MONTANA
Department of Transportation

PLAN AND PROFILE SHEETS IN AUTODESK

Contents

Overview

This document contains workflows necessary for creating plan and profile sheets. This workflow is intended for use with any MDT road project requiring a full plan set, such as reconstruction and shoulder widening projects.

Process Provenance

- Date of development: 2/14/2025
- Revision date: *N/A*
- Application/Tool(s): *Autodesk Civil 3D*
- Version(s): *13.6.1963.0 Civil 3D 2024.4.1*
- Environment(s): *MDT Civil 3D State Kit r2024 v2.1.0*
- Author: *MDT EngOps Workflow Steering Committee*

Statement of Need

Though workflows specific to plan and profile sheets were covered in the Civil 3D production training classes, the workflows did not meet MDT standards for plan production. For that reason, the Road Design Workflow Subcommittee identified the need for more thorough documentation covering the topic.

Disclaimer: Because the State Kit is continuously being updated and improved, the styles and layers in this documentation may vary from what is in the current version of the State Kit.

Acronyms/Definitions Used in This Document

ACC – Autodesk Construction Cloud, Autodesk's new cloud storage ecosystem with enhanced tools, which will replace BIM 360 when it is retired

References

Coordinate System Settings Support Document

Import NAIP TIFF Imagery into Civil 3D

Import Aerial Survey TIFFs into Civil 3D

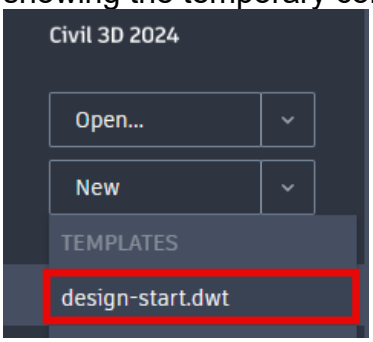
Process Description and Examples

Section I. Corridor Display File

Procedure – File Setup

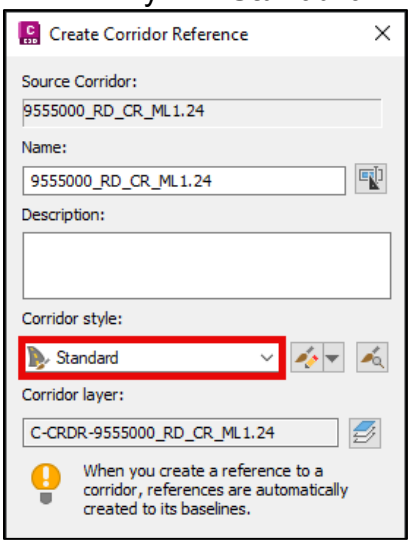
1. Create a new file using the ***design-start.dwt*** template. Save it as ***[UPN#]RDDISCRR.dwg*** (for example, *9555000RDDISCRR.dwg*) in the RD directory of the project on BIM 360/ACC. Use ***CTRL+S*** or navigate to the C3D icon in the top left and save the file.

   NOTE: If there is a detour on the project, create a second corridor display file for showing the temporary construction limits and follow the steps below.



2. Assign the project's coordinate system to the drawing according to the Coordinate System Settings support document.

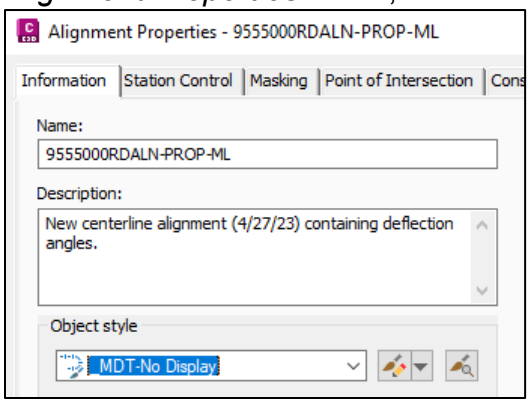
3. *Set the Working folder* to the project's Project Files folder and *set the Data Shortcuts project folder* if necessary. *Associate the project to the current drawing*. Then create a data reference to the corridor(s) within the file. Set the corridor style to ***Standard.***



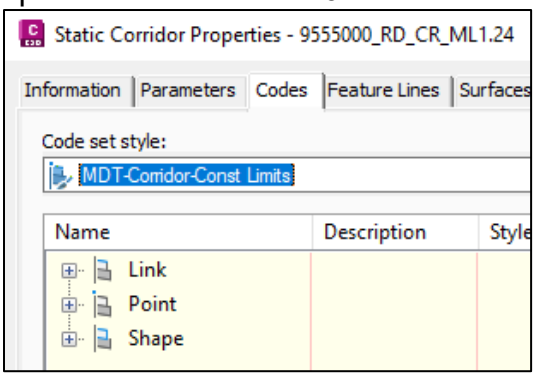
4. The corridor data reference will also bring in the alignment from which the corridor is based, which will not be displayed in this file.

    a. Select an alignment label, right click, and select *Edit Alignment Labels*. In the *Edit Alignment Labels* menu, select *Import label set* and change the set to ***_MDT-No Labels***. Select ***Apply***, then ***OK*** to close out of the popup.

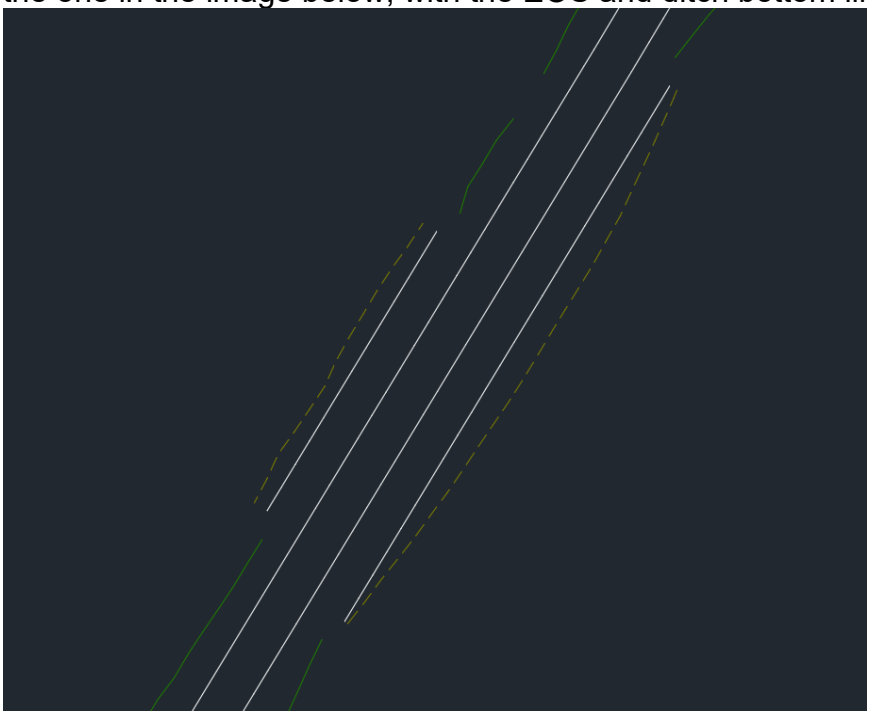
    b. Select the alignment, right click, and select *Alignment Properties*. In the *Alignment Properties* menu, set the alignment style to ***_MDT-No Display***.



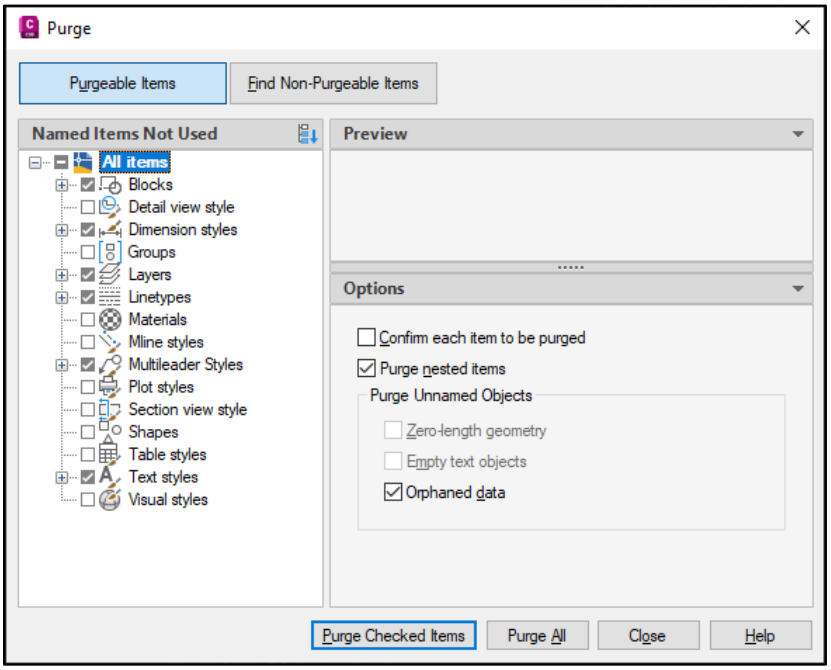
5. Select the corridor, right click, and select *Corridor Properties*. Within the Corridor Properties menu, select the *Codes* tab and change code set style to ***MDT-Corridor-Const Limits*** or ***MDT 2022-Corridor-Plan*** for corridors that were not updated to utilize the 2024 MDT State Kit subassemblies and assemblies.



NOTE: These styles will not show transition lines between cut and fill due to limitations with Civil 3D styles. The corridor should resemble something similar to the one in the image below, with the EOS and ditch bottom lines represented.



6. Use the ***PURGE*** command to remove unused blocks, dimension styles, layers, linetypes, multileader styles, and text styles from the drawing like shown in the image below. When purging, use the ***Purge Checked Items*** button. Then use the command ***MDTDWGCLEAN*** to clean the file. This command performs an audit on the file to fix errors within the drawing.



7. Save the file and close it.*

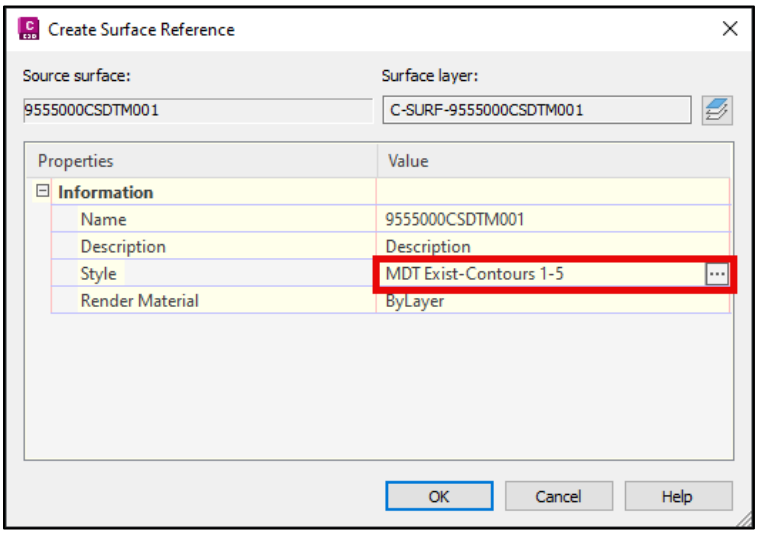
   IMPORTANT NOTE:** If/when the corridor(s) changes affect construction limits, the designer must open this file and synchronize the data reference (right click the corridor in the *Prospector* tab within the *Toolspace* palette and select ***Synchronize) to have the changes reflected in the plan and profile (PLP) file. The file must then be saved again, and the external reference to the DISCRR file within the PLP file may need to be reloaded in the *External References Manager* if the changes do not automatically sync upon reopening the PLP file.

   Additionally, when these significant changes are updated in the display file, notify the Right-of-Way designer for the project that these changes have been reflected in the display file, as the construction limits they utilize for their design are based on this file.

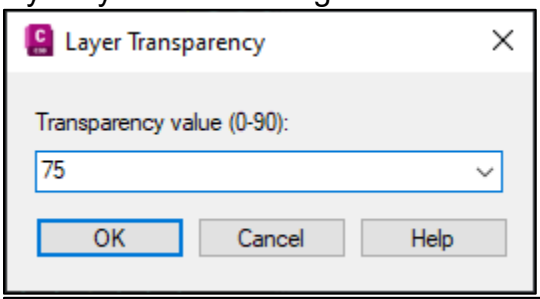
Section II. Surface Display File

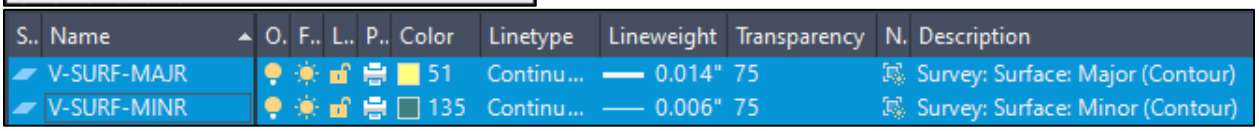
Procedure – File Setup

1. Create a new file using the ***design-start.dwt*** template. Save it as ***[UPN#]RDDISESU.dwg*** (for example, *9555000RDDISESU.dwg*) in the RD directory of the project on BIM 360/ACC. Use ***CTRL+S*** or navigate to the C3D icon in the top left and save the file.
2. Assign the project's coordinate system to the drawing according to the Coordinate System Settings support document.
3. Create a data reference to the existing surface. Set the surface style to ***MDT Exist-Contours 1-5.***



4. Open the *Layer Properties Manager* (Command: ***LAYER***) and locate the ***V-SURF-MAJR*** and ***V-SURF-MINR*** layers. Set the transparency to 75 for each layer by double clicking the value in the transparency column for each layer.





