MONTANA
Department of Transportation

Project Development & Delivery - Digital Design and Modeling Services

TYPICAL SECTIONS IN AUTODESK

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Overview

This document contains the workflows for creating typical sections and typical section layout sheets. This workflow is intended for use with any MDT road project requiring a model, such as reconstruction and rehabilitation projects.

Process Guide

Application/Tool(s):	AutoCAD / Civil 3D
Version(s):	13.6.2123.0 Civil 3D 2024.4.6 Update
Environment:	MDT Civil 3D State Kit r2024 v2.3.1
Released/Revised:	4/7/2026



SUPPORT
Open a Case

Statement of Need

Workflows specific to typical sections were not covered in the Civil 3D production training classes. For that reason, the Road Design Workflow Subcommittee identified the need for 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.

References

203 – Civil 3D Plan Production Training

Surfacing Calculation Spreadsheet

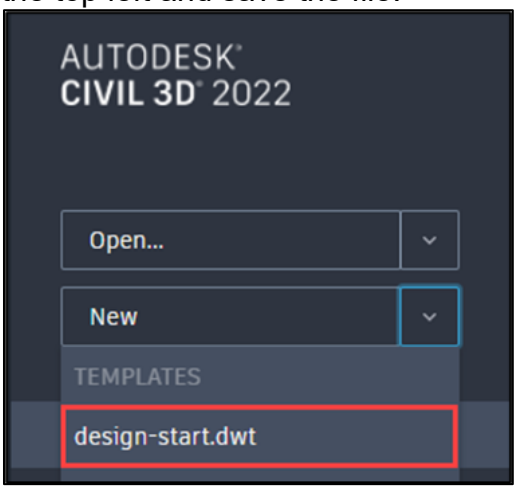
Revisions

4/7/2026	Updates to ADA Accessibility

Process Description and Examples

Section I. File Setup

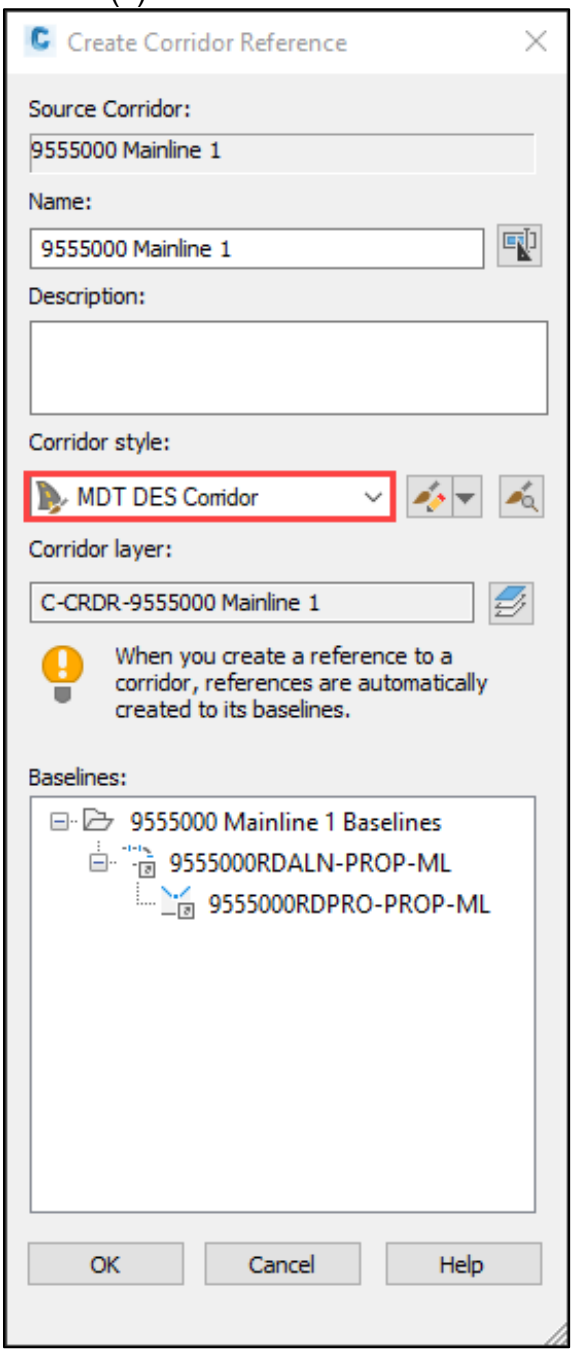
1. Create a new file using the ***design-start.dwt*** template. Save it as ***[UPN#]RDTYP001.dwg*** (for example, 9555000RDTYP001.dwg) in the RD directory of the project on BIM 360. Use ***CTRL+S*** or navigate to the C3D icon in the top left and save the file.



2. Set the Annotation Scale to ***1" = 10'.***

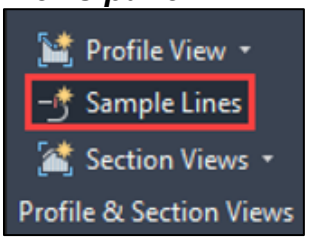


3. ***Set the Working folder*** to the project's Project Files folder and ***set the Data Shortcuts project folder*** if necessary. Then ***create a data reference*** to the corridor(s) within the file.

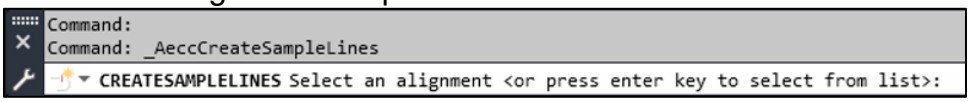


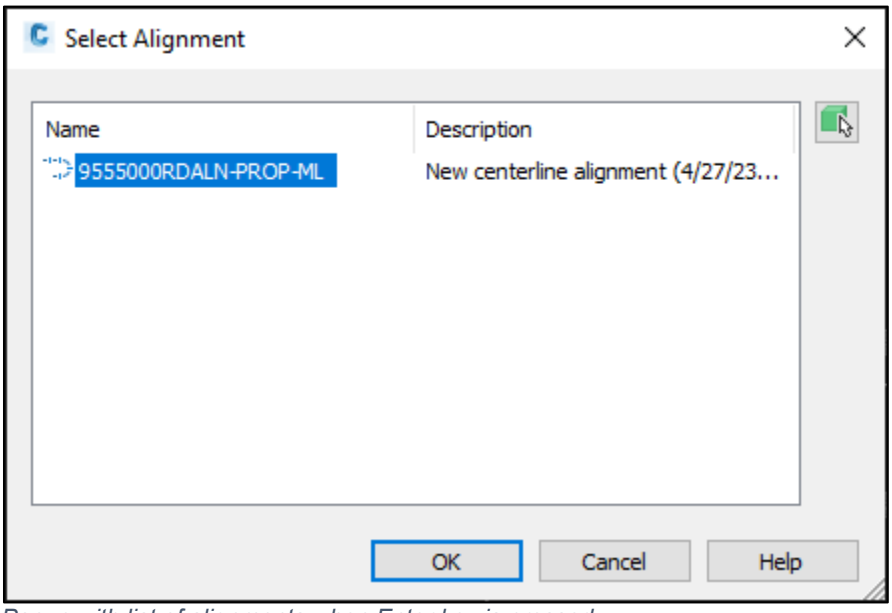
Section II. Create Sample Lines

1. In the *Home* tab, click ***Create Sample Lines from the Profile & Section Views panel.***



2. Click on the alignment OR press ***Enter*** and select from the list.

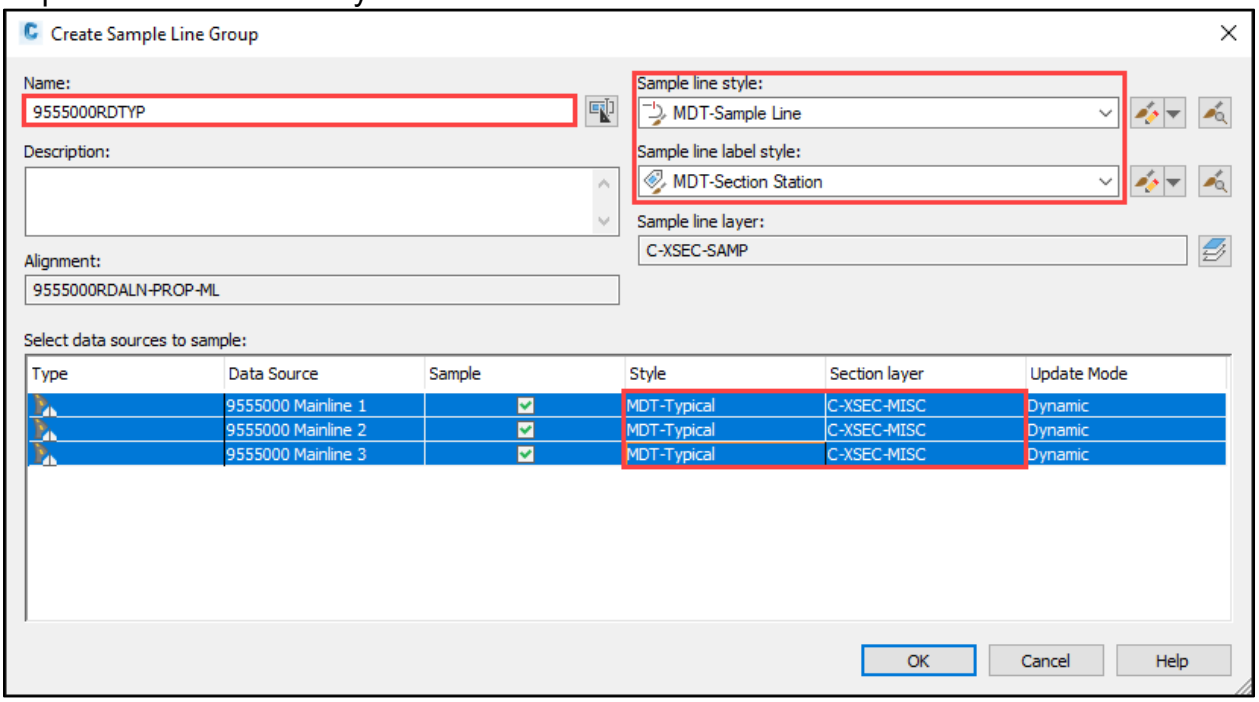




Popup with list of alignments when Enter key is pressed.

