

Merging projects together in PLS-CADD

Introduction

There are many times when multiple PLS-CADD projects (.xyz) files need to be combined or Merged.

Such scenarios are:

- To combine individual sections of a long line that was modelled in segments (often long lines are modelled in pieces to limit the size of the overall .xyz files).
- When separate line models are made for parallel or crossing lines, they can be merged to facilitate checking of electrical safety and operational clearances between individual designs.

The two techniques to merge projects are:

1. Merge different .xyz projects together by merging the respective .don files.
2. Merging Line models together.

The purpose of this technote is to shed light on the process and propose workflows for various scenarios that might be encountered in real world projects using simple examples.

PLS-CADD can merge .xyz projects together into one project using the **Lines/ Load DON File or Merge Projects** command. This command merges in structures and sections from another .don file or project. It also gives you the ability to merge in alignments, XYZ data, annotation, attachments (raster & vector), project notes, and spotting constraints from that project. It does not merge any other items (TIN, feature codes, criteria, etc.). If you wish to merge attachments from another project and nothing else, then you should use the **Drafting/ Attachments/ Merge in Attachments from Another Project** command.

Background

What are .don files?

The .don file stores information about structure locations, types, and materials, as well as cable installation conditions. .don files are generated automatically by PLS-CADD and should not be edited by the user. A .don file is unique to a line design and has a pointer to the appropriate .xyz or .pfl terrain file. However, different .don files can describe different lines defined on top of the same terrain.

What are Line Models?

Line Models Are described in Section 5.4.6.4 of Manual:

"There are some situations (see Fig. 5.4-7) where you will build different line models on the same alignment. For example, using the optimization technique described in Section 14, you can obtain complete competing designs made out of wood, steel or concrete poles on the same profile. Or, you may be comparing the design of a distribution line before and after adding new communication cables to it as part of a joint-use study. In these cases, you may wish to superpose these designs for comparison."

General rules

Be sure to make a backup of each model before merging so if a mistake is made you can quickly get back to your original project prior to the merge. Merging projects is not undoable and once you save a model in a merged state you cannot revert to the old model.

Merging *.don* files

1. For this function to work smoothly, it is highly recommended that the alignments in each project need to be constructed such that the stationing of each project is running in the same direction. If they are not running in the same direction, then you will need to use the **Terrain/ Alignment/ Reverse Alignment** command to change one of the projects, so the alignment's direction matches. The projects being merged should also be in the same coordinate system.
2. After starting the merge, you will be prompted to pick a *.don* file from another project to merge into the current project. Then you will tell the program whether the structures from this *.don* file exist on the current project's alignment or if not. If not, then the program will attempt to add the alignments associated with the *.don*.

Merging Lines Models:

1. You will need to make sure there is no station overlap in the structure range.

For example:

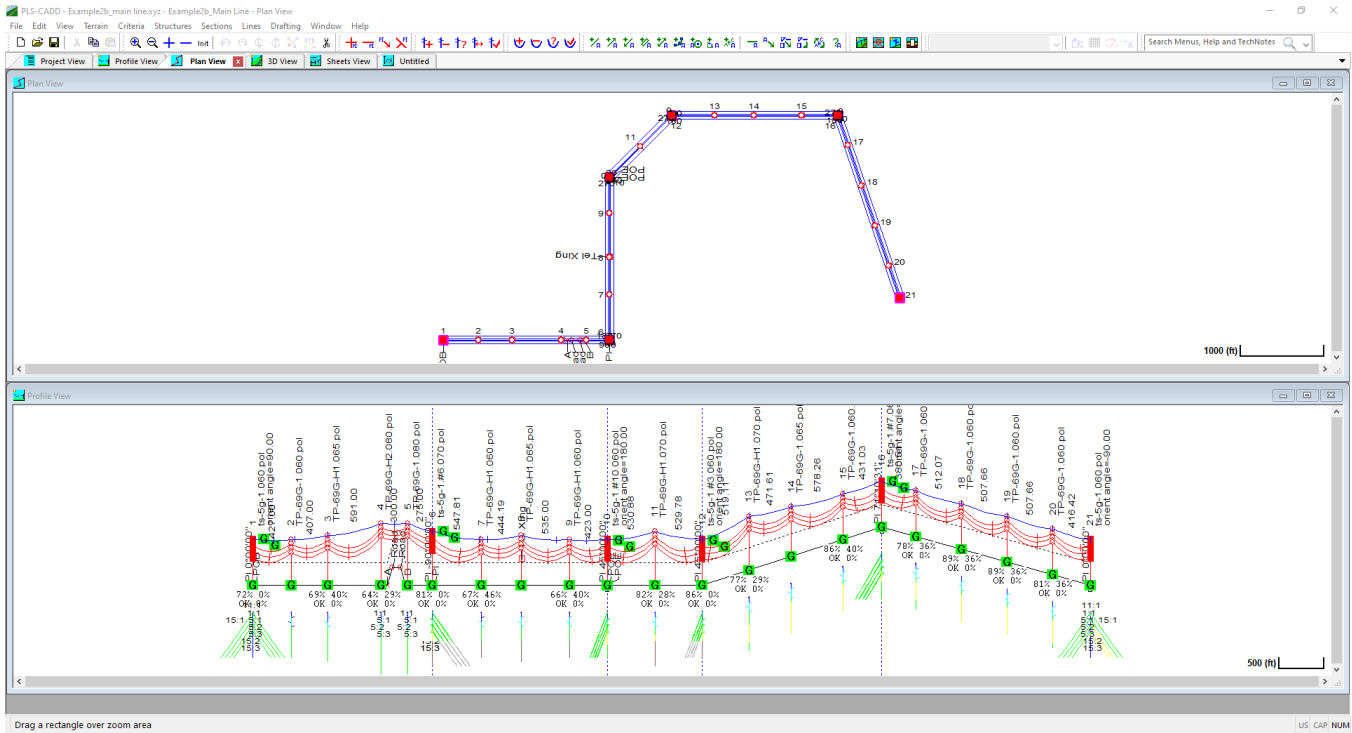
Say line model 1 has its first structure at station 0 and its last structure at station 10,000. This gives a station range of 0 to 10,000. Say line model 2 has its first structure at station 8,000 and its last structure at 20,000. This gives a station range of 8,000 to 20,000. You could not merge these line models together because of the 2,000-foot station overlap between 8,000 to 10,000. Now say line model 2 is instead going from 11,000 to 20,000. Now you could merge them together.

2. You may also want to merge together any common PI's in the project using the **Terrain/ Alignment/ Multiple Alignment Options/ Join Alignments** command. This command can be done as long as the two PI's being joined are in consecutive order, on separate alignments in consecutive order, and have the exact same XYZ coordinates. For example, you could join PI numbers 3 and 4 if alignment 1 ended at PI number 3 and alignment 2 began at PI number 4, but you could not join PI numbers 3 and 5 since they are not in consecutive order. Joining PI's and merging alignments can be confusing if there are multiple alignments in the projects you are merging. There may be situations where multiple alignments are present and the merging of PI's / Alignments may not be recommended.

Worked examples:

The following examples use the below line project.

It is a relatively simple profile to illustrate different situations where projects can be merged and how best to do so in each case.



Example 1 shows two cases of merging projects which are modelled on the same alignment.

Example 2 shows two cases of merging projects which are modelled on separate alignments.

Example 1:

Example 1.a)

The goal of this example is to merge the two projects into one line model. The two lines are modelled on one alignment although in separate .xyz files. There are no overlaps, but there is a shared structure:

- The last structure in line design "Segment 1" is structure 10 with a station value of 3950.
- The first structure in line design "Segment 2" is technically the same structure and is currently positioned at the same station value 3950.

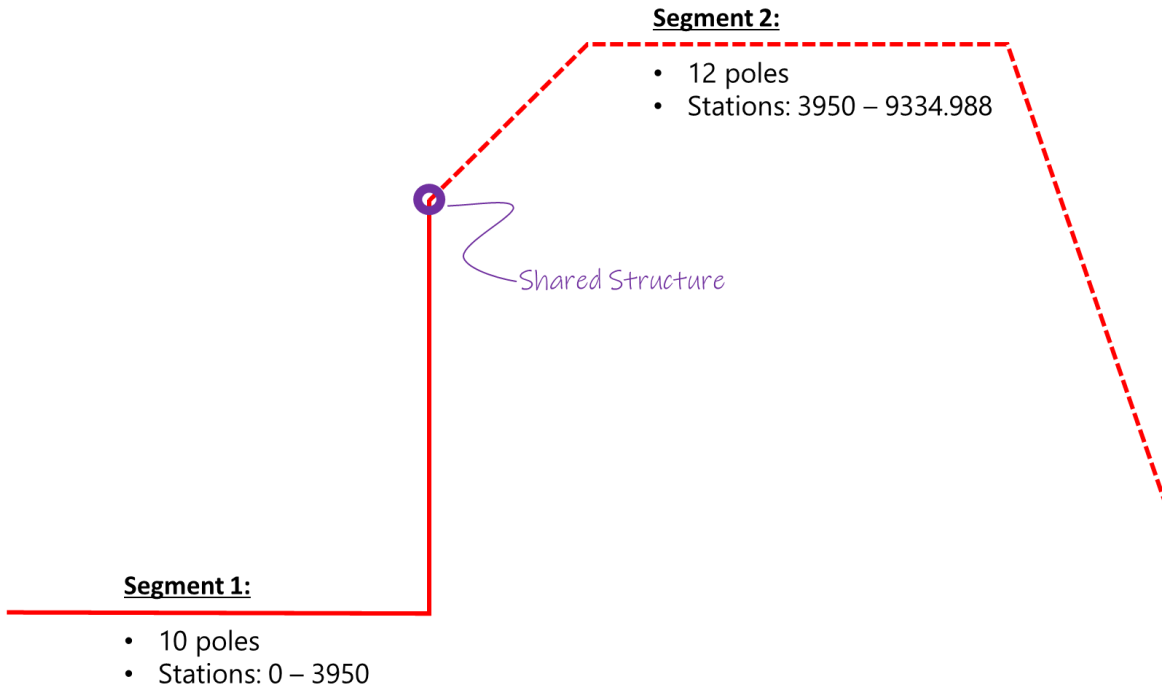
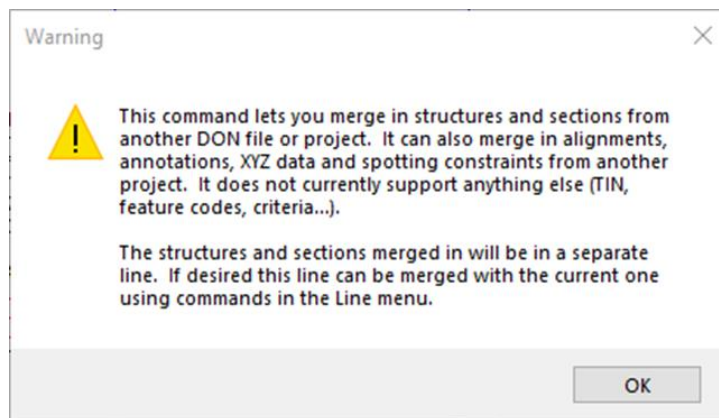


