

## Creating Cross Sections from Surface Entities

The following instructions will guide you through the process of drawing cross – sections from surface entities that represent proposed existing field conditions. These instructions assume that the point data has already been downloaded and drawn in SurvCADD, and that you have already created the grid file. SurvCADD modules are displayed as {**Section – Profile**}, main menus are displayed as [**Sections**], and submenus and menu commands are displayed as <**Input/Edit Section Alignments**>.

- 1) Start by drawing a 3D polyline that represents the CL.
- 2) Go to: {**Section - Profile**}  $\implies$  [**Sections**]  $\implies$  <**Input/ Edit Section Alignments**>
- 3) The “**Specify an MXS file**” dialog box opens on the screen.
- 4) Highlight the “**New**” tab and navigate to the job folder where the alignment file (.mxs) will be saved and name the file. Click “**Open**”.
- 5) The command line prompt reads as follow:
  - a. CL File/<Select polyline that represents centerline>: **Select the CL drawn in step 1.**
  - b. Enter Beginning Station of Alignment: Hit “**Enter**” to use the default zero.
- 6) The “**Make MXS File Settings**” box opens
  - a. Station Interval: Enter the station interval for sections.
  - b. Right Offset: Enter the width for the sections, right of the centerline.
  - c. Left Offset: Enter the width for the sections, left of the centerline.
  - d. Type of Curve: Select **Roadway**
  - e. Prompt for Starting and Ending Stations:
  - f. Pick Offset Distances: Allows you to specify the offsets by using the distance between two picked points in the drawing.
  - g. Use Perimeter Polyline: Allows the user to specify a closed polyline that will be used as the limit of the cross sections. The offsets will be contained within this closed polyline.
  - h. Stations at Interval: Creates cross sections at the specified interval such as every 25 feet. If the Prompt for Starting and Ending Stations is on, then the program will apply the station interval to the user-specified range of stations. Otherwise the station interval is used along the entire centerline.

- i. Stations at Centerline Points: Creates cross sections at every transition point in the centerline such as the PC, PT, spiral points and end points.
  - j. Stations at Crossing Polylines: Allows you to select polylines that cross the centerline and create cross sections at the intersections of these polylines with the centerline.
  - k. Odd Stations with Specified Endpoints: Creates cross sections at stations that are entered or at picked points along the centerline. This option also allows you to pick the left and right offset points which do not have to be perpendicular to the centerline.
  - l. Additional Odd Stations: Creates cross sections at the specified stations but the offsets are always perpendicular to the centerline with the user-defined default offset distances.
- 7) Change the Station Interval, and the Left & Right Offsets to the desired values to capture the full section.
  - 8) Use the Roadway Curve Type, Select the Station at Intervals option. Also select any other option that is needed for preparing your cross – section plot.
  - 9) Once all options have been selected click “**Ok**”.
  - 10) The “**Input – Edit Section Alignment**” dialog box appears. At the top of this box, it will display the location of the newly created file. In this box it will also show the range of stations, the left & right offset, and the station interval. Here you may edit the highlighted stations, add allows the user to add more sections to the current alignment file.
  - 11) If satisfied with the current stations, click “**Save**”.
  - 12) You will now see the alignment on the screen. When the screen zooms in/out the alignment will disappear.
  - 13) Draw the alignment: {**Section - Profile**} ⇨ [**Sections**] ⇨ <**Draw Section Alignment**>
  - 14) The **MXS File to Draw** box opens on the screen. Navigate to the location of the alignment file that was just created. Once the file is located click “**Open**”
  - 15) The Draw MXS Section Alignment box appears. Here the user has the option to change the layer name of alignment polylines, and if you choose to display the station labels whether they are perpendicular or parallel to the alignment lines, and the number of decimal places of the labels. Once this done click “**Ok**”.
  - 16) The alignment polylines are now drawn on the topo.
  - 17) Create Sections: {**Section - Profile**} ⇨ [**Sections**] ⇨ <**Sections from Surface Entities**>
  - 18) The “**Choose MXS file to process**” opens on the screen.
  - 19) Select the alignment file that was created and click “**Open**”.

- 20) The **Choose Section File to write** opens. Now, name the section file and click **“Open”**.
- 21) The **Sections from Surface Model** dialog box opens. The user can now set the options for the cross sections being generated from the surface entities:
  - a. **Interpolate 0 Offset Elevation of Sections:** Adds a data point at offset zero for every station with an elevation that is interpolated from the existing offset points.
  - b. **Make Profile from 0 offsets of Section:** Will create a profile based on the points created from the previous option.
  - c. **Extrapolate Endpoint Elevations from last slope:** Calculates the slope from the last two offset elevation points and calculates the elevation at the endpoint from this slope.
  - d. **Extend at Flat Grade to Right and Left MXS Limit:** Uses the last offset elevation as the end point elevation
  - e. **Cutoff at the End of Surface Data:** This option does not add offsets at the endpoints. The sections will end at the last offset found in the surface model.
  - f. **Interpolate from Surface Data Beyond the MXS Limit:** Looks beyond the offset limit for more intersections with surface entities. (Use this option for the default) With this option the **Distance to Add to MXS Limit for Interpolation** becomes available. (Set this value to a distance greater than the offset value that was set for your alignment file)
  - g. **Ignore Zero Elevation Lines in Surface Model:** Ignores any line with a zero elevation
  - h. **Breakpoint Description from Layer:** Stores the layer name of the surface entity as the description of the offset elevation point in the section file
  - i. **Limit of Break Points Per Section:** Specifies the maximum number of breakpoints per section
- 22) Once the options have been selected click **“Ok”**
- 23) Select the 3D polylines, and the contour lines that are used to define the surface being used. Then hit **“Enter”**.
- 24) Draw Section Files: {**Section - Profile**}  $\iff$  [**Sections**]  $\iff$  <**Draw Section File**>
- 25) The **Section Files for Drawing** box opens. The section file next to the **1<sup>st</sup>** button will be the first file that was created, click the **2<sup>nd</sup>** button if you have multiple section files to draw on the same grids.
  - a. The **2<sup>nd</sup> Section File to Plot** box opens. Select the **2<sup>nd</sup>** section file to be plotted then click **“Open”**.
- 26) Change any layers that need to be changed. Once the options have been changed click **“OK”**.

