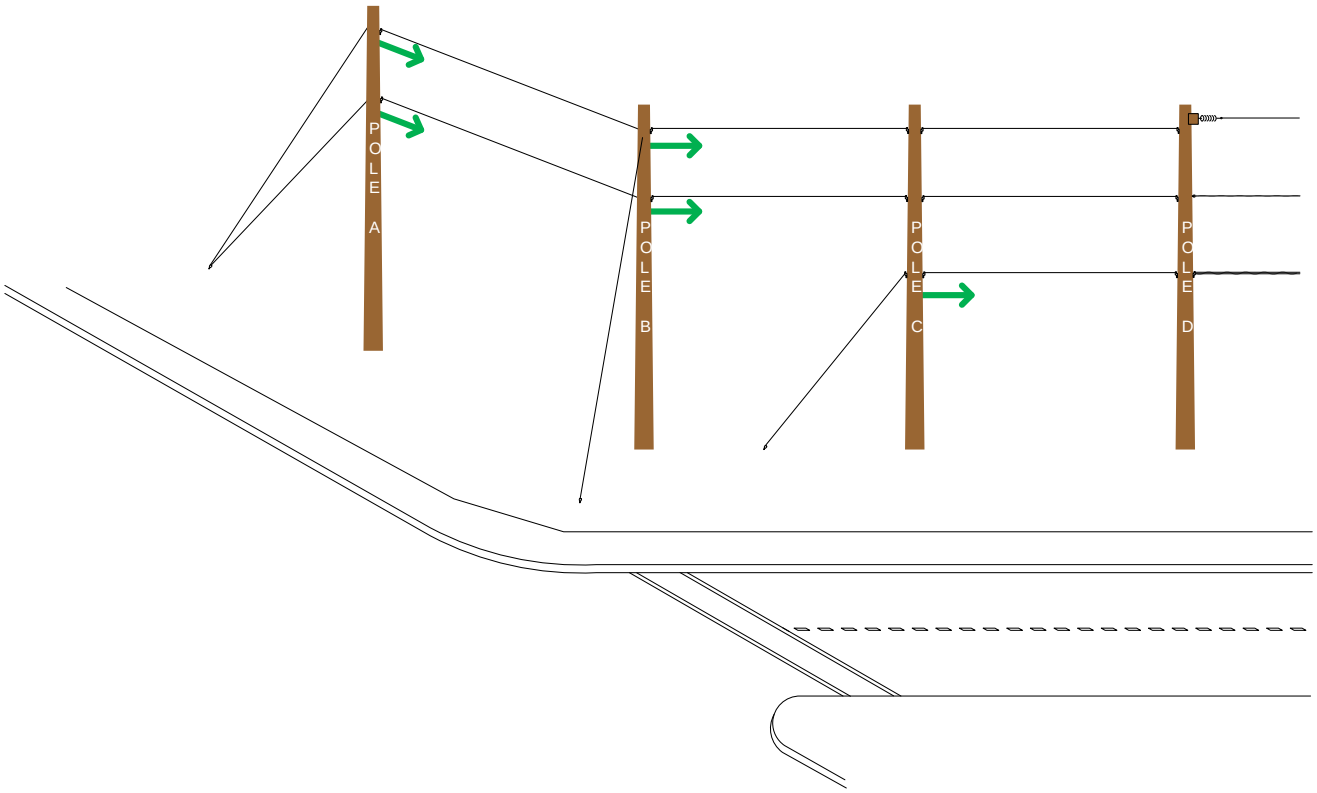


If all five poles in the figure above were being evaluated the procedure for each would be as follows:

1. Pole E: Model span guy as span guy.
2. Poles B, C, & D: Model span guy as wire at full tension
3. Pole A: Bring in Point Load from Pole E adjusting height of point load as needed.

Angle Pole Line

When span guys support a source pole and there are angles between the source pole and the down guy pole, all of the angle poles and down guy poles must be assigned point loads. In the example below, a point load must be calculated for the top two levels on Poles A and B, generated by source Pole D but not on Pole C because Poles B, C, and D are in-line. A point load is calculated for the lower level on Pole C because of the down guy.