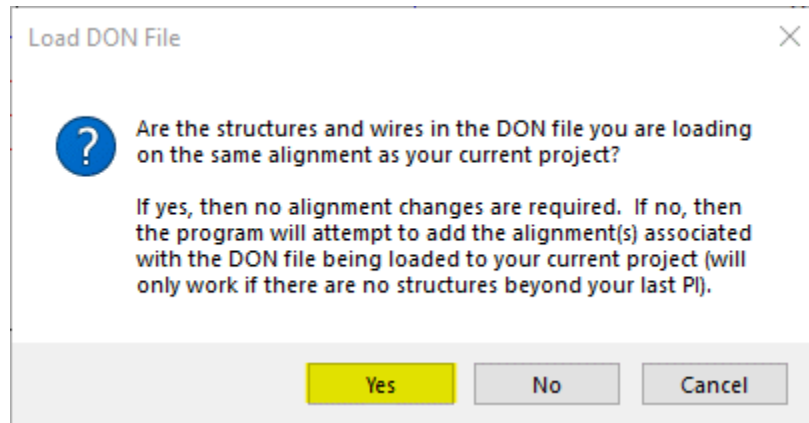
Figure 1: Example 1.a) Project overview

1. Restore both models (each one into a separate sub-directory),
e.g. "C:\Merge Projects\Example 1\1a\Segment1" and "C:\Merge Projects\Example 1\1a\Segment2"
2. Open "Example1a_Segment 1.xyz". You will notice that Segment 1 consists of 10 poles from Station 0 – 3950 ft.
 - a. Now you will want to merge in the Segment 2 model by selecting **Lines/ Load DON file or Merge Projects**.

You will receive the following warning, explaining the Merge command functionality:

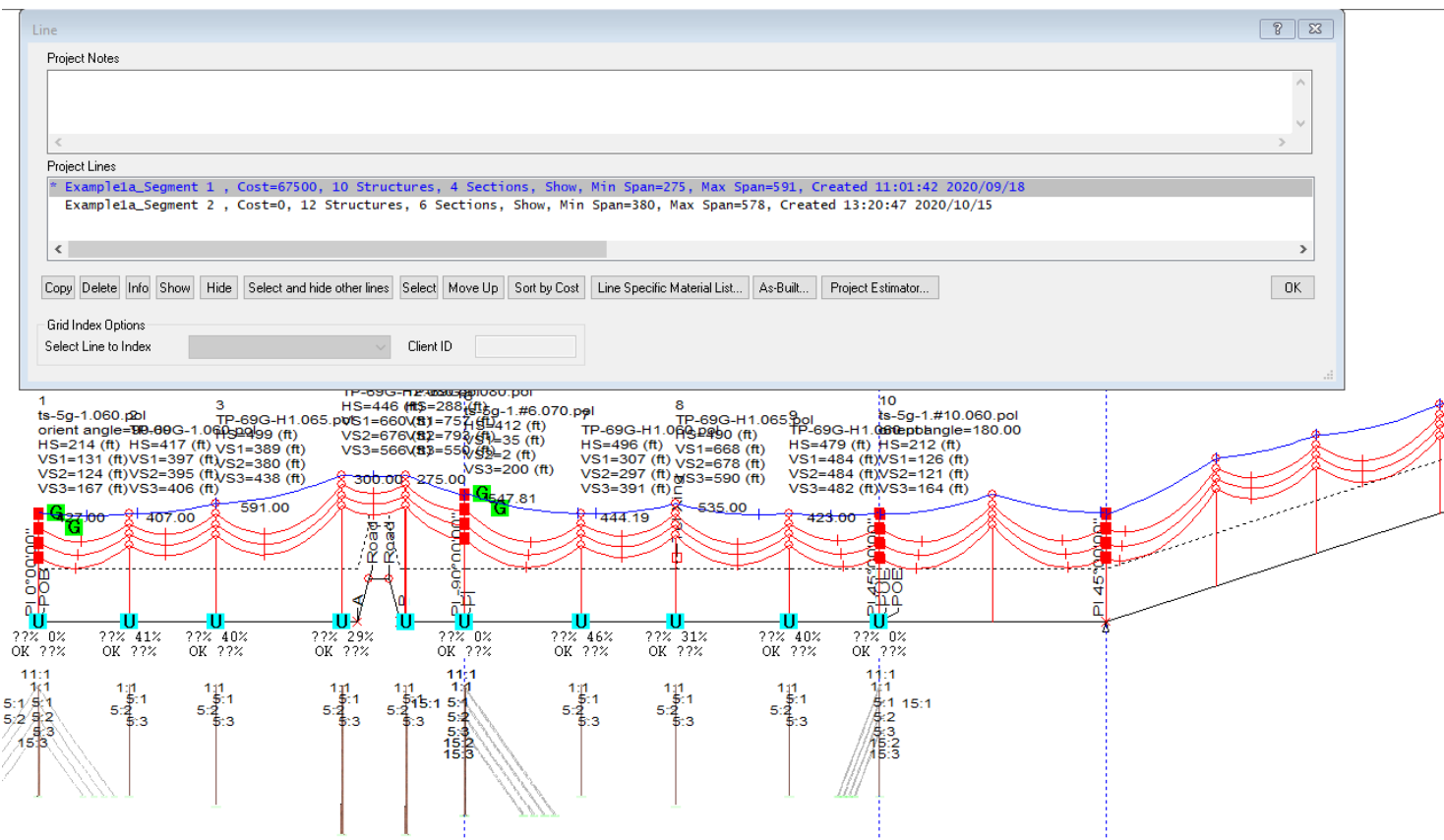


- b. Then you will be prompted to select the file to Merge in with the current project, select "Example1a_Segment 2.don".
- c. After selecting the desired file, you need to instruct PLS-CADD on how to merge the files together. Basically PLS-CADD needs to know if the two projects are on the same alignment or not, i.e. is the alignment network in each .xyz project identical? This will control how the profile views of the structures are laid out.
 - i. In this example, the two line segments are on the same alignment, so in the **Load DON File** Dialog you should select "**Yes**".

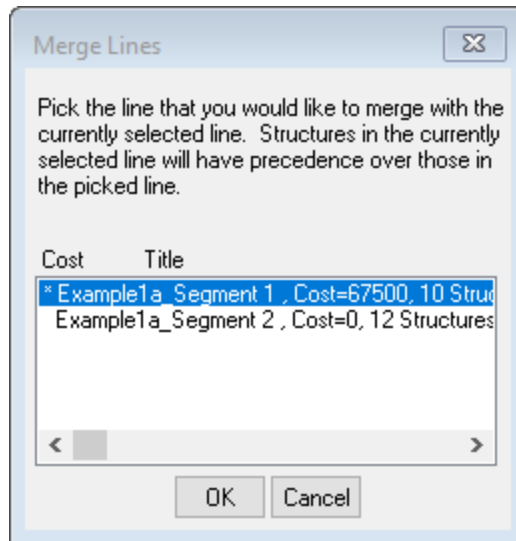


NOTE: If you select "**No**" at this dialog, then PLS-CADD adds in the alignment from the merged project and the structures in the merged project will be placed on this added alignment. If you select "**Yes**" then PLS-CADD assumes that the alignment network between the 2 projects is the same and the structures being merged in will have the same station positions as they did in their original project.

- d. You will then be prompted several times to Merge other attributes into the current project, these are:
 - i. XYZ Point Data
 - ii. Spotting Constraints
 - iii. Annotation
 - iv. Project Notes
 - v. Reference Manager
- e. At this stage, the two .xyz files have been merged together as one project, with the structures and wires from the project merged in added as a unique Line Model. You can see this if you navigate to **Lines/ Edit**.



3. The next step is to merge these two Lines together to make the one contiguous line model. However, since structure 10 in segment 1 and structure 1 in segment 2 are on the same station coordinate, there is essentially a station overlap and when the Lines are merged, one or both of the conductor sections on the shared structures will be removed from the model. This can be a big setback if modeling of As-Built lines has been undertaken or if the user has applied graphical sagging or clipped insulators. To avoid the loss of any of the wires from the model, there are a few steps to follow due to the presence of the shared structure (Structure#10 in Segment 1 and Structure#1 in Segment 2).
 - a. When the two .don files are merged together the shared structure will appear twice, once in each line model design. It can be difficult to notice this as the structures will be co-located. In this project it will be structure#10 on Segment 1 and structure#1 on Segment 2. To overcome this it is necessary to shift one of the structures to ensure they are not collocated, and hence will no longer have a station overlap.
 - b. Since Segment 1 is the active Line, move Structure#10 slightly to the left. This can be done with the **Structures/ Move/ Freehand** command or by clicking on the **Structure Move** button on the Structures Toolbar. A shift of 5 ft or less is adequate.
 - c. Once one of the structures has been shifted, select the **Lines/ Merge** command to merge the Lines together.



