Plateia
by **CGS Labs**

PARKING LOT DESIGN

Tutorial

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L A B S

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Parking Lot Design

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INTRODUCTION

Plateia and Autosign allow several different approaches for designing parking lots. The choice of the method depends on the individual case.

In this tutorial, all methods will be shown on the same example. In addition to the designing procedure, the drawing of road markings will be shown at the end of this document.

If you want to repeat the procedures, you only need a drawing with the terrain. You can import this using the Google Maps Import tool.
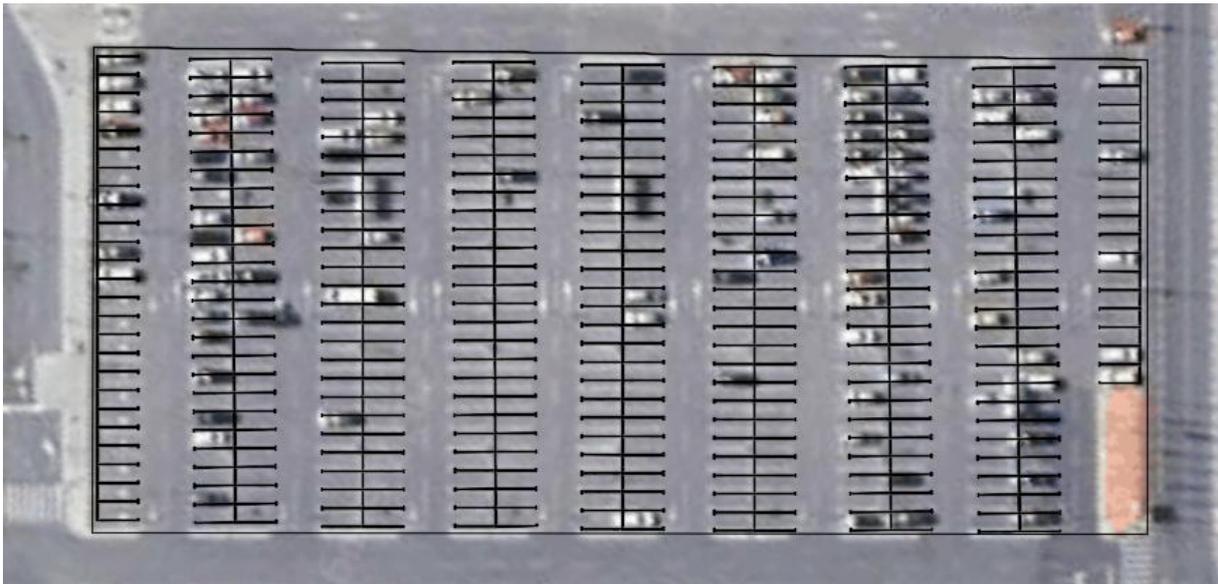
1. Site Design functionalities

In the Site Design tab, you can find various functionalities for editing polylines and creating surfaces that can help you design a parking lot.
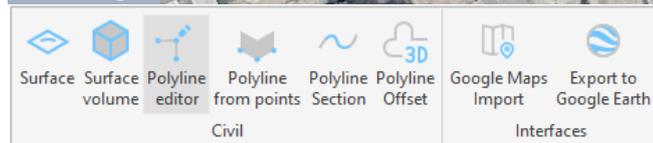
1.1 Polyline Editor

1. Draw 3D Polylines, using CAD command 3DPOLY. The polylines represent the outer edge of the parking lot.

2. Run the Polyline Editor command.

3. Select one of the previously drawn lines in the drawing.

In this dialogue box, you can see all the data about each vertex (point) on the 3D polyline.

These data are:
- station: the length between point 1 and the selected point.
- elevation: elevation of the individual point.
- length: the length between two points.
- gradient back/ahead.

All these values can be changed manually. The user can click on a cell and type a new value. Based on the newly entered data, the selected 3D polyline is automatically changed.

Entity name	Point number	Station	Elevation	Length	Gradient back	Gradient ahead
AcDb3dPolyline	Point 1	0.000	0.000	123.429		0.000 %
	Point 2	123.429	0.000		0.000 %	

If you left-click on the 3D polyline name in the 3D polyline editor dialogue box, you can find even more options:
- drop all but selected,
- filter 3D polyline only,
- raise to surface elevation (vertices only) and
- raise to surface elevation /add vertex on surface break).

4. Right-click on the 3D polyline and select the Raise to surface elevation (vertices only) option.

Entity name	Point n...	Station	Elevation	Length	Gradie...	Gradie...
AcDb3dPolylin	Point 1	0.000	0.000	123.429		0.000 %

Drop all but selected

Filter 3D polyline only

Raise to surface elevation (vertices only)

Raise to surface elevation (add vertex on surface break)

5. Select the surface and confirm by clicking the OK button.

You can also use a terrain from a separate drawing. If you are not familiar with this option, please watch the following tutorial.


Watch now
External Surface

6. Repeat this step for all four 3D polylines.

Select a Surface

Add external references

Select a Surface

Surface	Type
Terrain	CGS Lightweight Surface

OK   Cancel

Then change the gradient of the polylines marked with arrows to 2.5 %.

Site Design

7. Run the 3D Polyline editor again.

8. Select one of the polylines (marked with an arrow) in the drawing.

| Surface	Surface volume	Polyline editor	Polyline from points	Polyline Section	Polyline Offset	Google Maps Import	Export to Google Earth
			Civil				Interfaces