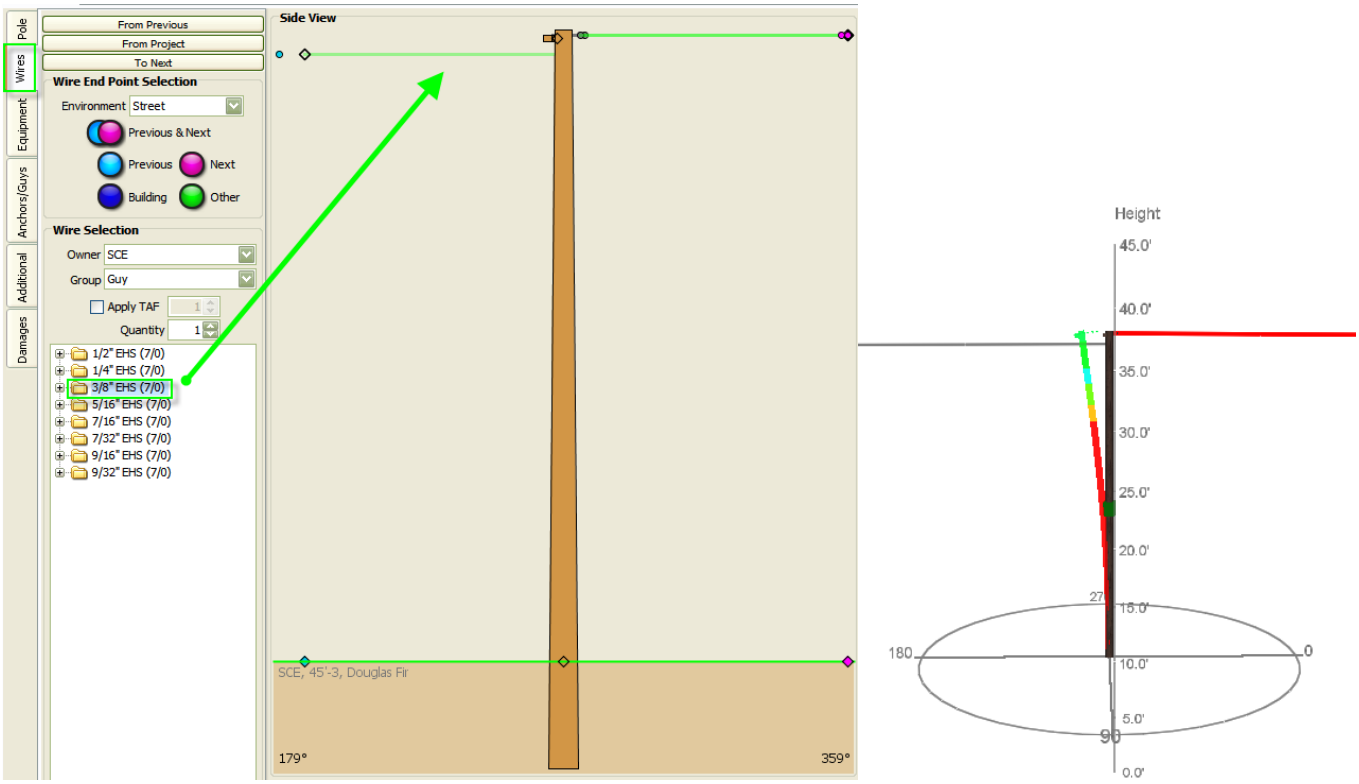
Note: Review the Communication Messengers section before point loading communication guys.

More Than One Load Case

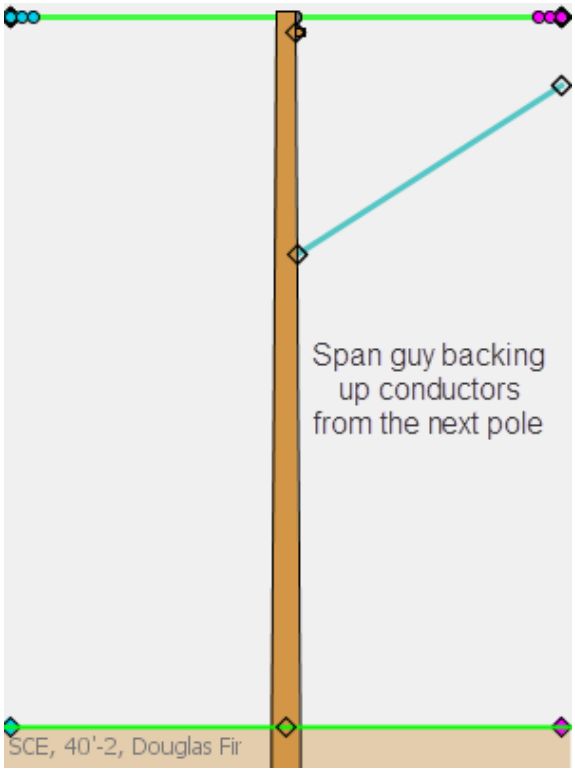
When evaluating more than one wind case transferring point loads only, (e.g. heavy loading areas), only one of the load cases can be selected in transferring the loads to the next pole. In general, the load case with the lower span guy safety factor on the source pole would be transferred for the other load case even though it will a little conservative. For example, if the source pole included the following: 8# with a SF or 3.5 and 12# with SF of 2.2. Use the guy that was analyzed using the 12#.

Entry Errors

In order to see the error that occurs when installing span guys from the wires tab, the example on the following page depicts the span guy in a lime green color. This indicates the wire is placing stress on the pole (not supporting the conductor that it is backing up). The analysis screen on the right demonstrates the impacts of using an incorrect span guy type.



As a result, the pole will bend in whichever direction is greater instead of striving to evaluate the balance of the span guy backing up the conductors.