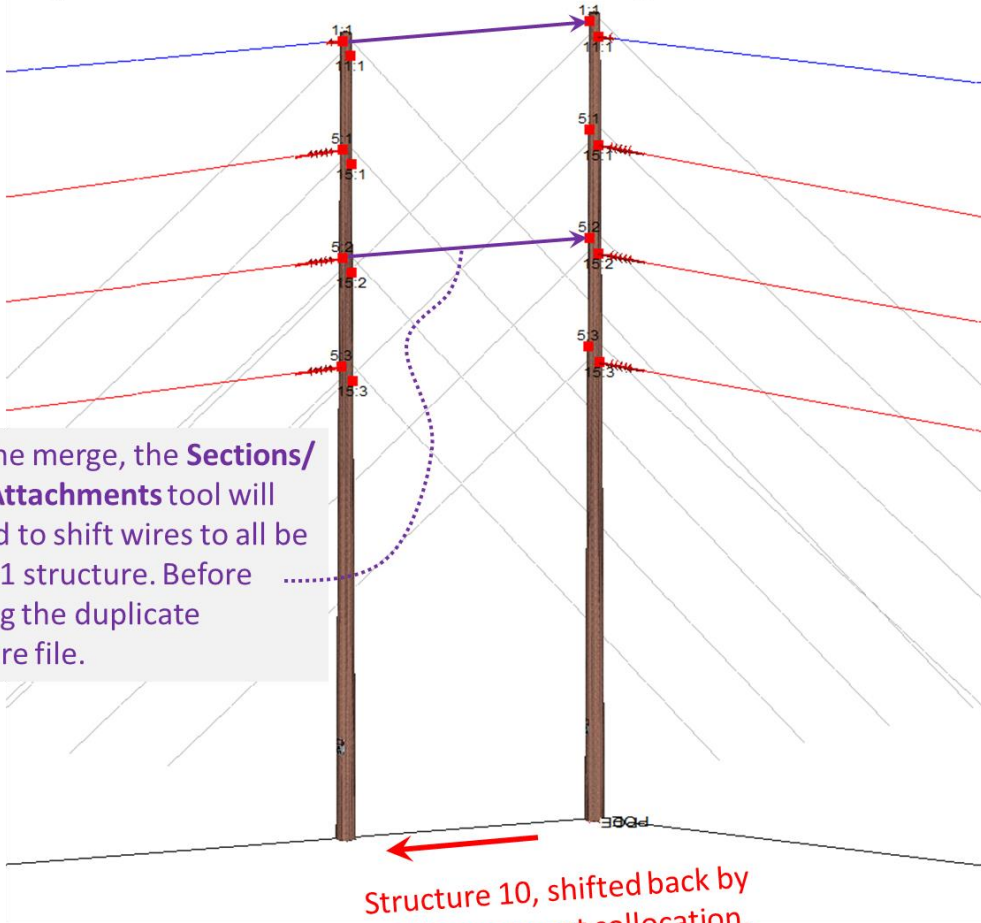
- i. Note that the currently active/selected line has a * prefix in the list of available Lines to merge together. When many line models are present in a project, it may be more difficult to keep track of them, so it is important to note which line model is the active one.

NOTE: you will need to make sure there is no station overlap in the structure range.

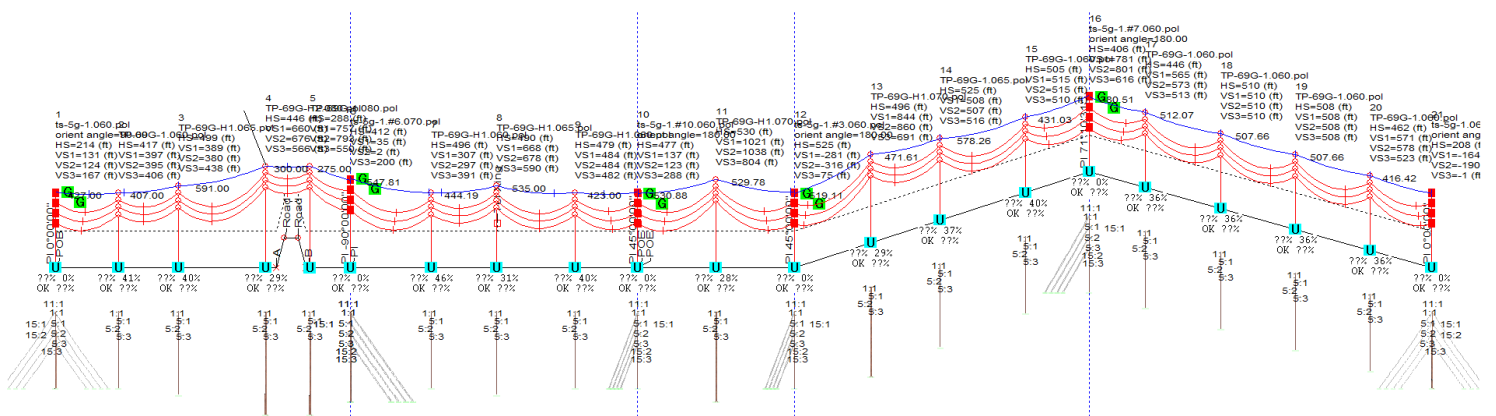
- d. Select the Segment 2 Line and Click **OK**.
 - e. The line model designs are now merged successfully together.
4. The last step is to resolve the conductor Stringing and then to remove the duplicate Structure#10/Structure#11.
- a. Ensure that the conductors and shield wire are shifted off Structure#10 before deleting it, to avoid having the section being deleted. The simplest way of doing this is to use the **Sections/ Swap Attachments** command.
 - b. After activating the **Swap Attachments** command, left click on Set 1 on Structure#10 and hold and drag the mouse towards Set 1 on Structure#11. (see below)
 - c. Repeat the process for Set 5.
 - d. Structure#10 should now have no wires on it and can be safely deleted (**Structures/ Remove** or the **Structure Delete** button on the Structures Toolbar).

Segment 1: Structure 10

Segment 2: Structure 1



After the merge, the **Sections/ Swap Attachments** tool will be used to shift wires to all be on the 1 structure. Before deleting the duplicate structure file.



The lines are successfully merged.

Example 1.b)

This project is similar to Example 1.a), however, in this case Segment 1 has two discrete portions of the line modelled, with a gap between portions. Segment 2 covers the middle portion of the line, but this portion has been defined in the reverse direction and there is a station overlap with the first portion of the Segment 1 model. Further, there are two shared structures to resolve when merging these models.

Here we aim to learn:

- How to split a Line into 2 Line elements
- How to reverse an alignment

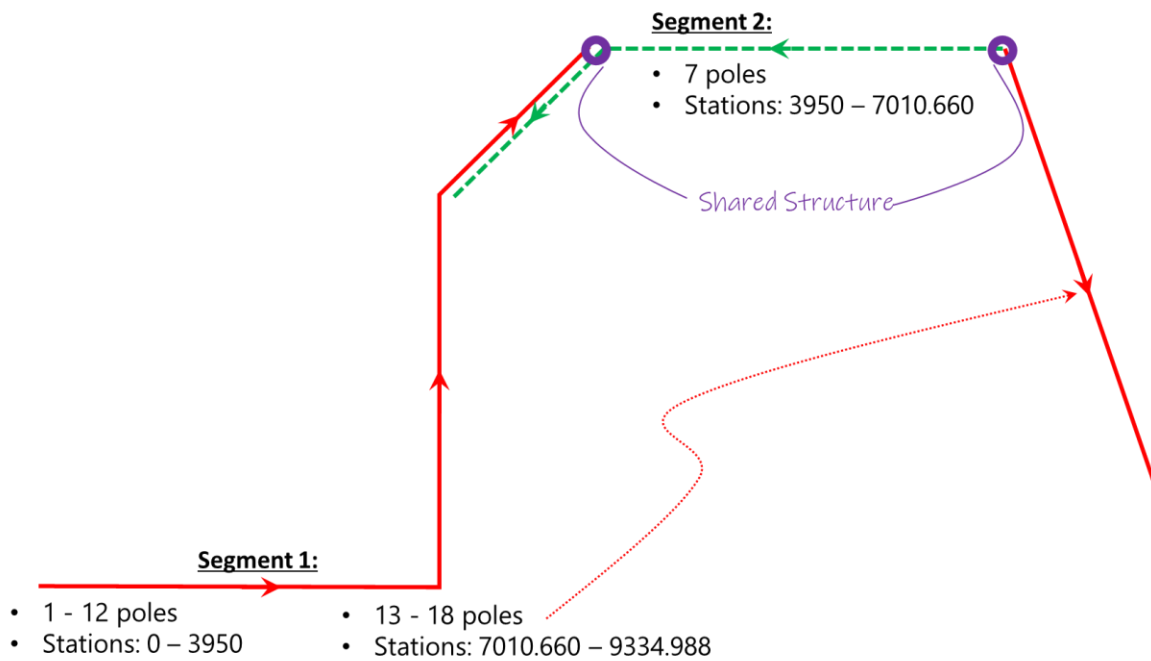
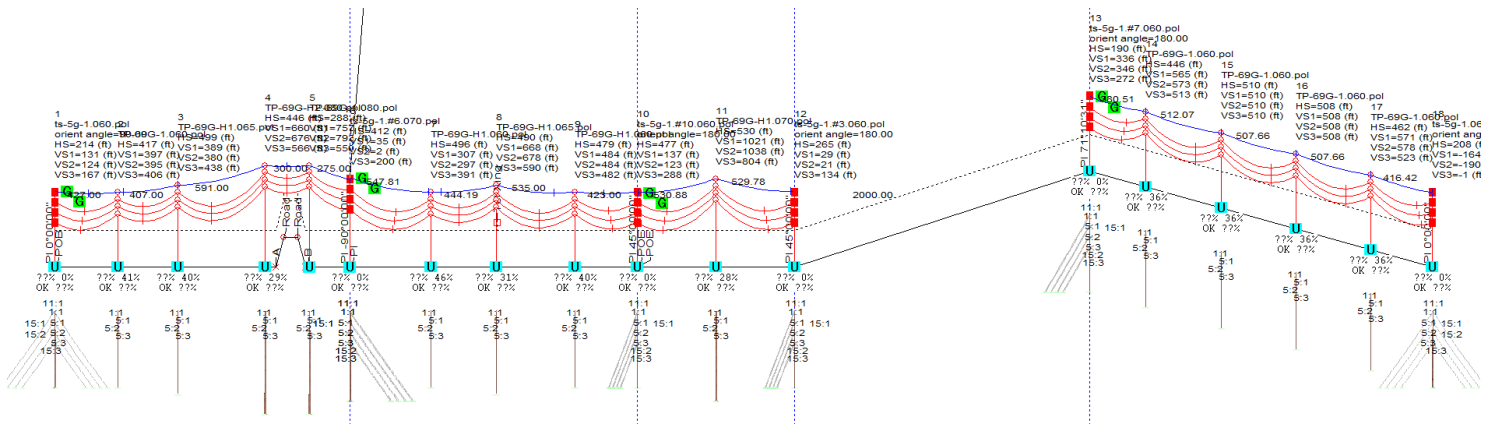
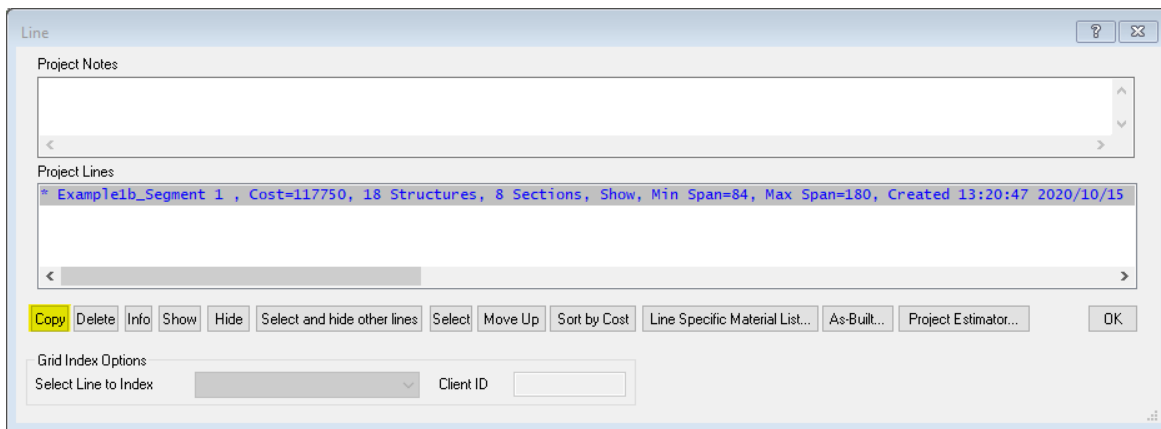