9. Type a new value for the gradient. Pay attention to which direction the slope decreases, as the water will also drain in that direction.
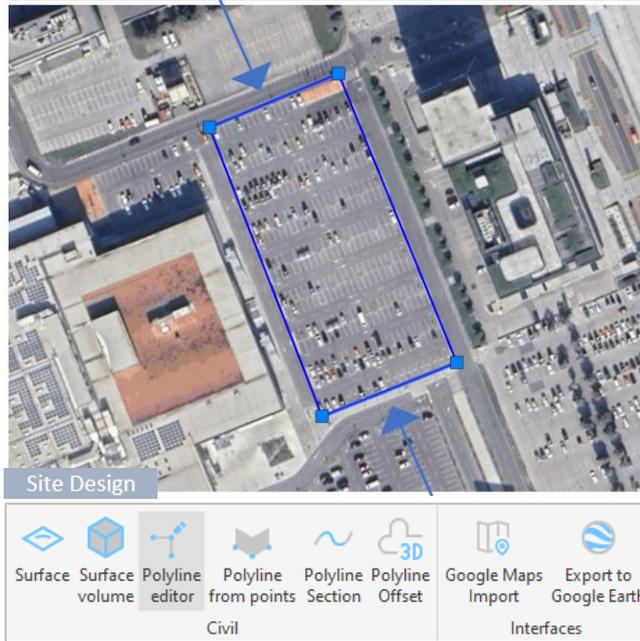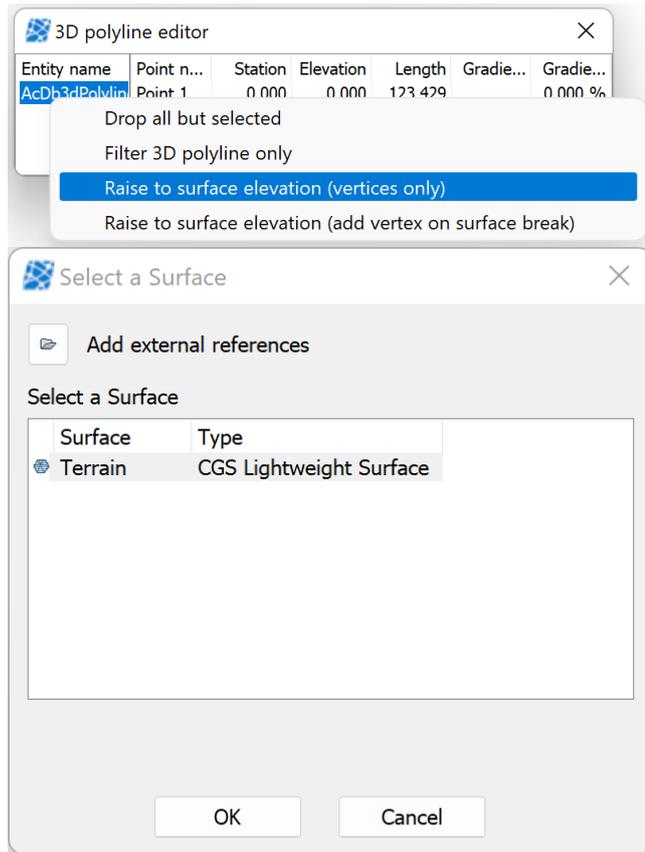
3D polyline editor

Entity name	Point number	Station	Elevation	Length	Gradient back	Gradient ahead
AcDb3dPolylin	Point 1	0.000	293.000	58.382		-2.500 %
	Point 2	58.382	291.541		2.500 %	

10. Then repeat the same procedure for the second polyline (marked with an arrow).

11. Then adjust the height of the remaining two polylines. You can also add additional lines in the middle of the parking lot - depending on the water drainage and the position of the manholes.
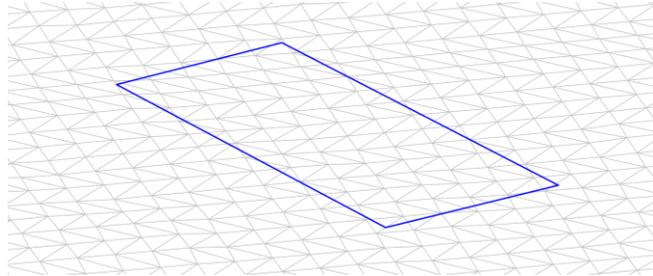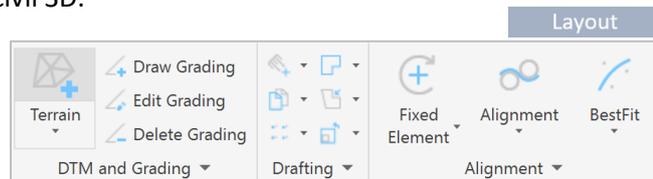
1.2 Surface

Based on the 3D polylines, you can very quickly draw the surface of the parking lot.

Plateia offers several different options for creating terrain based on 3D polylines:

- **Terrain command**: the basic command for creating terrain in Platea.
- BricsCAD surface: only applies to those using BricsCAD.
- Civil 3D: only applies to those using Civil 3D.

1. Run the Terrain command.

2. Define a surface name and confirm by pressing the OK button.
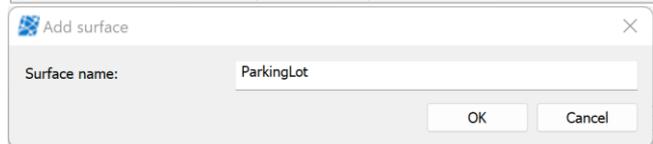
3. Press the Plus button and select 3D polylines that represent the parking lot. After you select all the polylines in the drawing, press Enter.
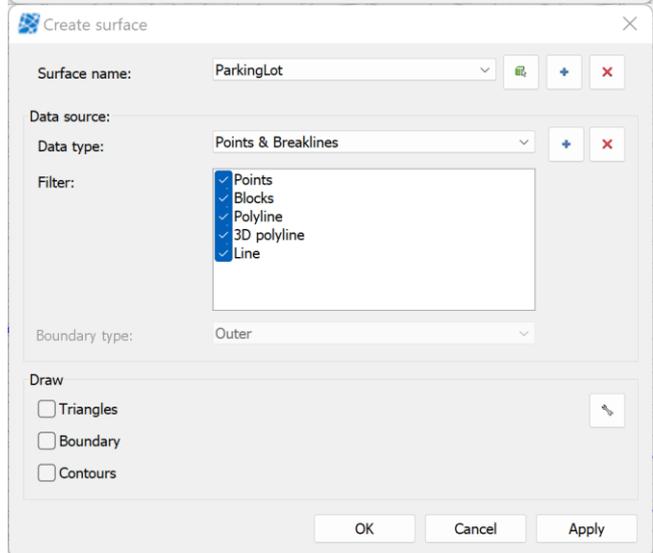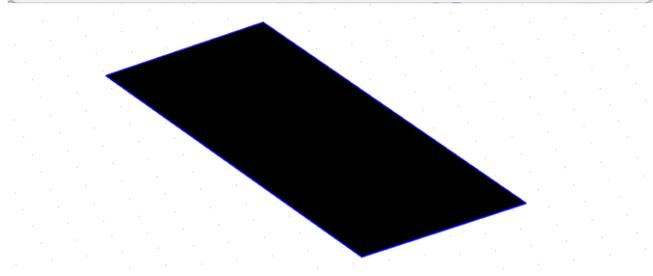
4. Check the Triangles box at the bottom of the dialogue box.