5. Repeat steps 6 and 7 from Section 1.

Section III. Imagery Display File

Procedure – File Setup

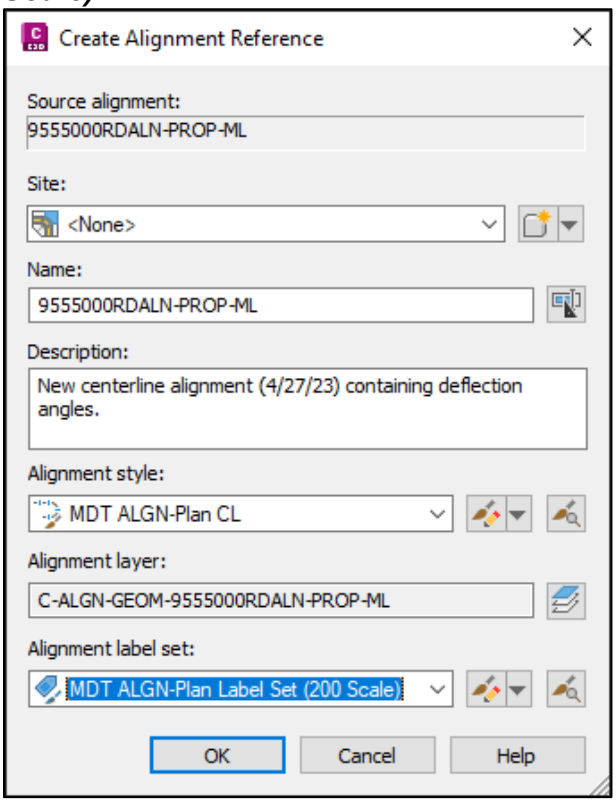
1. Create a new file using the ***design-start.dwt*** template. Save it as ***[UPN#]RDDISIMG.dwg*** (for example, *9555000RDDISIMG.dwg*) in the RD directory of the project on BIM 360/ACC. Use ***CTRL+S*** or navigate to the C3D icon in the top left and save the file.
2. Assign the project's coordinate system to the drawing according to the Coordinate System Settings support document.
3. Follow the steps outlined in the tip documents Import NAIP Imagery into Civil 3D or Import Aerial Survey TIFFs into Civil 3D if imagery from Photogrammetry is available for the project to insert the imagery into the file. Transform the raster from color to grayscale so that the imagery will properly plot in grayscale.
4. Repeat steps 6 and 7 from Section 1.

Section IV. PLP Sheet File

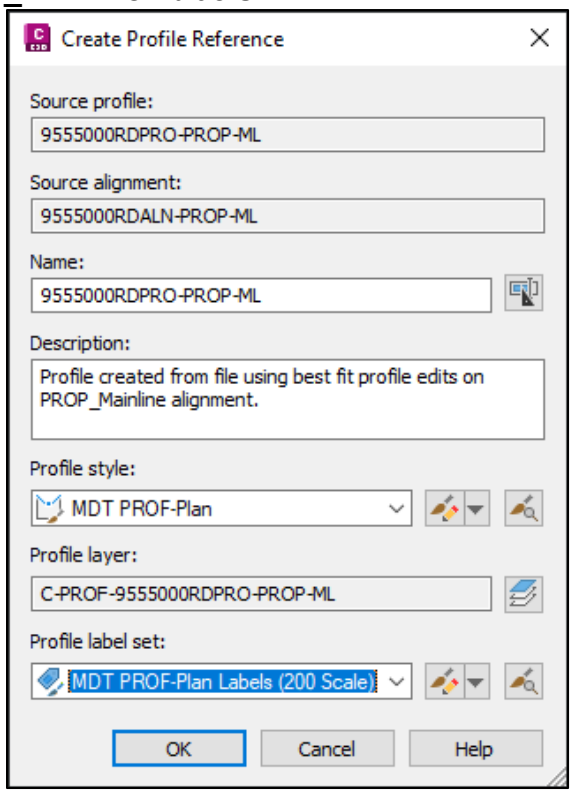
NOTE: This process assumes that a sheet set file containing plan-related layouts (i.e., title sheets, notes sheets, typical sections sheets, summary frames sheets) has already been created for the project. If a sheet set has not yet been created, one must be created prior to the Create Sheets procedure.

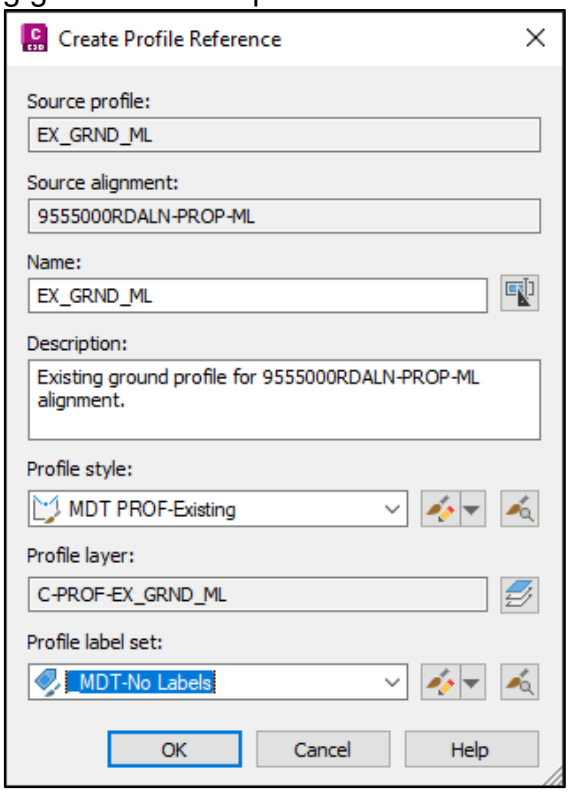
Procedure – File Setup

1. Create a new file using the ***design-start.dwt*** template. Save it as ***[UPN#]RDPLP001.dwg*** (for example, *9555000RDPLP001.dwg*) in the RD directory of the project on BIM 360/ACC. Use ***CTRL+S*** or navigate to the C3D icon in the top left and save the file.
2. Assign the project's coordinate system to the drawing according to the Coordinate System Settings support document.
3. ***Attach*** the *RDDISCRR*, *RDDISESU*, and *RDDISIMG* files created from Sections I-III via the *External References* palette. Attach the *CSMAP, ENWSU,* and *ROMAP* files for the project, if applicable. Ensure that the attachment type is Overlay and that the scale, insertion point, and rotation are all unchecked when importing the display files. Ensure that the path is relative.
4. Create a reference to the mainline alignment. Set the alignment style to ***MDT ALGN-Plan CL*** and the alignment label set to ***MDT ALGN-Plan Label Set (200 Scale)***

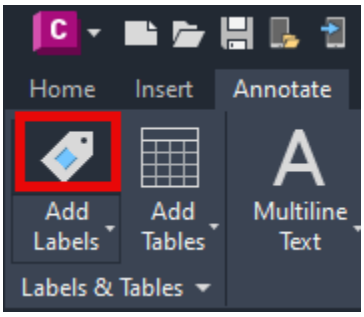


5. Create references to the design profile and the existing ground surface profile. Use the ***MDT PROF-Plan*** profile style and ***MDT PROF-Plan Labels (200 Scale)*** label set for the design profile. Use the ***MDT PROF-Existing*** profile style and ***_MDT-No Labels*** label set for the existing ground surface profile.



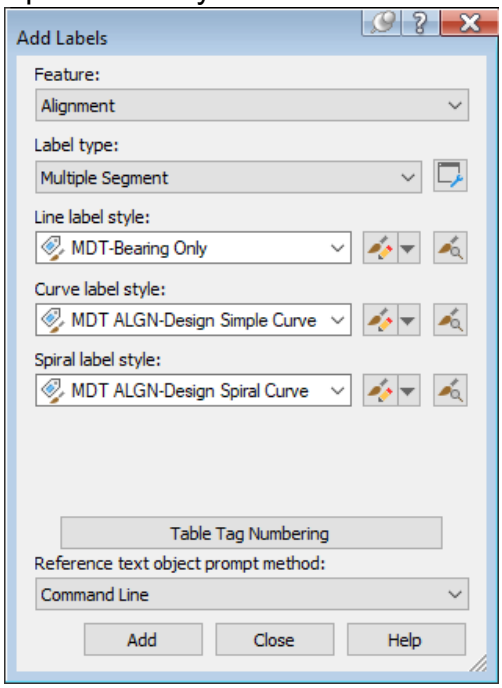


6. Add bearing and curve labels to the alignment.
   a. Select the ***Add Labels*** tag button from the *Labels & Tables* panel in the *Annotate* tab in the ribbon.



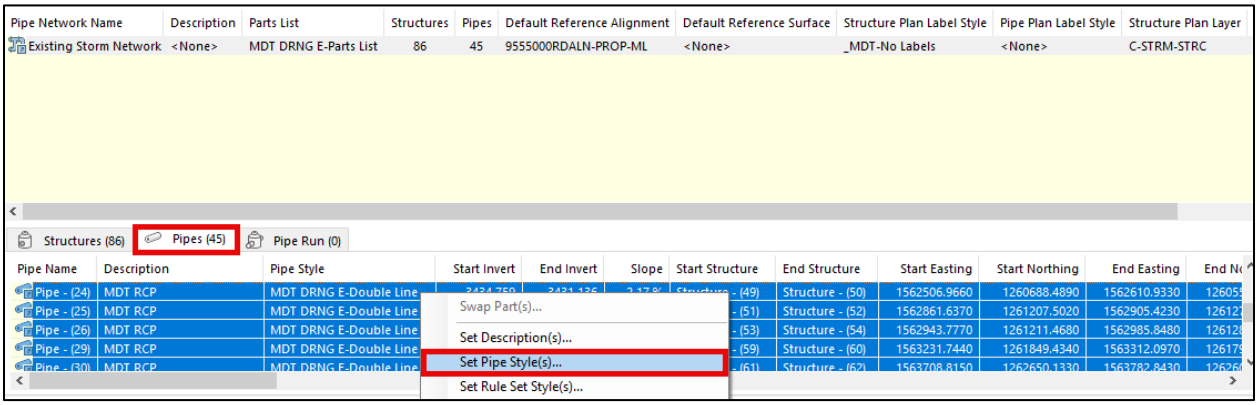
b. Set the *Feature* to ***Alignment*** and the *Label type* to ***Multiple Segment***. Set the following labels:

Line label style: ***MDT-Bearing Only***
Curve label style: ***MDT ALGN-Design Simple Curve***
Spiral label style: ***MDT ALGN-Design Spiral Curve***



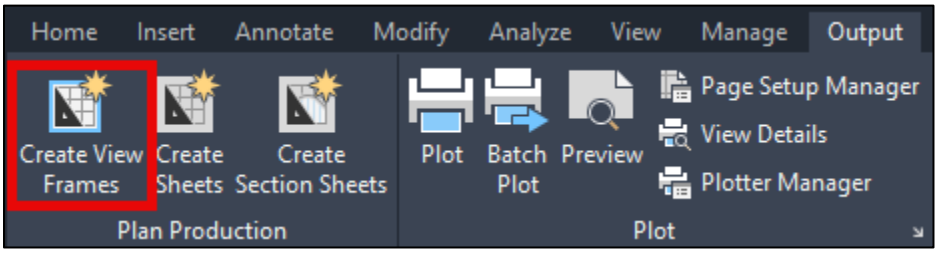
7. Create a reference to the existing pipe network as well as the proposed pipe network, if available and applicable. Match the parts lists to those of the source files. Set labels to ***<none>***.

8. Use the *Pipe Networks* tab in the *Project Explorer* to set the pipe style for the pipes to ***MDT DRNG E-Double Line*** for existing pipes and ***MDT DRNG-Double Line*** for proposed pipes. To set the style for all the pipes at once, select appropriate pipe network, select the *Pipes* tab, Shift + Select all the pipes, then right click and select ***Set Pipe Style(s)***.