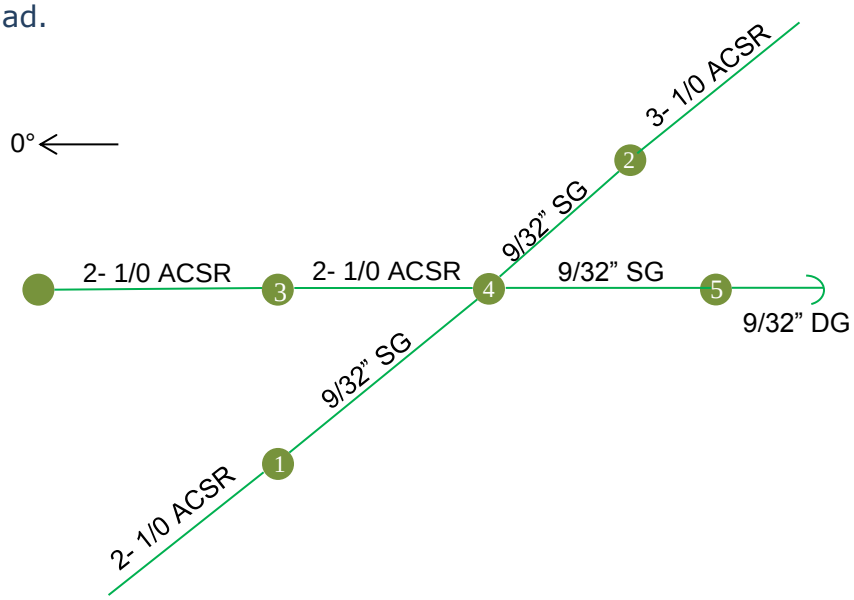


If a pole has a span guy on it backing up conductors on another pole, it would be necessary to pole load the other pole. Then, the tool would calculate the point load actually impacting the original pole. If a scenario such as this occurred, it would not be acceptable to add a guy wire without calculating the prior pole.

If a pole load depicts a span guy (in turquoise- which means supporting) where the point of attachment on the pole is lower than the WEP attachment or midspan height, the inputs will result in an incorrect assessment. This guy is actually putting stress on the pole because it is supporting something else. With the prior pole loaded, the span guy put in support of it, and the point loads transferred correctly, this pole would need further remediation to support the stress of the point load.

The example to the left shows this entry error.

In more dynamic pole loads, it is important to set up all poles with the same orientation. This will allow for the point loads to be brought in at the proper angles. In the example below, pole #4 is required to be pole loaded. Due to the nature of its support in the overall pole line, it will be necessary to pole load other poles around it in order to bring those point loads into this pole load.



Pole #1

Because the intent of this exercise is to achieve a correct pole load for Pole #4, it is important to set up all other pole loads in relation to that pole. So, for this pole, the 9/32" Span Guy (SG) to Pole #1 is backing up 2- 1/0 ACSR. Assuming that 0° is as oriented above, the conductor is at 315° and the SG is at 135°. In order to obtain the correct point load that the SG is placing on Pole #4, Pole #1 must be pole loaded. Once analyzed, the point load is brought over to Pole #4 in the process described previously.

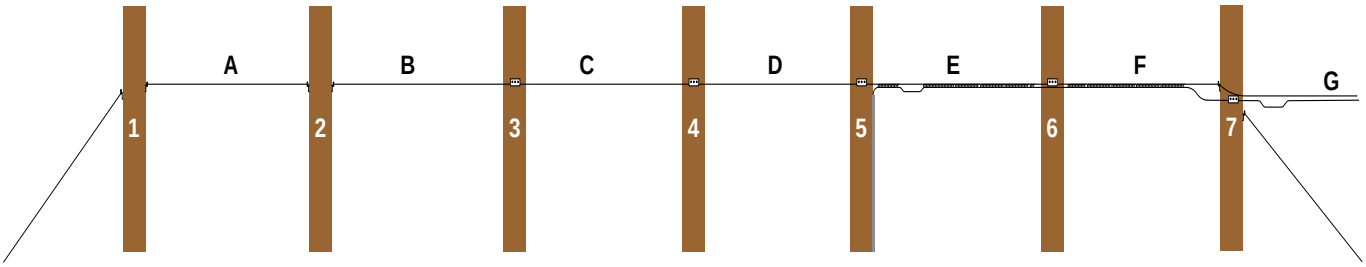
Pole #2
Similar to Pole #1, there is a SG backing up 3- 1/0 ACSR conductor. Orienting it in similar fashion, the pole would be loaded with conductor at 135° and the SG at 315°. Once analyzed, the point load may be brought over to Pole #4.

Pole #3
Based on our depiction above, there are no SGs on this pole. There is no need to pole load this pole. The 1/0 ACSR at 0° will be added to Pole #4 when it is pole loaded, but only after the point loads have been added.

Pole #5
Keeping in mind that the intent of this exercise is to accurately pole load Pole #4, Pole #5 would not be necessary to pole load. The 9/32" SG attached to it at 180° is in support of Pole #4, and therefore, is not adding any load to the pole. The SG would be placed on Pole #4 after the point loads have been brought in, and finally, the analysis would be run.

Communication Messengers

When selecting guys for communication messengers, determine if the messenger is connected to the pole (hook or spool) or passing through the pole (3 bolt or bracket). Follow the image below when choosing guys for communication messengers.