If you want to see where the water flows, then check the Contours box and then click on the Setting icon to define major and minor contour interval.

5. Confirm by pressing the OK button.

6. The surface of the parking lot is completed.

1.3 The volume between two surfaces

In the drawing, you now have the surface of the terrain and the parking lot. With the help of the Surface Volume command, you can calculate the amount of cut and fill.

1. Run the <u>Surface Volume</u> command.

2. Select the Terrain and click OK.

3. Then the same dialogue opens again. This time select the ParkingLot surface.

4. Then confirm by pressing the OK button.

In the command bar, the amount of cut and fill is displayed.

NOTE! The quantities of the cut and fill are large, because the big slope for the parking lot was chosen. The large slope enables that the results are more visible.
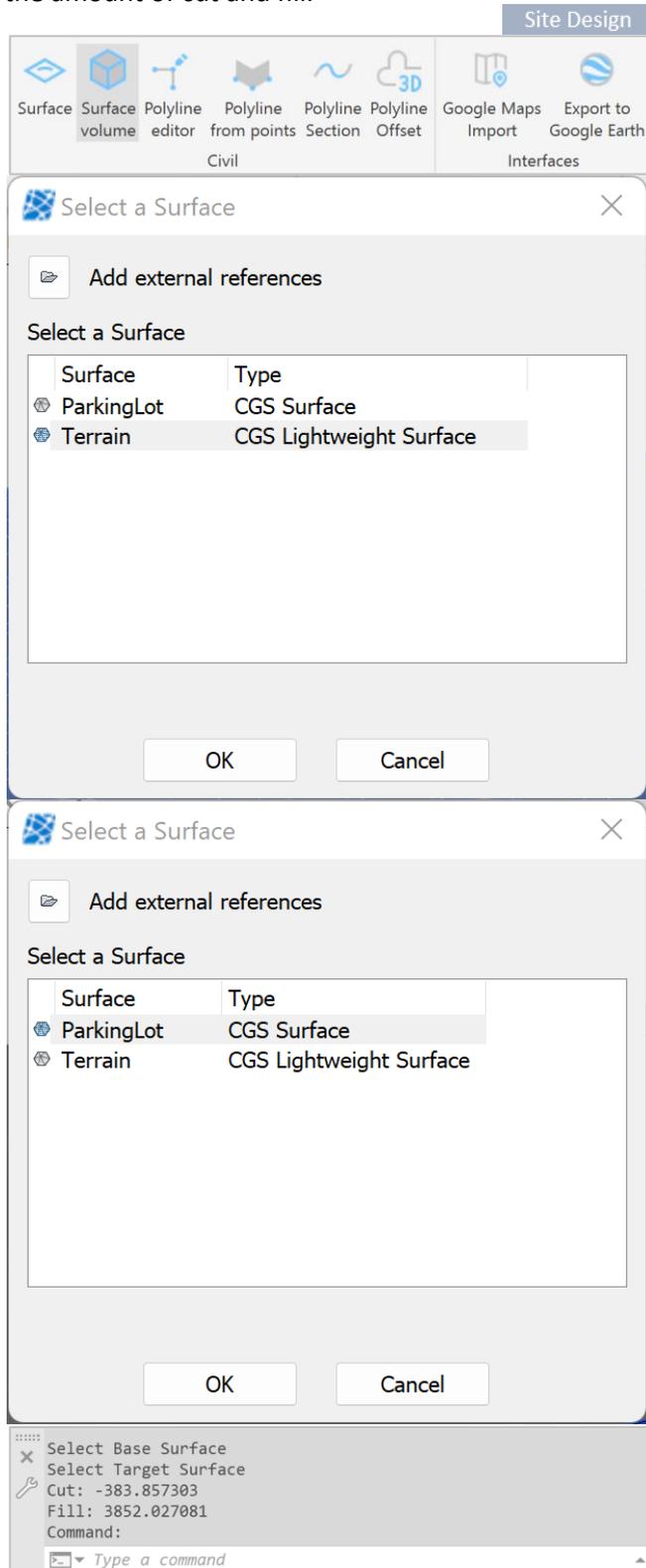
2. 3D points

If you have a geodetic survey of the parking lot, you can immediately create the surface, based on the points.

2.1 Insert points from XYZ file

1. Click on the Layout tab and select the Input Points from File icon.

It opens a new dialogue box, where you define the file with points and set which data should be imported into the drawing.
2. Click on the Folder icon and find the XYZ file with the geodetic survey. Select it and press Open.

3. Select file type from the drop-down menu.

Click on the Pencil icon. It opens a new dialogue box, where you define a new file type and set which columns contain which data. Do this if none of the predefined file types suits you.

4. Check the box at the Select Layer and type 0_Points.

5. Type 2 for the number of decimal points.

6. In the Draw points option, select 3D from the drop-down menu.

7. Uncheck the box at the Draw links option and check Draw points and Don't draw points with 0.00 elevation boxes.

8. Confirm parameters by clicking the OK button.

Points are now inserted in the drawing.
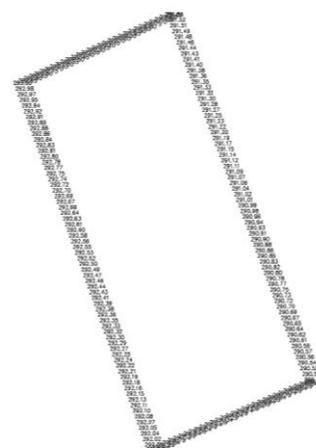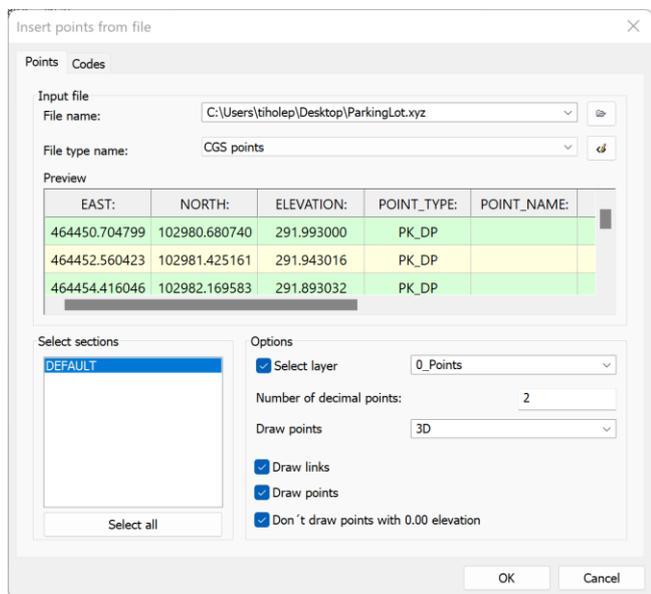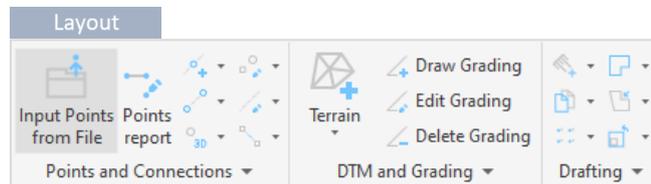
You can then create the terrain in the same way as in chapter 1.2.