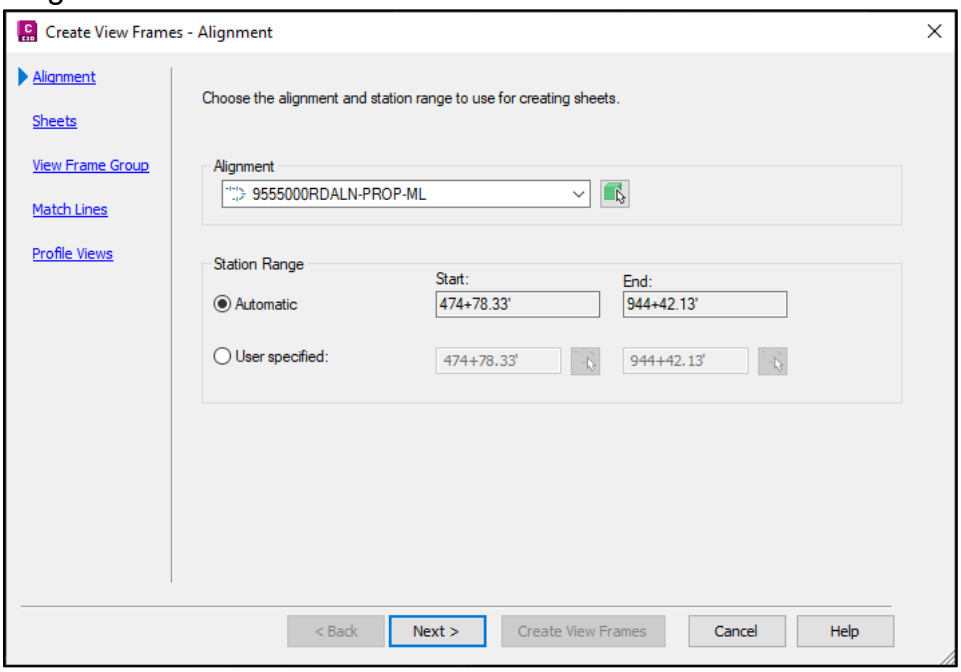


Procedure – Create View Frames

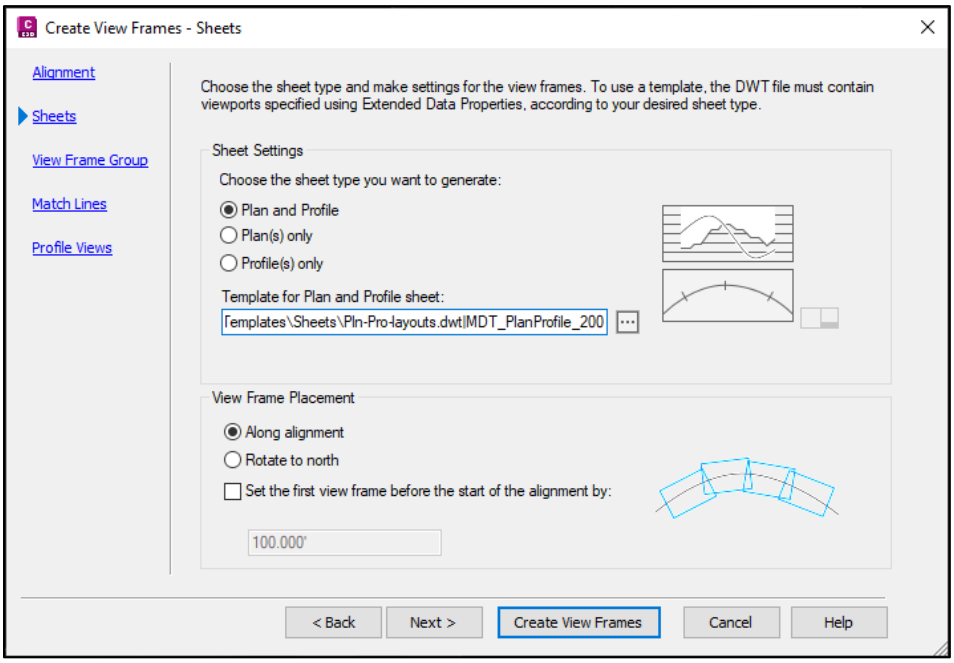
1. Select ***Create View Frames*** from the *Plan Production* panel in the *Output* tab in the ribbon.



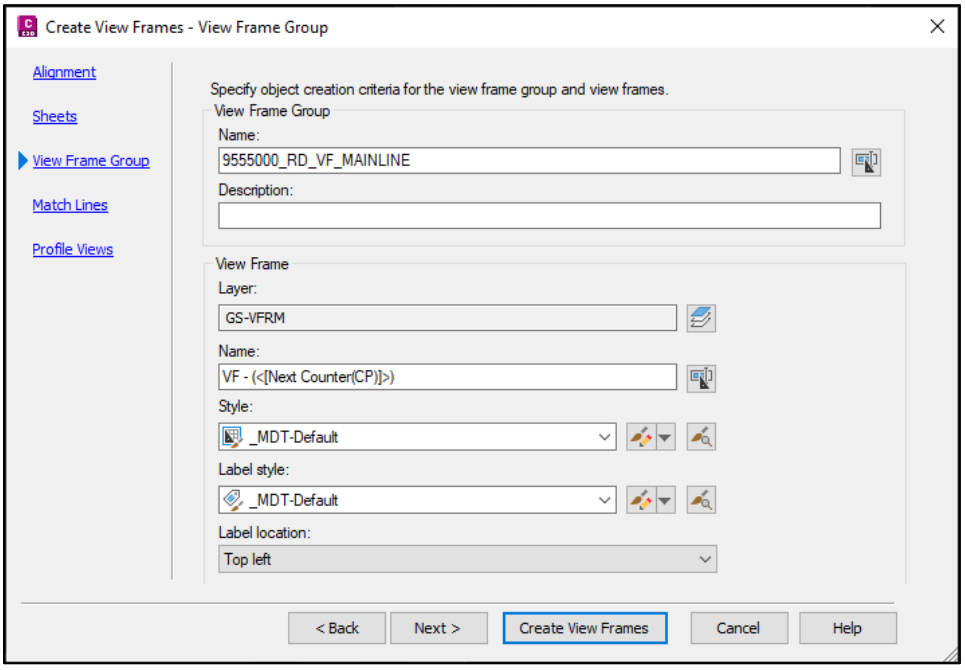
2. In the *Alignment* section of the *Create View Frames* wizard, accept the default settings, which should have the mainline alignment selected and the station range as *Automatic*. Then select ***Next >***.



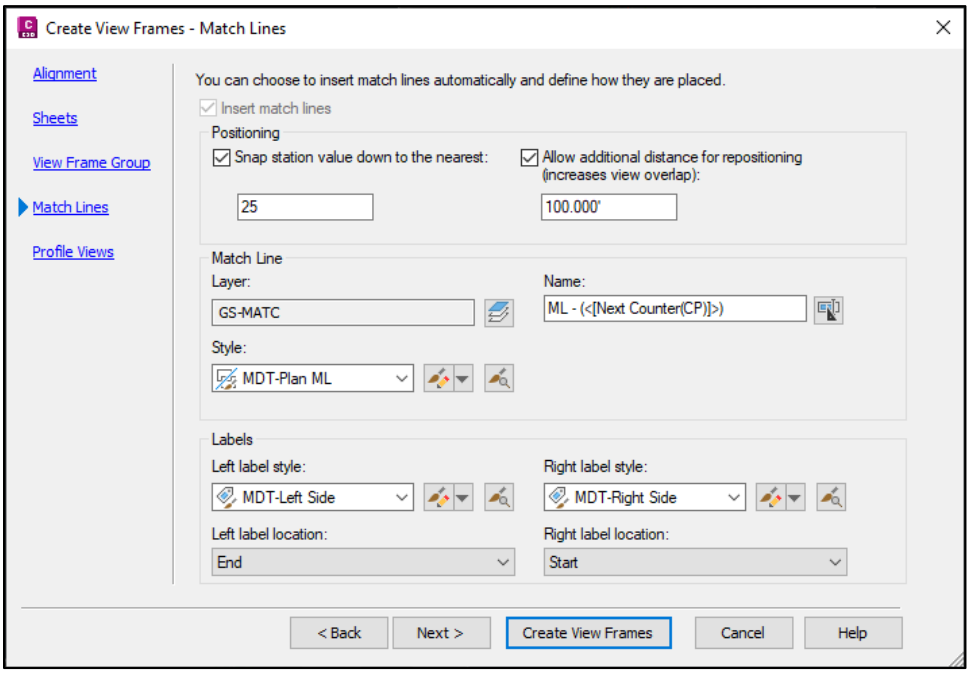
3. In the *Sheets* section of the *Create View Frames* wizard, select ***Plan and Profile*** for the *Sheet* settings, and the *View Frame Placement* to ***Along alignment***. The *Template for the Plan and Profile sheet* should be set to the following location, with the ***MDT_PlanProfile_200*** layout selected: *C:\MDOH\StateKit\Civil 3D\2024\Templates\Sheets\Pln-Pro-layouts.dwt.* Then select ***Next >***.



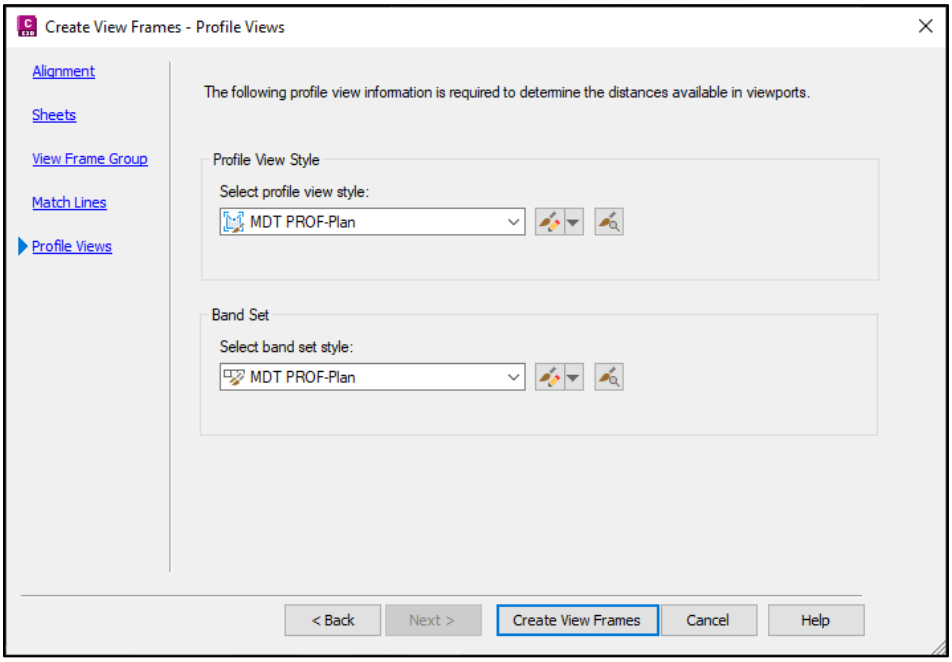
4. In the *View Frame Group* section of the *Create View Frames* wizard, name the view frame group ***[UPN#]_RD_VF_[descriptor]***. Then set both the style and label style to ***_MDT-Default***. Then select ***Next >***.



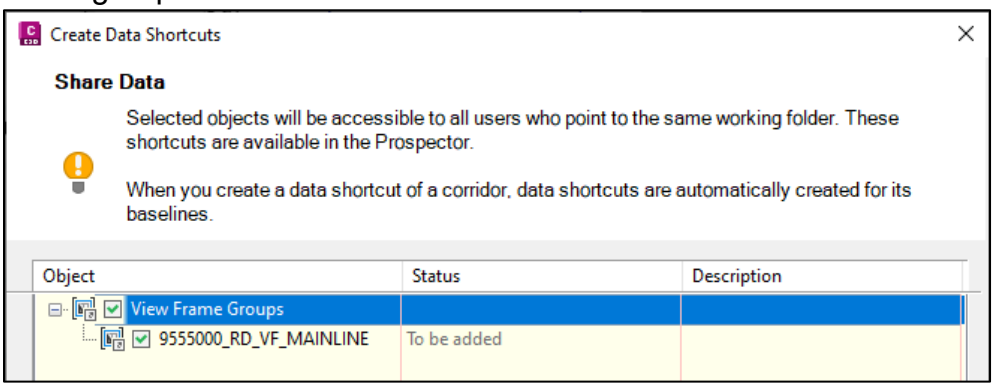
5. In the *Match Lines* section of the *Create View Frames* wizard, check the *Snap station value down to the nearest* and set the value to ***25*** feet. Check *Allow for additional distance for repositioning* and start with a value of ***100*** feet. Enabling this allows users to move the match lines and it is recommended for projects with several curves. For straighter alignments, this setting may not need to be enabled. Then select ***Next >***.



6. In the *Profile Views* section of the *Create View Frames* wizard, set the *Profile View Style* to ***MDT PROF-Plan*** and the *Band Set Style* to ***MDT PROF-Plan***. Then select ***Create View Frames***.