SPAN:

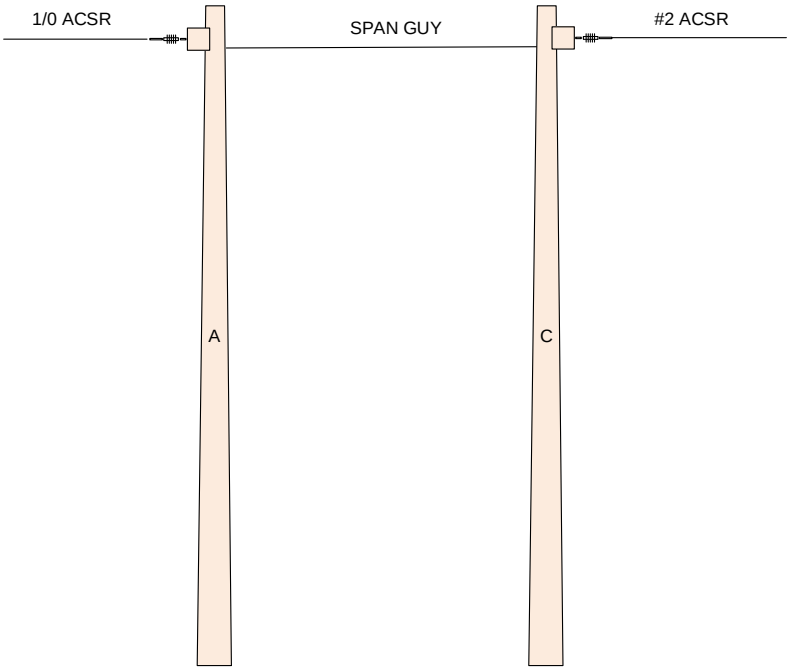
A. SPAN GUY FROM GUYS TAB - FULL TENSION
B. SPAN GUY FROM WIRES TAB – FULL TENSION
C. SPAN GUY FROM WIRES TAB - FULL TENSION
D. SPAN GUY FROM WIRES TAB – FULL TENSION
E. APPROPRIATE SIZE WIRE AND MESSENGER
F. APPROPRIATE SIZE WIRE AND MESSENGER
G. APPROPRIATE SIZE WIRE AND MESSENGER - < 160' REDUCED TENSION
≥ 160' FULL TENSION

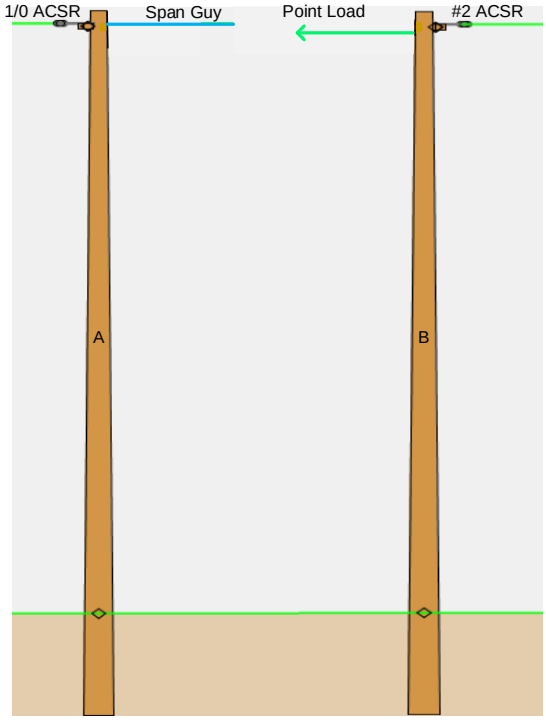
Example: If your initial pole requiring pole loading is pole 2, you would enter span A from the Guys Tab and Span B from the wires tab as full tension. When loading pole 1, load pole 2(+) to calculate the point load for the messenger because it is installed as a span guy.

Opposing Tensions Supported By Span Guys

Different Size Wires (1 Span)