3. Grading

Grading is a very practical tool that can be used for drawing embankments, curbs, offsets, and polylines, …

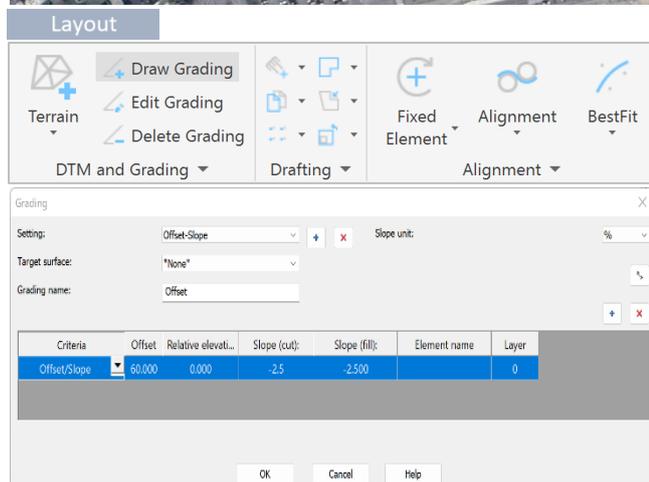1. Draw a 3D Polyline, using CAD command 3DPOLY.

2. Run the Draw Grading command.
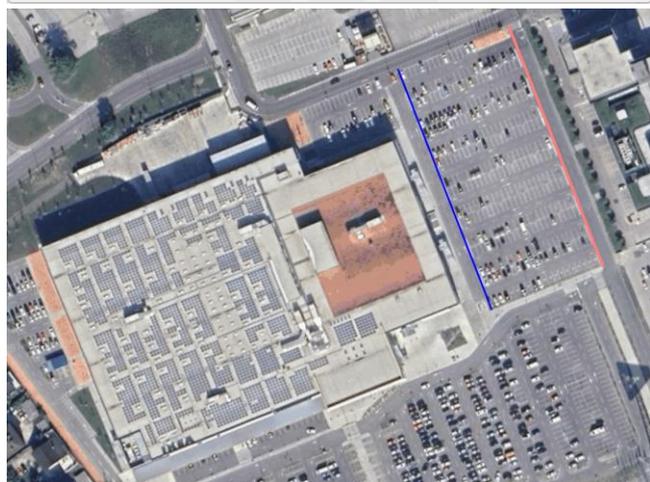
3. Select the polyline in the drawing.

4. Select on which side the new polyline should be drawn.

5. Then press ENTER twice.

Then the Grading dialogue box opens. Define settings, grading name, slope unit and criteria.

5. When you have finished, click OK.

6. Now you connect the existing polylines with additional 3D polylines and you get the edge of the parking lot. Based on the line, you then create a surface with the Terrain command, described in the chapter 1.2..

4. Basic Plateia functionalities

If you are designing a parking lot of the correct shape, you can also draw the Plateia's axis, define a profile and calculate superelevation. Based on this input data, you can generate 3D edges. With the help of 3D edges, the software can automatically create a surface. You can also create a 3D model of the road pavement, based on the planimetry quantities in the cross-sections.

4.1 Define a new alignment

1. Click on the Layout tab and run the <u>Alignment Manager</u> command.

2. Define the Alignment Name.

3. Check the box at the Drape to surface and select the surface from the drop-down menu.

4. When you have finished, confirm parameters by clicking the OK button.

After that, a new dialogue box named Alignment Manager opens. This is intended for the management of alignments present in the drawing. In this dialogue box, you can then edit axis parameters, category and station. You can also add new or delete the existing axis directly in this dialogue with the right click anywhere in the window.
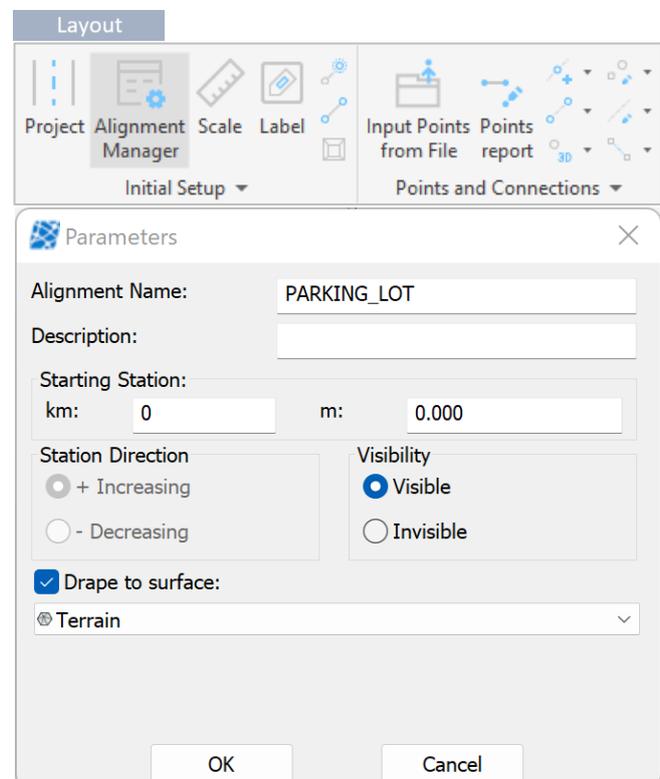
5. In the Alignment Manager dialogue box double-click on the Category.