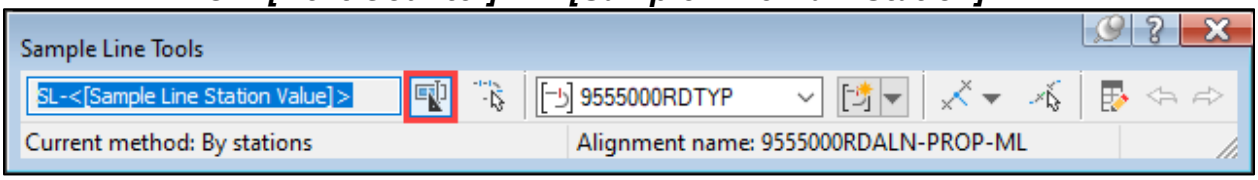
3. For the *Sample Line Group*, set the following, then select ***OK***:
   Name:
   [UPN]RDTYP
   Sample line style:
   MDT-Sample Line
   Sample line label style:
   MDT-Section Station
   Data Source [Code Set] Style:
   MDT-Typical
   Section layer:
   C-XSEC-MISC

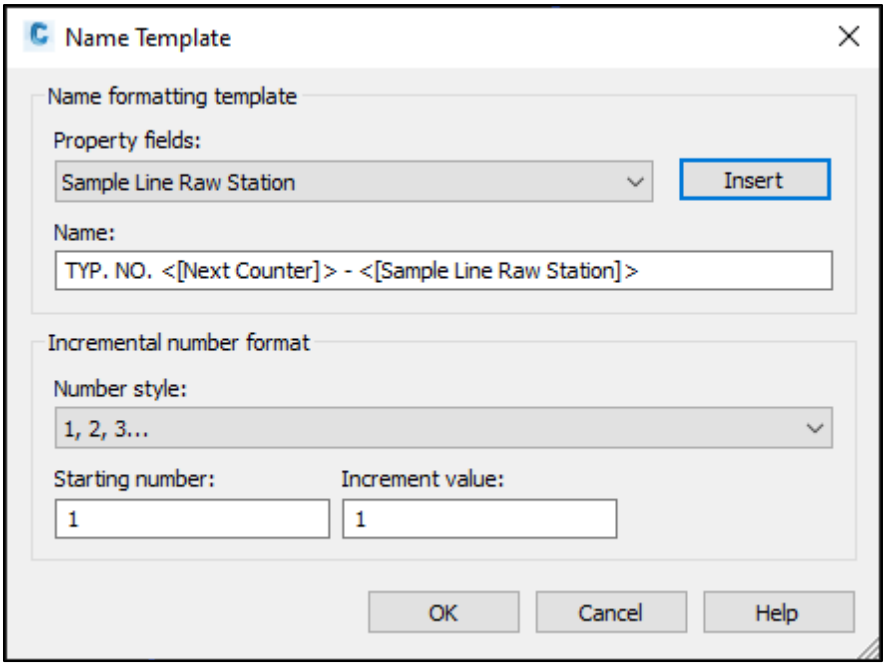
NOTE: If there are multiple corridors (sources), all corridors can be selected and the styles and layers can be changed once to have changes apply to all the corridors. To do this, select the first corridor, press and hold the ***Shift*** key, then select the last corridor to select all sources. Then select anywhere in the Style column (except for the header) and change the Code Set Style to ***MDT-Typical***. Repeat for the Section layer.



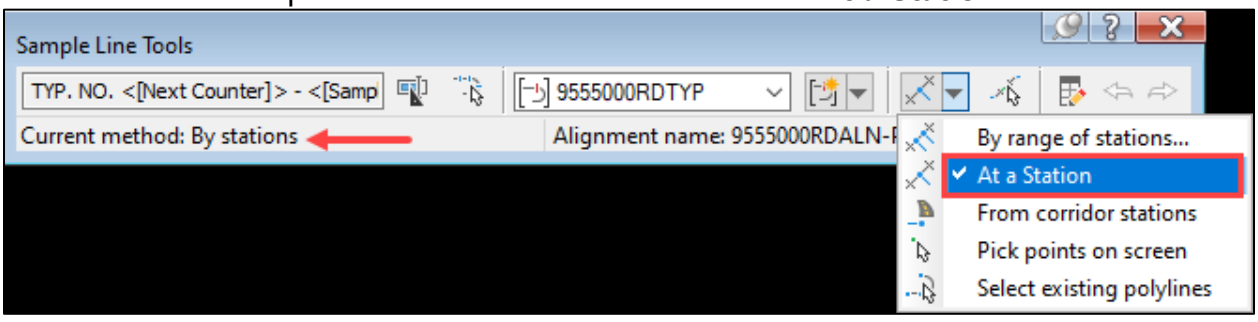
4. In the ***Sample Line** Tools*, set the sample line name to the following by using the property fields within the ***Name Template*** button:

   TYP. NO. <[Next Counter]> - <[Sample Line Raw Station]>

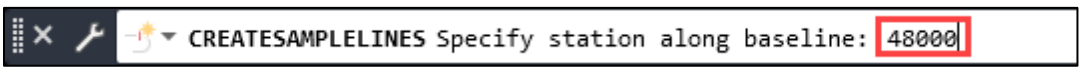




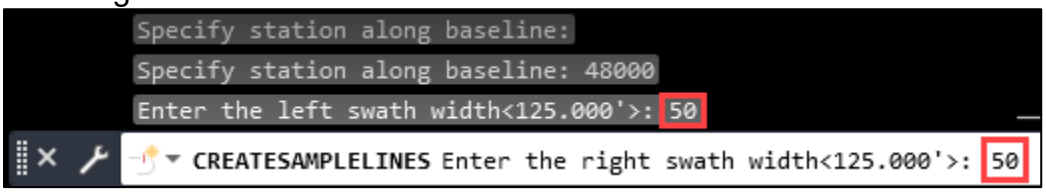
5. Ensure that the sample lines are set to be created via the ***At a Station*** method.



6. Select stations with full width typical sections. Do not pick a section where the corridor is transitioning to the next section. When specifying a station along the baseline, type the station without the "+" separator. Otherwise, a sample line will not be created.



7. Set the ***left*** and ***right swath widths*** to ***50 ft***. Large surfacing widths may require increased swath widths. The width only needs to reach the hinge point of the surfacing section.

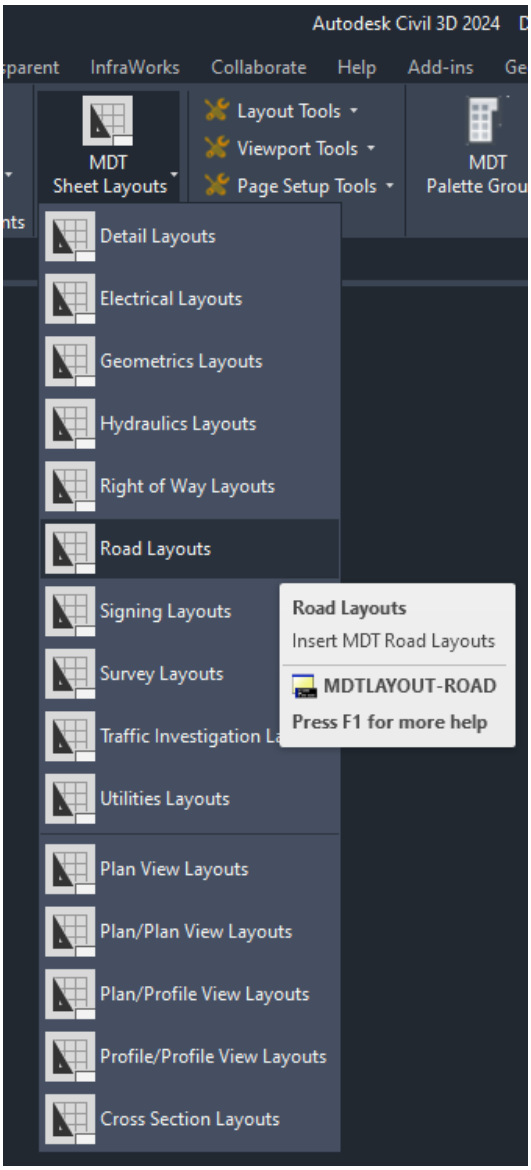


8. Repeat Steps 6-7 to create sample lines as needed for the remaining typical sections. When complete, press ***Enter*** to close out of the *Sample Line Tools* to exit the command.

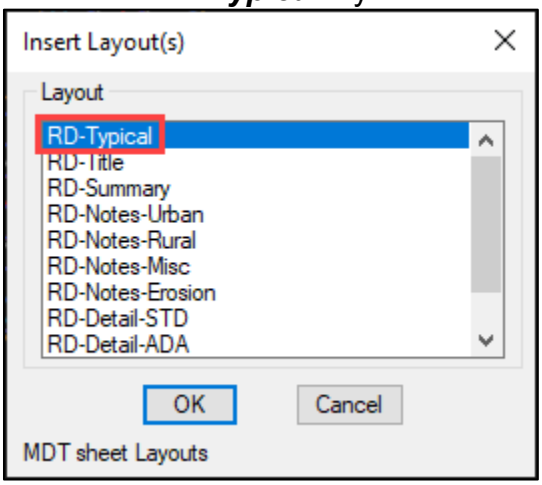
Section III. Layouts and Typical Border Setup

Procedure – Create Layout

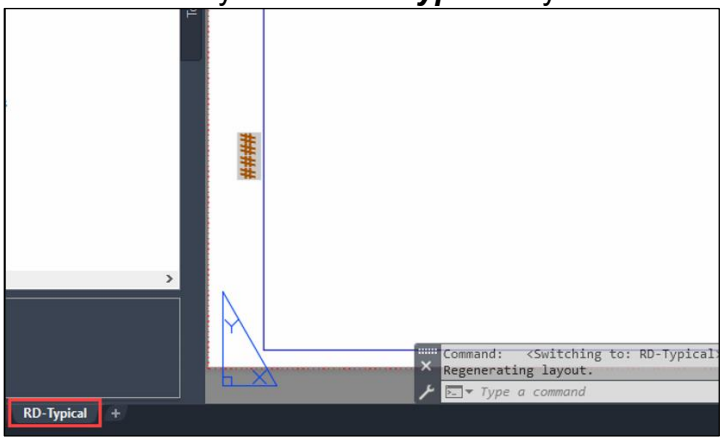
1. Create a new layout using the ***Road Layouts*** within the ***MDT Sheets*** tab of the ***MDT Tool Palette***.



2. Select the ***RD-Typical*** layout.

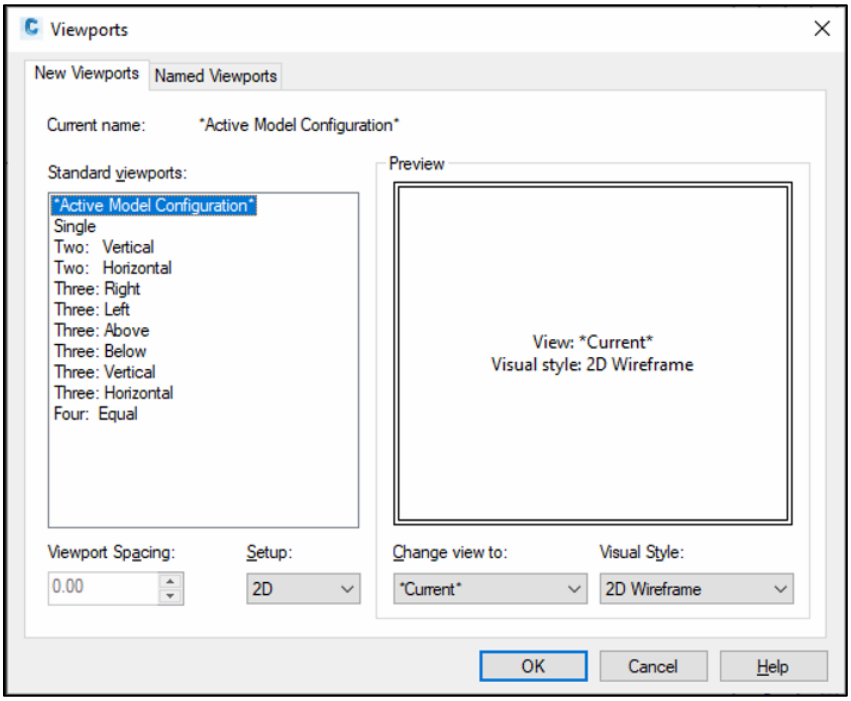


3. Select the newly added ***RD-Typical*** layout.



Procedure – Create Viewport

1. While in the ***RD-Typical*** layout, set the active layer to ***GS-VPRT***, then type the command ***VPORTS*** and press ***Enter***. Accept the defaults (shown below) and select ***OK***.