Figure 2: Example 1.b) Project overview

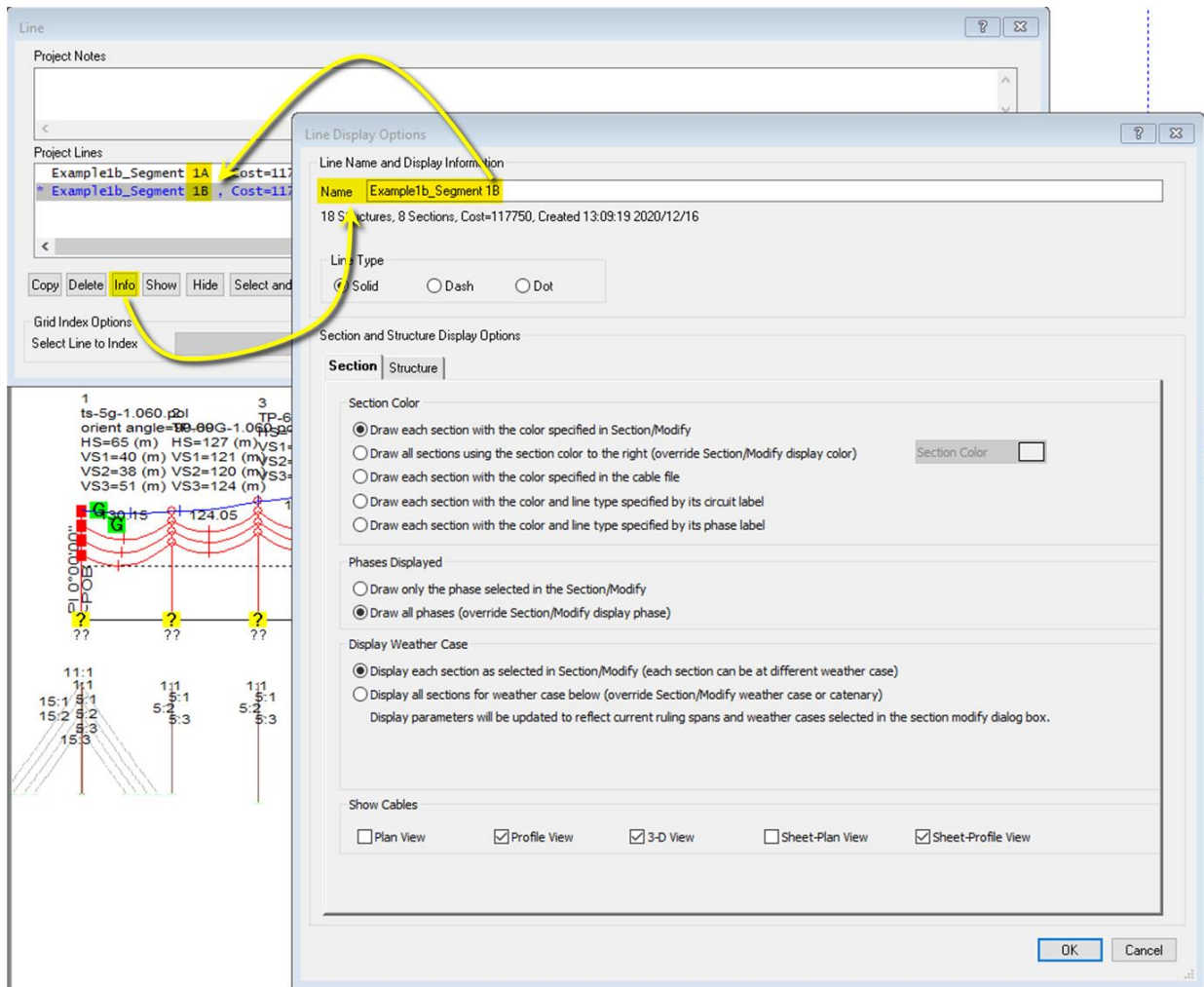
1. Restore both models (each one into a separate sub-directory),
e.g. "C:\Merge Projects\Example 1\1b\Segment1" and "C:\Merge Projects\Example 1\1b\Segment2"
2. Open "Example1b_Segment 1.xyz". You will notice that Segment 1 has two line sections profiles, with a gap in the middle.



- a. Unfortunately, as per the **Note** in Example 1.a) Step 9, you cannot Merge Lines together if there is a station overlap. This means that to be able to Merge the Segment 2 line in place, we will first need to split the Segment 1 into two discrete line models.
 - ii. To do this use **Lines/ Edit** and (with Segment 1 selected – as it will be by default) click on the **Copy** button.

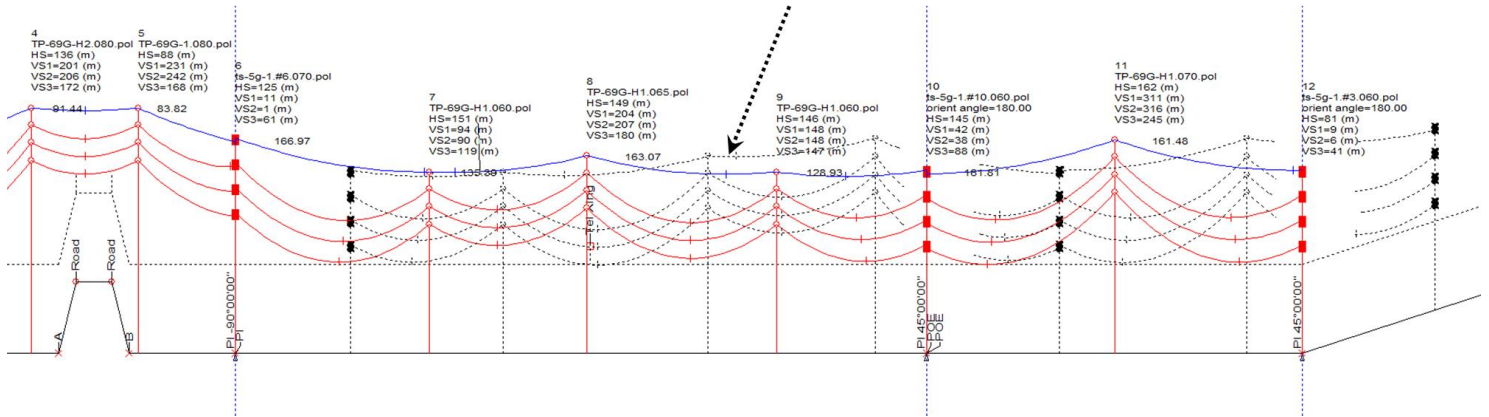


- ii. These 2 lines should be renamed by Selecting them and then clicking on the **Info** button and renaming the Line in the **Line Display Options** Dialog (It is suggested that the lines are named *Example1b_Segment 1A* and *Example1b_Segment 1B*).