6. In the Standard dialogue box define the following:
- Road function: Assembly roads
- Road type: Local road - LC
- Terrain type: Flat
- Design speed: 30 km/h
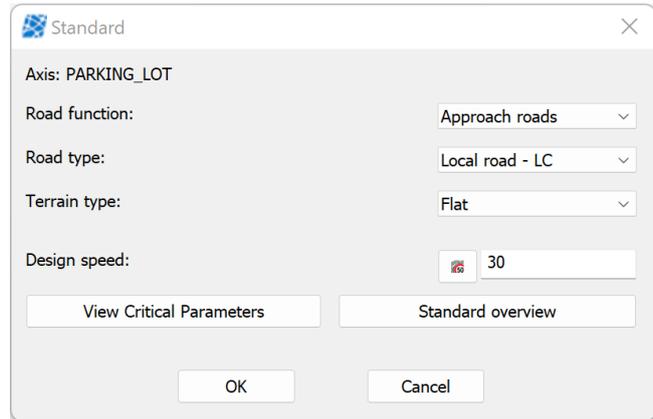
You can also preview Critical parameters and Standard overview at the bottom of the dialogue box.

7. Confirm by pressing OK.

8. In Alignment Manager then double-click on the Lanes. At the top of the dialogue box, you have a list of predefined types of lanes. Select Default.

9. Double-click on the LANE_L1, change the width to 30.0 meters and press OK.
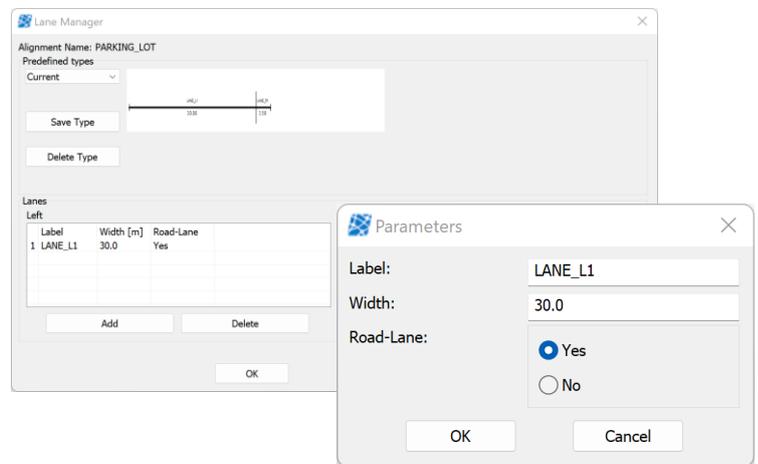
10. Repeat the previous step, but this time, double-click on the LANE_R1. Change the width to 30.0 meters and confirm by clicking OK.
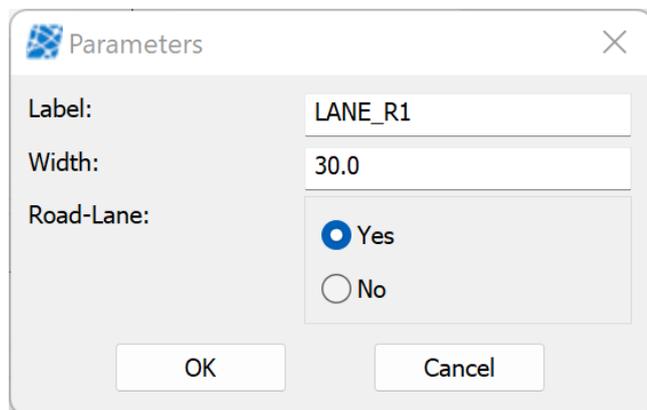
In the image on the right, you can verify if you have entered all the parameters correctly. If you find any differences simply double-click on that lane and correct it.

11. When finished, click OK.

4.2 Design an alignment

Plateia enables many different methods for road design:

- drawing with tangent polygon,
- drawing with floating elements,
- drawing with stick method and
- converting PLINE to alignment.

In this tutorial, the stick method will be used.

IMPORTANT! Before you start drawing an alignment you have to always check that this alignment is set as active (the icon next to the alignment name is coloured blue). If it is not, double-click on the axis in the Alignment Manager.
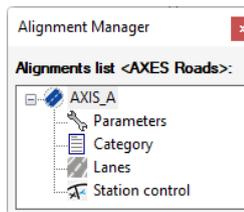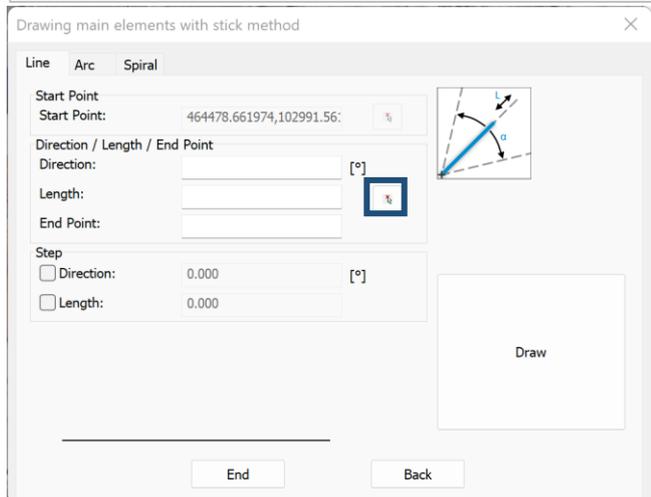
1. Run the <u>Draw with Stick Method</u> command.
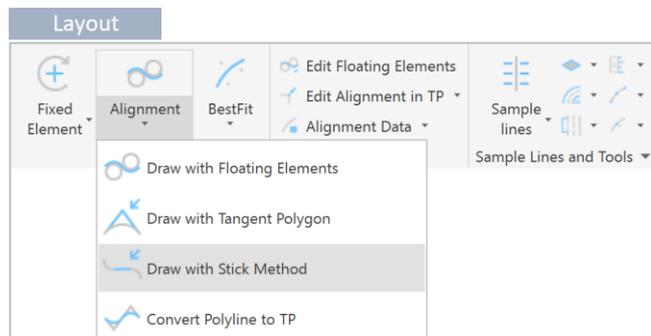
2. Define the start point in the drawing.

3. It opens a new dialogue box. Click on the Line tab and then on the icon next to the Length.

4. Then determine the length directly in the drawing.

After that, the previous dialogue box opens again. You may notice that some values are entered. You can manually change these values or leave them as they are.

5. Confirm by clicking the Draw button.

6. Then click End in the lower part of the dialogue box.

The Draw lanes and widenings dialogue box opens.