2. Select the corners of the border sheet as shown below:

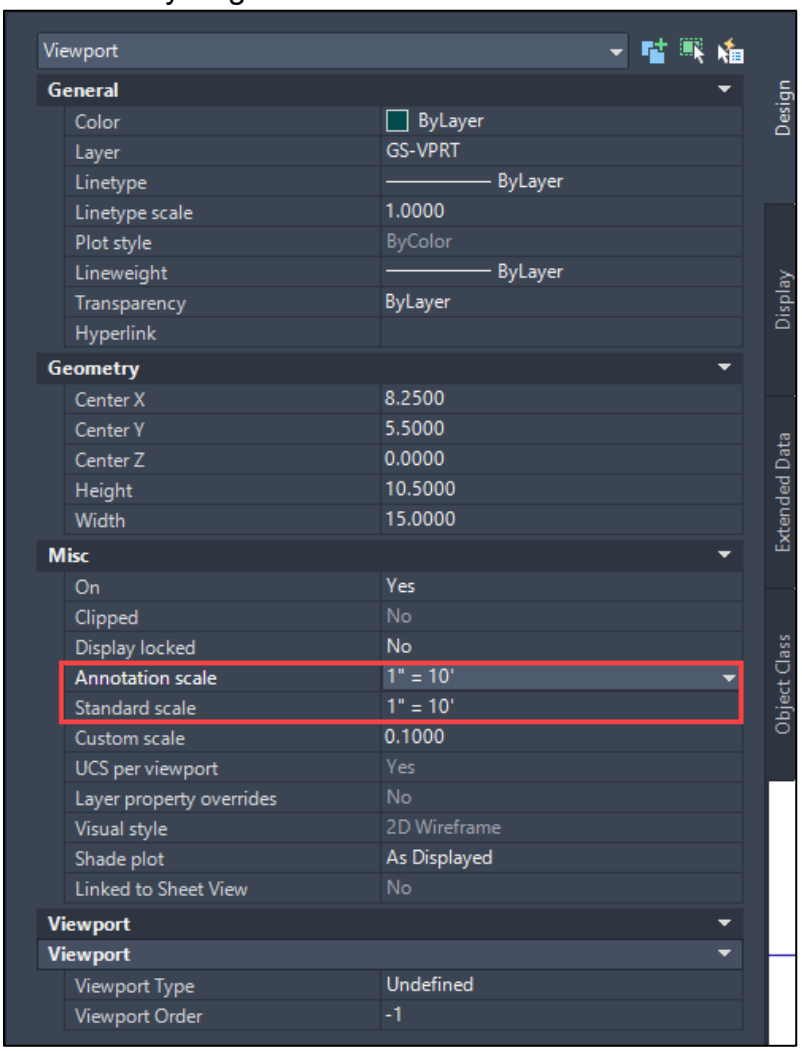


NOTE: Because of the default setup, the corridor will be centered within the viewport. The typicals will need to be drawn a sufficient distance from anything else within the model space to avoid having any unwanted objects, lines, or text displayed within the typical section in paper space.

3. Double click within the viewport and ***pan*** (click on the scroll wheel and move the mouse) to a location away from the corridor.

4. Return to the paper space by double clicking outside the extents of the viewport border. In the paper space, ***select*** the viewport border (turn on selection cycling *[Command: **SELECTIONCYCLING**, variable <2>]* to aid in selecting) and use the *Properties* palette set the both the *Annotation scale* and the *Standard scale* of the viewport to ***1"=10'***.

   Selection Cycling icon on bottom bar: 

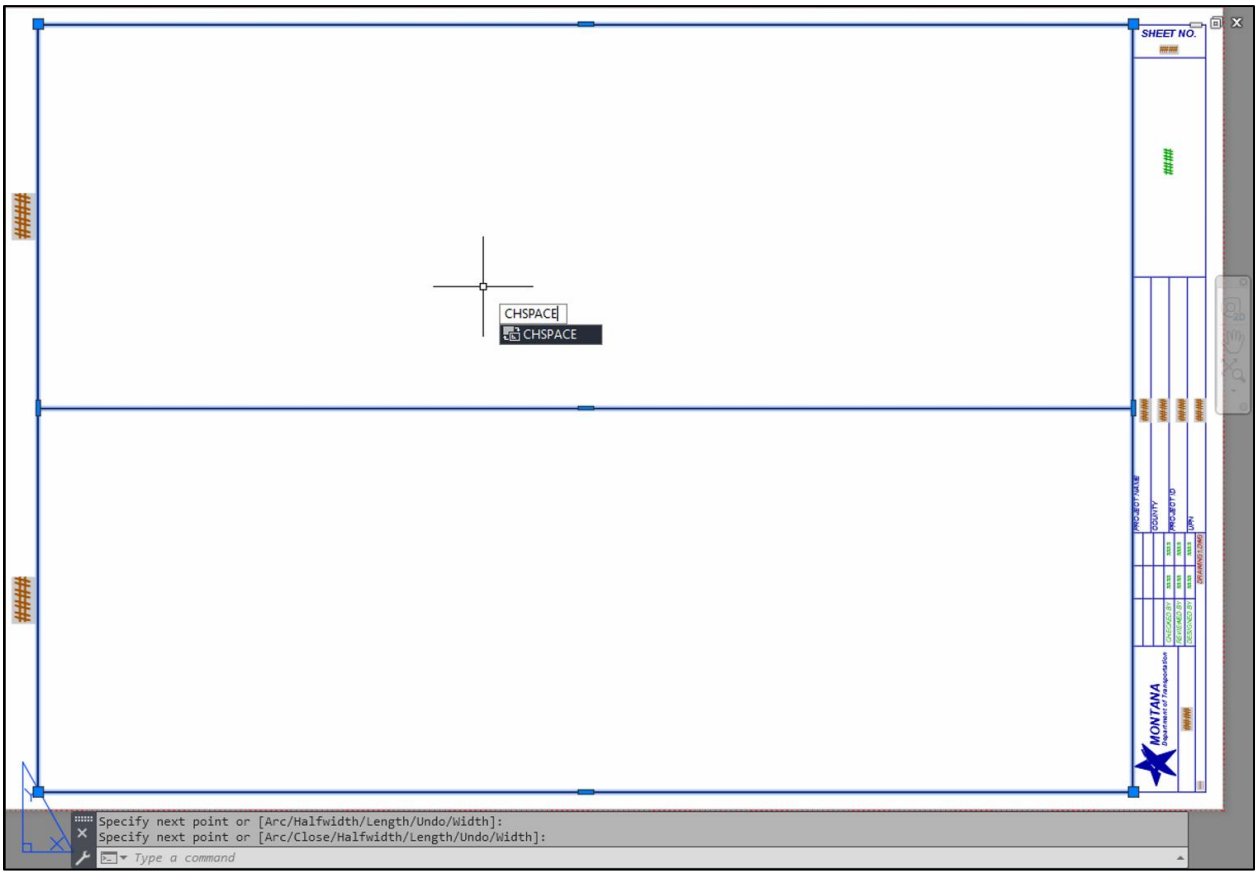


Procedure – Create Borders

1. In paper space, set the active layer to ***X-WRKG-0001*** and draw a rectangle around the viewport either using the ***RECTANG*** command or selecting the ***Rectangle*** tool from the *Drawing* tools in the *Home* ribbon tab.

2. Draw a horizontal line (Command: ***L*** for line or ***PL*** for polyline) on top of the middle horizontal border line. Ensure object snapping is on so that the line snaps to the midpoint of the rectangle.

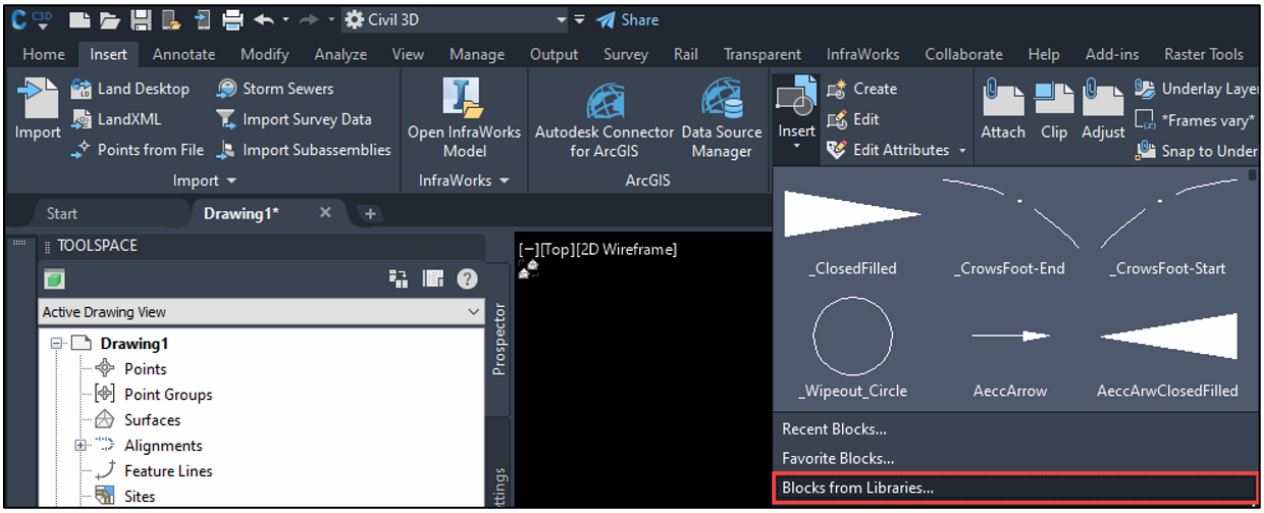
3. Select both the rectangle and line and type ***CHSPACE*** to transfer them into the model space.



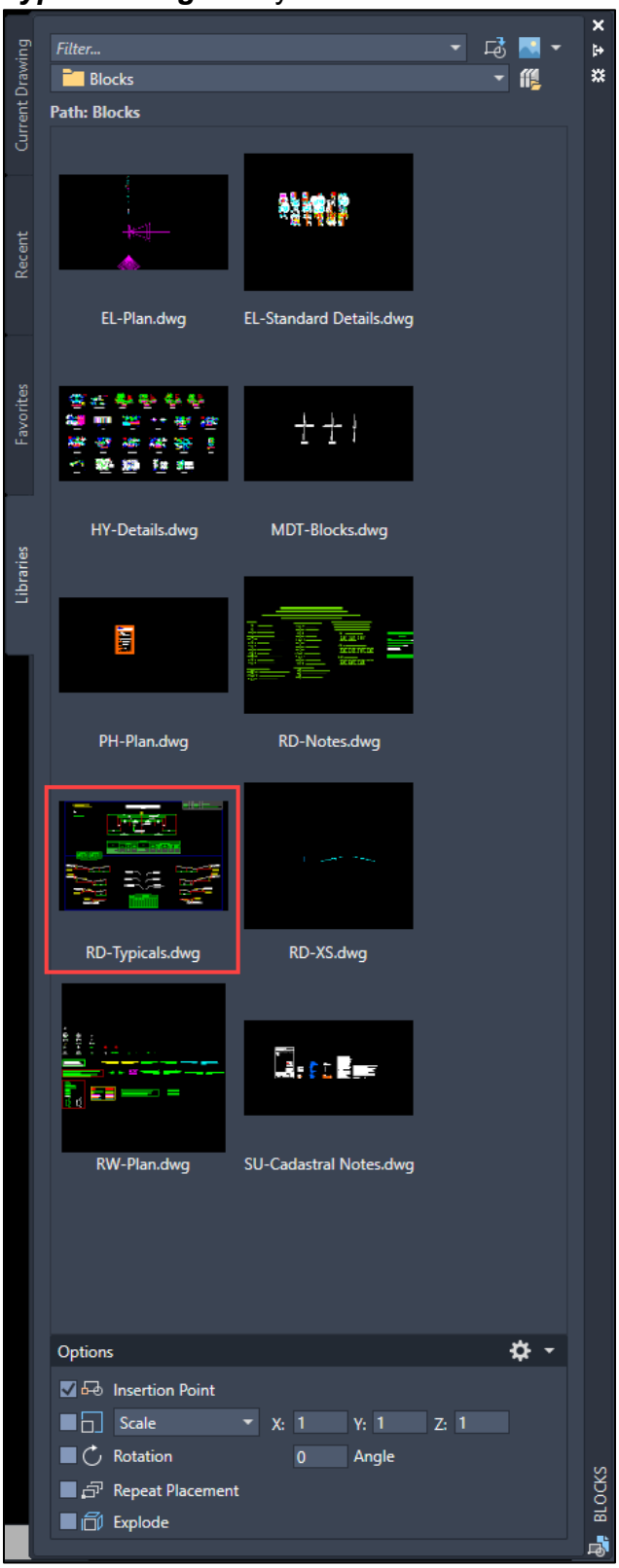
4. Return to the model space via the *Model* tab and find the border created in the previous steps.