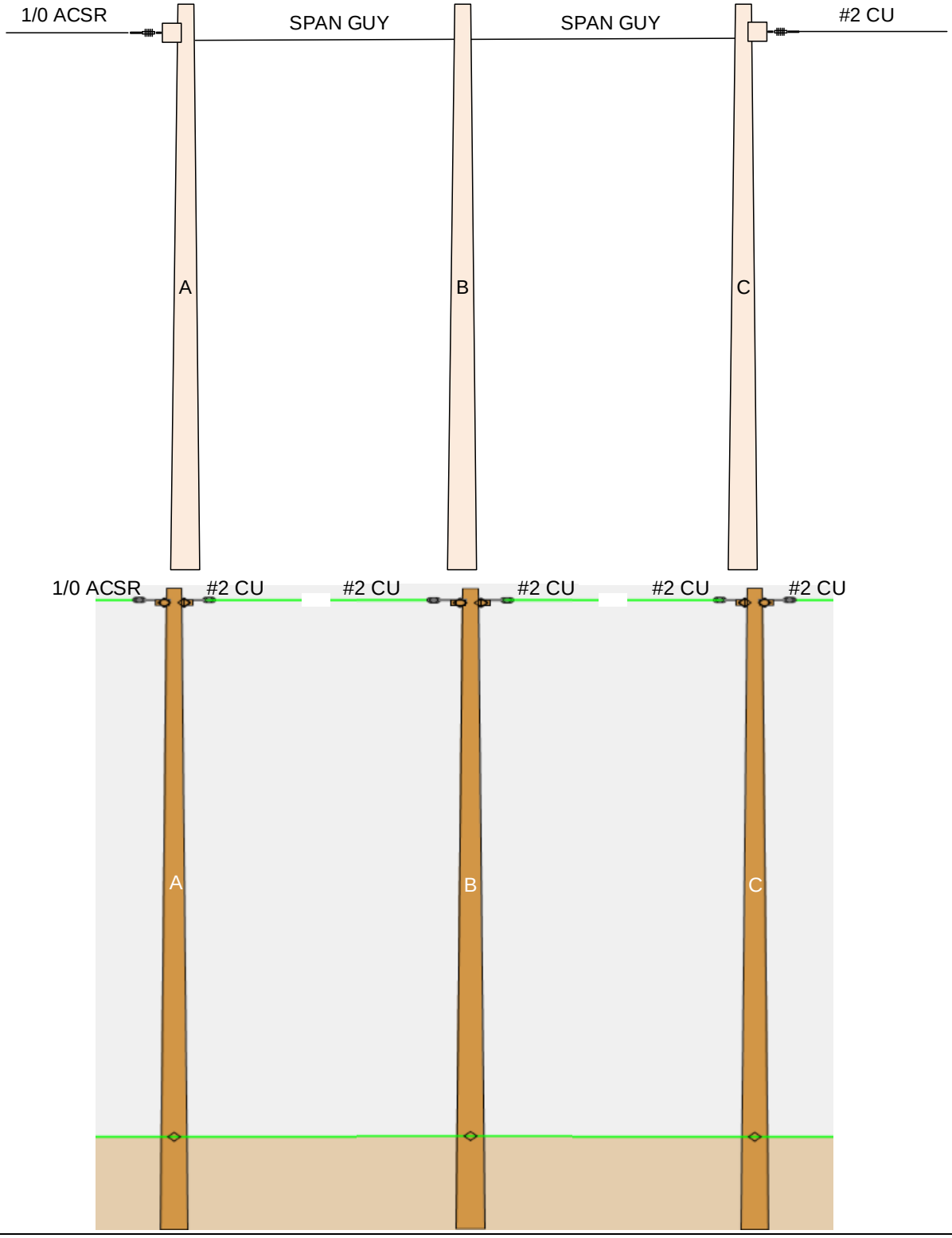
When wires are supported by a span guy and the wires are different, import a point load from the pole with the larger wire and apply it to the pole with the smaller wire in place of the span guy.





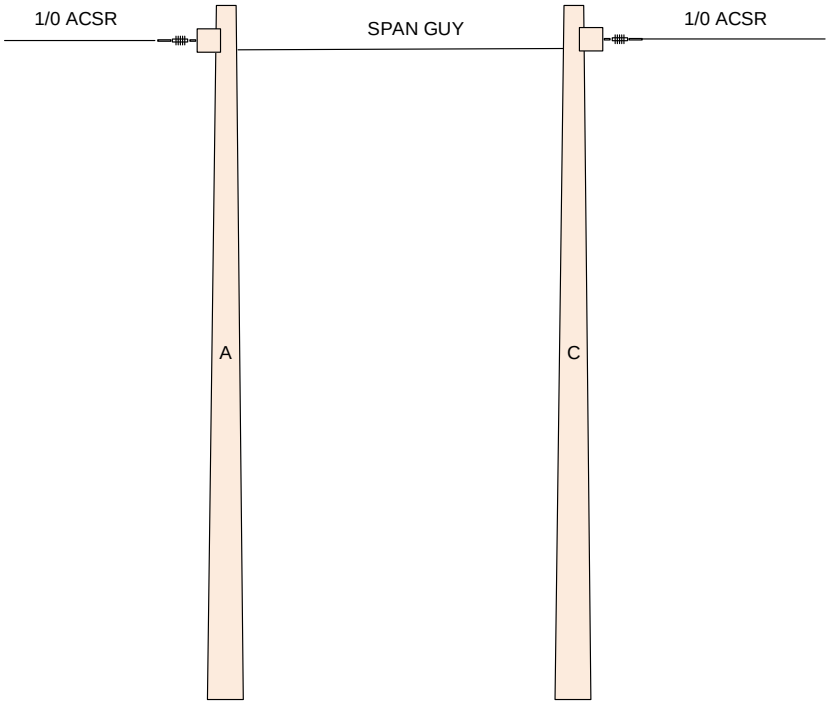
Different Size Wires (More Than 1 Span)

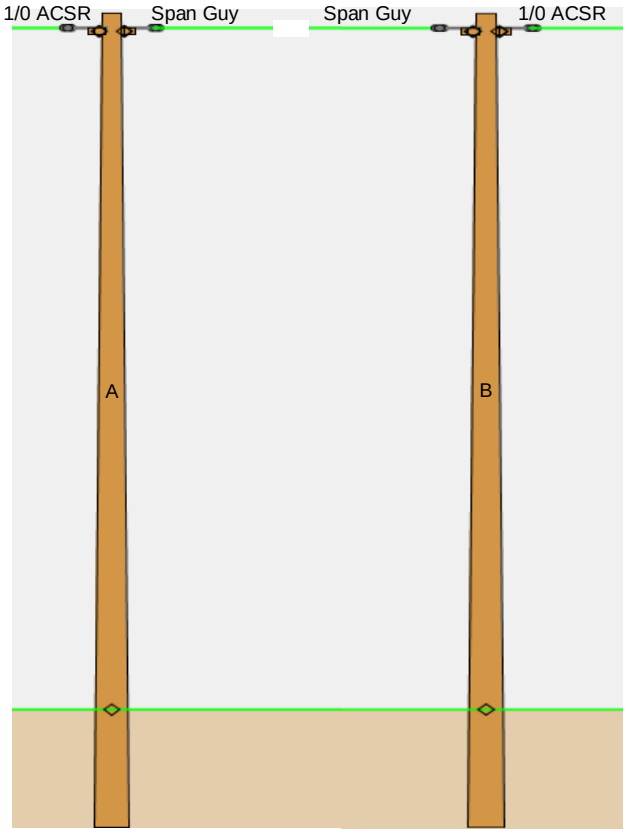
When dead-end tensions of different size wires are supported by span guys over multiple spans, remove the span guys from the calculation and replace them with wire.