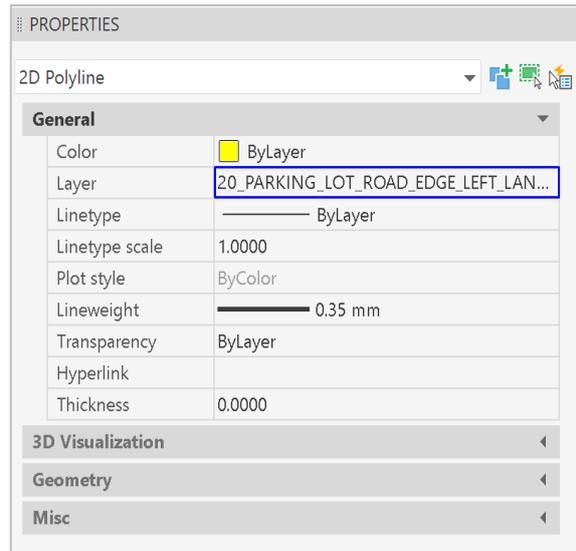7. Uncheck the box at the Draw widenings option and confirm by pressing OK.
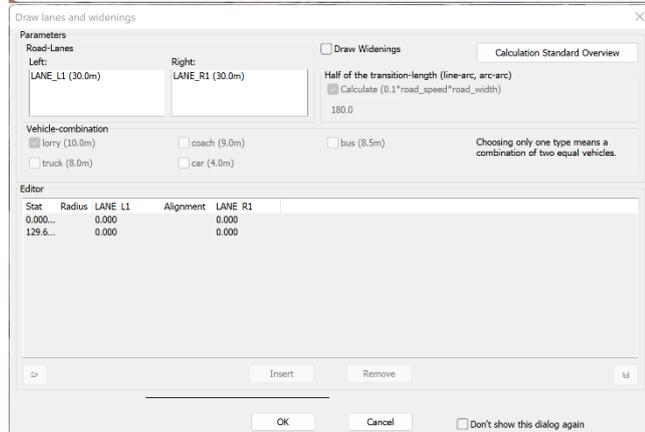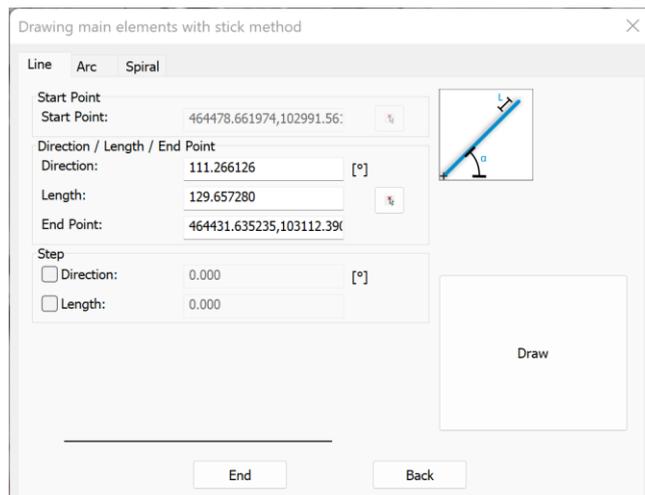
If desired, you can also change the edges (yellow lines in the picture on the right).

Using CAD commands, you can move the edge closer or further away from the axis. It is only important that the edge always remains on the same layer.
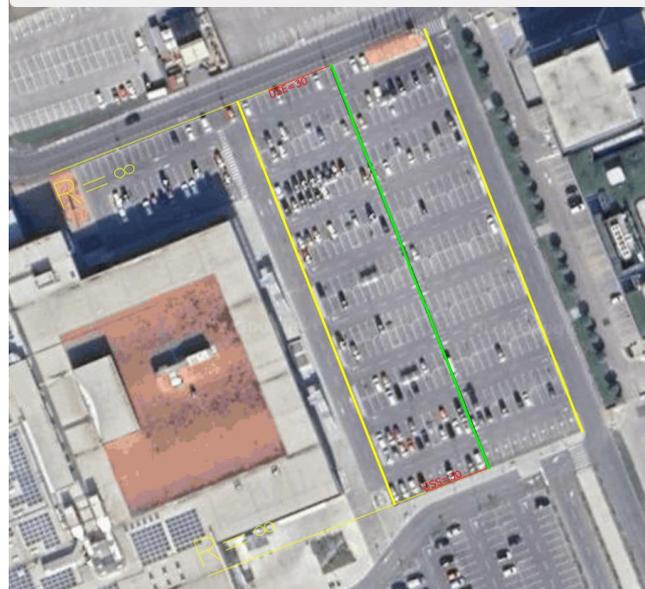
Example:

4.3 Drawing a profile

4.3.1   Draw a profile view

1. Click on the <u>Draw Profile View</u> command.

2. In the Input terrain dialogue box specify:
   Scale: 1000:100
   Input Data: *current drawing*
   From Station: select the first sample line
   To Station: select the last sample line
   Check: Labeling
           Draw verticals
           Draw horizontal elements
           Horizontal road elements
           Lane widths
           Lane widenings

3. Confirm by pressing OK.

4. Define the insertion point in the drawing.
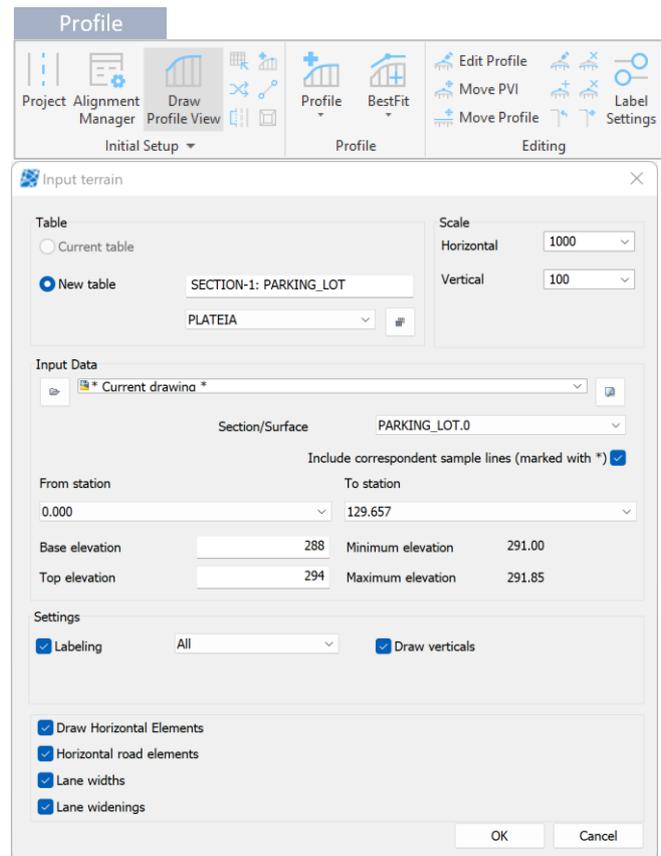
4.3.2   Draw a profile

1. Run the <u>Draw Profile</u> command.

2. Select first tangent point in the drawing.

Draw tangents dialogue box opens. You can define vertex points interactively in the drawing, or you can specify tangent parameters in the dialogue box.