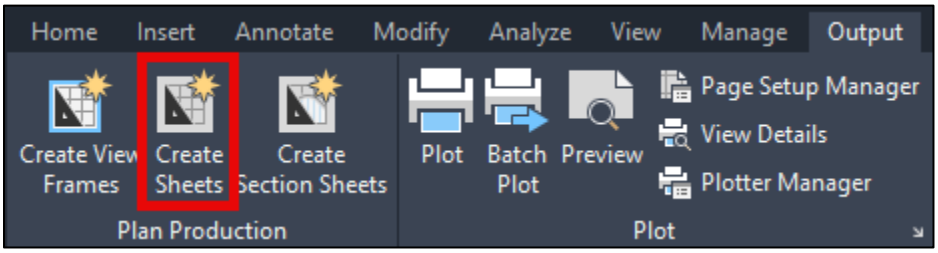


7. After the view frames have been drawn, ***Create a data shortcut*** to the view frame group.

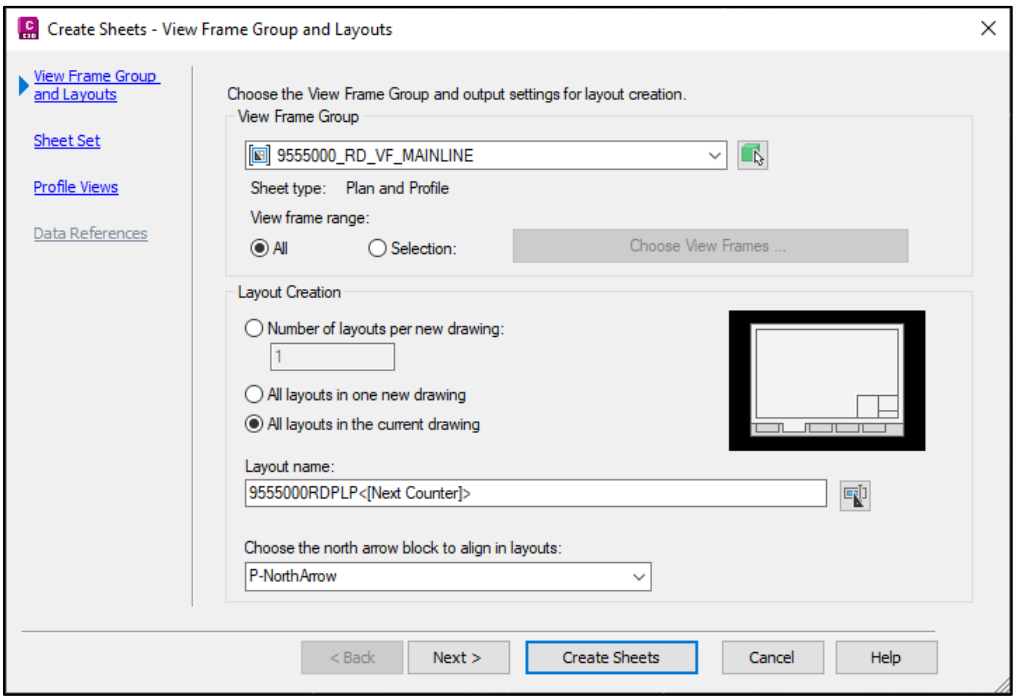


Procedure – Create Sheets

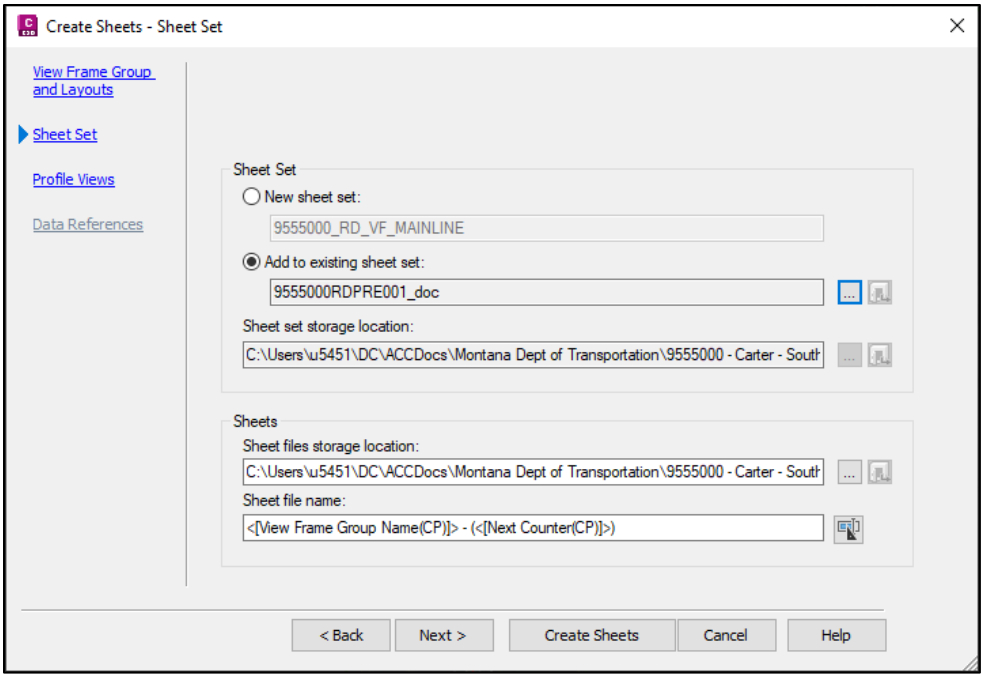
1. Select ***Create Sheets*** from the *Plan Production* panel in the *Output* tab in the ribbon.



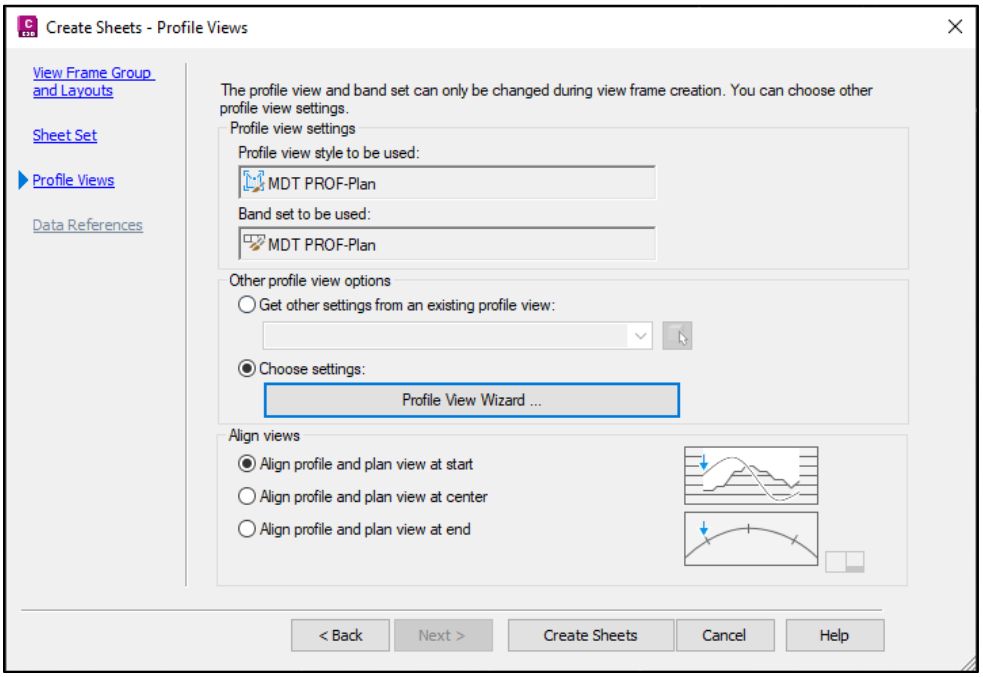
2. In the *View Frame Group and Layouts* section of the *Create Sheets* wizard, set the following, then select ***Next >***:
   - *View frame range: **All***
   - *Layout Creation: **All layouts in the current drawing***
   - *Layout name*: ***[UPN#]RDPLP<[Next Counter]>***
     - Set the number style to 001, 002, 003 within the Name Template popup.
   - *North arrow block to align in layouts: **P-NorthArrow***



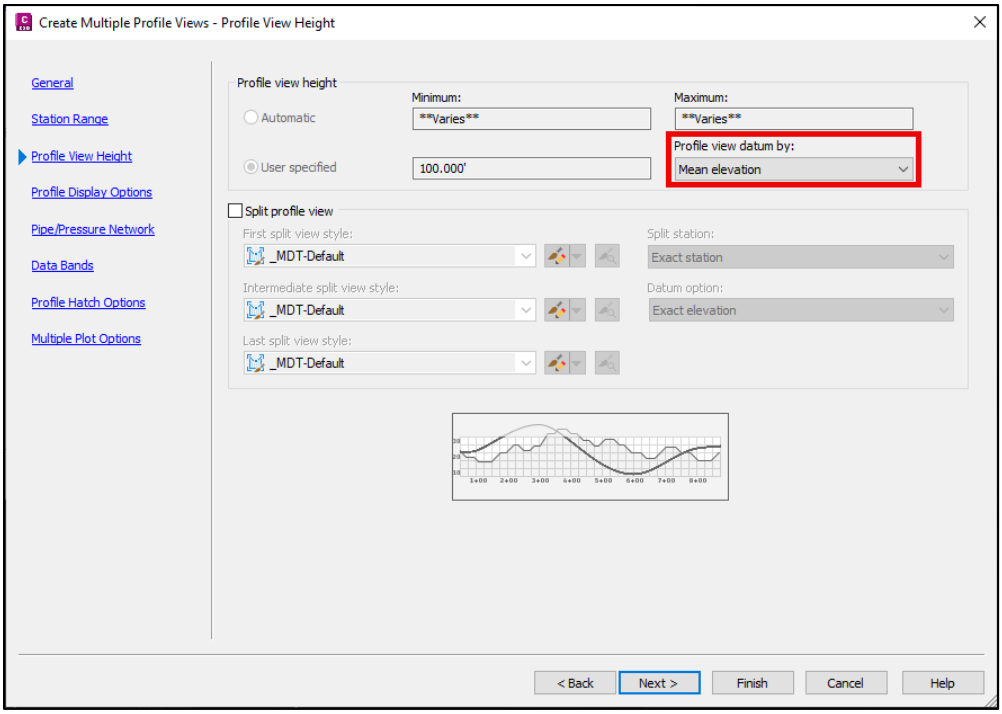
3. In the *Sheet Set* section of the *Create Sheets wizard,* Select ***Add to existing sheet set*** and navigate to the project's sheet set file on BIM 360/ACC. Then select ***Next >***.



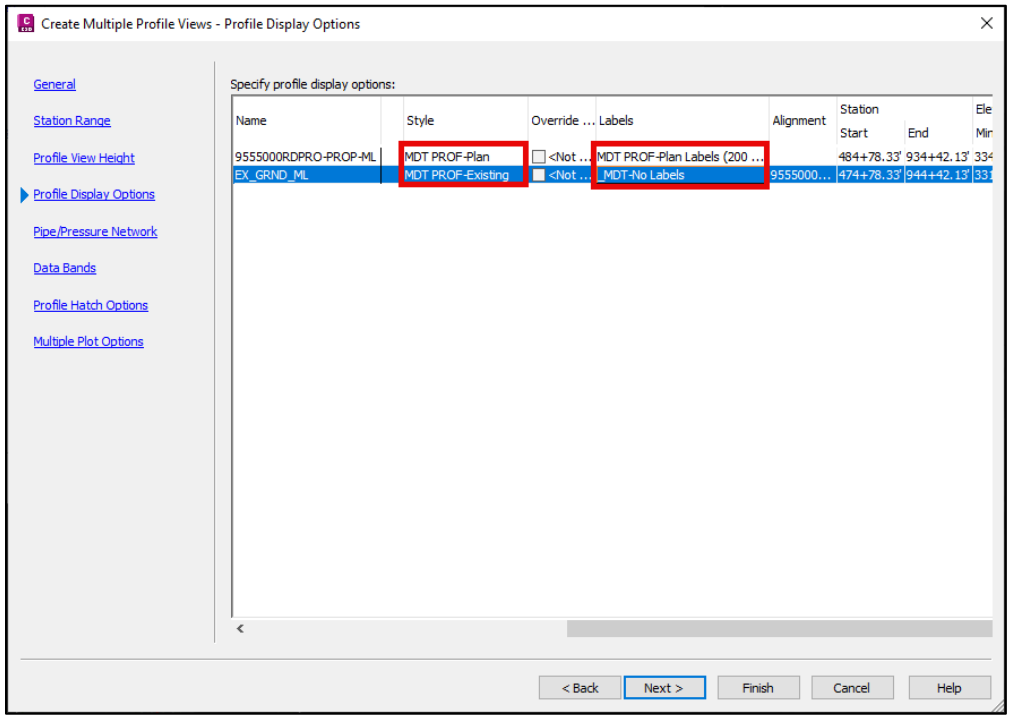
4. In the *Profile Views* section of the *Create Sheets* wizard, select ***Align profile and plan view at start,*** then select ***Choose settings*** for the *Other profile view options*. Then select ***Profile View Wizard***.



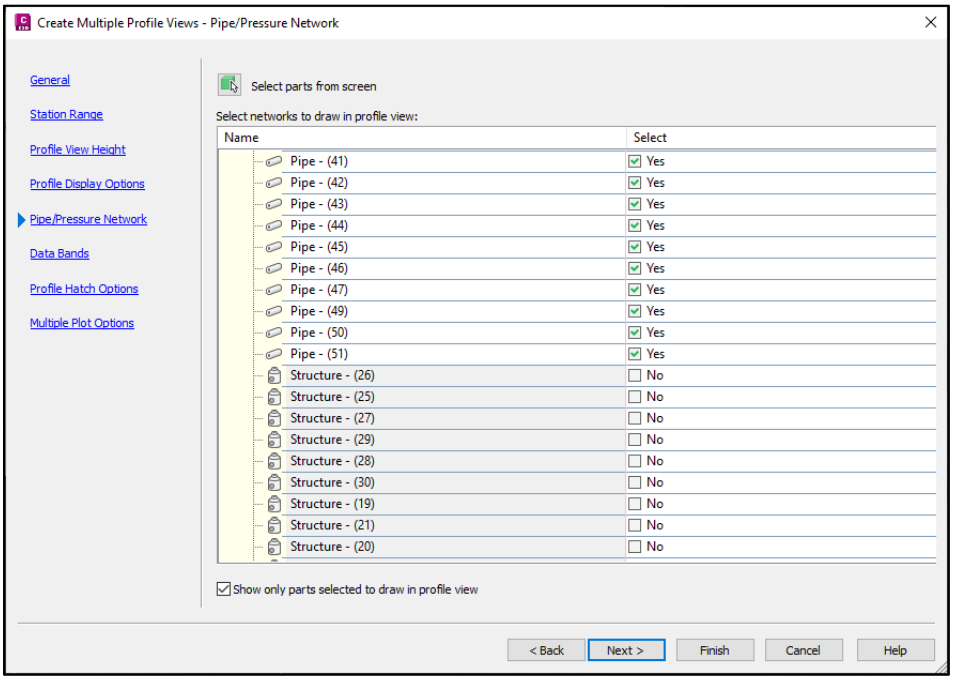
5. In the *Profile View Height* section of the *Create Multiple Profile Views* wizard, change the *Profile view datum by* to ***Mean elevation*** by selecting it from the dropdown. Then select ***Next >***.