Procedure – Insert Border Title and Table Blocks

1. In the model space, open the blocks palette by typing ***BLOCKSPALETTE*** or by selecting the *Insert* tab and selecting the insert dropdown of the *Block* panel and selecting ***Blocks from Libraries***.



2. In the *Blocks Palette*, select the *Libraries* tab and double click the ***RD-Typicals.dwg*** library.

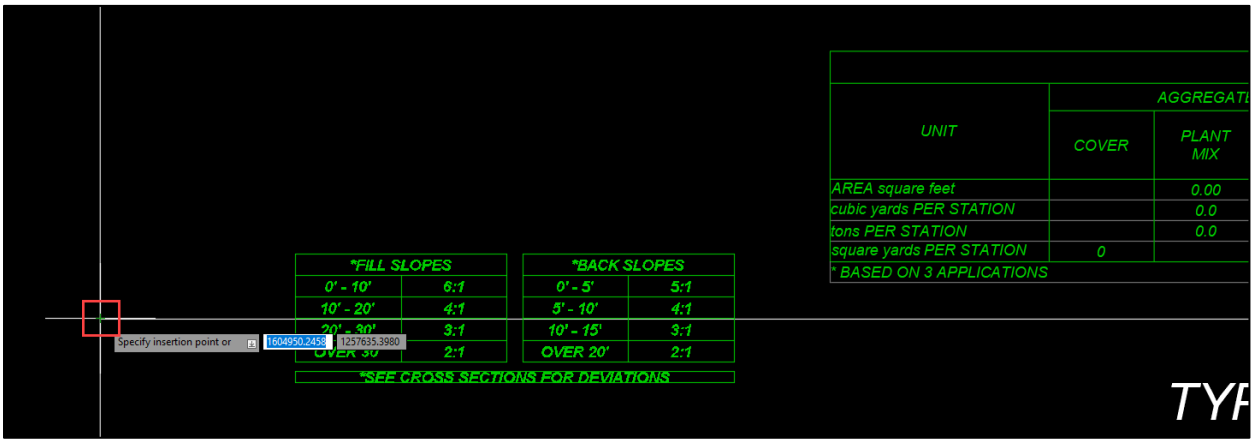


3. Within the library, select the ***T-TablesQtyStaLabel*** block so that it is attached to the cursor and ready to be inserted into the drawing. Using the midpoint snap, select the midpoint of the upper horizontal line of the border as the insertion point.

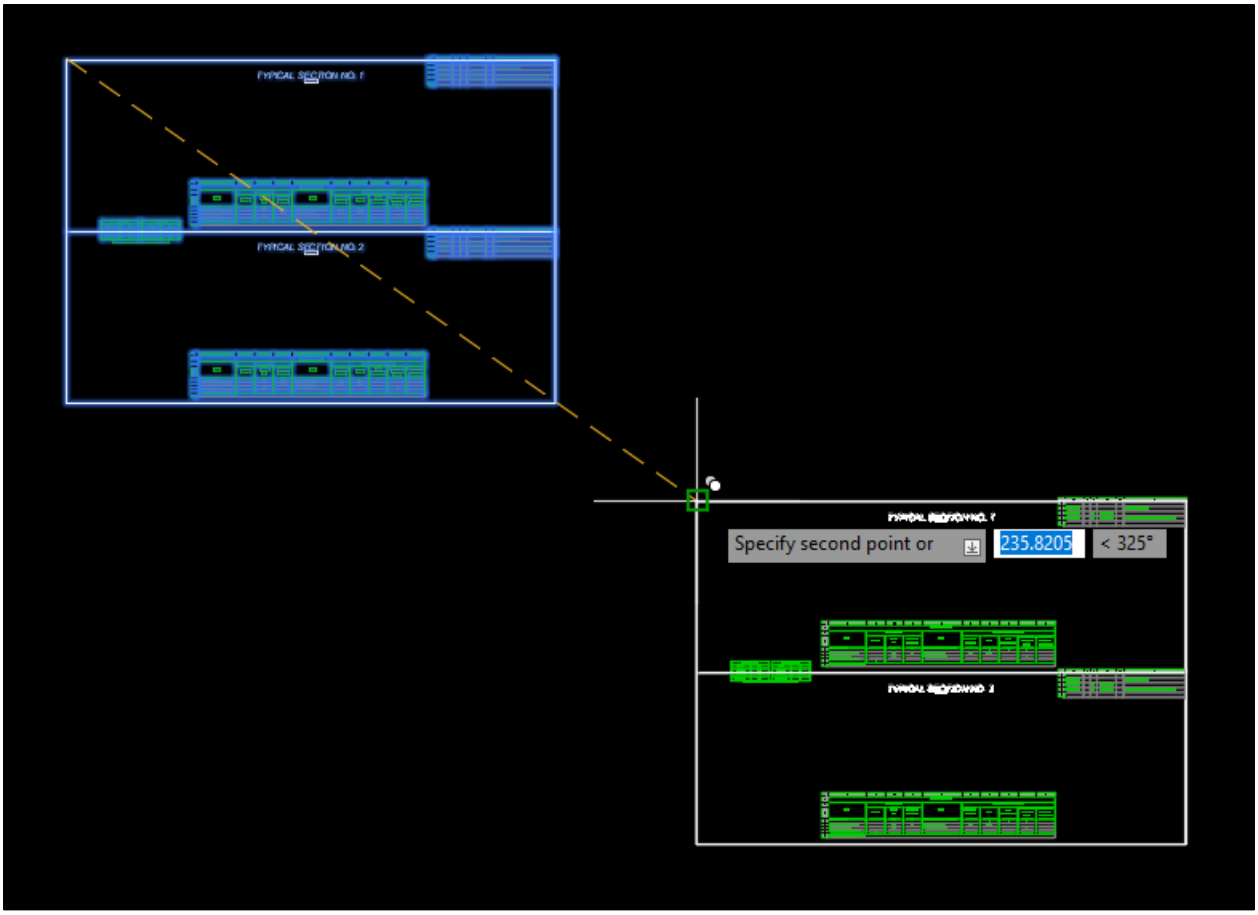


4. Repeat the process above for the second typical section, except snap to the midpoint of the middle horizontal line.

5. Select the ***T-TableCutFill*** block from the blocks palette and attach it to where the middle horizontal line intersects the left side of the border.

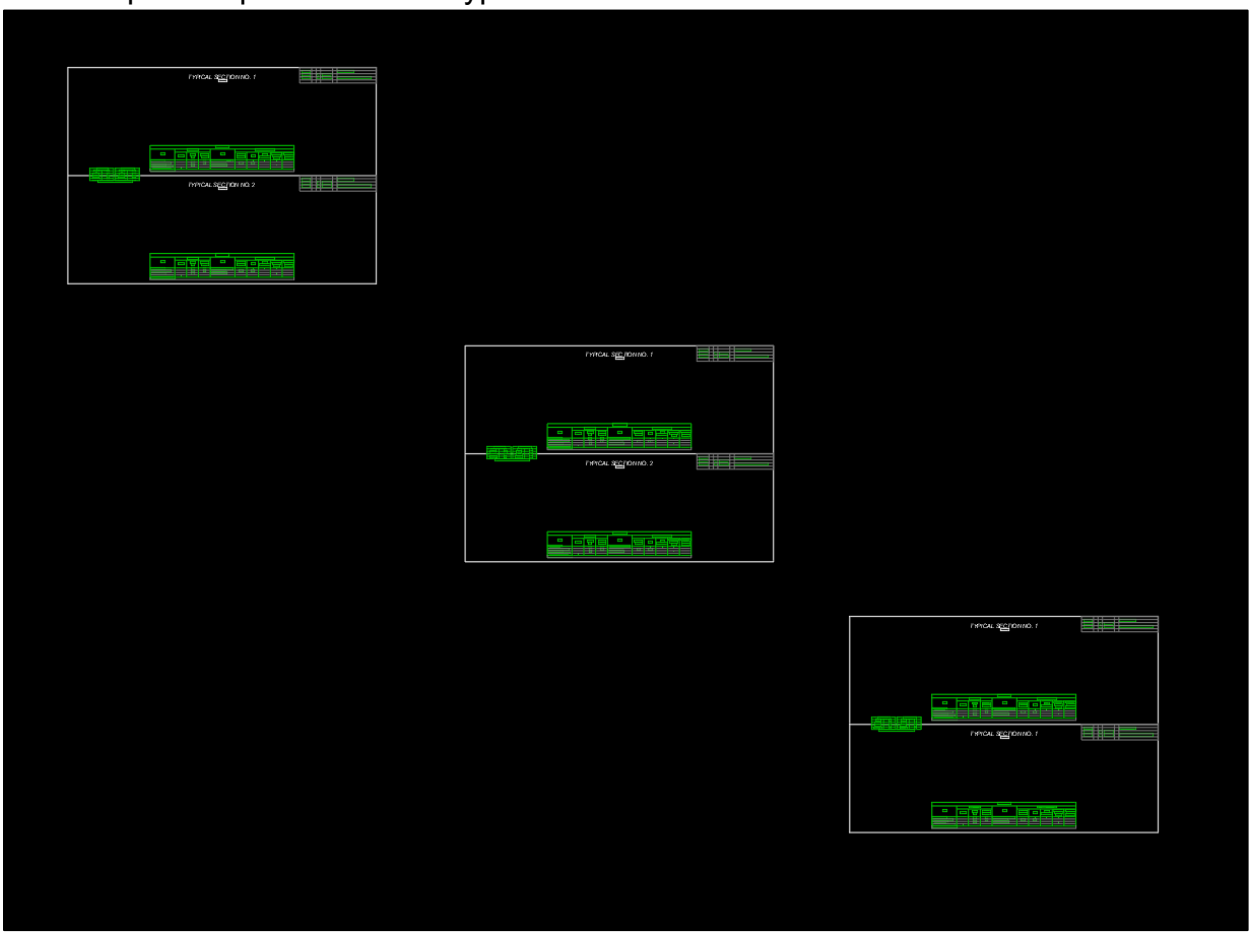


6. Select the border lines and blocks and ***Copy*** [Command: ***CO***] the shapes diagonally until there are as many typical borders as the number of needed sheets.



NOTE: Copying diagonally ensures that no more than two section view frames overlap. Overlapping section views can cause issues when adjusting dimensions on the typical sections. The issues arise when the view frame needs to be adjusted vertically to better position the section view within the sheet border.