3. When finished, press Enter. Vertical alignment and tangents are drawn and labelled in the drawing.
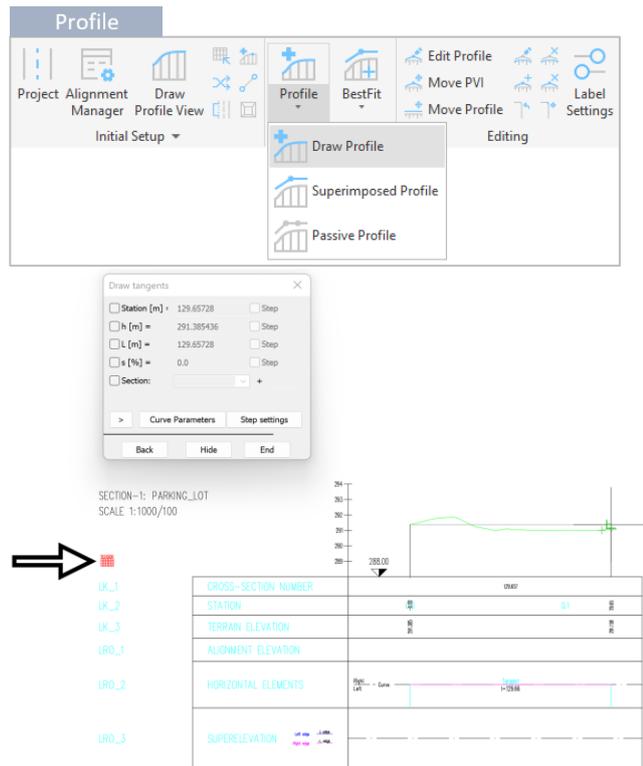

4.3.3   Calculate Superelevation

1. Run the <u>Calculate Superelevations</u> command.

2. Define all the parameters and confirm by clicking the OK button.
3. Run the <u>Edit Superelevations and Curbs</u> command if you need to edit values manually.
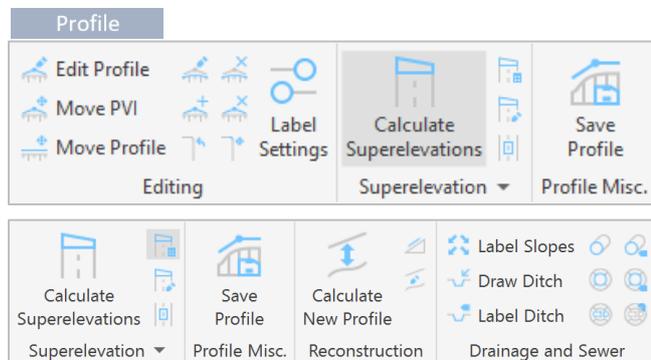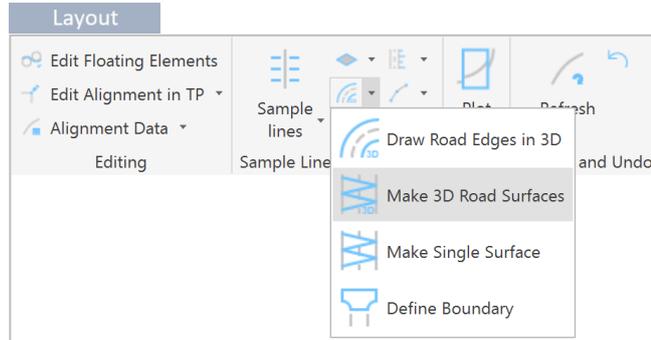

4.3.4   Draw 3D Road Edges

1. Run the <u>Draw Road Edges in 3D</u> command.

2. Select lanes in the dialogue box by clicking on them.
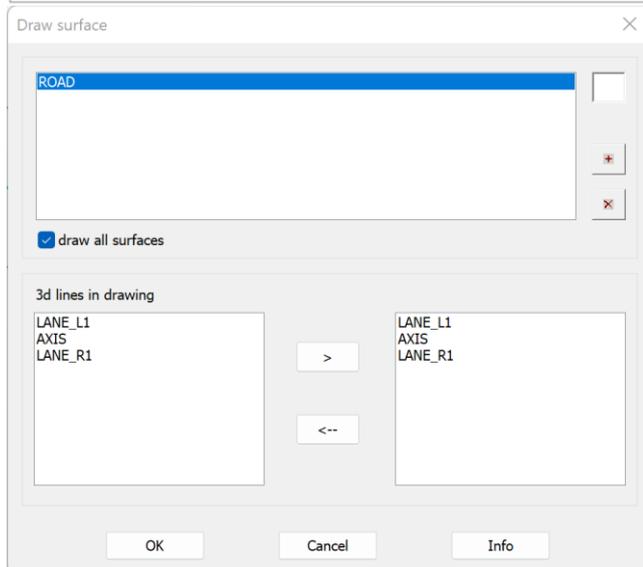
3. Confirm by clicking OK.
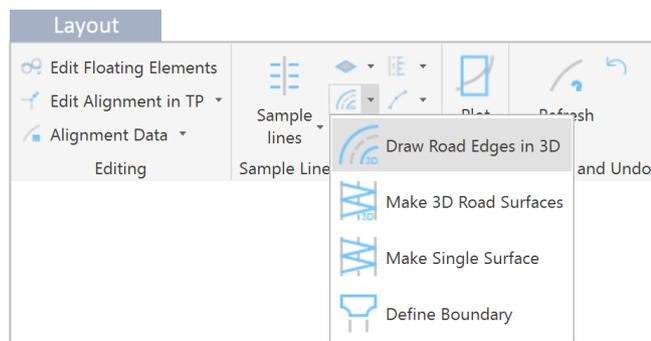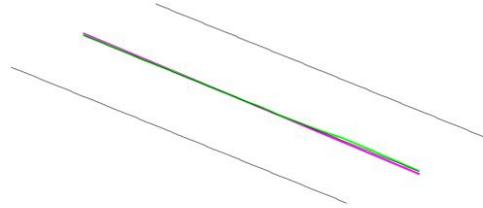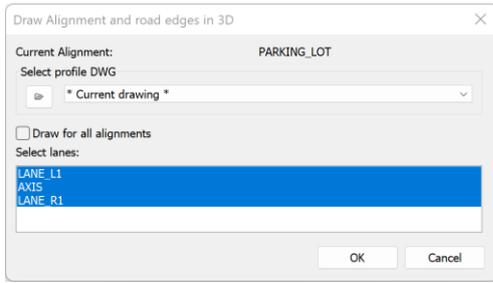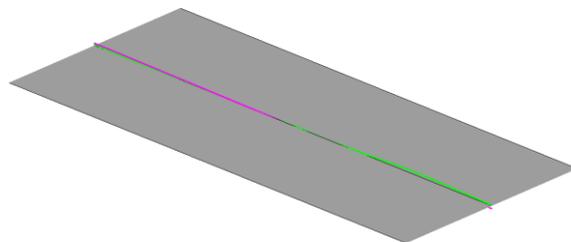
4.3.5   Draw a surface