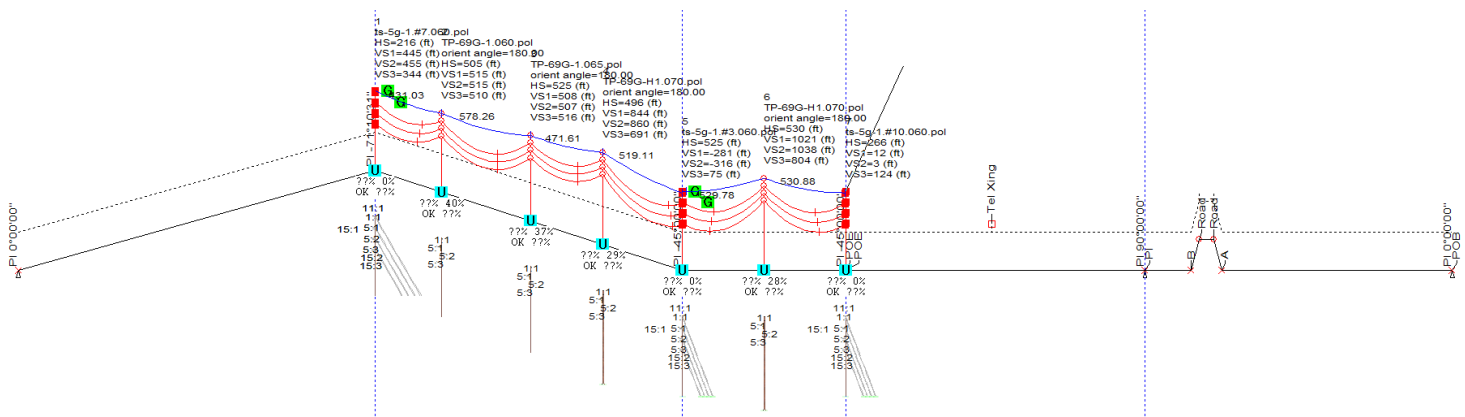


- iii. While *Example1b_Segment 1A* Line is Selected/active, delete the last 6 structures (from Structure#13 – Structure#18).
 - iv. Select/activate *Example1b_Segment 1B* and delete the first 12 structures (from Structure#1 – Structure#12).
 - b. Save the .xyz file (possibly with a new name, to avoid losing any existing work if you make a mistake) and Close PLS-CADD.
3. Open "*Example1b_Segment 2*.xyz".
 - a. You should notice that the alignment for this segment is the same as for Segment 1, just in reverse order, this fact will prevent the merge operations from happening as desired. This is because, whilst the alignment appears identical it is actually different due to the direction. Structures along an alignment are located based on their station coordinate, and since this is not the same due to the direction mismatch, the structures would all be placed at the incorrect locations. In this case there would be an unintended structure station overlap and it would cause structures and wires to be lost if we proceeded with merging the line models. The result of not reversing this alignment before the merge of the .don files is shown below, with Segment 2 structures being placed in the wrong location:

Incorrect merge occurred, with the structures appearing to be overlapped (due to station mismatch resulting from direction reversal)



- i. To reverse this alignment, select **Terrain/ Alignment/ Reverse Alignment**. Accept the warning about the Stringing direction and cable load adjustments.

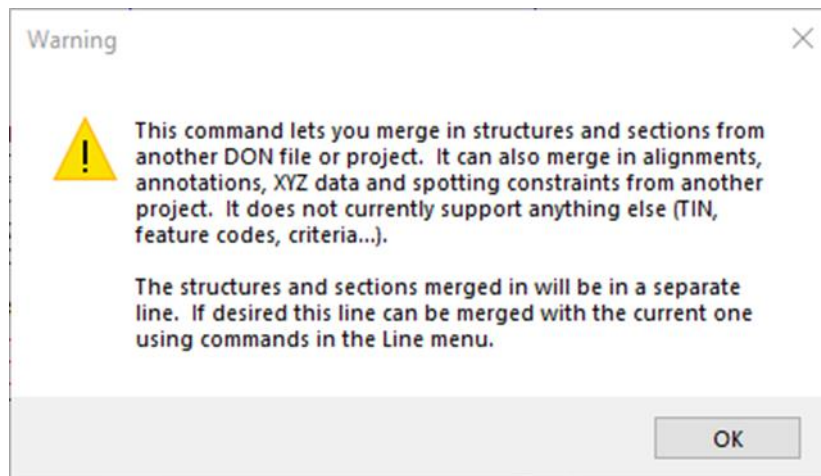


- b. Save and close this model.

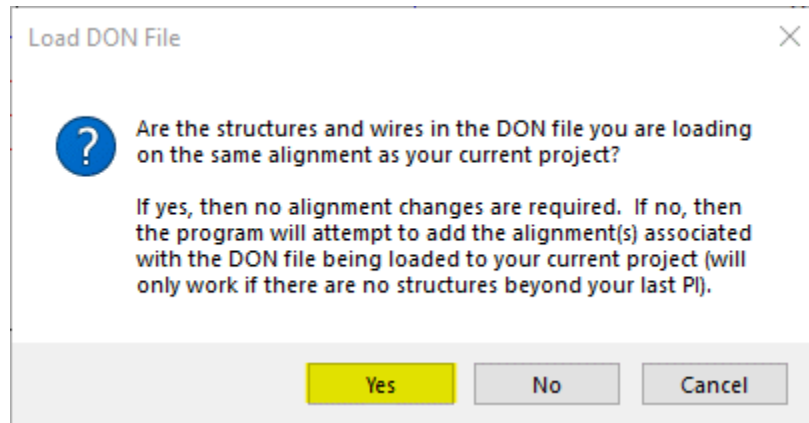
4. Open the reworked "Example1b_Segment 1.xyz" once again to Merge the .don files.

- a. Select **Lines/ Load DON file or Merge Projects**.

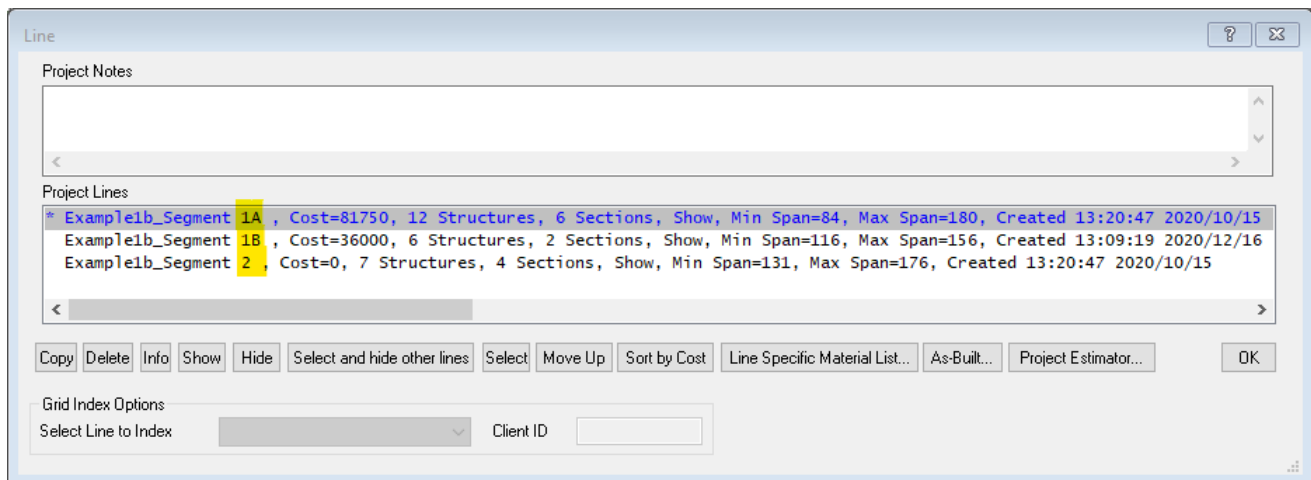
You will receive the following warning, explaining the Merge command functionality:



- b. The you will be prompted to select the file to Merge in with the current project. Select "Example1b_Segment 2.don".
- c. In this example, the two line segments are on the same alignment, so in the **Load DON File** Dialog you should select "Yes".

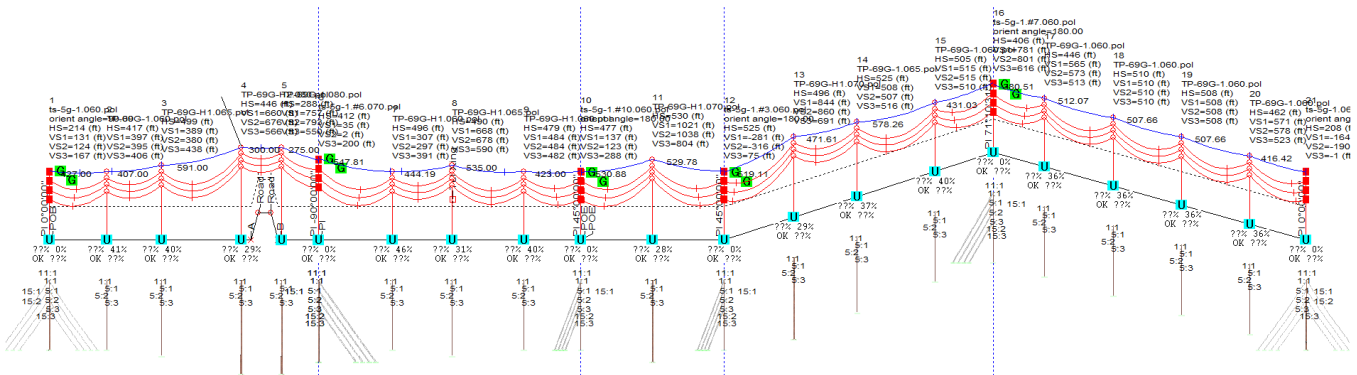


- d. You will then be prompted several times to Merge other attributes into the current project, these are:
 - i. XYZ Point Data
 - ii. Spotting Constraints
 - iii. Annotation
 - iv. Project Notes
 - v. Reference Manager
- e. After this, the three line models will be in the one project as unique Line elements. You can see this if you select **Lines/ Edit**.



5. The last thing to be cleaned up is the Station overlap between Segment 1 and Segment 2.
 - a. Select Line *Example1b_Segment 2*.
 - b. Delete Structure#1 and Structure#2 as they are already in *Example1b_Segment 1A* as structures #11 and #12.
 - c. Then shift the positions of the two shared structures (Structure #1 and Structure#5) so that they are not co-located with the identical structures in the other two Lines, as was shown in step 3 of the previous example.