Same Size Wires (1 Span)

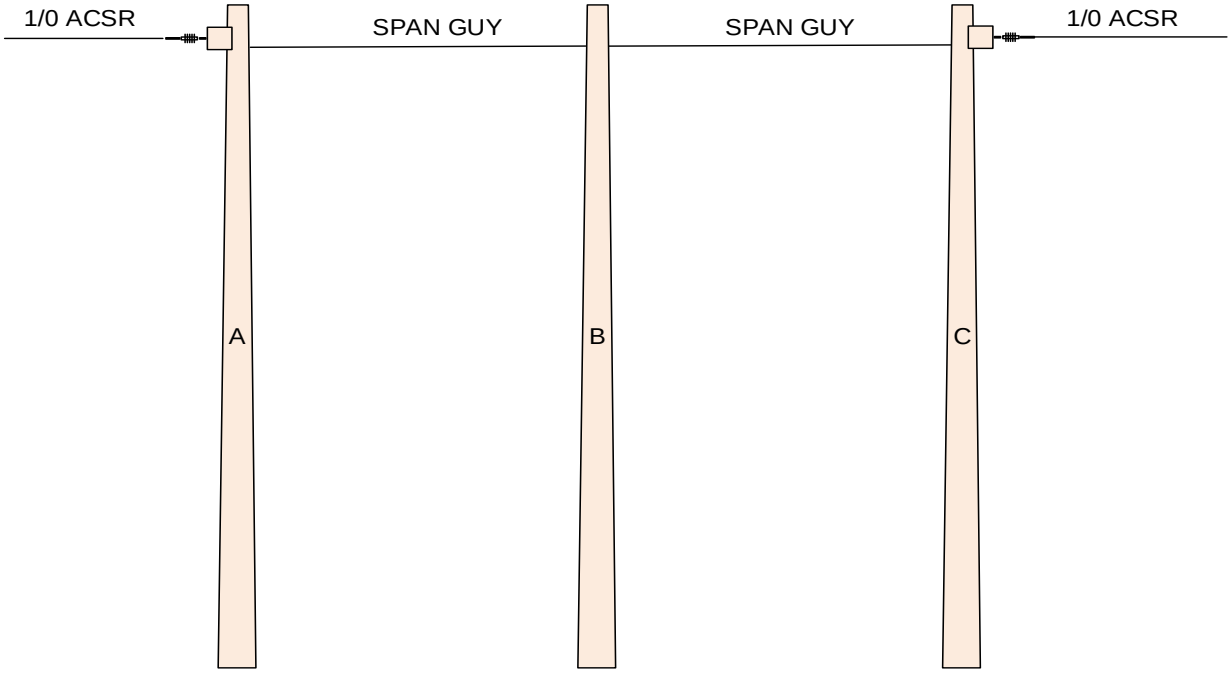
When the dead-end tensions of wires are supported by a span guy and the wires supported by the span guy are the same size, model both poles using a span guy from the guys tab.

