

Design Pad Template for Waterway or Lane Design

The following instructions will guide you through creating a trapezoidal waterway or a lane using the Carlson design functions. Carlson modules are displayed as {**Civil - Design**}, main menus are displayed as [**Points**], and submenus and menu commands are displayed as <**Edit Points**>.

- 1) In Carlson, open the drawing that has the existing grid you want add the waterway or lane to.
- 2) Make sure the grid for the existing surface is created. If not, create it.
- 3) Draw the centerline of the pad using a 3D polyline. The best results will occur if you contour the site and pick points on the contour or through surveyed points.
 - a. Draw 3D polyline: {**any Carlson module**} → [**Draw**] → <**3D Polyline**>
 - b. Uncheck use current layer
 - c. Specify the layer: **COGO – C/L**
 - d. Click “**OK**”
 - e. Pick the location of the centerline using contours and surveyed points
- 4) Adjust the elevations of the C/L for your desired final elevations
 - a. Right click on the line and go to “**Properties**”
 - b. Click on the “**1**” next to “**Vertex**”
 - c. Vertex 1 should highlight – enter adjusted **elevation** and press “**Enter**”
 - d. Click on the “**1**” next to “**Vertex**” again and hit the over arrow to go to vertex 2.
 - e. Adjust the elevation
 - f. **Repeat** until all elevations are set. (Note: there are many ways to adjust elevations and you should use the one that will fit your project)
- 5) Offset the centerline for the desired width: {**any Carlson module**} → [**Edit**] → <**3D Polyline Utilities**> → <**Offset 3D Polyline**>
 - a. Press “**Enter**” for the interval method
 - b. Enter the **horizontal offset distance** and press “**Enter**” (this will typically be half the final width)
 - c. Enter the vertical offset distance or “**0**” if none and press “**Enter**”
 - d. Click the **centerline** and click on **one side** of the line

- e. Click on the **centerline** again and then the **opposite side**
 - f. Press "**Enter**" when done
- 6) Join the two offset lines: **{any Carlson module} → [Edit] → <Join Nearest>**
 - a. Set the max separation to join to be larger than the width
 - b. Select "**Directly Connect Endpoint**" as the connection method
 - c. Press "**OK**"
 - d. Select the two offset lines
 - e. Press "**Enter**" when done selecting
- 7) Run the Design Pad Template function: **{Civil - Design} → [Grading] → <Design Pad Template>**
- 8) The "**Design Pad Template**" box appears. The following is a summary of the commonly used options:
 - a. **Source of Surface Model:** Choose between a grid (.GRD) file, screen entities, or a flat elevation
 - b. **Design Slope Format:** Choose between Slope, Ratio, or Template
 - c. **Use Different Slopes for Separate Sides:** Allows you to specify different slopes for different sides of your pad polyline. If this is toggled ON, you will be prompted to specify two or more slope groups, then you will be prompted to select the polyline segments that belong to each group
 - d. **Round Exterior Corners:** This option rounds the corners of the pad.
 - e. **Draw Side Slope Polylines:** When this option is ON, Design Pad Template will draw 3D polylines perpendicular to the pad perimeter from the pad to the catch point. This helps visualize the grading and can aid when taking cross sections.
- 9) Select the following in the "**Design Pad Template**" box:
 - a. Source of Surface Model: **Surface File**
 - b. Slope Direction from Closed Polylines: **Outside**
 - c. Design Slope Format: **Ratio**
 - d. Round Exterior Corners: **Checked**
 - e. Draw Side Slope Polylines: **Checked**
 - f. Side Polyline Spacing: **25**
 - g. Cut/Fill Factors: **1.000**
 - h. Pad Layer Name: **PAD - Pad**
- 10) Click "**OK**" when done
- 11) **Click** the closed 3D polyline created in step 7
- 12) In the "**Select the Slope Target Surface**" dialog box that appears, navigate to and **double-click** the grid file to use (your existing grid)
- 13) Enter the fill slope ratio for the sides: **ratio** (i.e. **2:1, 3:1, 5:1**, etc.)

- 14) Enter the cut slope ratio for the sides: **ratio** (i.e. **2:1**, **3:1**, **5:1**, etc.)
- 15) Press "**Enter**" to calculate the earth work volumes
- 16) The "**Pad Report**" displays
 - a. Save it to file by hitting the "**Save**" button
 - b. Print for your records using the "**Print**" button
- 17) Press "**Exit**" when done
- 18) Press "**Enter**" to not adjust and redesign the pad
- 19) Type "**Y**" and then "**Enter**" to write the surface to a grid file
- 20) Navigate to your drawing folder and save the grid with a recognizable name
- 21) Press "**Y**" and then "**Enter**" to trim existing contours inside of the pad
- 22) Press "**Y**" and then "**Enter**" to save the trimmed sections
- 23) Press "**Enter**" to leave the trimmed sections on their current layers
- 24) Press "**Enter**" to contour the pad. Press "**N**" then "**Enter**" to not contour
 - a. For contouring, select the options desired in the same way as using the main contouring function.
 - b. Change the layer name (i.e. **CTR – Proposed**)
 - c. Click "**OK**" once options are set
- 25) Inspect the drawing and redo if necessary

Use Different Slopes for Separate Sides

- 26) If this option was checked, the "**Assign Pad Cut/Fill Slopes**" box appears after selecting the grid file. The box shows a sketch of your pad and a list of groups with possible different cut/fill ratios.
 - a. Determine how many different cut/fill groups you need and **enter** their appropriate cuts and fills for **each group**
 - b. The pull down menu has the different groups listed. All lines start in group 1. Set the pull down menu to "**Group 2**"
 - c. **Click** the lines in the sketch that you want to use the Group 2 cut/fill ratios. The lines will turn red to show they are in the current group.
 - d. **Repeat** with each group until all lines are in the proper groups
 - e. Click "**OK**" once groups are set
- 27) Continue the main instructions from **step 13**