6. The final Step involves merging the Line elements together.
 - a. Select/activate *Example1b_Segment 1A*.
 - b. Merge in *Example1b_Segment 2*.
 - c. Merge in the last Line, *Example1b_Segment 1B* (containing the 5 structures that originally formed the second half of Line Segment 1).
 - d. Once all 3 lines are combined into 1 line model, rectify the stringing and delete the duplicate/"shared" structures, as was shown in step 4 of the previous example.
 - i. Ensure that the conductors and shield wire are shifted from Structure 13 and 17 before deleting them, to avoid having the section being deleted. The simplest way of doing this is to use the **Sections/ Swap Attachments** command.
 1. Left click on the Set 11 on Structure#13 and hold and drag the mouse towards Set 11 on Structure#12. Repeat the process for Set 15.
 2. Left click on the Set 1 on Structure#17 and hold and drag the mouse towards Set 1 on Structure#18. Repeat the process for Set 5.
 - ii. Structure#13 and #18 should now have no wires on them, so they can be safely deleted (**Structures/ Remove** or the **Structure Delete** button on the Structures Toolbar).



The lines are successfully merged.

Example 2:

Example 2.a)

This example is almost identical to Example 1.a), except that in this case the lines are on separate alignments. Note the station coordinates in Figure 3 below and compare them to those in Figure 1 above.

This means that the survey data and alignment network from Segment 2 does not exist in Segment 1, and so a part of the Merge process will be to bring the survey points across to the new model and extend the alignment as necessary.

For this example, we show you the first steps to highlight the differences between Example 1.a) and **Example 2.a)** in merging the *.don* files together, but thereafter the process of merging line elements together is identical and is not repeated below.

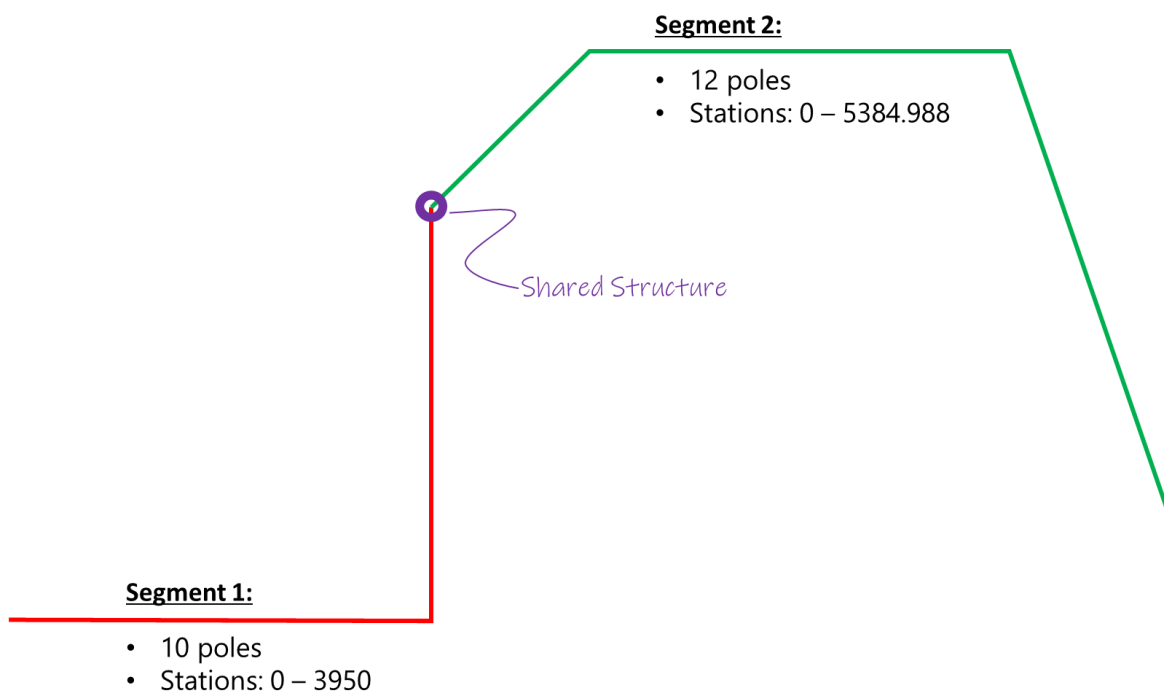
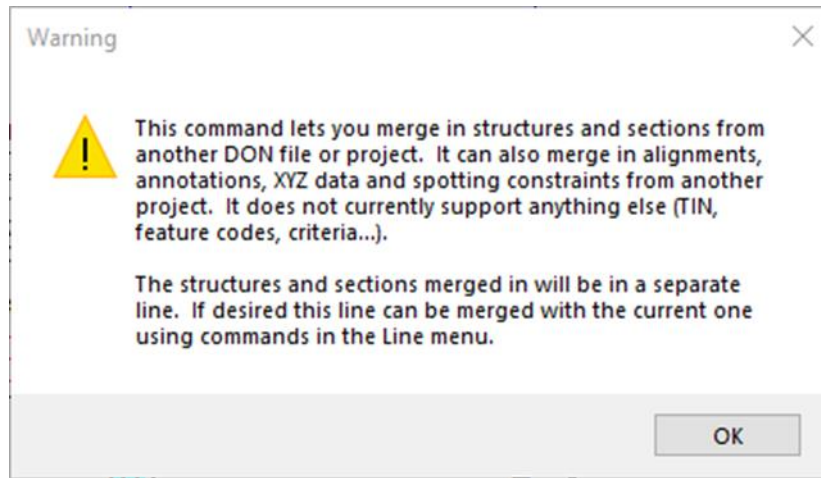
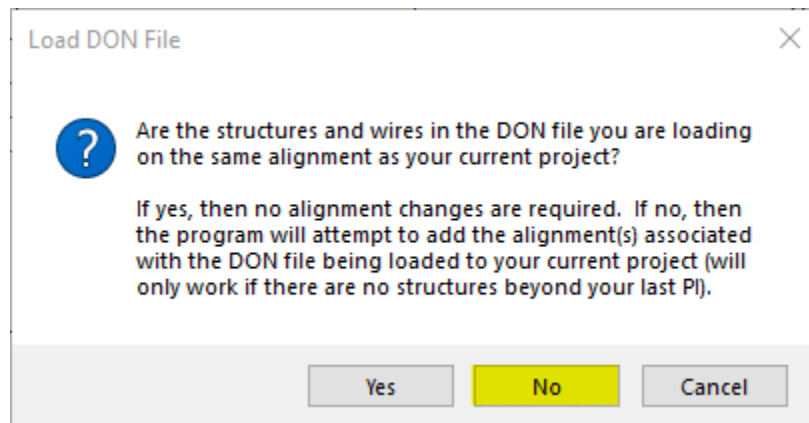


Figure 3: Example 2.a) Project overview

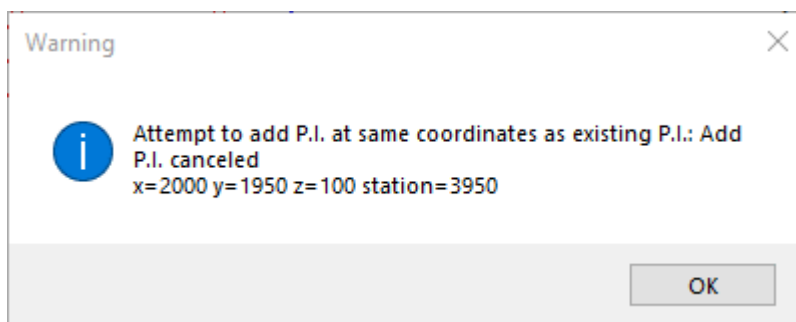
1. Restore both models (each one into a separate sub-directory),
e.g. "C:\Merge Projects\Example 2\2a\Segment1" And C:\Merge Projects\Example 2\2A\Segment2".
2. Open "Example2a_Segment 1.xyz". You will notice that Segment 1 consists of 10 poles from Station 0 – 3950 ft, and also that the alignment does not proceed past this point.
 - a. Now you will want to merge in the Segment 2 model by selecting **Lines/ Load DON file or Merge Projects**.
You will receive the following warning, explaining the Merge command functionality:



- b. The you will be prompted to select the file to Merge in with the current project, select "Example2a_Segment 2.don".
- c. After selecting the desired file, you need to instruct PLS-CADD on how to merge the files together. Basically PLS-CADD needs to know if the two projects are on the same alignment or not, as this will control how the profile views of the structures are laid out.
 - i. In this example, the two line segments are on separate alignments, so in the **Load DON File** Dialog you should select "**No**".