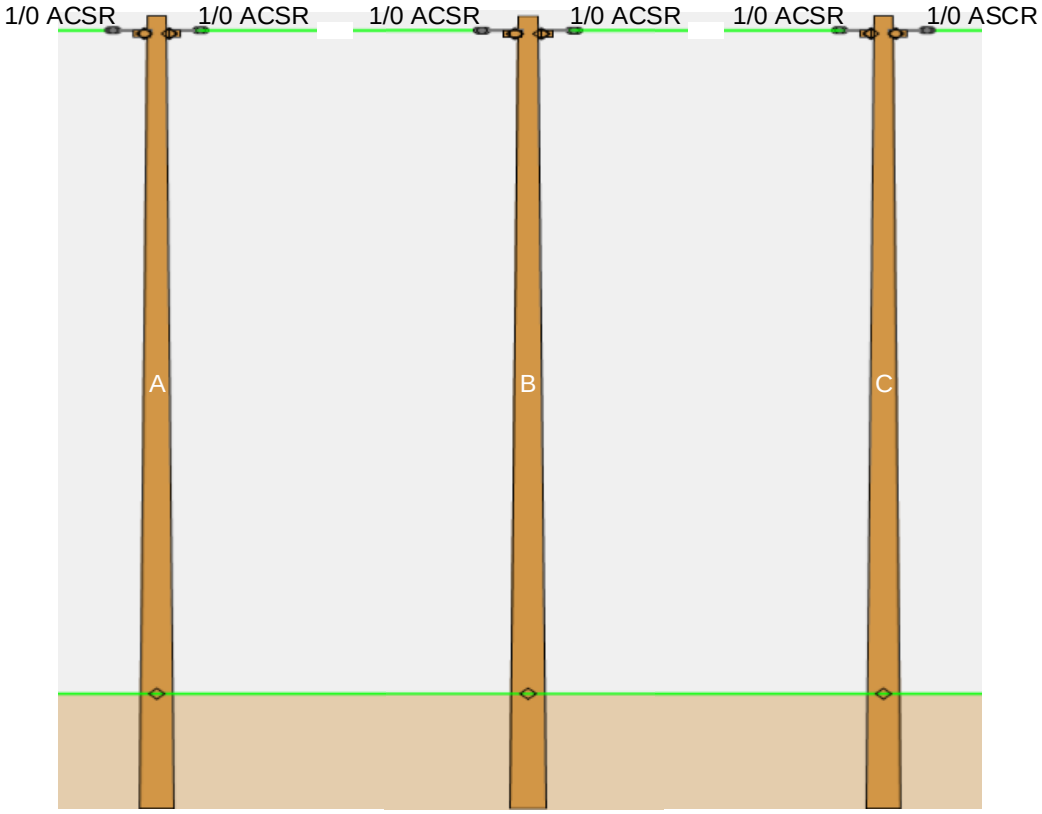




Same Size Wires (More Than 1 Span)

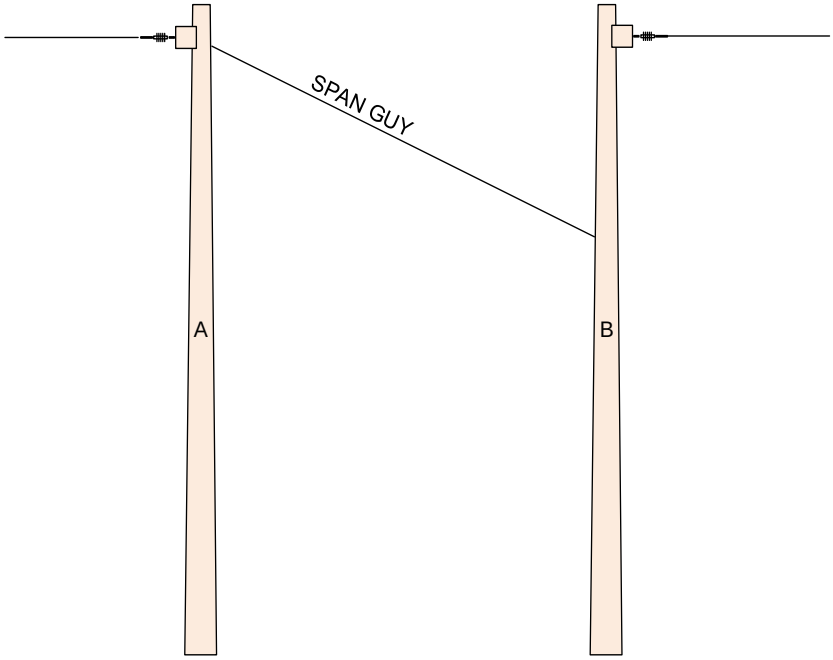
When dead-end tensions of the same size wires are supported by span guys over multiple spans, remove the span guys from the calculation and replace them with wire.