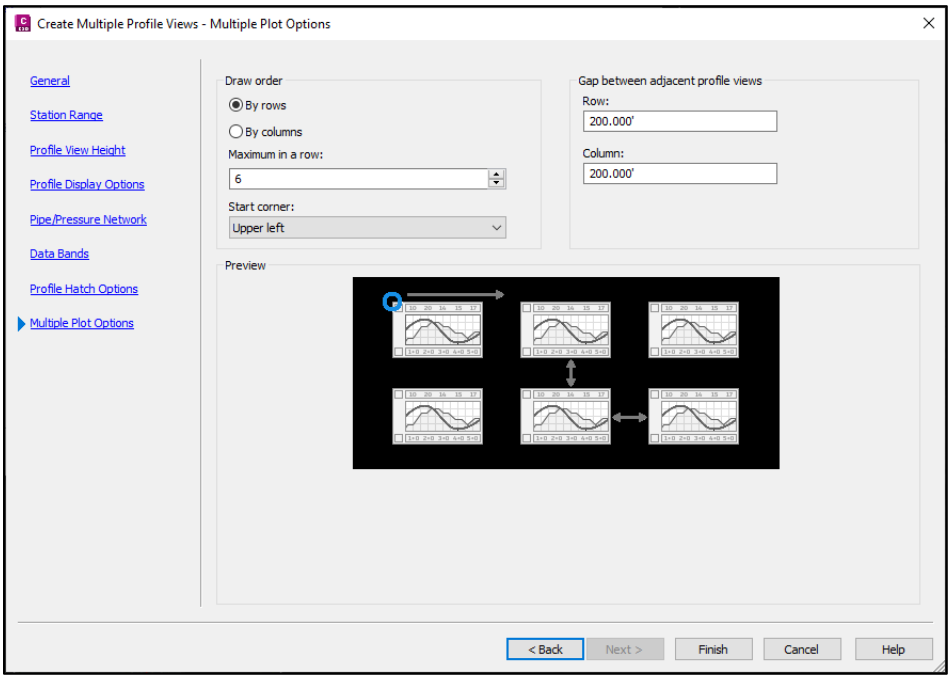
6. In the *Profile Display Options* of the wizard, set the style for the proposed profile to ***MDT PROF-Plan*** and its label style to ***MDT-PROF-Plan Labels (200 Scale)*** and the existing ground profile style to ***MDT PROF-Existing*** and its label style to ***_MDT-No Labels***. Then select ***Next >***.



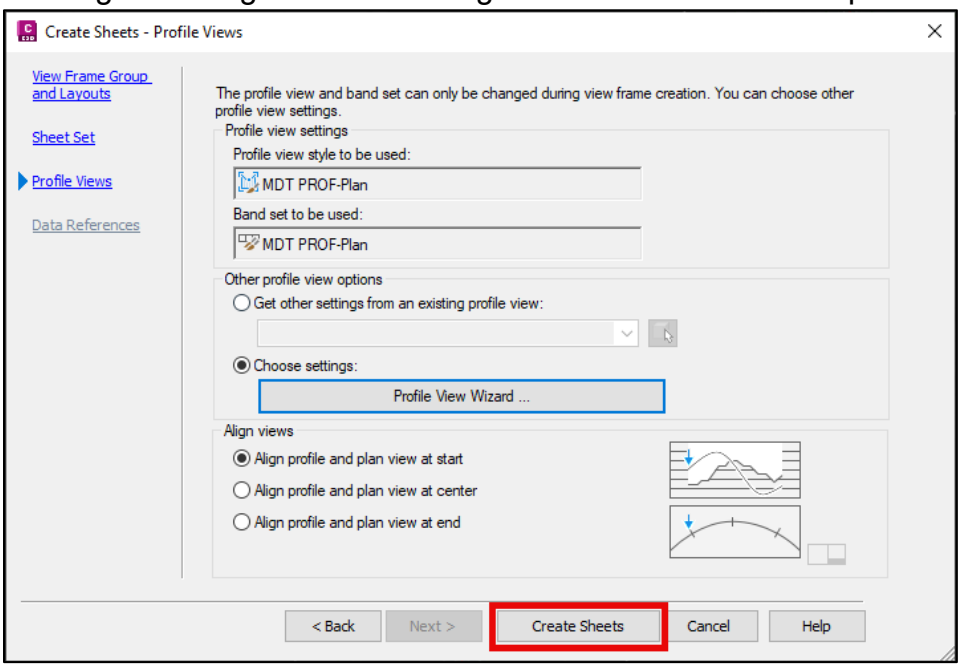
7. In the *Pipe/Pressure Network* section of the wizard, expand the pipe network and ***uncheck Yes*** for all the structures, so that only the pipes will be drawn in the profile views. Then select ***Next >*** three times to accept the defaults for *Data Bands* and *Profile Hatch Options,* stopping at the *Multiple Plot Options* section.



8. In the *Multiple Plot Options* section of the wizard, set the draw order to ***By rows*** and set the *maximum in a row* to ***6*** and set the *start corner* to ***upper left*** so that the profile views are arranged from top to bottom and left to right. Then select ***Finish*** to exit the *Create Multiple Profile Views* wizard and return to the *Create Sheets* dialog box.

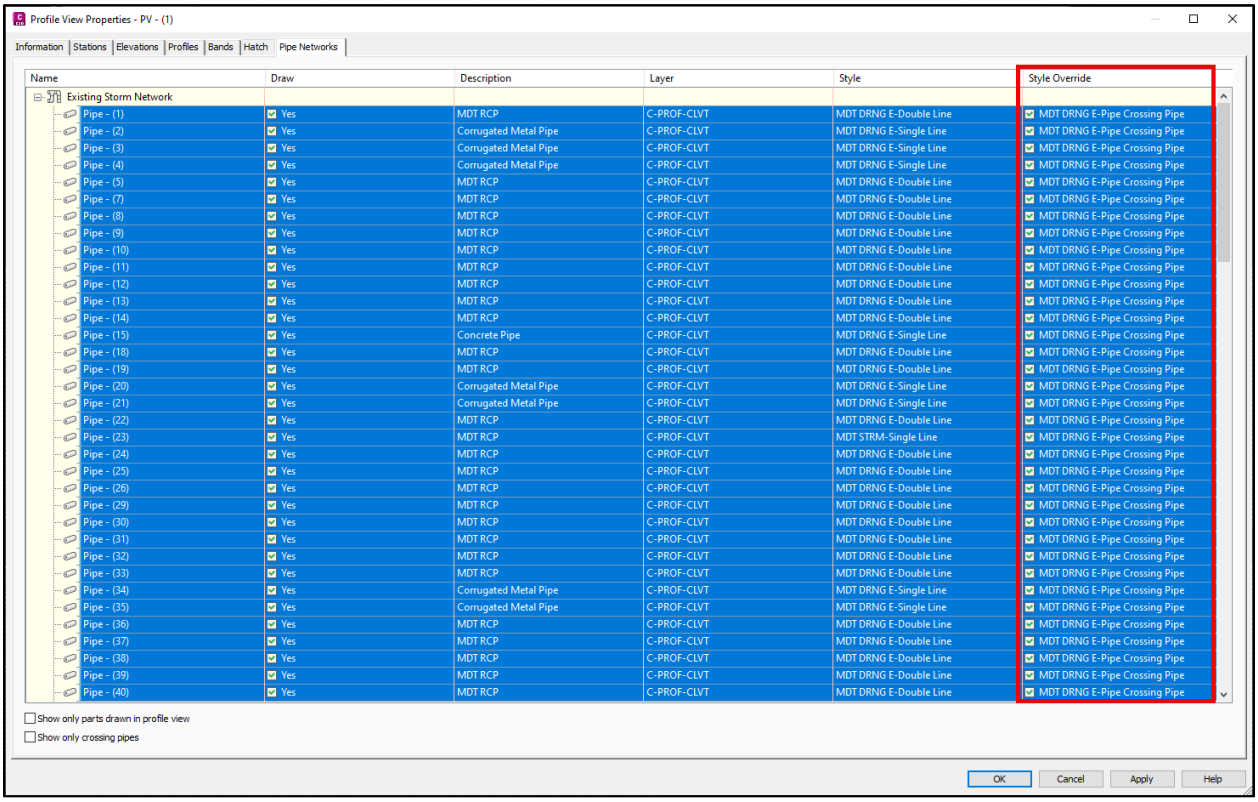


9. In the *Create Sheets* wizard, select ***Create Sheets***. The program will pop up a warning indicating that the drawing will be saved in order to proceed. Select ***OK***.

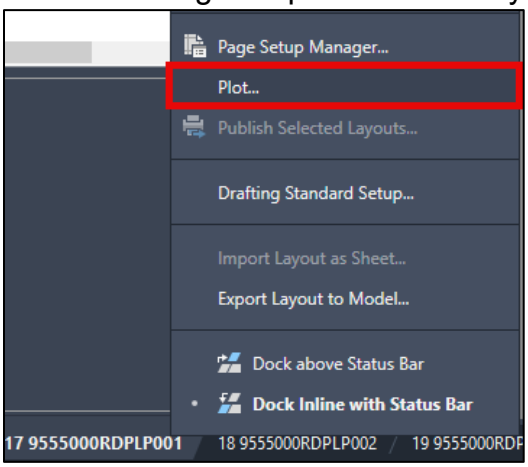


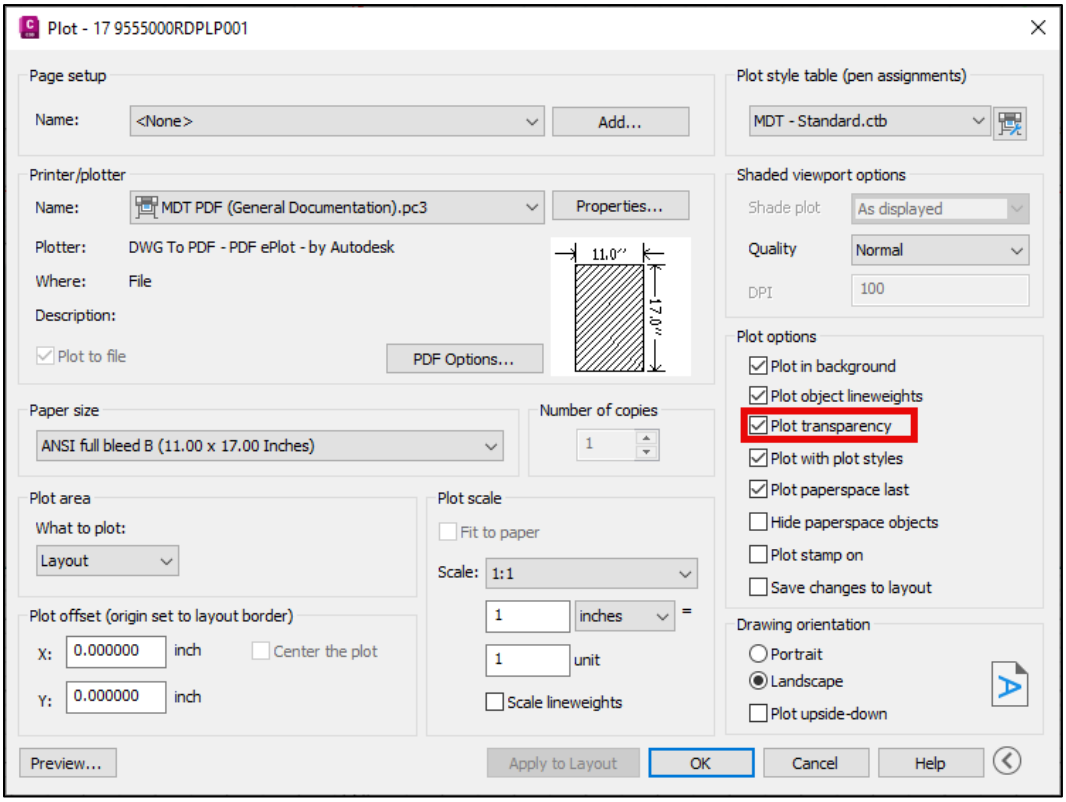
10. When prompted in the command line, click to select a location, ideally to the right of the model, in model space to draw the profile views. The profile views will be drawn, and the plan and profile layouts will be created.

11. Each profile view will need the pipe network styles to be overridden from the plan view. Right click a profile view, select *Profile View Properties*, then select the *Pipe Networks* tab. Shift + Select all of the pipes, and select the style override dropdown for one of the pipes. For existing pipes, set the style to ***MDT DRNG E-Pipe Crossing Pipe***. For proposed pipes, set the style to ***MDT DRNG-Pipe Crossing Pipe***. Repeat for each profile view in the drawing.



12. To ensure that the transparency that was set in both the imagery and surface display files will plot correctly from the PLP file, the ***Plot transparency*** option must be checked on for each sheet's plot settings. Right click a layout, then select ***Plot*** to access the layout's plot settings. Check the ***Plot transparency*** box in the *Plot options* section, then select ***Apply to Layout***, then ***OK*** to close out of the *Plot* settings. Repeat for each layout.