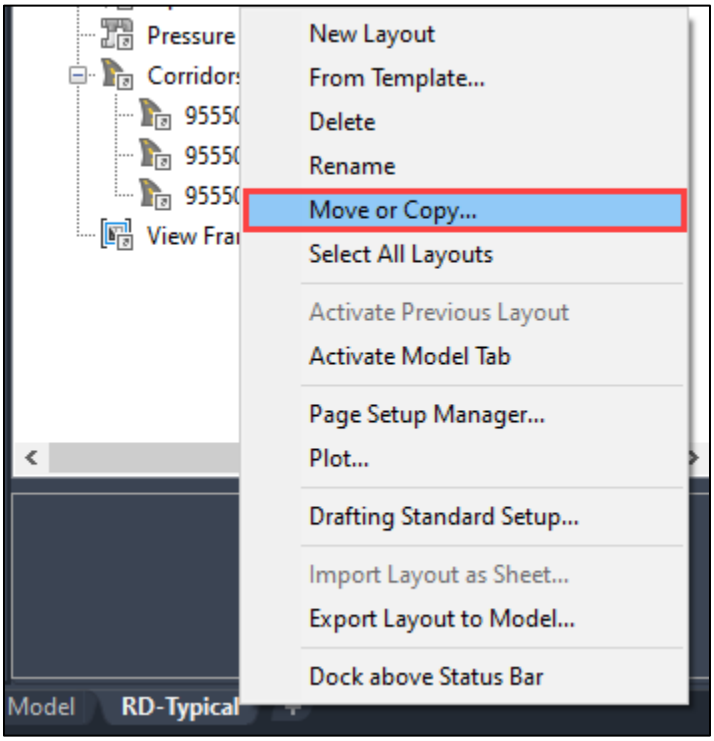
An example setup for five to six typical sections:



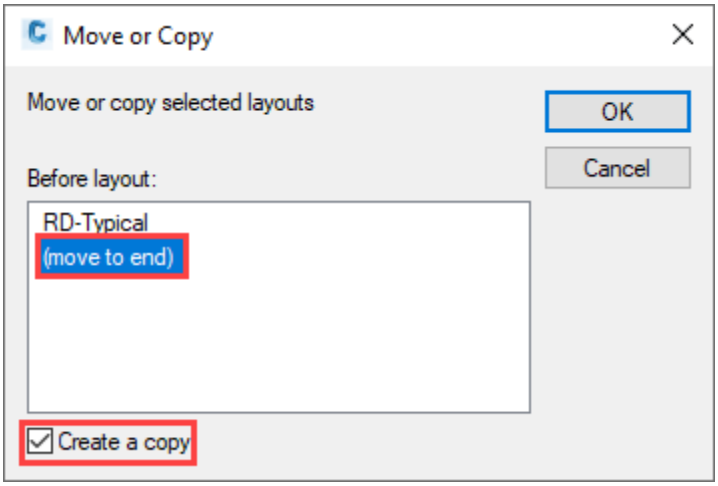
7. Delete the default ***MDT-TMP*** layout from the drawing to clear up space by right clicking the layout and selecting ***Delete***.

Procedure – Copy Layouts

1. Copy the *RD-Typical* layout to create more layout sheets. Right click the ***RD-Typical*** layout and select ***Move or Copy…*** from the list.



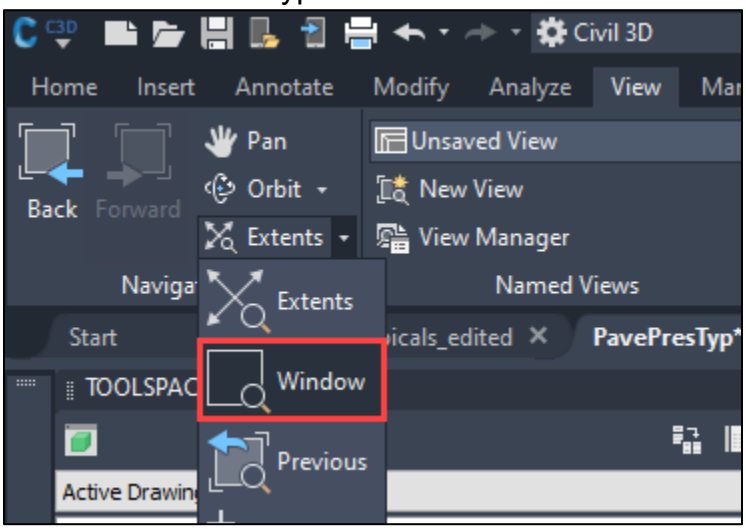
2. In the *Move or Copy* dialog, select ***(move to end)***, and check the ***Create a copy*** box. Then select ***OK***.



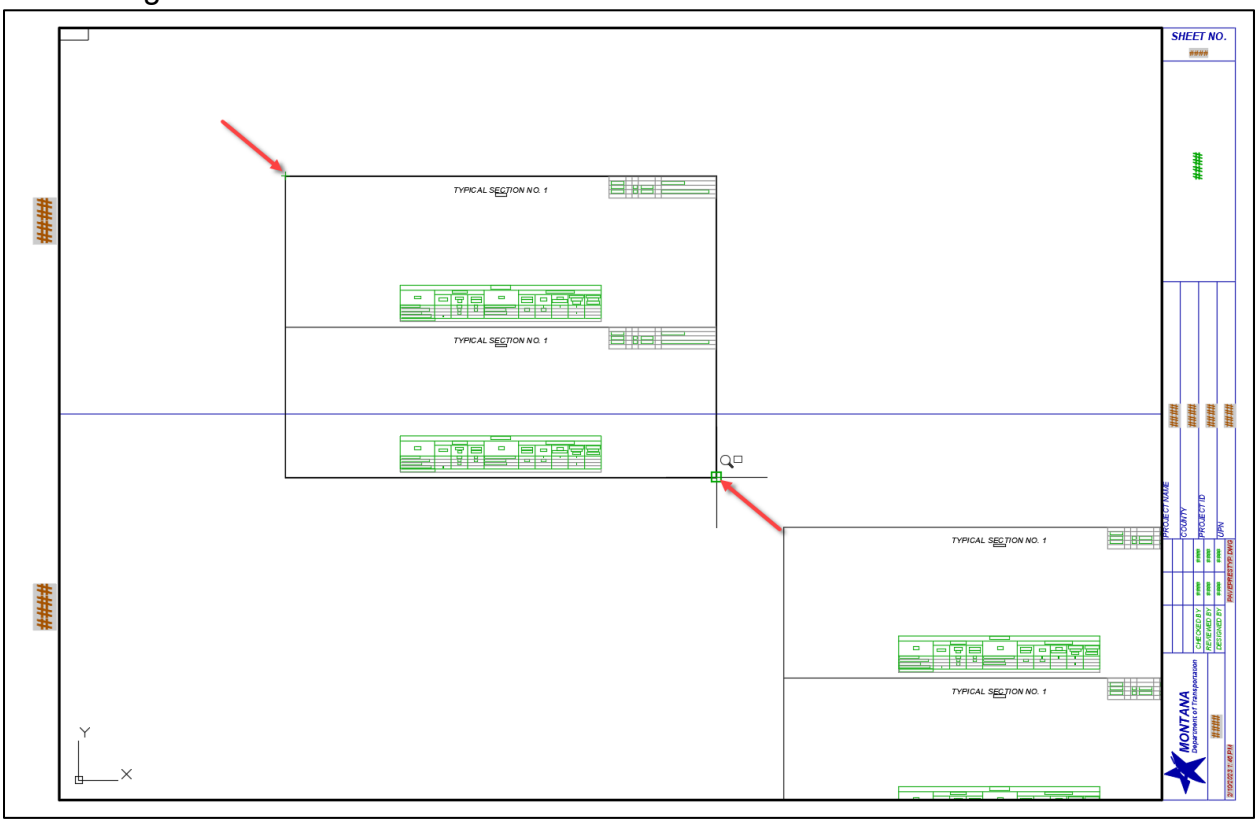
3. In the copied layout *(RD-Typical (2))*, double click within the viewport and type ***OSNAPCOORD*** and change the variable to ***<0>***.

   NOTE: Because this process pertains to a system variable and not a file, it only needs to be completed once. It may also need to be completed each time after updating the State Kit.

4. While in the viewport, select the dropdown next to *Extents* from within the *Navigate 2D* panel in the *View* tab and select ***Window***. The command ***ZOOM*** can also be used. Type or select ***W*** for window within the command.



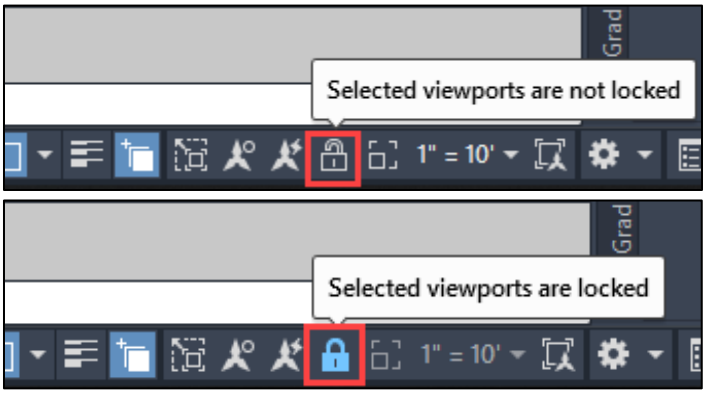
5. With endpoint snaps turned on, select the upper left and lower right corners of the rectangle border.



6. Double click outside of the viewport to return to paper space.

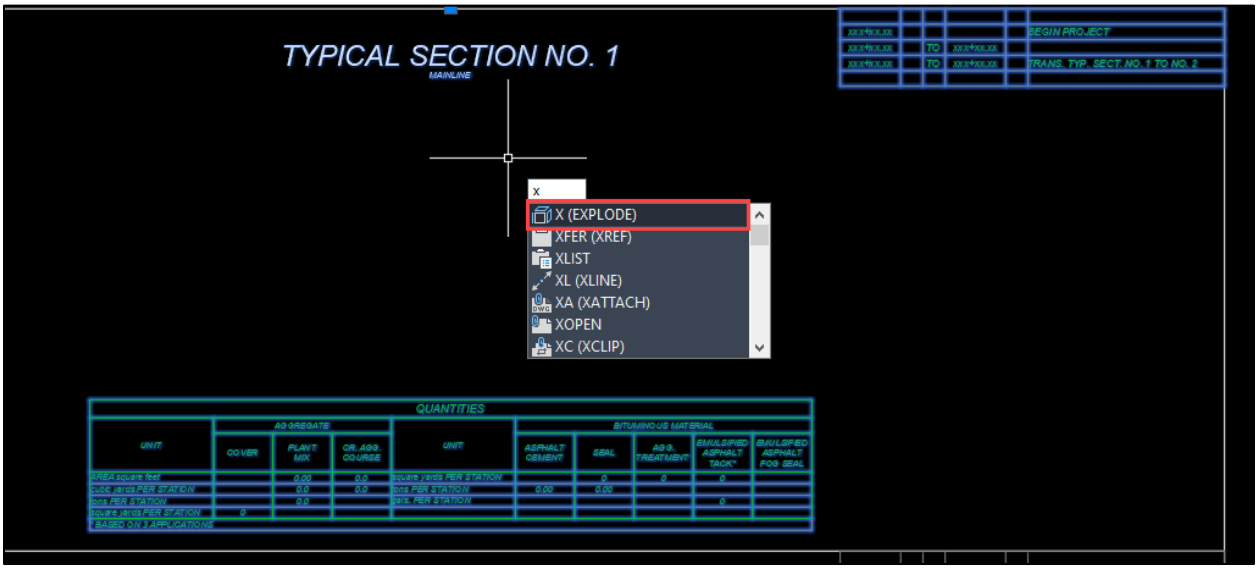
7. Repeat steps 1-6 as necessary for the remaining borders.

8. Once complete, lock the viewports in each layout to avoid any accidental changing of the viewport scale while switching between the model and paper space. Select the viewport and select the viewport lock button in the *Quick Access* toolbar on the bottom of the screen.



Procedure – Edit Table Blocks

1. In the model space, select the table blocks and explode them by typing ***X***, then pressing ***Enter***.



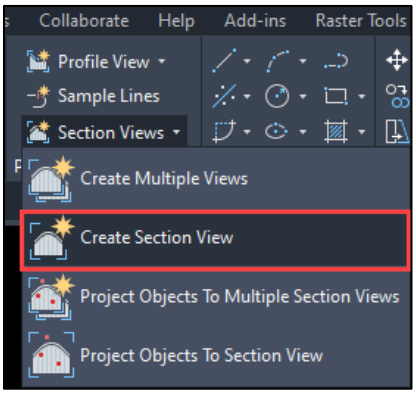
2. Double click the cells within the tables to edit the text. If a new line must be added to the station ranges, select a row of the table, right click, and select ***Insert Row Below*** or select it from the contextual tab for the table in the ribbon.