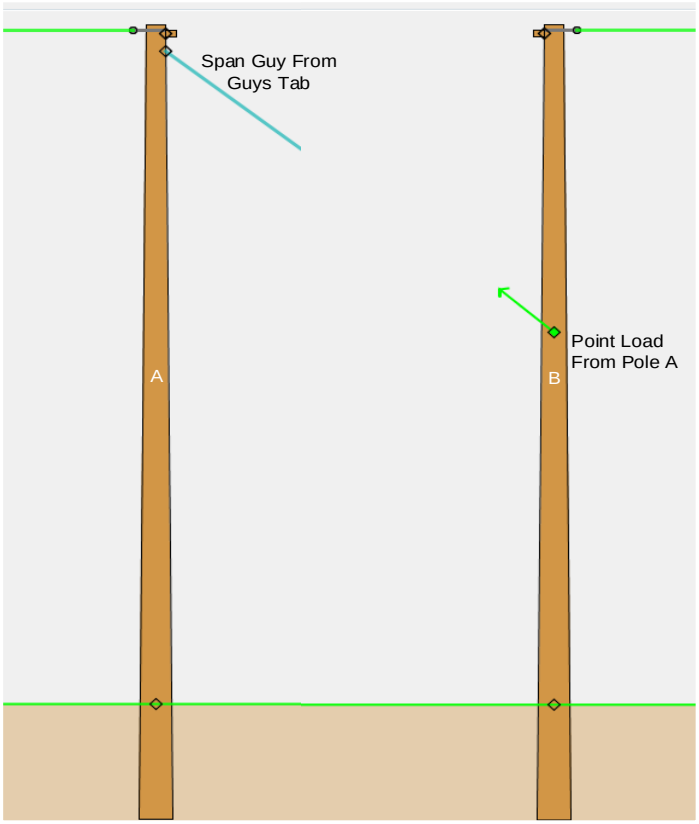




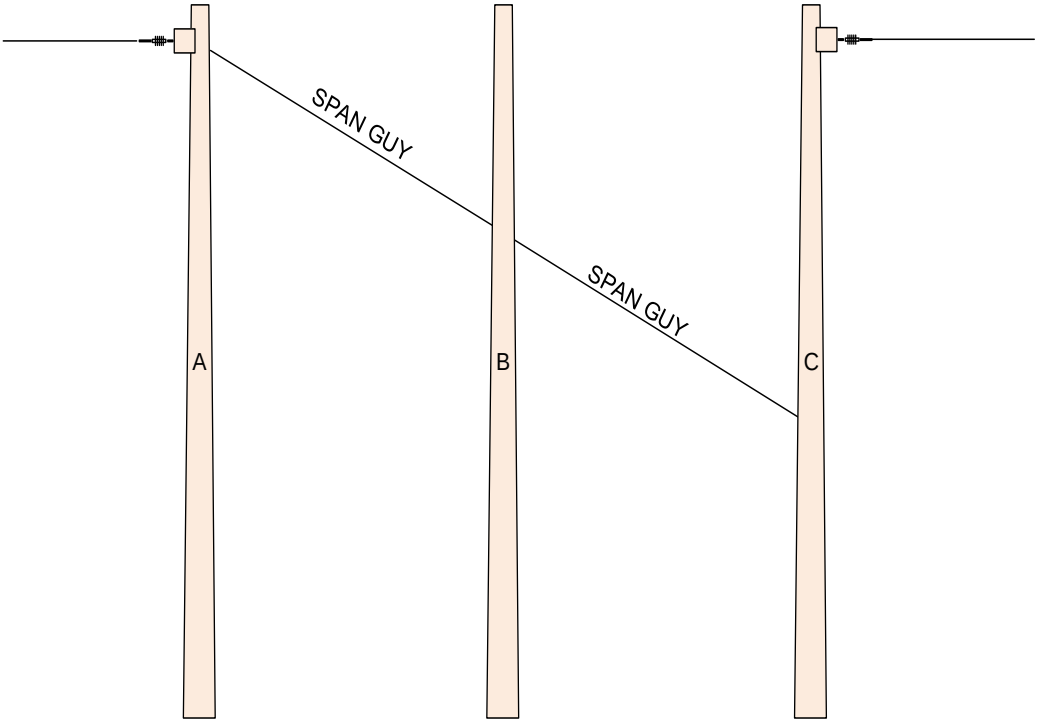
Uneven Span Guy > 1' Without a Down Guy

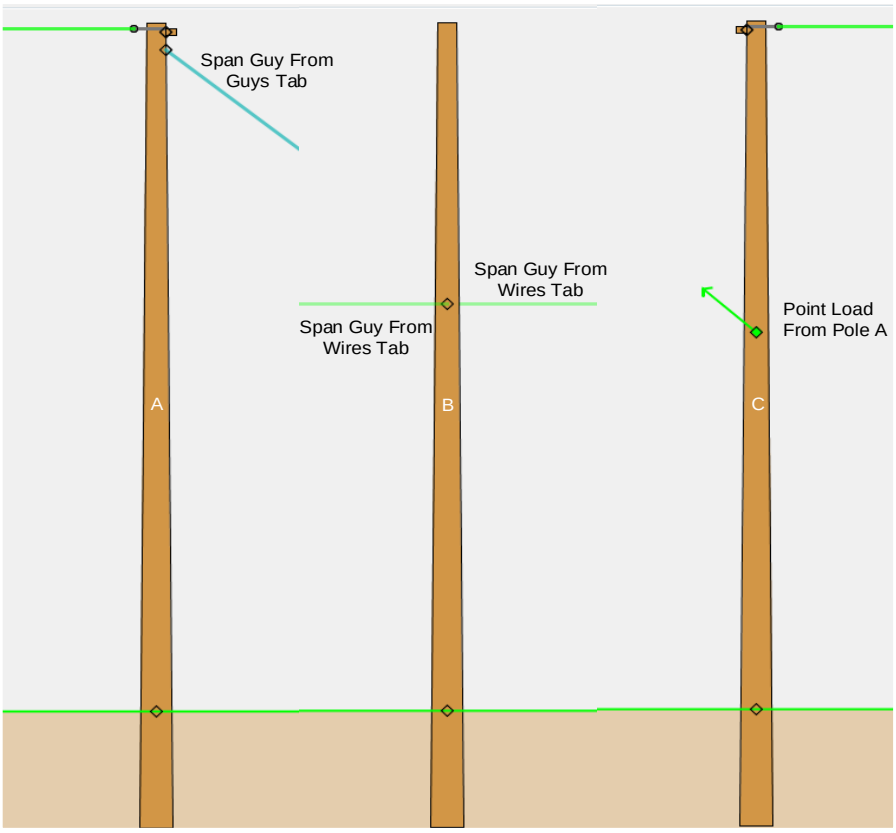
When wires are supported by a span guy attached at different levels, import a point load from the pole with the higher attachment point and apply it to the pole with the lower attachment point in place of the span guy.





Uneven Span Guy > 1’ - Multiple Spans With or Without a Down Guy





General Order 95 Crossings

For crossings where the wire sizes remain the same through the crossing, load each pole with the wires passing through and install the span guy(s) from the wires tab. Load as Grade A regardless of whether there is communication on the pole or not.