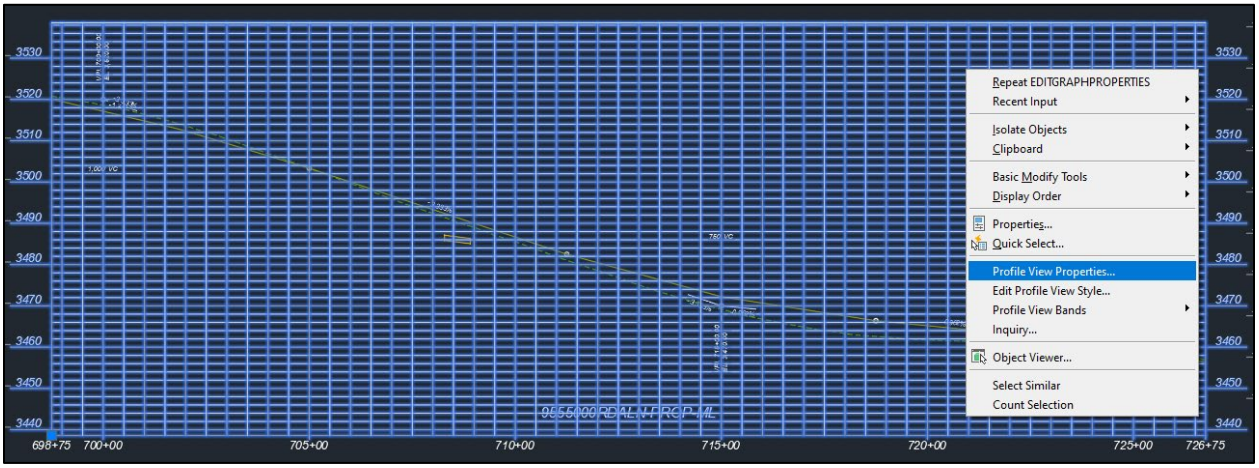




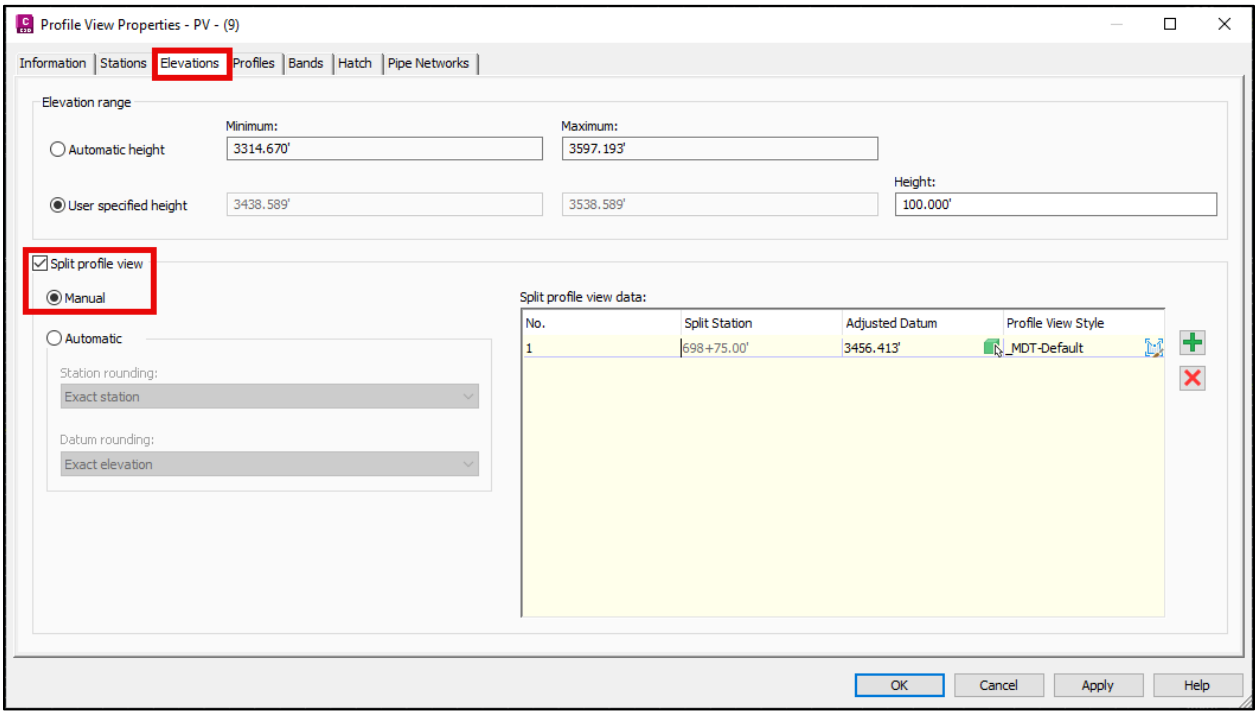
Procedure – Split Profile Views

There are instances where the grade of a profile is so steep that the profile is cut off on a profile view. A profile view can be split so that the full grade of the profile can be shown on the plan and profile sheets. Follow the steps below to add a split to a profile view.

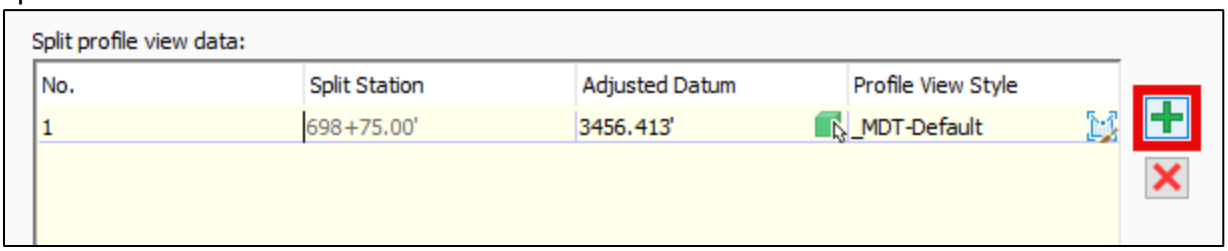
1. Select the profile view grid in which a split is desired, right click, then select ***Profile View Properties***.

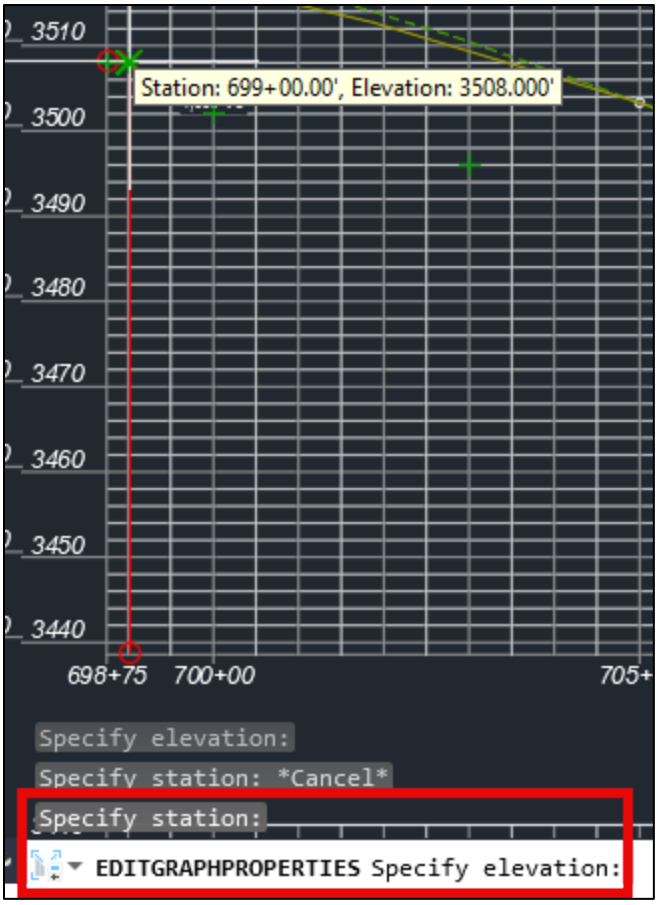


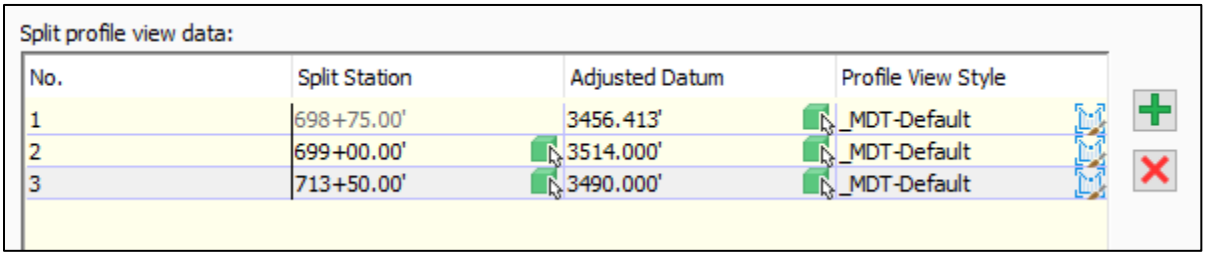
2. Select the *Elevations* tab, then check ***Split profile view*** and set the method to ***Manual***.



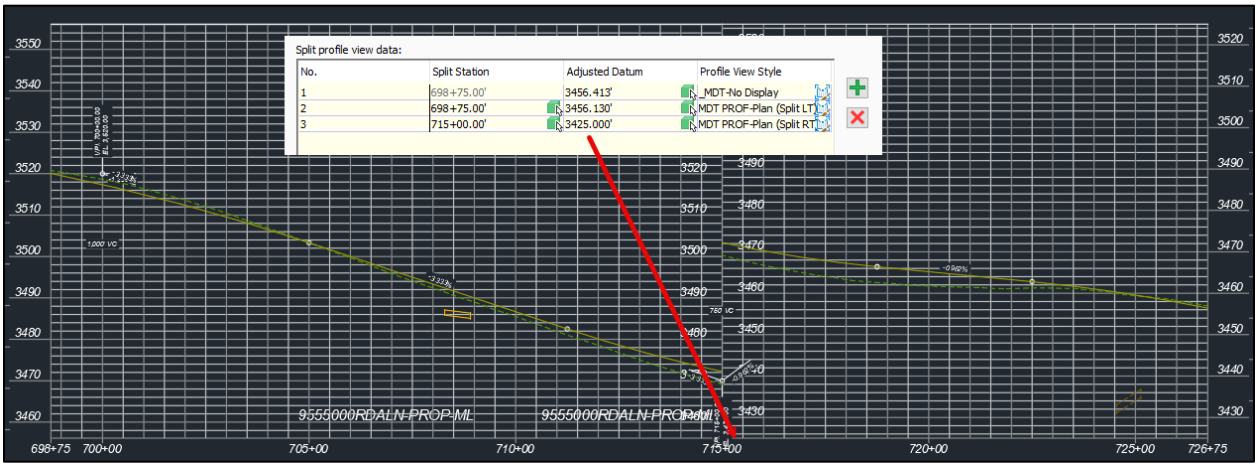
3. Select the green **+** to add a split section. Select a location towards the beginning of the profile view and click twice, once representing the station and once representing the elevation. The value will be overwritten in the properties, so the selection does not need to be precise. Repeat the process but select a location towards the middle of the profile view so that there are three total rows of profile splits.



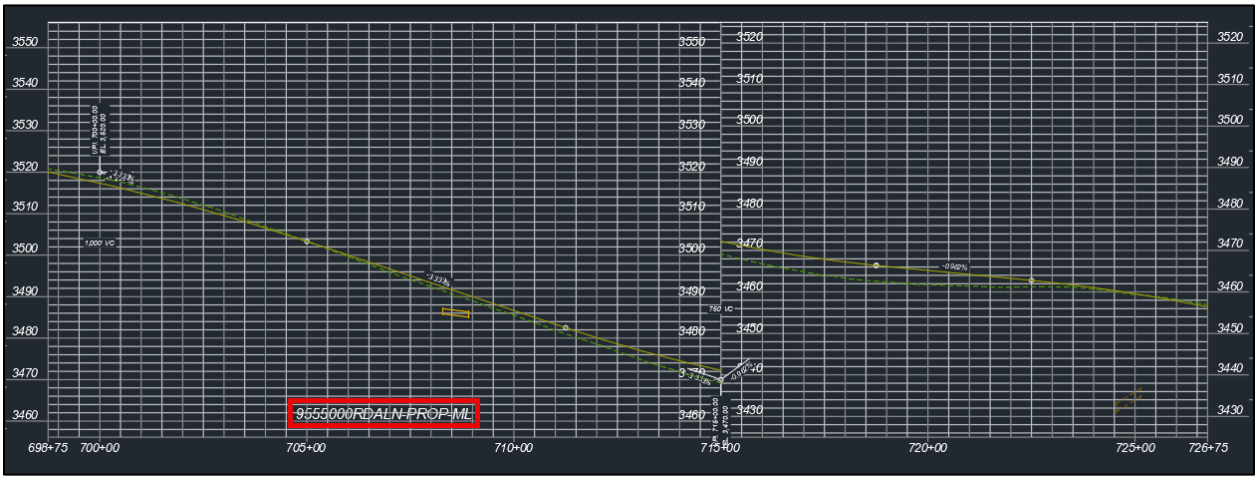




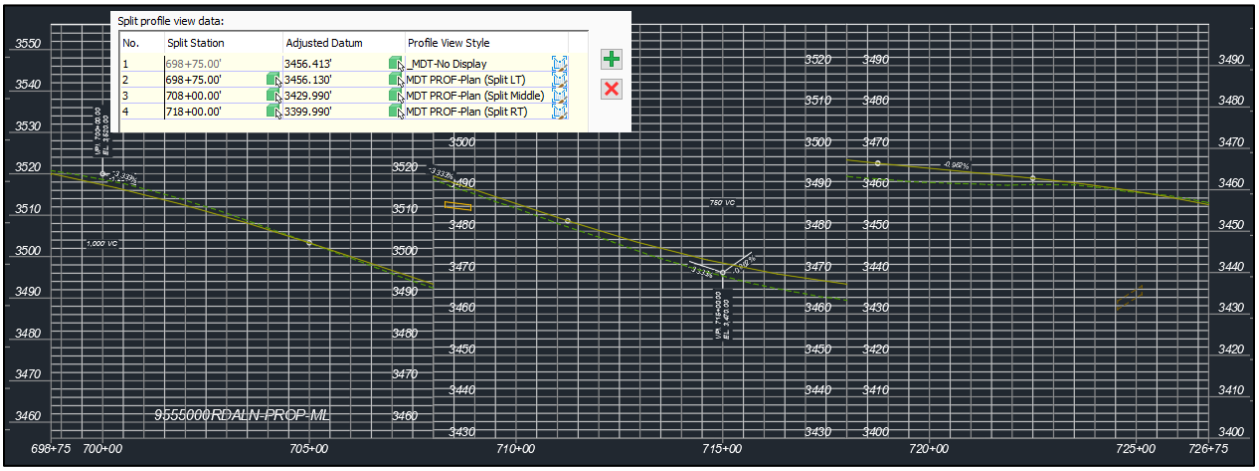
4. Set the *Profile View Style* for Split No. 1 to ***_MDT-No Display***.
5. For Split No. 2, set the split station and adjusted datum to match the values in Split No. 1. Then set the *Profile View Style* to ***MDT PROF-Plan (Split LT)***. **NOTE:** If the design profile begins outside the range of the profile view, the datum elevation for Split No. 1 may need to be adjusted.
6. For Split No. 3, type in the station or use the green box to select where the split line is preferred on the profile view. In this example, the split is preferred near station 715+00. Adjust the elevation to set a new datum for the new split. The elevation in this example will be set to 3425.000' to move the profile up in the view. Set the *Profile View Style* to ***MDT PROF-Plan (Split RT)***. Then select ***Apply*** to apply the changes. Do not close out of the *Profile View Properties*.