- 27) The **Draw Section File** box opens. Here the user can manipulate the properties of the grid further. Click the “**Scan File to Set Defaults**” button. This will set the minimum elevation of the grid, the ranges of the station to draw, and set the right and left limits of the grid.
- a. **Horizontal Scale:** Specify the horizontal scale.
  - b. **Vertical Scale:** Specify the vertical scale.
  - c. **Axis Text Size:** 0.125 – normal height. Specify the text size scaler for the axis text. This value is multiplied by the horizontal scale to obtain the final text height. For example, if you set Axis Text Size to 0.125 and the horizontal scale is 50.0, then the text height will be  $(0.125 \times 50)$  or 6.25
  - d. **Type of Plot:** Choose between Vertical Stack, Pick Location, or Sheets
  - e. **Station Text Size:** 0.25 – title height. Specify the text size scaler for the station text label. This value is multiplied by the horizontal scale to obtain the final text height. For example, if you set Station Text Size to 0.25 and the horizontal scale is 100.0, then the text height will be  $(0.25 \times 100)$  or 25.0
  - f. **Circle Station Label:** Will draw the station number with a circle around it on the left and right sides of the section grid.
  - g. **Ranges of Stations to Draw:** If there just certain ranges of stations to be drawn enter them here, or type ALL for all stations in the file to be drawn.
  - h. **Interval of Stations to Draw:** Input the intervals of the stations (i.e., 20, 50, 100)
  - i. **Vertical Grid Adder to Top:** Specifies the distance that will be added to the highest elevation of the section for the sheets and pick location options. Only available when **Fit Each Vertical Grid** is checked on.
    - i. **Grid Bottom Elevation:** Specify actual bottom elevation for each section grid. Only available when **Fit Each Vertical Grid** is checked OFF.
  - j. **Vertical Grid Adder to Bottom:** Specify the distance that will be subtracted from the lowest elevation of the section for the sheets and pick location options. Only available when **Fit Each Vertical Grid** is checked on.
    - i. **Vertical Grid Height:** Specify actual grid height for each section grid. Only available when **Fit Each Vertical Grid** is checked OFF.
  - k. **Vertical Space Between Grids:** Specify the distance the sections are stacked above the last one plotted when drawing multiple sections.

- l. **Draw Elev at Zero Offset:** Labels the section elevation at offset zero. The label is drawn on the section grid just above the section line.
  - m. **Draw Break Pt. Elevations:** Labels all break point elevations along the section line above each point in a section.
  - n. **Draw Break Pt. Offsets:** Labels the offset distance from zero of each break point along the section.
  - o. **Draw Break Pt. Descriptions:** Labels the descriptions of your break points if any exists.
  - p. **Draw Slopes:** Labels the slope ratio above the section line.
  - q. **Label End Areas:** Labels the end areas if there was an existing and final grade section plotted on the same section. Click the Set button to the right of this toggle to set the display precision, text size scaler and layer for these labels
- 28) Click the Set button to the right of this toggle to set the display precision, text size scaler and layer for these labels.
  - 29) Now set the horizontal and vertical scales of the section file, the horizontal axis spacing.
  - 30) Under the **Grid Line/Text Drawing Controls**, the user can adjust the right and left grid limits for the section grids. Also, the user has the option to plot the just the section line by selecting the Plot Grid option or plotting the section line and the text by selecting Text only.
  - 31) The Horizontal Axis Spacing Grid specifies the distance the vertical lines of the grid will be spaced.
  - 32) The Horizontal Axis Spacing Text specifies the interval that the text will be plotted. (labeling of stations)
  - 33) The Vertical Axis Spacing Grid specifies the distance the horizontal lines of the grid will be spaced.
  - 34) The Vertical Axis Spacing Text specifies the interval that text will be plotted to the left and right of the grid lines. (labeling of elevations)
  - 35) Once all options have been selected click the “**Ok**” button.
  - 36) If the type plot selected was **Vertical Stack**, the command prompts will be as follows:
    - a. Select Starting Point for Row of Sections: **Screen Pick the Point**
  - 37) The stack of cross – section grids are now drawn on the screen.