NOTE: A macro for calculating for the typical section surfacing quantities in Civil 3D does not exist, so the quantities must be calculated by the designer and manually entered into the tables. The surfacing calculation spreadsheet on MDT's web page is intended to assist designers in calculating the quantities for pavement sections.

Section IV. Create Section Views

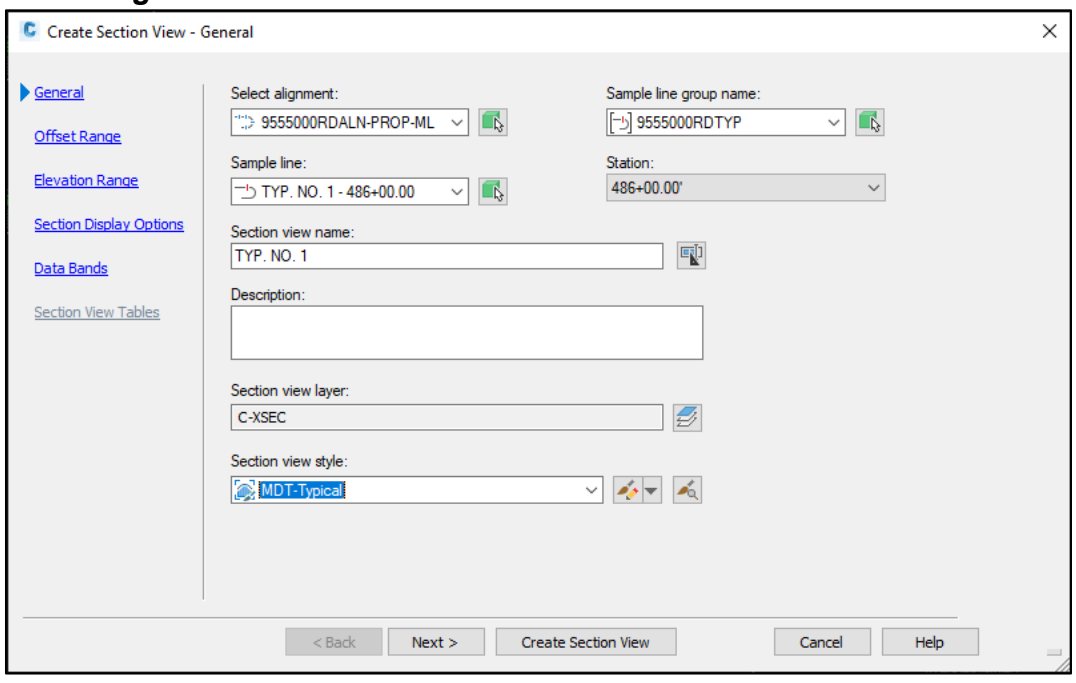
1. In the *Profile & Section View* panel of the *Home* tab, select ***Create Section View.***



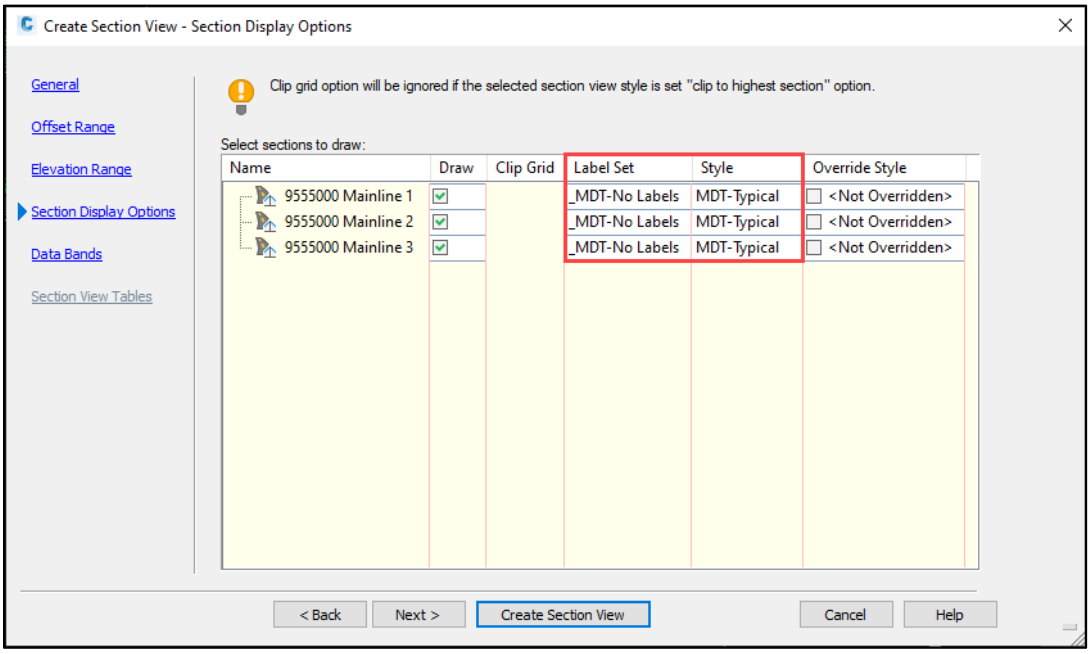
2. In the *General* section of the *Create Section View* wizard, set the following:

Section view name:
TYP. NO. 1 [Then change for each section]
Sample line:
Change for each section
Section view style:
MDT-Typical or
MDT-Typical Special*

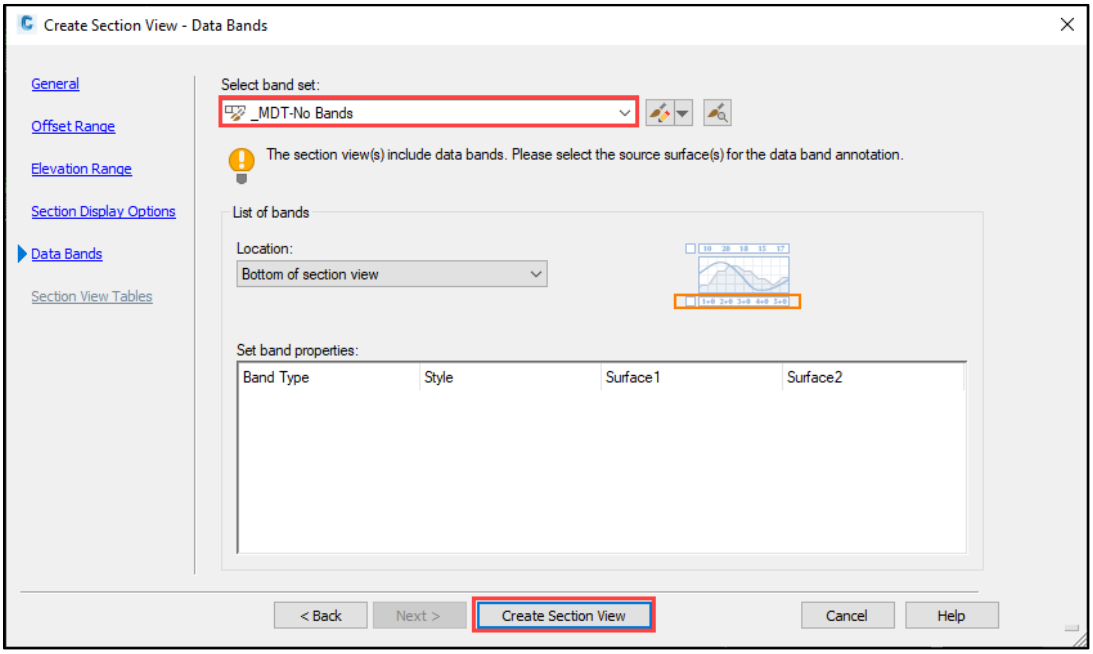
****To be used if special borrow less than two feet is included in the surfacing section.***



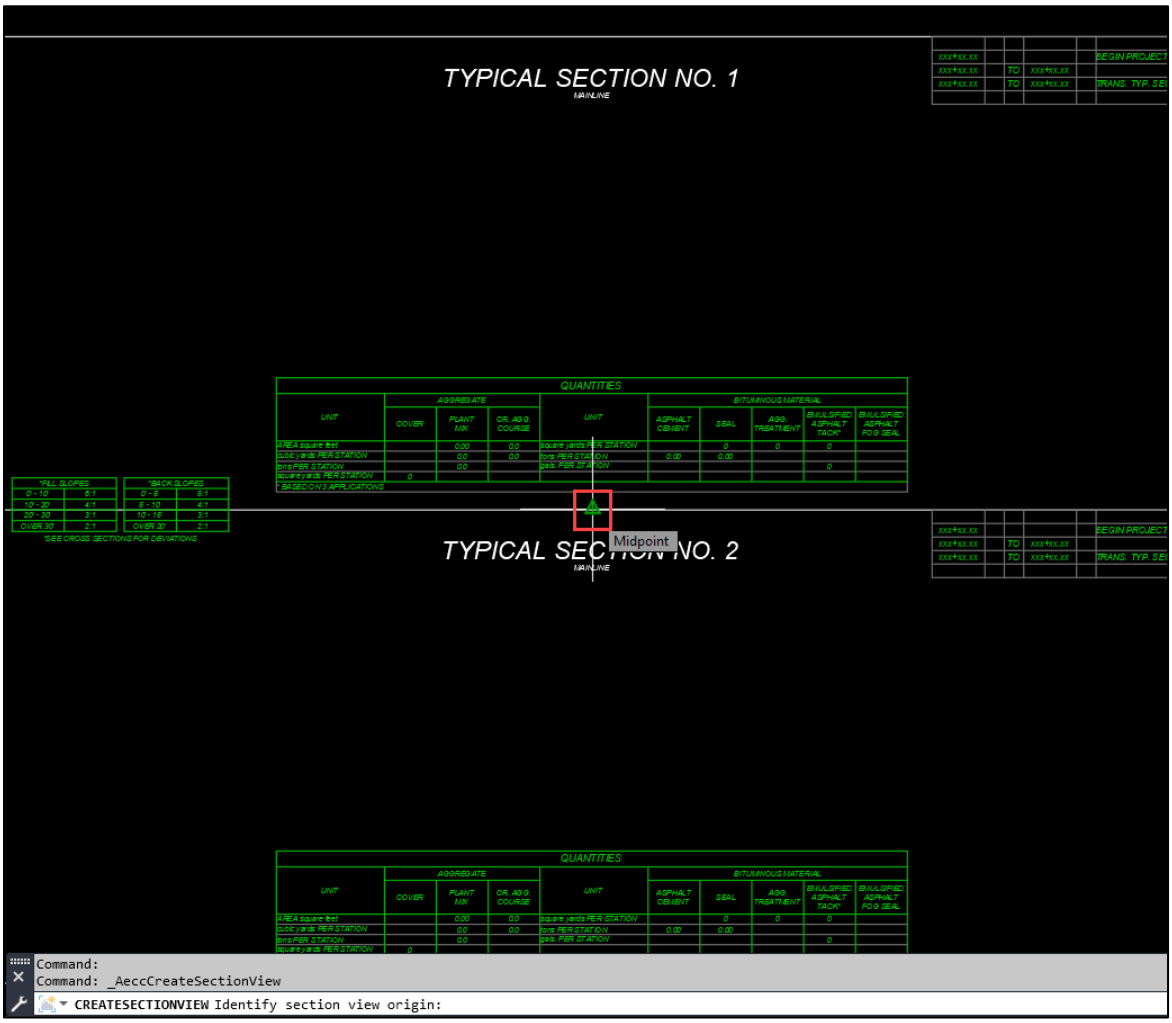
3. Accept the defaults for the *Offset and Elevation Range* sections. In the *Section Display Options*, set the following:
   Label Set:
   _MDT-No Labels
   Style:
   MDT-Typical