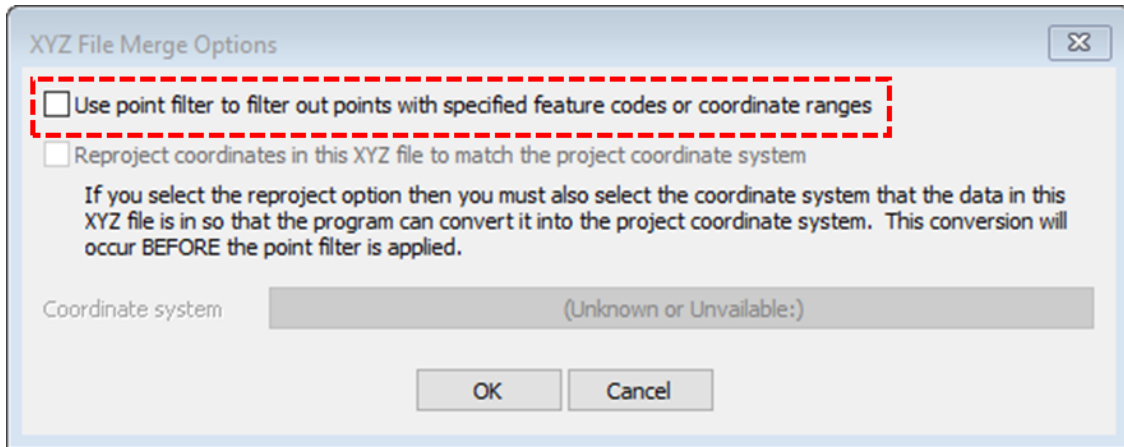


- d. There will be a warning about attempting to add a P.I. at a position where there is an existing P.I. in this example– this is regarding the P.I. at the location of the Shared Structure (at Station 3950 ft):

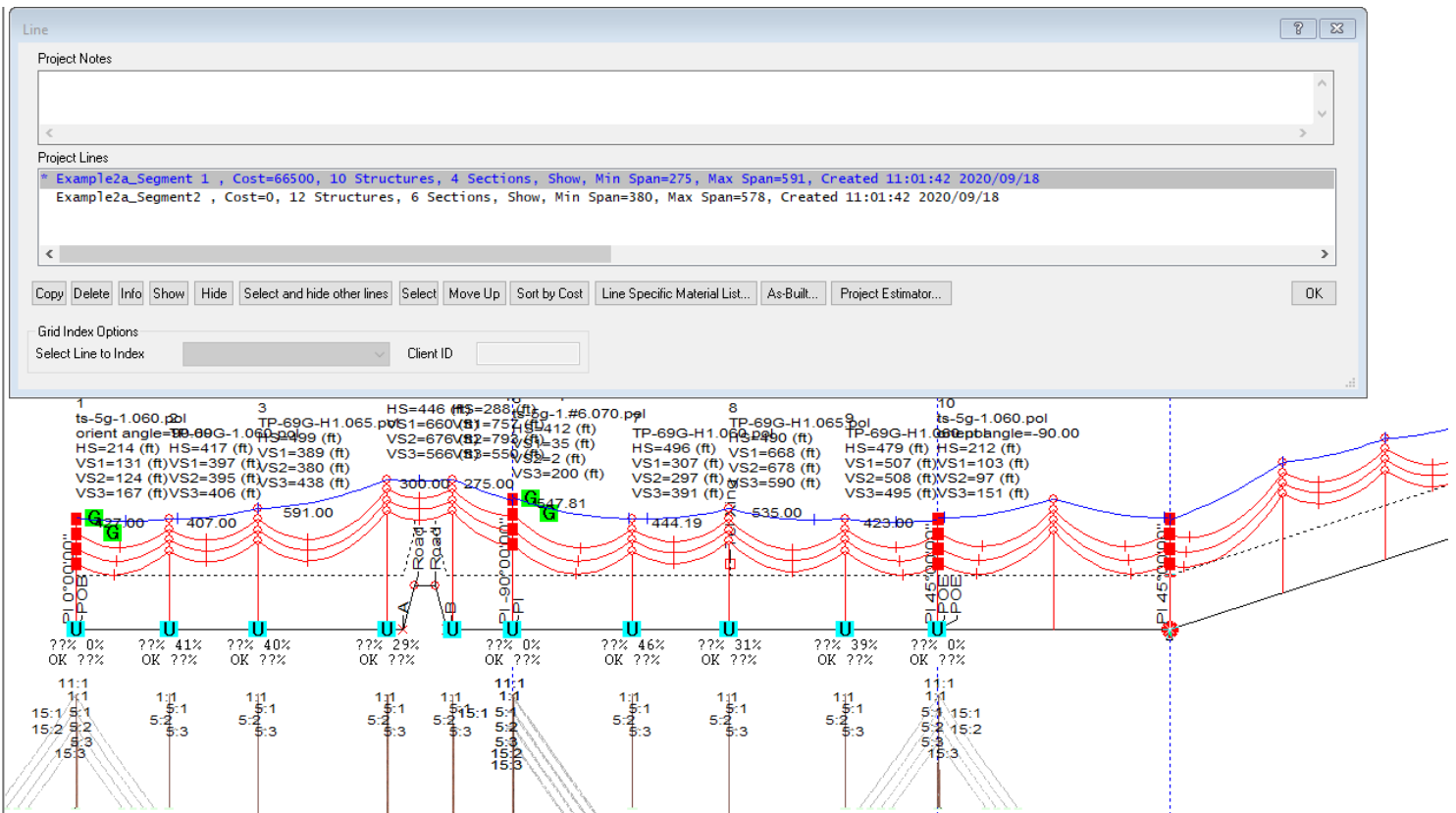


- e. You will be asked if you wish to merge the XYZ data into the model, Click **Yes**.

- f. At this point you will be taken to an **XYZ File Merge Options** Dialog can apply a point filter to control which survey points are merged in. You also can reproject the incoming project into a different coordinate system if needed.



- g. You will then be prompted several times to Merge other attributes into the current project, these are:
 - i. Spotting Constraints
 - ii. Annotation
 - iii. Project Notes
 - iv. Reference Manager
- h. After this, the line second model has been added in as a unique Line. You can see this if you select **Lines/ Edit**.



From this point onwards the process is identical to that described in Example 1.a) from Step 3 onwards.

Example 2.b)

This example comprises of a PLS-CADD model of a 69 kV (main) line and a separate PLS-CADD model of a 24 kV (crossing) line. The example aims to show how lines on separate alignments can be merged. This is valid for parallel lines, complicated substation approaches where multiple line models might exist separately, etc.

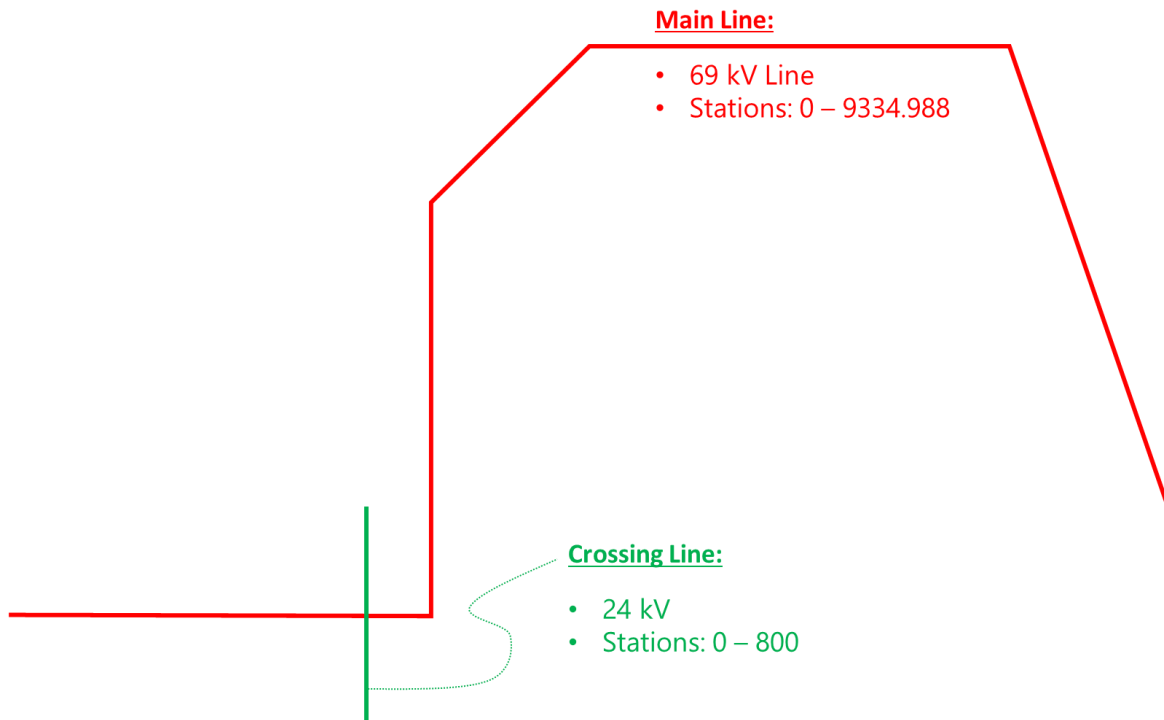
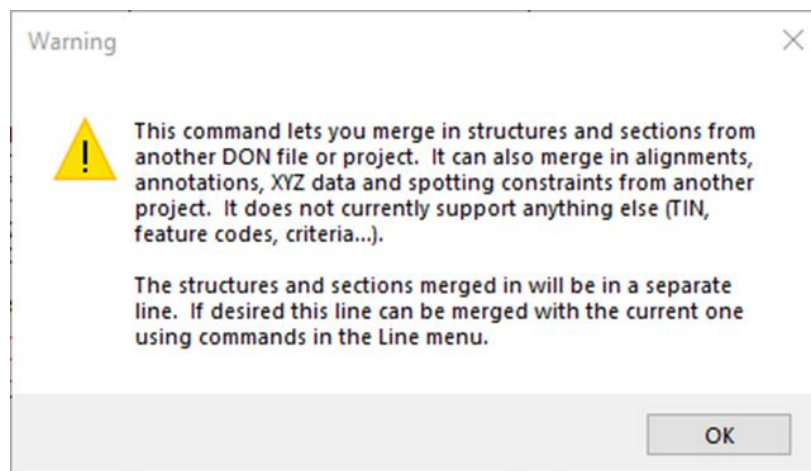


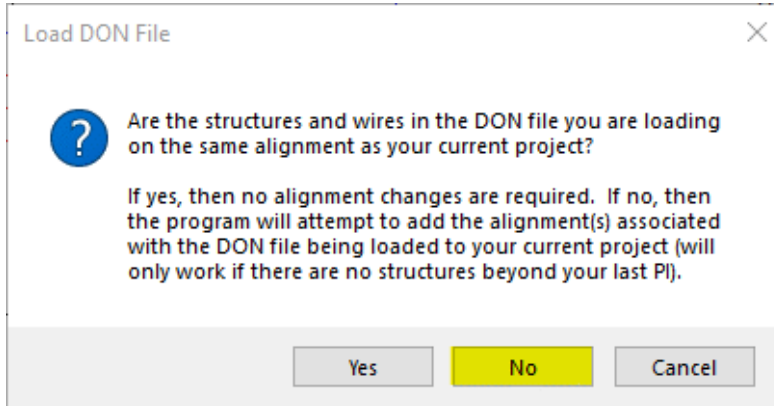
Figure 4: Example 2.b) Project overview

1. Restore both models (each one into a separate sub-directory),
e.g. "C:\Merge Projects\Example 2\2b>Main Line" and "C:\Merge Projects\Example 2\2b\Crossing Line".
2. Open "Example2b_main line.xyz". You will notice that this main line is the final product of all three previous examples.
 - a. Now you will want to merge in the Crossing Line model by selecting **Lines/ Load DON file or Merge Projects**.