7. Select the *Information* tab of the *Profile View Properties* dialog. Set the *Profile View Style* to ***_MDT-No Display***. This will remove a duplicate profile title (as seen on the image above) on the profile view so that only one shows. Select ***Apply***, then ***OK*** to close out of the dialog box.



If a profile needs to be split more than once, the settings can be set similar to the one below. Use the ***MDT PROF-Plan (Split Middle)*** style for the middle split profile view. Note that the adjusted datum was set to an elevation such as 3399.990'. If the elevation was set to 3400.000', a label representing 3400' would not show.

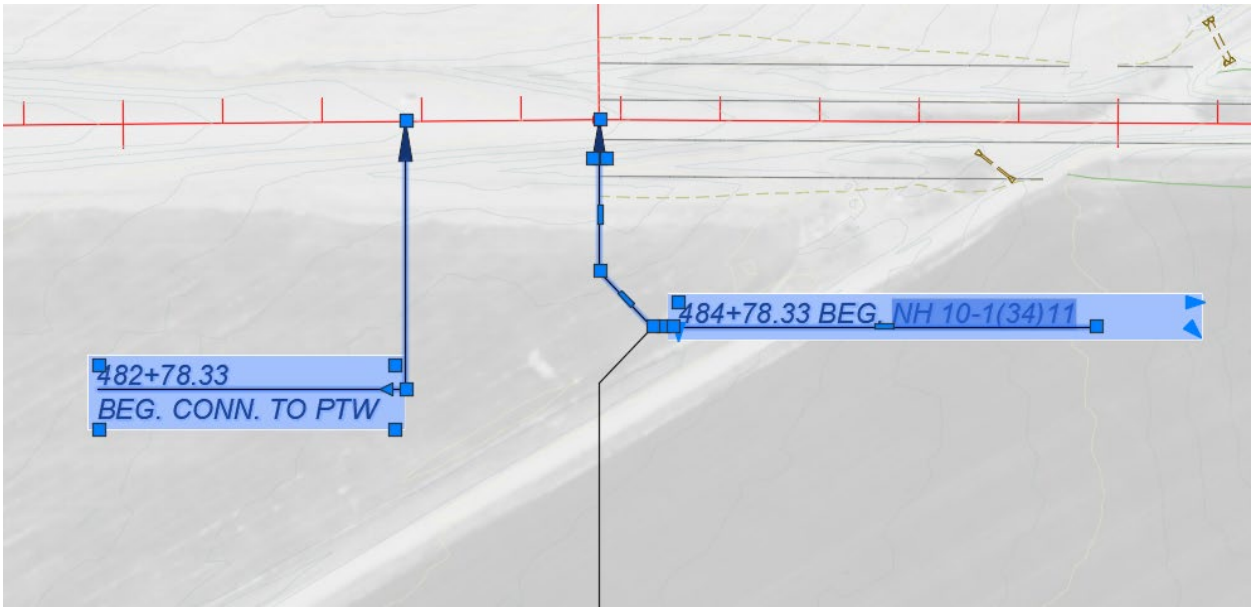


Section V. Annotate Sheets

Procedure – Add Project Leader Blocks

1. Set the active layer to ***X-MISC-LABL***.
2. Select the layout containing the beginning of the alignment.
3. Open the *Blocks Palette* by typing the command ***BLOCKSPALETTE*** or by selecting the insert dropdown from the *Block* panel in the *Insert* tab in the ribbon and selecting ***Blocks from libraries***.
4. Select the *Libraries* tab and select the ***RD-Plan.dwg*** library.
   If the library has not yet been set, select the folder icon dropdown and select *Browse Block Libraries*, then navigate to the following location:
   C:\mdoh\StateKit\Civil 3D\2024\Blocks
5. If applicable, ***insert*** the ***N-BegConnToPTW*** block representing the beginning connection to PTW and snap to the appropriate location on the alignment in the plan view of the layout.
6. ***Insert*** the ***N-PLP_BeginProjectLeader*** block and snap to the project's begin station.
7. ***Explode*** the ***N-BegConnToPTW*** block once and the ***N-PLP_BeginProjectLeader*** block twice. Then edit the station values within the text editors. The field following the station value in the ***N-PLP_BeginProjectLeader*** will pull the federal aid number from the *Sheet Set Manager*, so it should not be overwritten.

8. Select the leader and the text for the begin connection to PTW, then select the top arrow, the angled leader line and the text for the begin project leader, like shown below:

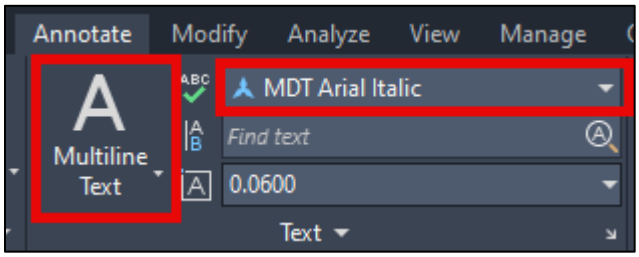


9. Use the command ***CHSPACE*** and select the top (plan) viewport to move the notes from paper space to model space. These notes need to be in model space so that anyone who references the PLP file can see the notes that have been added to the sheets. Any note added to paper space will not be seen in model space.
10. Repeat steps 5-9 with the ***N-EndConnToPTW*** and ***N-PLP_EndProjectLeader*** blocks for the end of the project.

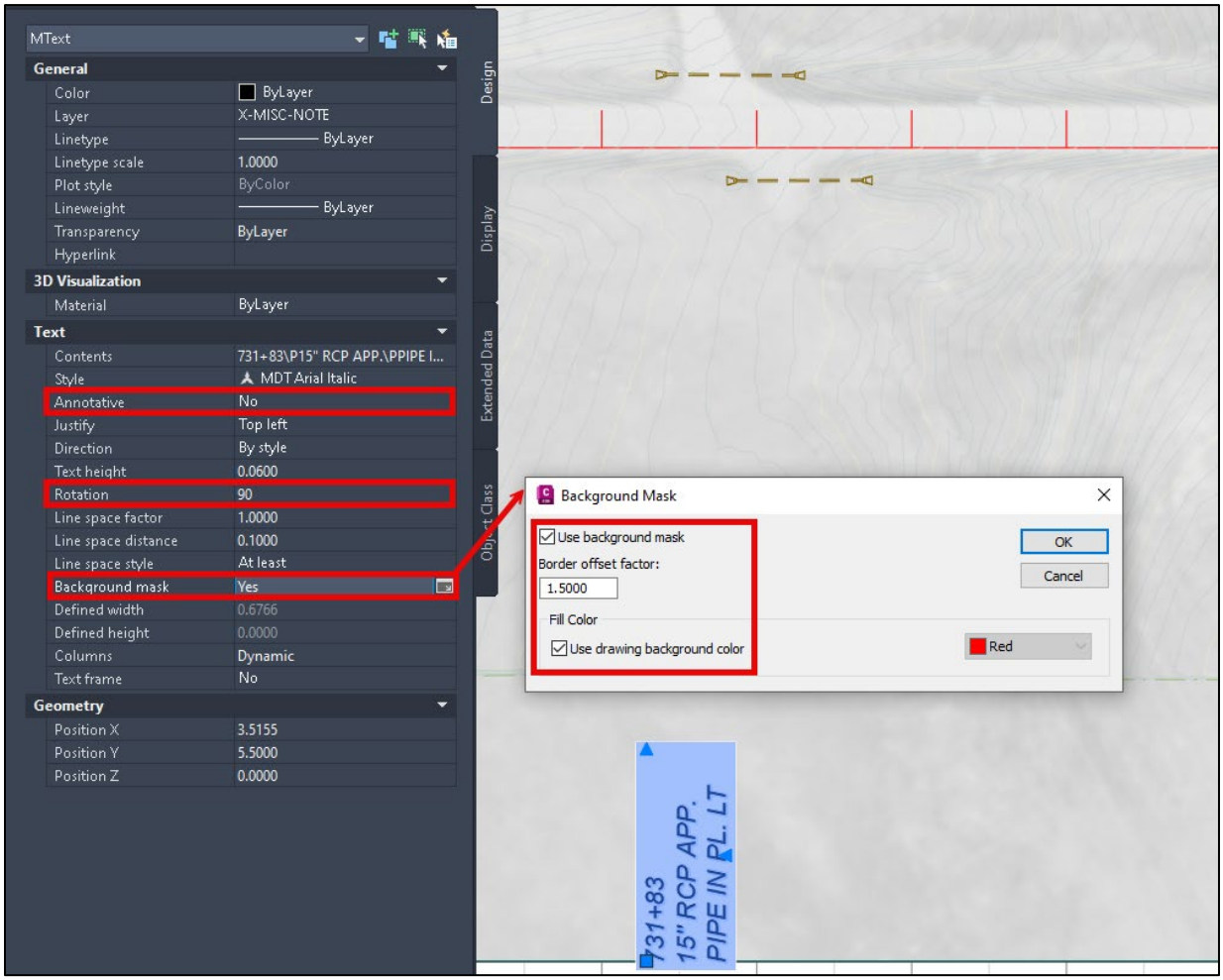
Procedure – Add Notes

This procedure applies to adding notes in both the plan and profile views.

1. Set the active layer to ***X-MISC-NOTE***.
2. Select a layout in which a note is desired.
3. Select the *Annotate* tab and ensure that ***MDT Arial Italic*** is the active text style. Select the ***Multiline Text*** button or use the command ***MTEXT*** to add a note to the layout.



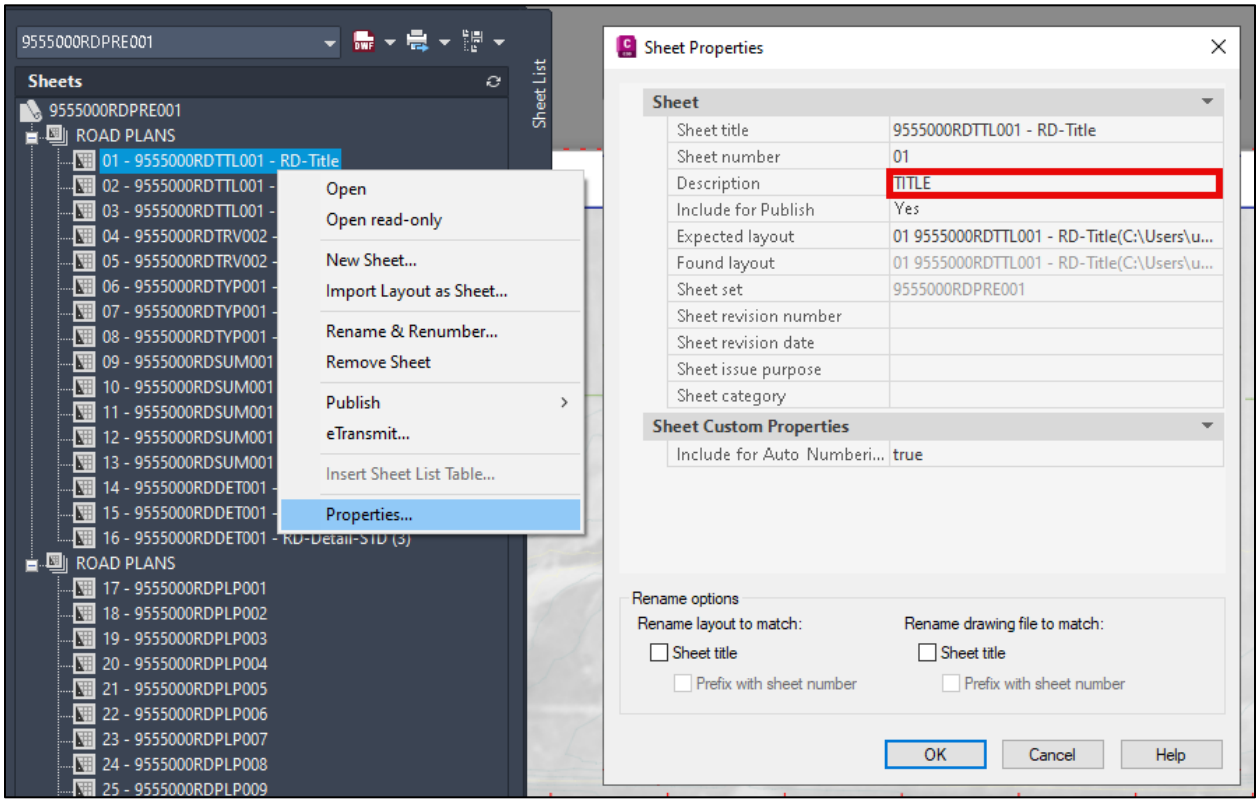
4. Add the desired text for the note. Then select the note and open the *Properties* palette.
   NOTE: For notes requiring stationing, the Alignment inquiries within the *Inquiry Tool* (which can be found in the *Inquiry* panel of the *Analyze* tab or the command ***SHOWINQUIRY***) are useful for obtaining accurate stations from the alignment.
5. In the *Properties* palette, set the *Rotation* to ***90*** (if applicable), change *Annotative* text to ***No*** and apply a background mask.
   NOTE: After pressing Enter to set the rotation, the value may show a cardinal direction as the angle, such as N for 90 degrees. This is because the Drawing Units were set to Surveyor's Units (bearings) for angles in the State Kit V2.1.0 update. Files created prior to this update will show angles as decimal degrees.