1. Click on the <u>Make 3D Road Surfaces</u> icon.
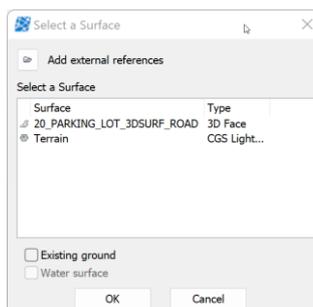

2. Define 3D lines and click OK.

3D faces are drawn between 3D road edges.

Plateia supports 3D faces, which means you can project any entities onto them. The name of the surface is generated automatically, according to the layer on which the 3Dfaces are located.
(*An example of the name is shown in the figure on the right.*)

5. Road markings

A very important part of parking lot design is the creation of road markings. Autosign includes a tool for quickly and easily drawing different types of parking spaces. In addition, with one click you can generate 3D road markings that are automatically projected onto a previously created surface.
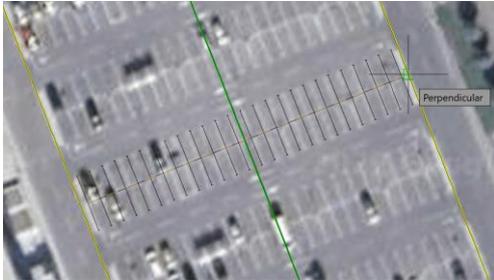
5.1 Draw 2D markings

1. Run the Parking Design command.

2. Define parking lot group.

3. Select the angle from the drop-down menu and change some parameters if necessary.

Below you have two more icons for additional line marking type settings.

4. Click on the Straight line and draw road markings directly in the drawing.

The Parking lot is a modeless dialogue box. This means that it remains open throughout the design of parking spaces.

5. When finished, click OK.
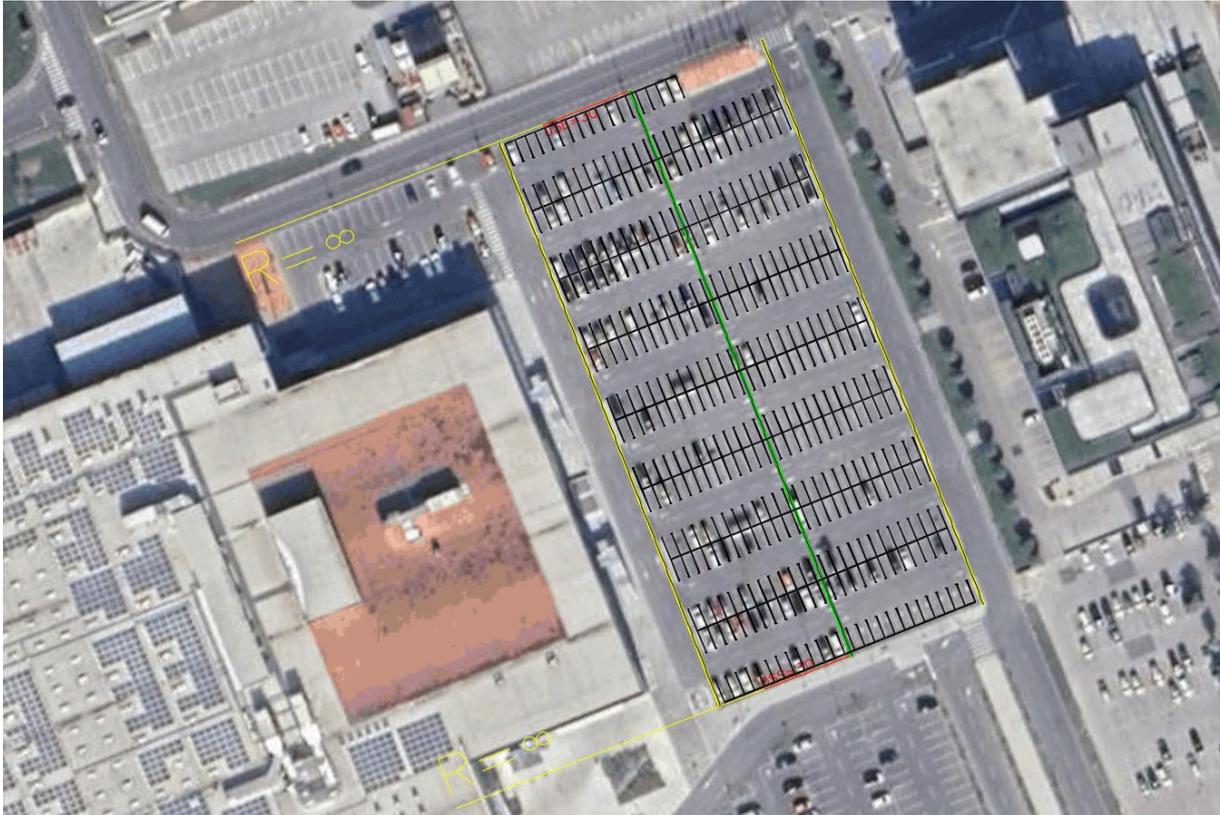
6   Draw 3D markings

1. Run the <u>Draw 3D Signs and Markings</u> command.

2. Select the surface, define parameters (you can also leave as it is by default) and confirm by pressing OK.