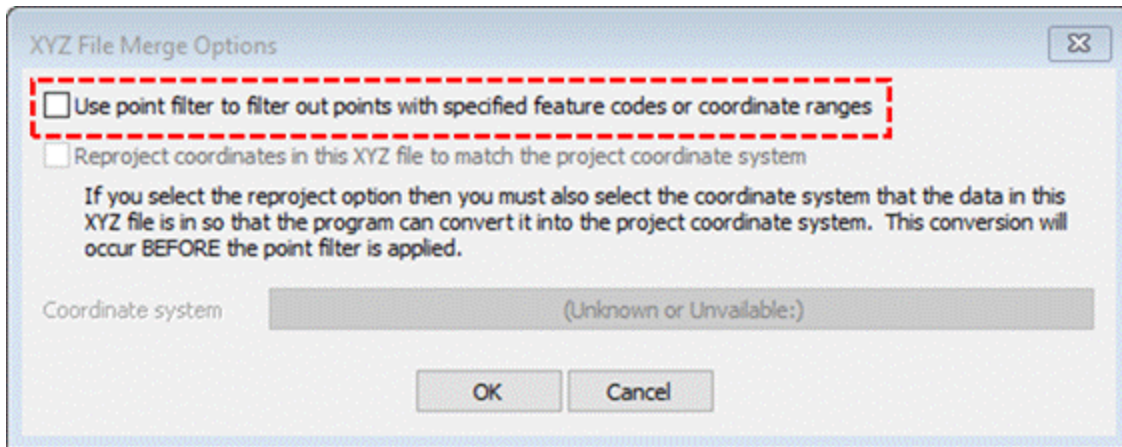
You will receive the following warning, explaining the Merge command functionality:



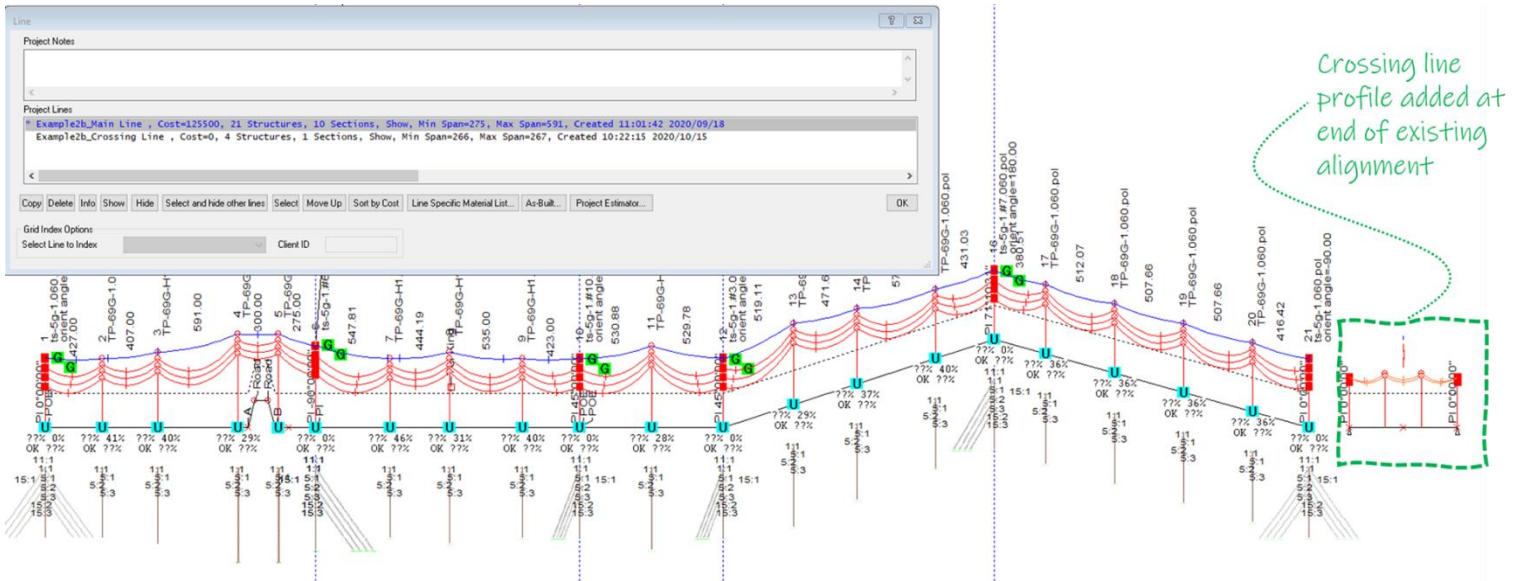
- b. The you will be prompted to select the file to Merge in with the current project, select "Example2b_crossing line.don".
- c. After selecting the desired file, you need instruct PLS-CADD on how to merge the files together. Basically PLS-CADD needs to know if the two projects are on the same alignment or not, as this will control how the profile views of the structures are laid out.
 - i. In this example, the two line segments are on separate alignments, so in the **Load DON File Dialog** you should select "No".



- d. You will be asked if you wish to merge the XYZ data into the model, Click **Yes**.
- e. At this point you will be taken to an **XYZ File Merge Options** Dialog can apply a point filter to control which survey points are merged in. You also can reproject the incoming project into a different coordinate system if needed.

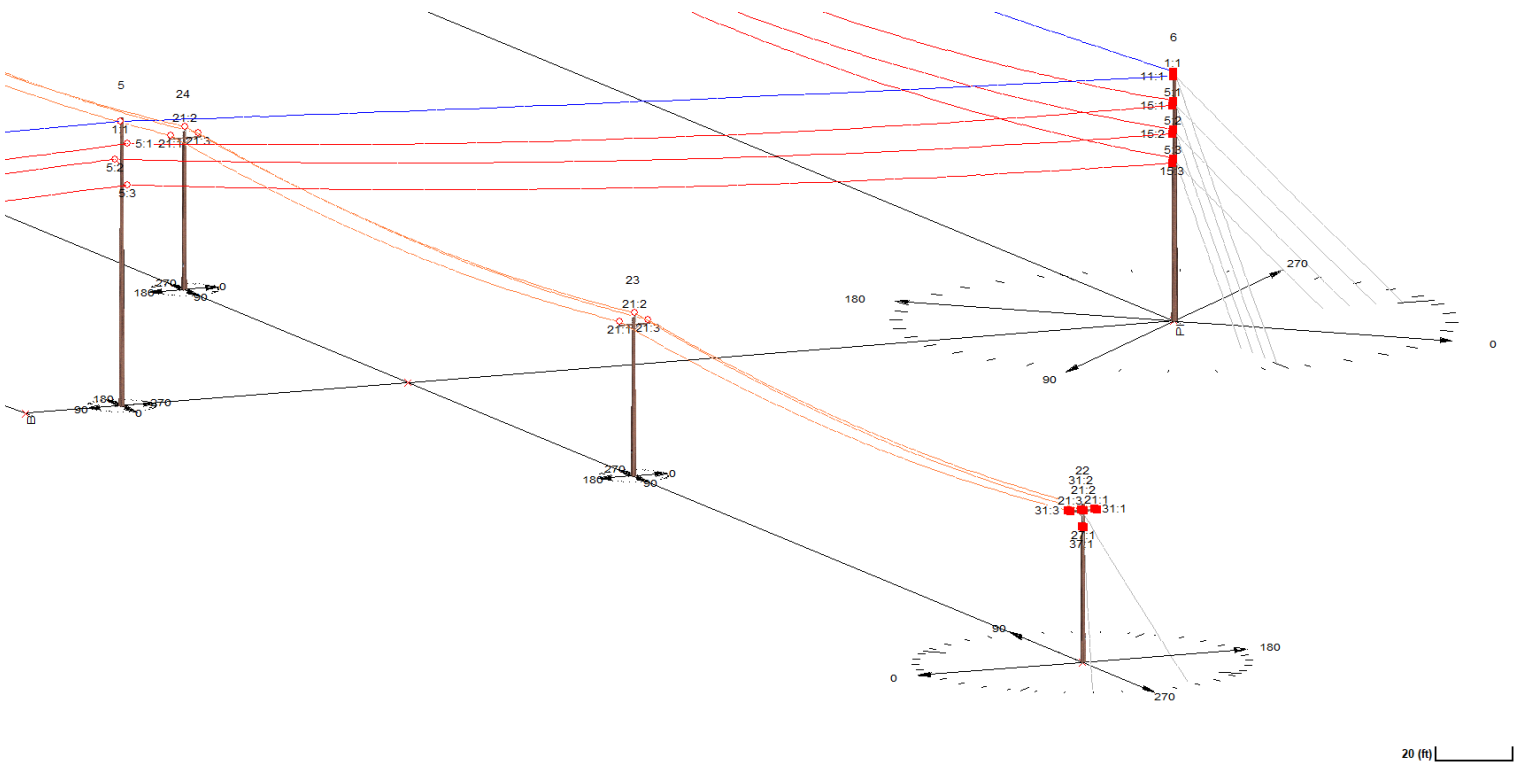


- f. You will then be prompted several times to Merge other attributes into the current project, these are:
 - i. Spotting Constraints
 - ii. Annotation
 - iii. Project Notes
 - iv. Reference Manager
- g. At this stage the crossing line model has been added in as a unique Line. You can see this if you select **Lines/ Edit**.
 - i. In a slight difference from the other examples, you will notice the new alignment added at the end of the original main line alignment.



3. Merging the 2 lines together is trivial in this case, as there are no shared structures to be concerned about, nor any station overlaps.

The end result is the completed model which can be used to accurately check clearance between both lines under a range of operating conditions.



The lines are successfully merged.