6. Use the ***CHSPACE*** command to move the note to model space so that anyone who references the file can also see the note. Doing this will also ensure that the text is consistently the same height in model space across all the sheets.

Procedure – Edit Title Block Sheet Description

The title block was updated with Version 2.0 of the State Kit where the sheet description placeholder text was replaced with a field that is tied to the *Sheet Set Manager*. The field links to the sheet's description within a layout's properties, like shown below:

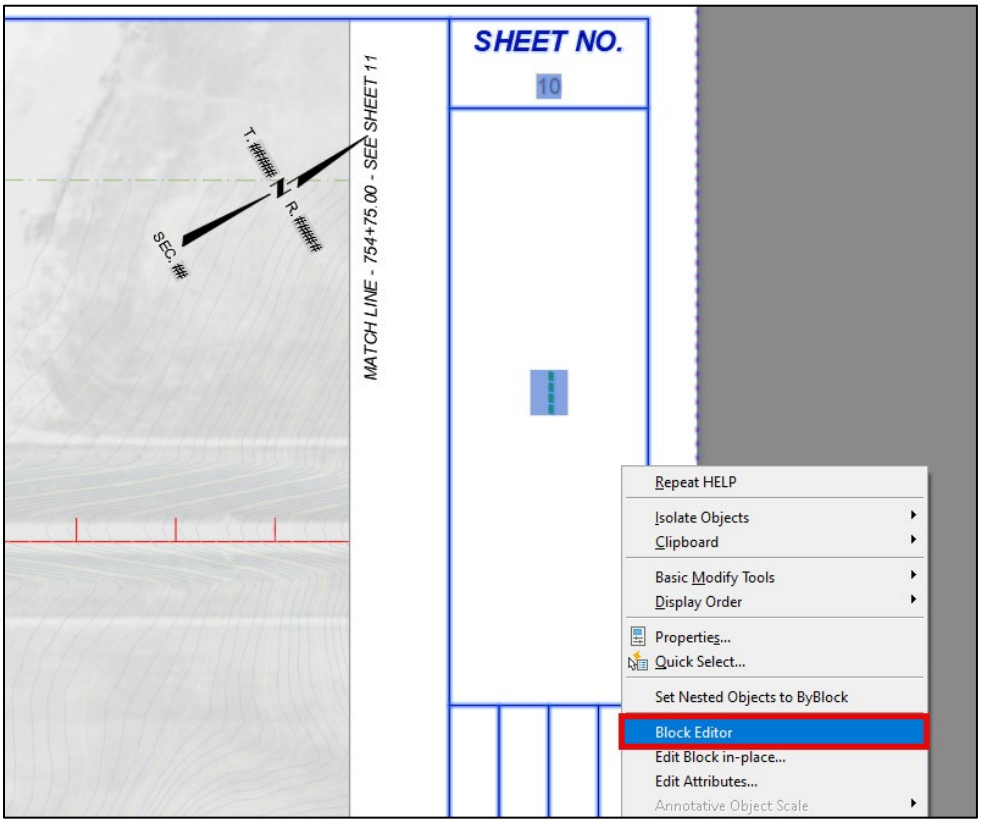


This change removes the ability to use the *Find and Replace* tool to update the description on all PLP sheets. Instead, the title block must be edited, and the field must be overwritten to have the change apply to all layouts within the PLP file.

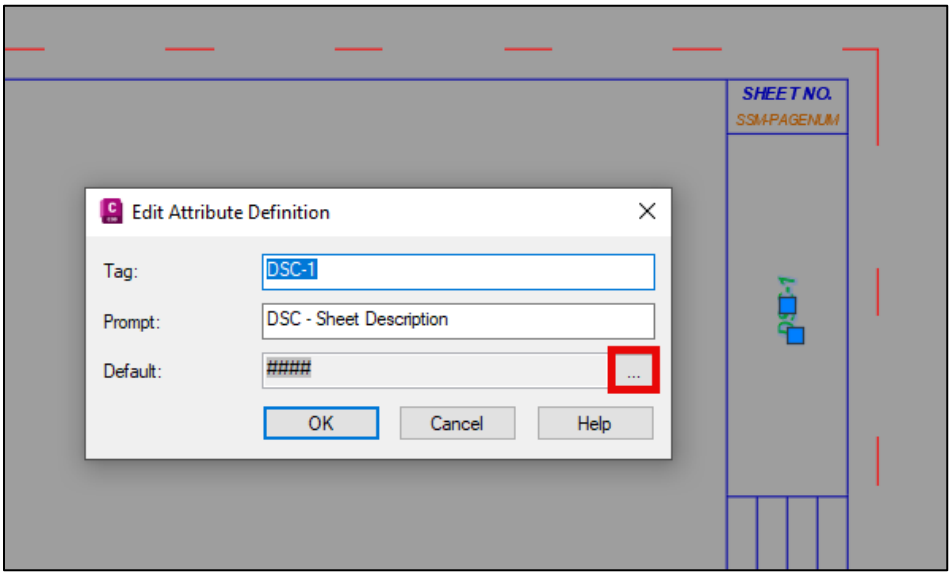
To update the sheet description to the same name for multiple layouts in one file, follow the steps below:

1. In the PLP file, select a layout containing a PLP sheet. Select the title block, right click, and select ***Block Editor***.

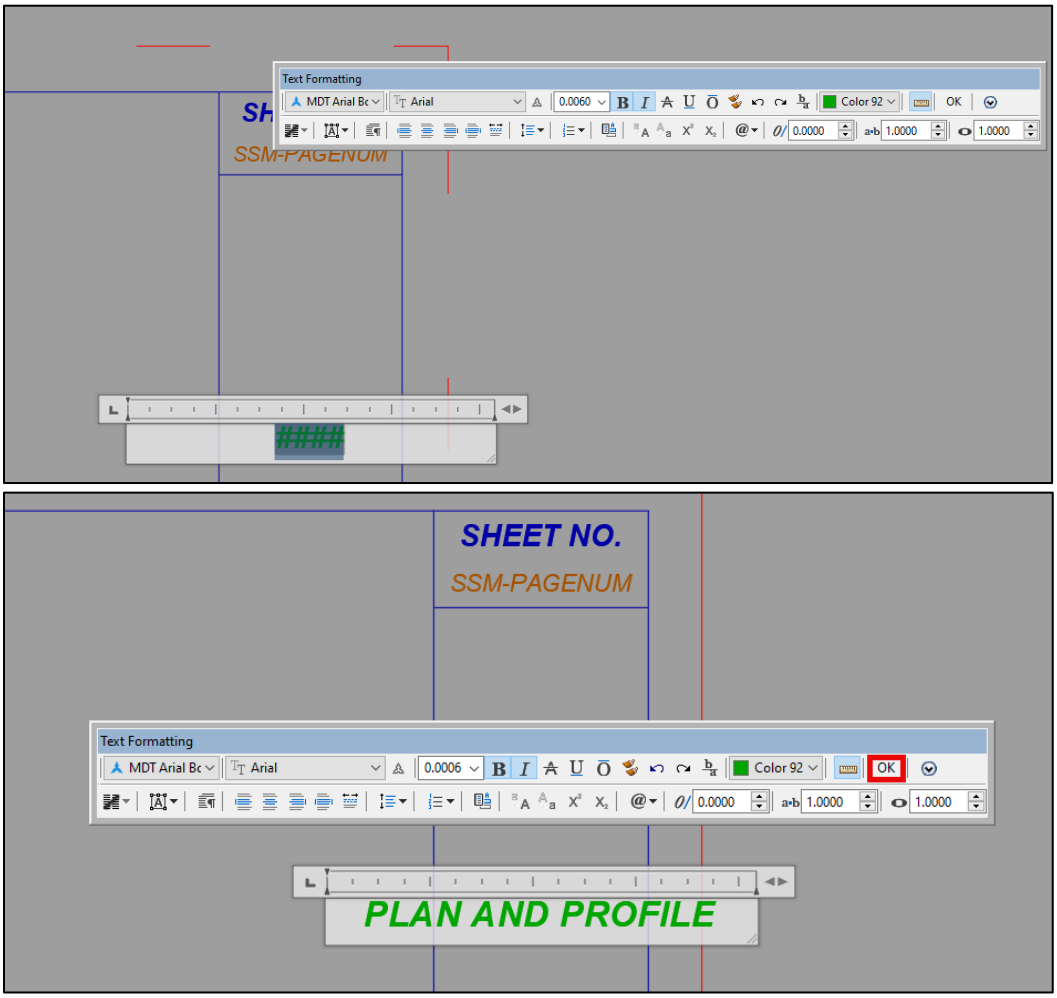
   NOTE: This process will not work if the *Edit Block in-place* option is selected.



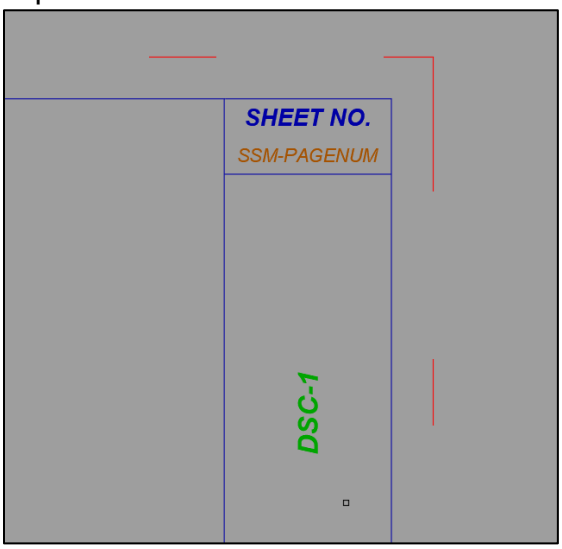
2. In the *Block Editor*, double click the ***DSC-1*** attribute definition, then select the ellipsis button in the *Default* section of the *Edit Attribute Definition* popup.



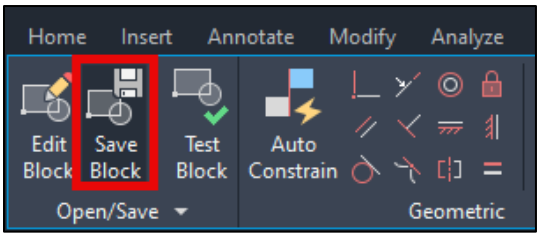
3. Double click the field to open the *Text Formatting* dialog box and highlight the field. Either delete the field or overwrite it by typing "***PLAN AND PROFILE***" or other appropriate terminology. Select ***OK*** to exit the *Text Formatting* box to save the text changes.



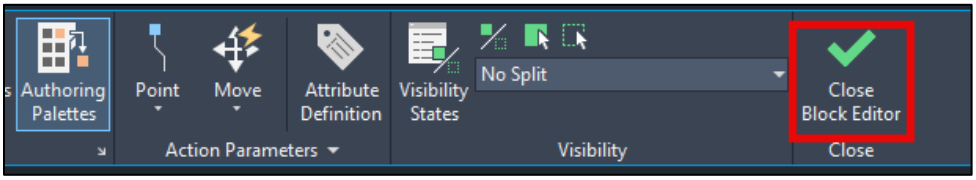
4. When the *Text Formatting* dialog is closed, the DSC-1 tag will still show; this is expected.



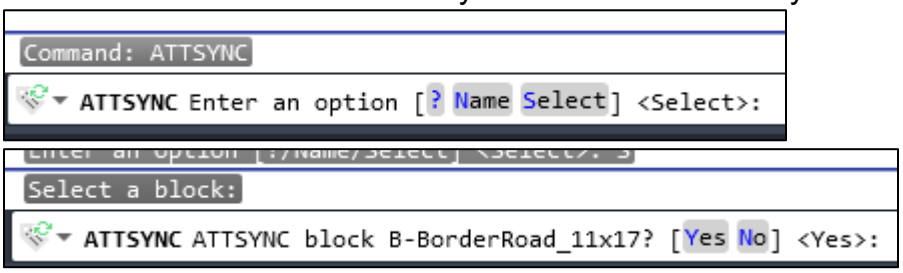
5. Save the block by selecting the ***Save Block*** button from the *Open/Save* panel in the *Block Editor* contextual tab. Select ***Save the changes*** if a popup regarding parameters shows.



6. After the block has been saved, select the green check mark to close out of the *Block Editor*. A prompt to save the changes to the block may appear again. If the prompt shows, select ***Save the changes to B-BorderRoad_11x17***.



7. In the layout, type the command ***ATTSYNC***. Click the ***<Select>*** option, then select the title block within the layout. Select ***<Yes>*** to synchronize the changes.



8. The title block will then update to show the changes. The ***RegenAll*** (***REA***) command may need to be used to update all the layouts within the file.