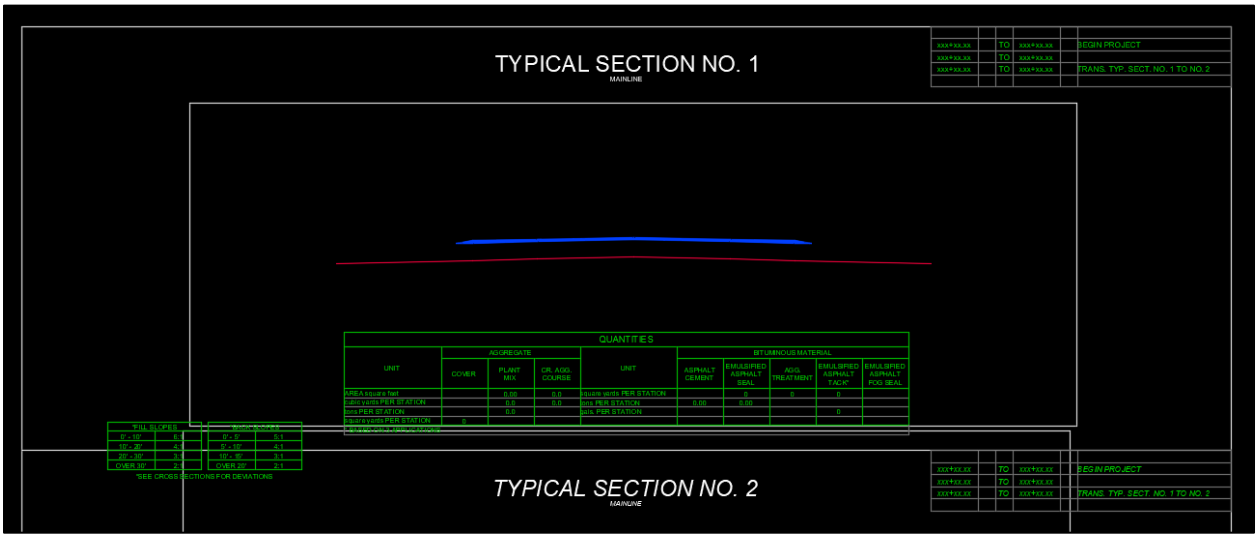
4. Set the *Data Bands* to ***_MDT-No Bands***, then select ***Create Section View***.



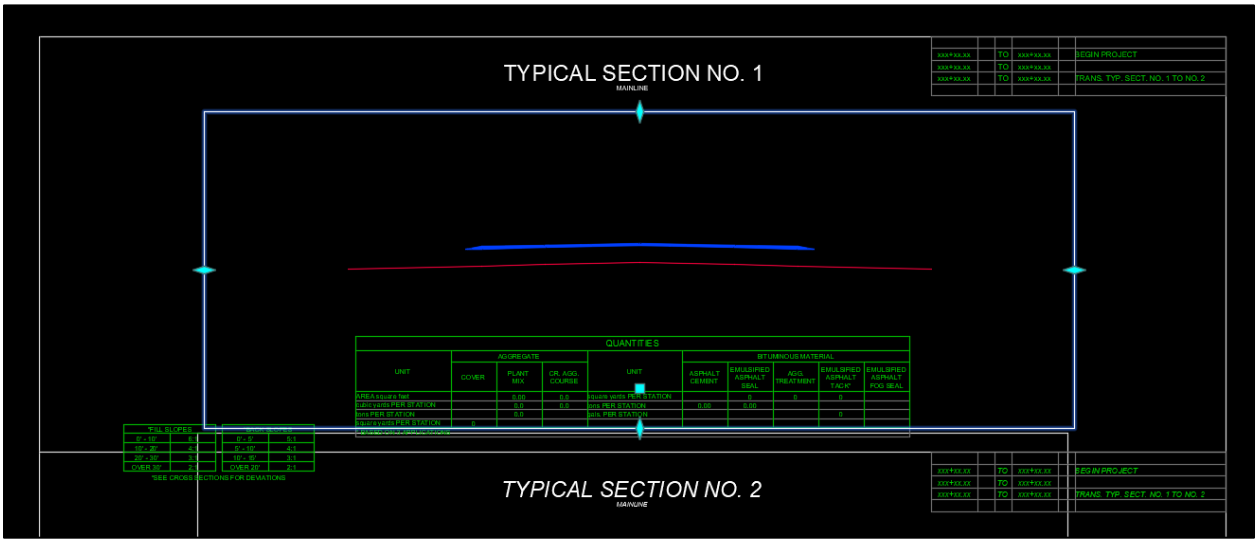
5. Select the midpoint of the middle horizontal line as the starting point for the section view.



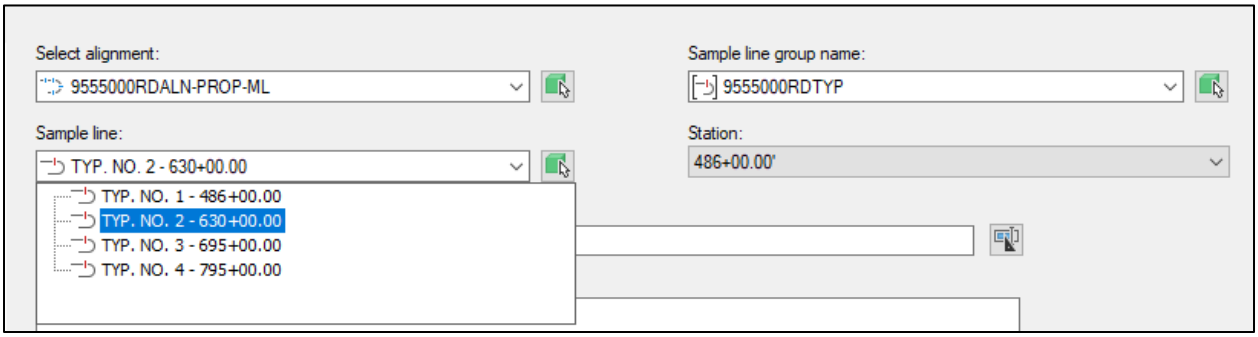
The section view will be drawn, like shown below:



6. **IF NEEDED:** To move the section up so that the bottom dimensions will not overlap with the quantities table, select the view frame border, then select the square grip on the midpoint. Move the square grip up so that the section linework is roughly centered between the top of the Quantities table and the bottom of the title.

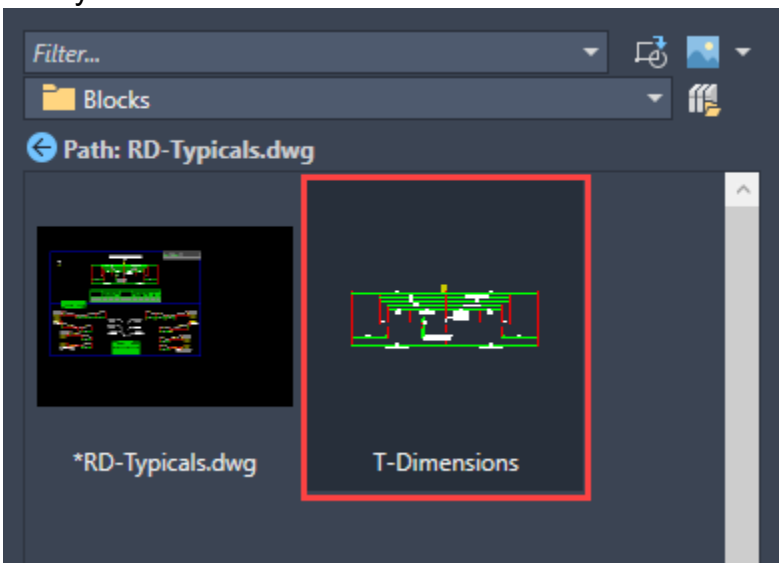


7. Repeat steps 1-6 as necessary for the remaining typical sections. Remember to select the sample line associated with the next typical section.

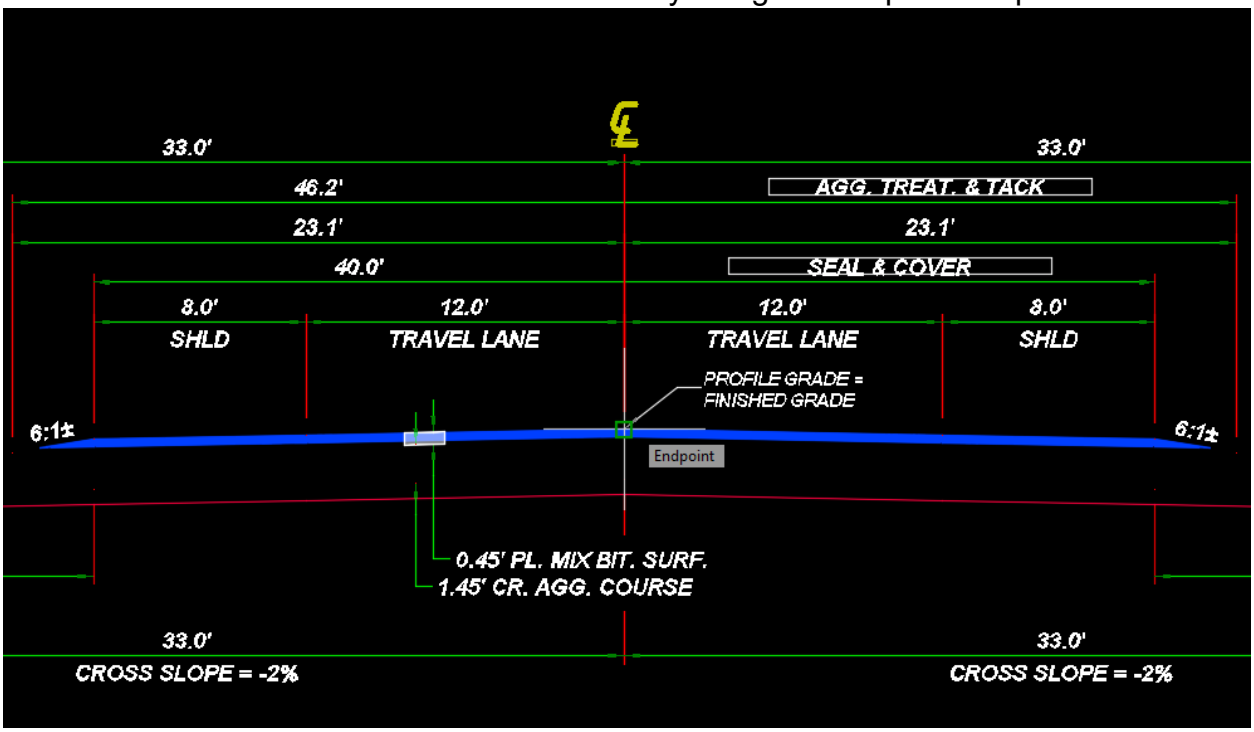


Section V. Add Dimensions and End Conditions

1. In the *Blocks* palette, select the ***T-Dimensions*** block from the *RD-Typicals* block library.

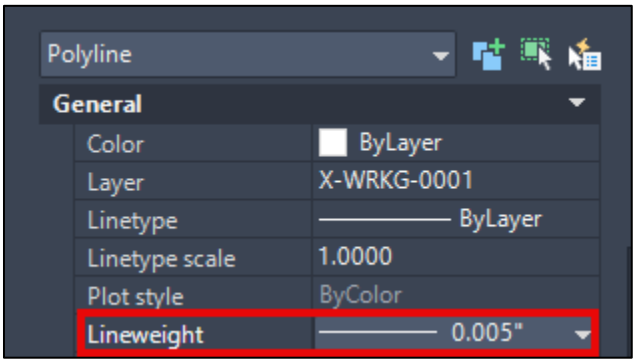


2. Insert the block on the centerline of the roadway using the endpoint snap.



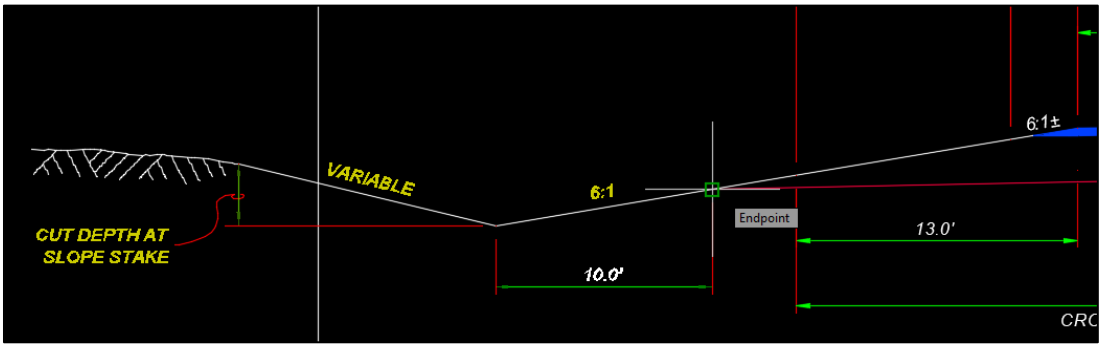
3. Set the active layer to ***X-WRKG-0002***. Draw a line to connect the end of the surfacing inslope to the bottom of the CAC on both the left and right side of the section.

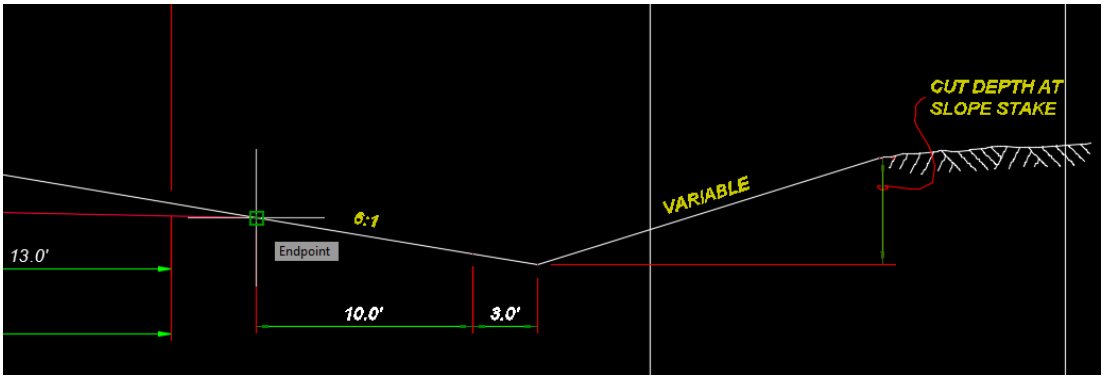
4. Select the newly drawn lines and change the lineweight to ***0.005"*** using the *Properties* palette. Doing so will match the line weights that are set within the code set style.



5. Insert the appropriate end conditions from the block library. The insertion point is where the bottom of the CAC meets the line drawn in Step 3.

   Shown below: ***T-EndCondition-LT-Cut*** for the left side and ***T-EndCondition-RT-CutVDitch*** for the right side.





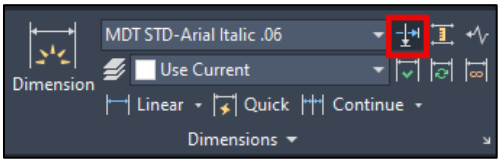
6. ***Explode (X)*** the dimensions block and drag and snap the dimensions to the appropriate points. If multiple dimensions are tied to the same point, they can all be selected at once and moved simultaneously.

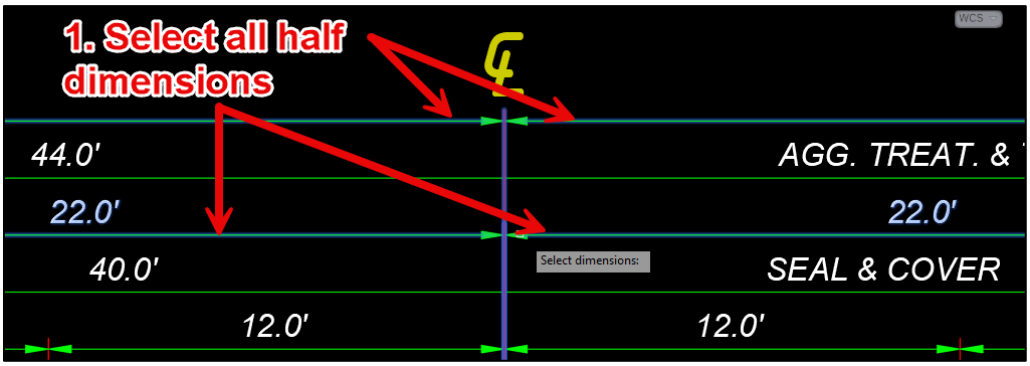
   For sections that have additional lanes, ***Copy*** the dimensions from the block.

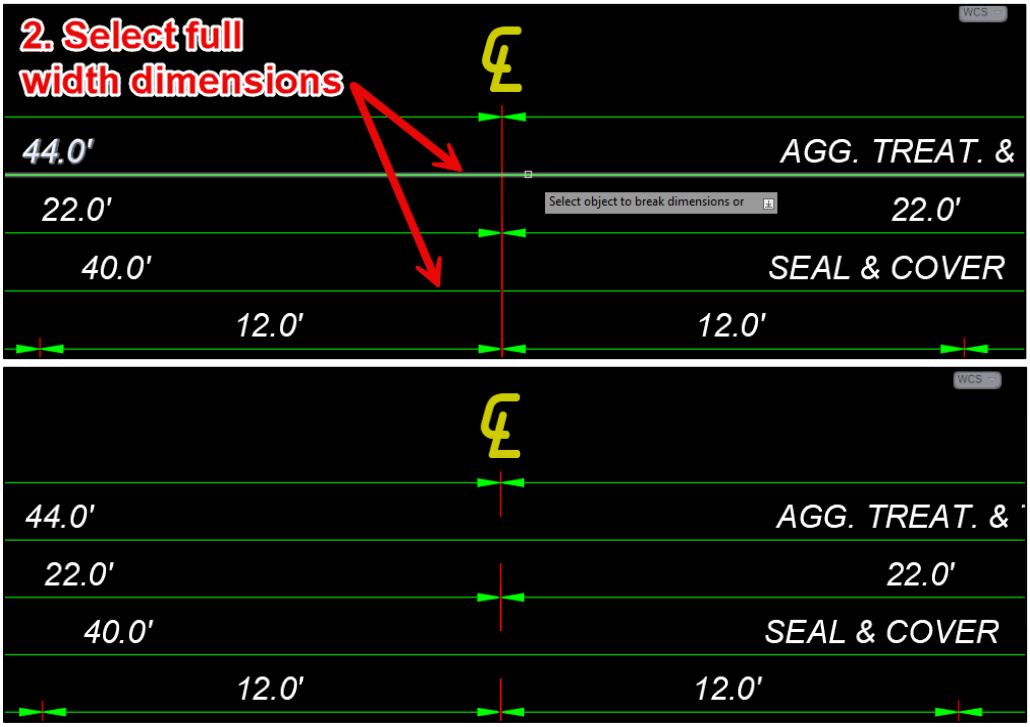
   If a dimension needs a line break with the font (i.e., the Travel Lane or SHLD designation), double click within the dimension. At the end of the number, type ***\X*** to insert the text line break.

   NOTE: Dimensions may need to be edited as necessary to display the desired values and eliminate discrepancies. For example, the full width dimension for aggregate treatment and tack may show the true model width of 68.1', rather than 68.0'. To edit the dimensions, double click within the dimension contents to overwrite the numerical values.

7. Use the command ***DIMBREAK*** OR select the ***Break*** button from the *Dimensions* panel in the *Annotate* tab in the ribbon to break the dimensions surrounding the full width dimensions. Type ***M*** and press ***Enter*** OR select ***M****ultiple* from the command line to break multiple dimensions at once. Select the dimensions left and right of centerline to be broken, press ***Enter***, then select the full width dimensions as the breaking elements. Repeat as necessary until there are breaks surrounding all full width dimensions.





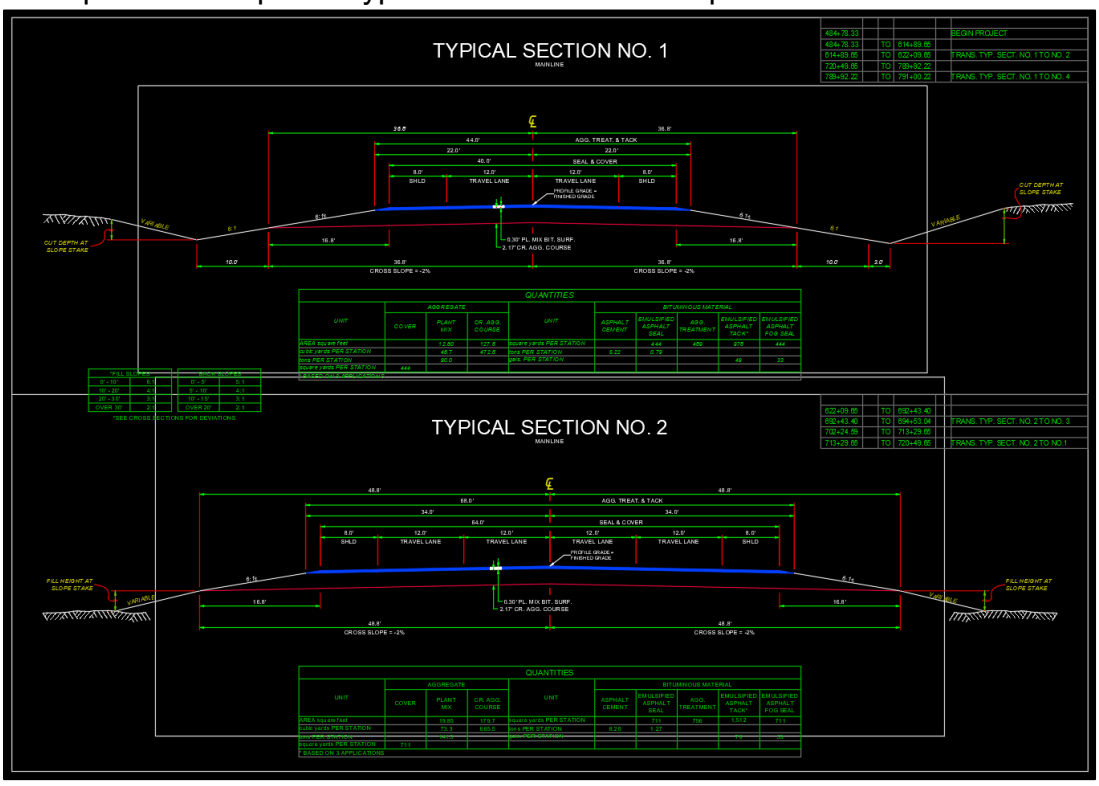


8. Adjust the hatch to match the thickness of the pavement section by stretching straight up from the corner points. If the dimension arrow is displayed behind the hatch, select the dimension, and use the ***Display Order*** (***Right click>Display Order***) to bring the dimension to front.

9. If the typicals do not fit within the sheet border limits, the scale of either the viewport or the border may need to be adjusted, or both.

Section VI. Completed Example

Example of a completed typical section in model space:



Example of a plotted typical section sheet:

