Plateia by CGS-labs

Create Longitudinal Alignment

Tutorial

CGS SOFTWARE

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Create longitudinal alignment Tutorial

Title: **Create longitudinal alignment Tutorial**

Document date: 15. 06. 2020

Version: 3.0.

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INTRODUCTION

Plateia contains different commands to define alignment elements. The longitudinal alignment can be defined using the following alignment elements: tangent, curve, spiral and compound spiral. Horizontal elements can be drawn as independent objects or as combinations between existing construction elements. When creating and editing horizontal alignment elements, the horizontal elements and their combinations must always be created in the direction of the station increase.
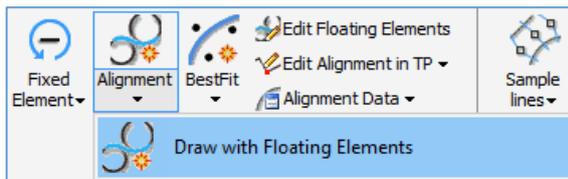
1. Draw with Floating Elements

1. Start with Layout Ribbon Panel.

2. To draw an alignment with floating elements, construction elements (tangent or circle) need to be drawn in the drawing first. Click on Fixed Element icon.

3. Draw Arc +/ Arc – / Line element. When finished, click on the icon Draw with floating elements.
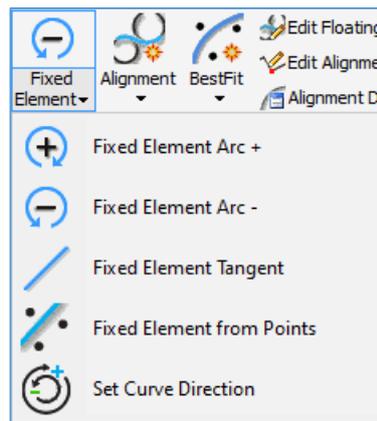
4. The command interface differs based on a combination of construction elements that have been selected. There are several combinations possible, from single construction element (tangent or circle), tangent – circle combinations to circle – circle combinations which include circle orientation in same or opposite direction.

5. Select the first and second fixed element and press *Enter*.
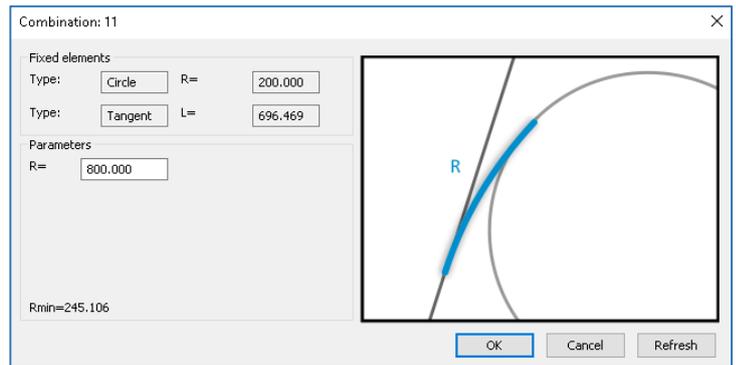
6. The following dialog box of combinations to draw floating elements open up (which dialog box of combinations open depends on selected combination of construction elements). In this tutorial are presented three possible combinations.

1. tangent – circle combination

After the selection of the tangent and circle construction elements the following dialog box opens up:
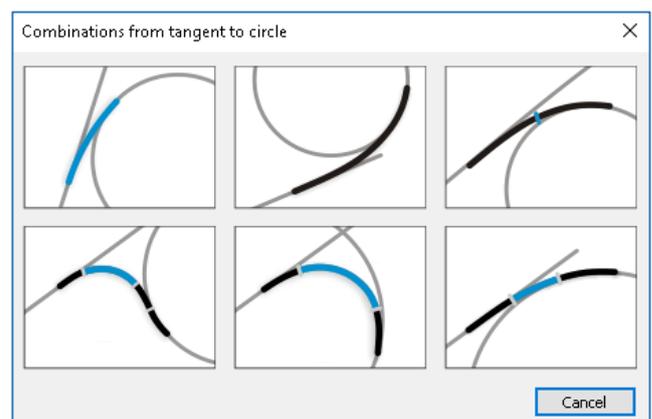
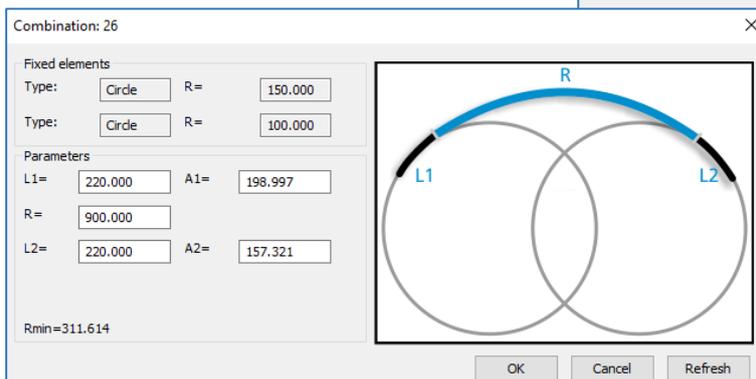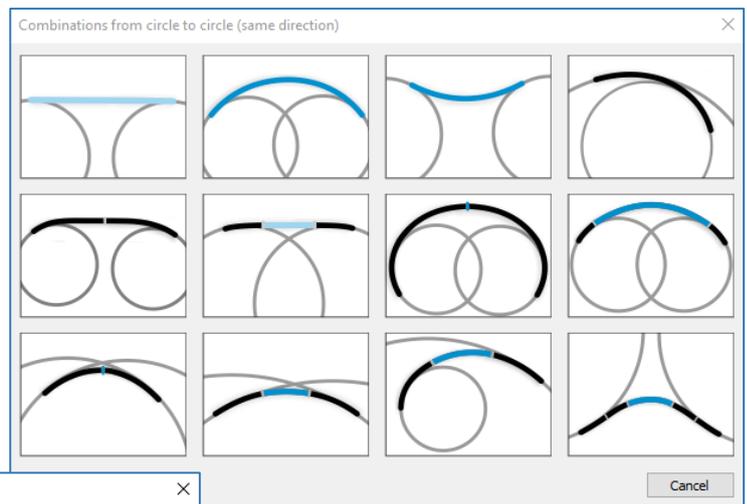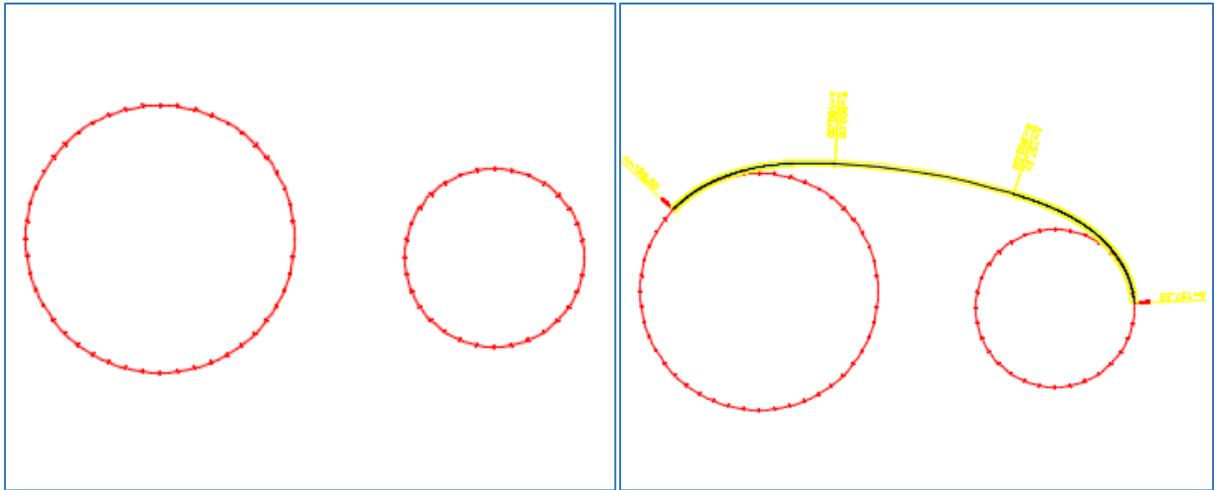Select the proper combination. Then the detailed user interface opens, where the radius value can be defined. Press OK to draw the alignment.
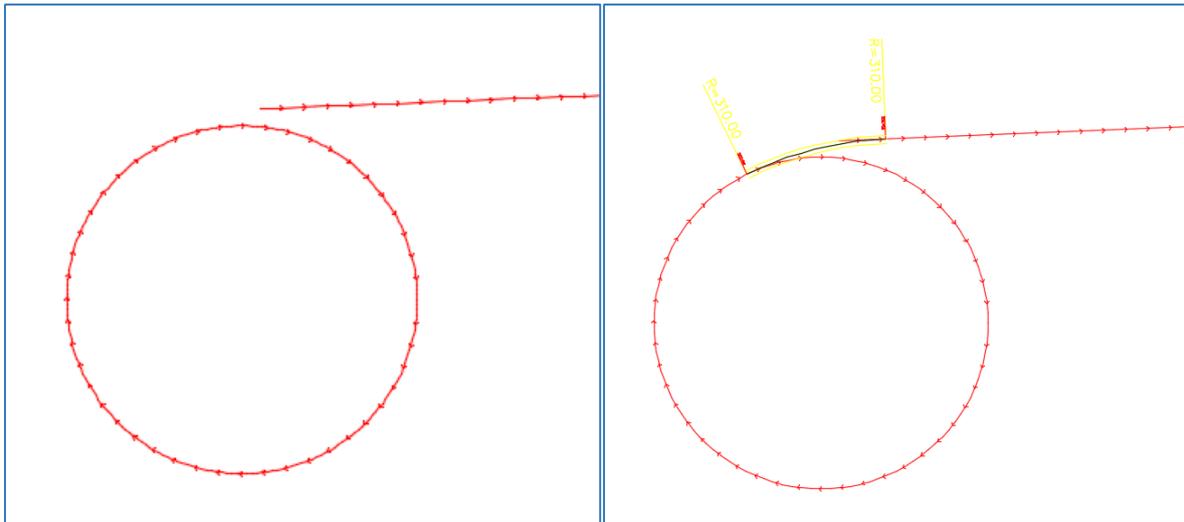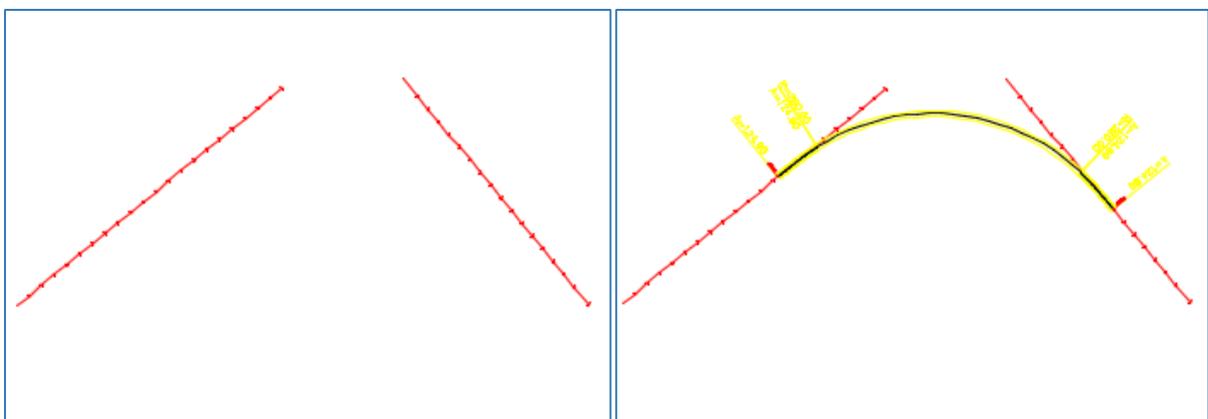

2. circle – circle combinations

After the selection of two circles construction elements in the following dialog box select the proper combination and in the detailed user interface define specific parameters, like the length of spiral or radius value.

3. Tangent-tangent combinations

Based on two construction tangent elements, three different combinations of floating horizontal elements creation are possible. Select the proper combination and in the detailed user interface define the length of spiral or radius value.

Combinations with from tangent to tangent

Combination: 22

Fixed elements

Type:	Tangent	L=	415.469
Type:	Tangent	L=	354.947

Parameters

L1=	60.000	A1=	124.900
R=	260.000		
L2=	60.000	A2=	124.900

Rmax=535.953

OK   Cancel   Refresh
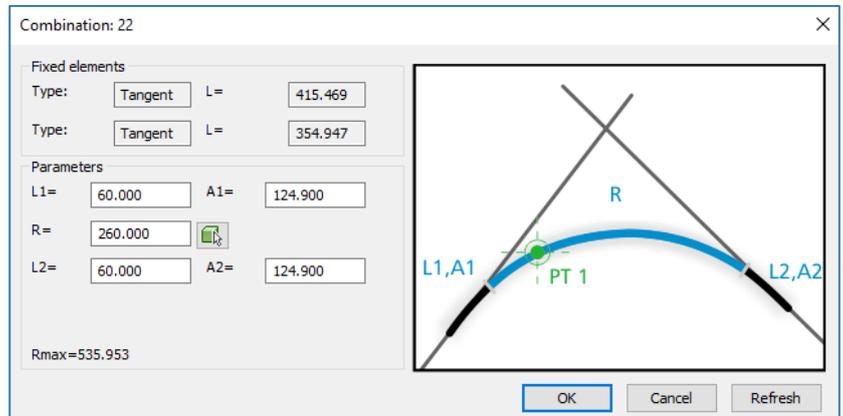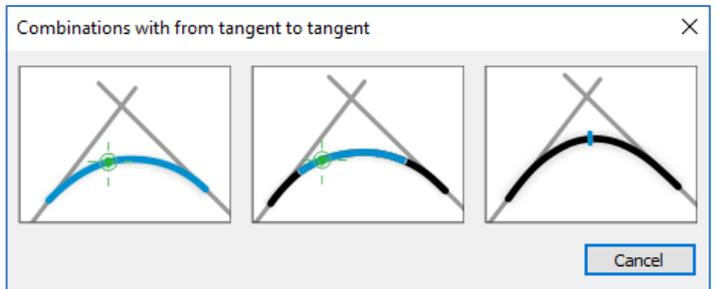
In the *Draw lanes and widenings* dialog box choose appropriate vehicle combination.
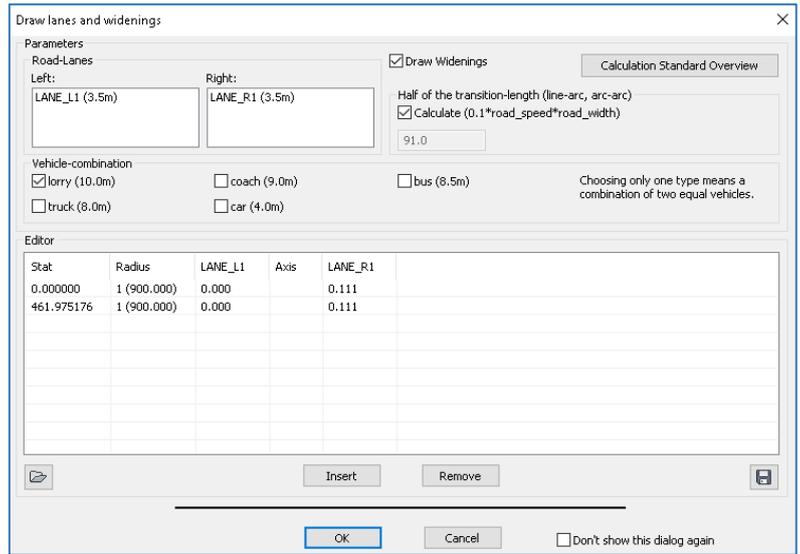
2. Draw with Tangent Polygon

1. To design an alignment with tangent polygon, click on Draw with Tangent Polygon icon. Using a tangent polygon, you can describe any combination of main elements.

2. After invoking the command, the *Create Tangent Polygon* dialog box appears.

3. Click OK and then in the drawing define the first point of tangent polygon. Continue with a selection of more points to create a tangent polygon.

4. In *Draw lanes and widenings* dialog box, you chose vehicle combination to calculate widenings. Alignment parameters such as spiral lengths and radius values are calculated based on design speed defined in alignment name *Category definition*.

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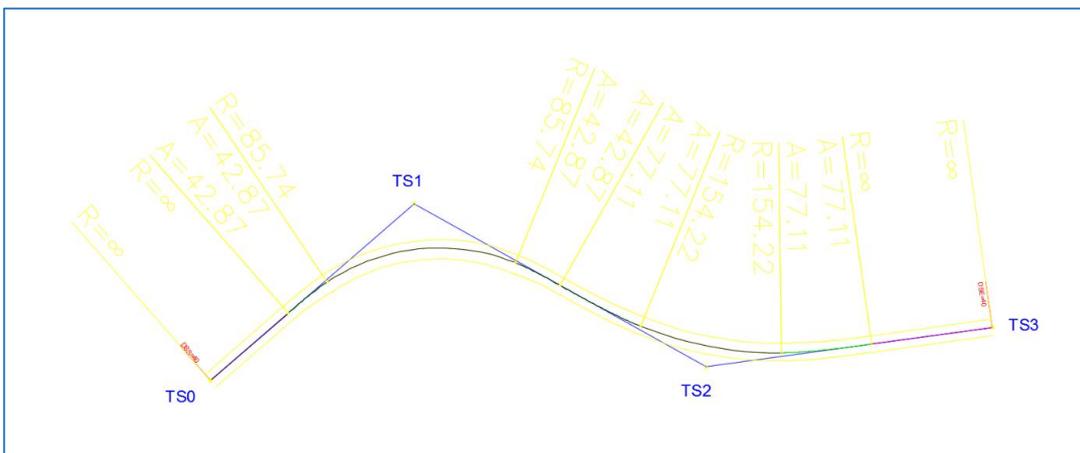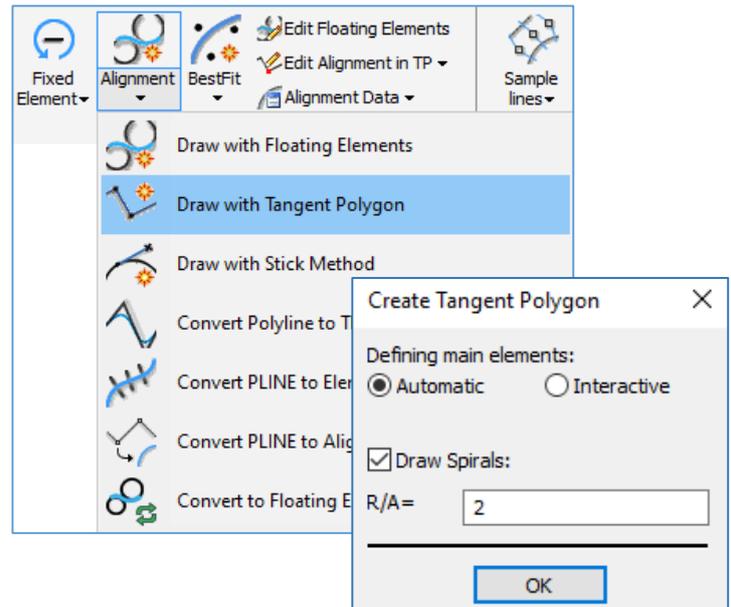
3. Draw with Stick Method

With this method, command Draw with Stick Method, you "stick" the horizontal elements together in a sequence.

1. Click on the icon Draw with Stick Method.

2. Select a start point of the first element or the horizontal alignment element from which you want to continue your drawing.

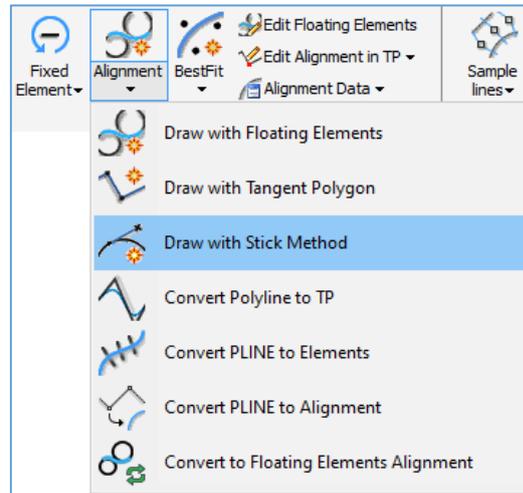3. A dialog box that appears has three tabs for drawing: line, arc, and spiral. Some of the parameters found in the tab are fixed and cannot be modified according to the previous element. This tutorial shows how to draw a section of the line, spiral and arc.

1. Drawing line

1. Define direction and length or an end point of the line.

2. You can enter parameters manually to the appropriate field or select them interactively by selecting the button [icon] and dragging the auxiliary line in the drawing.

3. Press *Draw* to get your horizontal element drawn with its labels included.
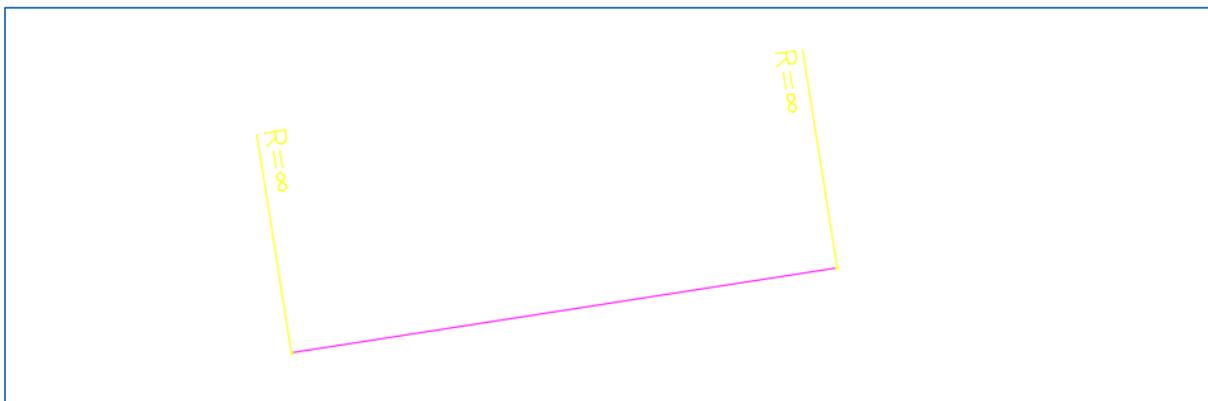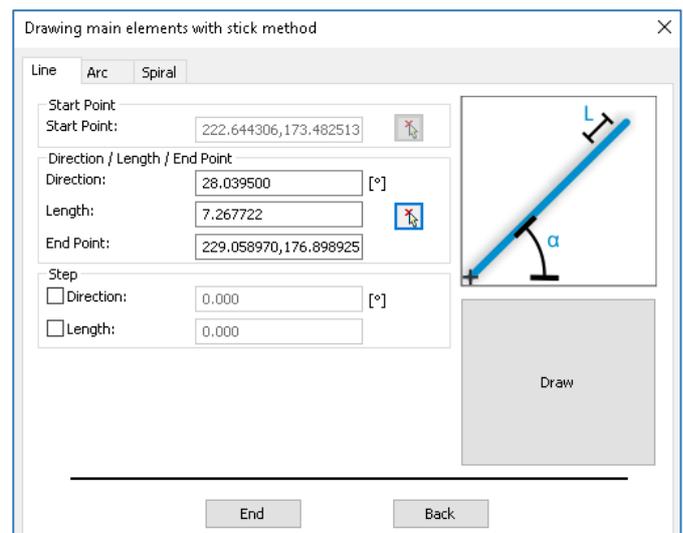
2. Spiral drawing

1. You can define a spiral in three ways.
- you can define a start point, start angle and end point,
- you can define a start point, start angle, radius and length,
- you can define the start point, start angle and the A parameter.

2. In case the radius, length or parameter haven't been defined, you just select a spiral
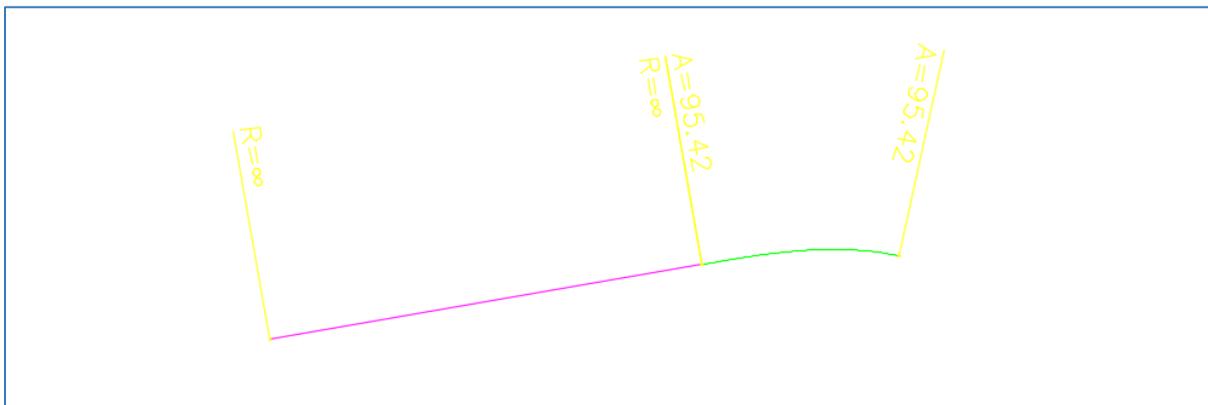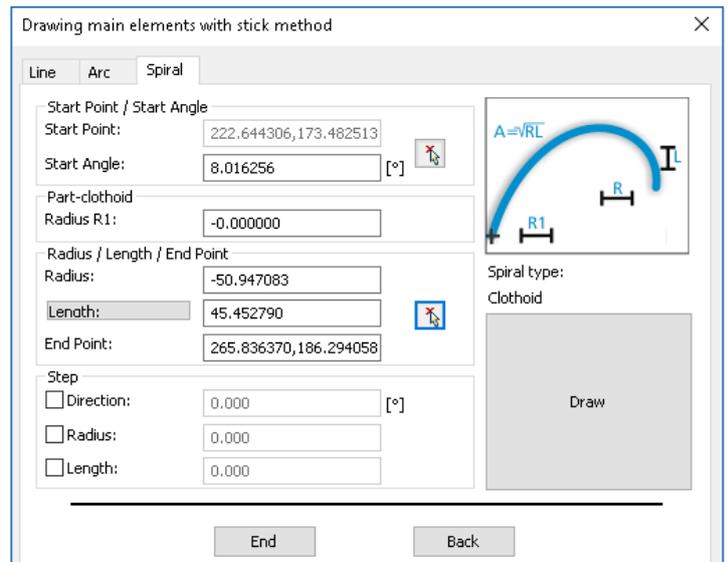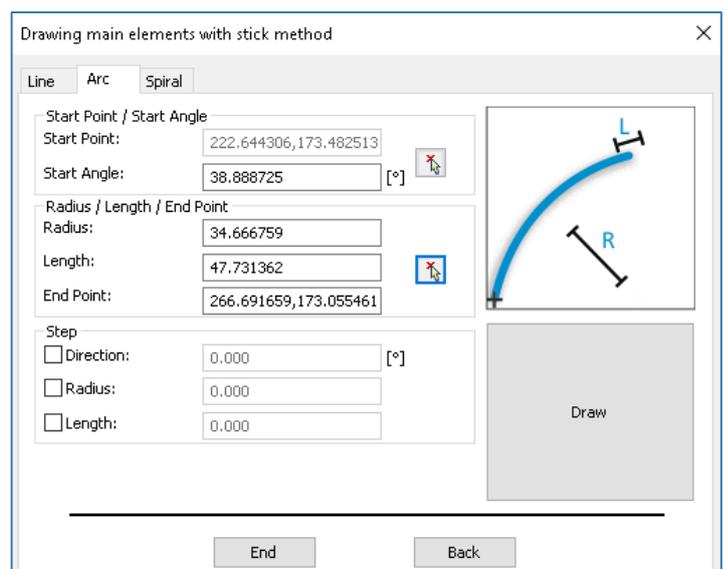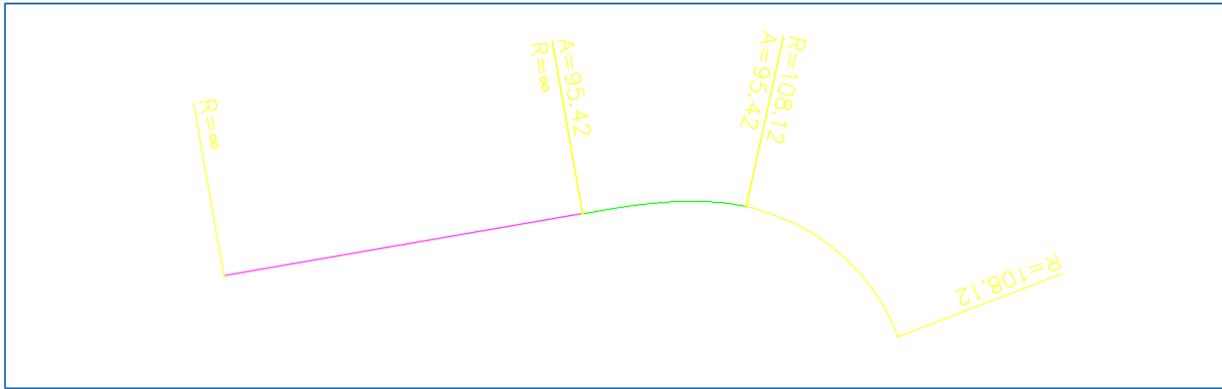
end point by pressing [button icon] and define it in the drawing.

3. Click *Draw* to get horizontal element drawn.

Drawing main elements with stick method

Line | Arc | **Spiral**

Start Point / Start Angle
Start Point: 222.644306,173.482513
Start Angle: 8.016256 [°]

Part-clothoid
Radius R1: -0.000000

Radius / Length / End Point
Radius: -50.947083
Length: 45.452790
End Point: 265.836370,186.294058

Step
☐ Direction: 0.000 [°]
☐ Radius: 0.000
☐ Length: 0.000

$A=\sqrt{RL}$

Spiral type:
Clothoid

Draw

End   Back

3. Arc drawing

1. Arc can be defined using three different methods.
- In the first method define three points,
- in the second one define the start point, start angle and end point,
- in the third one define a start point, start angle, radius and length.

2. Also arcs parameters can be defined manually or by dragging an auxiliary arc with

the button [button icon] .

3. Press *Draw*.

Drawing main elements with stick method

Line | **Arc** | Spiral

Start Point / Start Angle
Start Point: 222.644306,173.482513
Start Angle: 38.888725 [°]

Radius / Length / End Point
Radius: 34.666759
Length: 47.731362
End Point: 266.691659,173.055461

Step
☐ Direction: 0.000 [°]
☐ Radius: 0.000
☐ Length: 0.000

Draw

End   Back

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4. By pressing the button *Back* you can go one step back. Program erases the last drawn element and continues its drawing from the previous one.

5. Click *End* to finish your drawing.

6. After drawing main elements, the *Draw lanes and widening* dialog box appears, where you choose appropriate vehicle combination to calculate widenings.
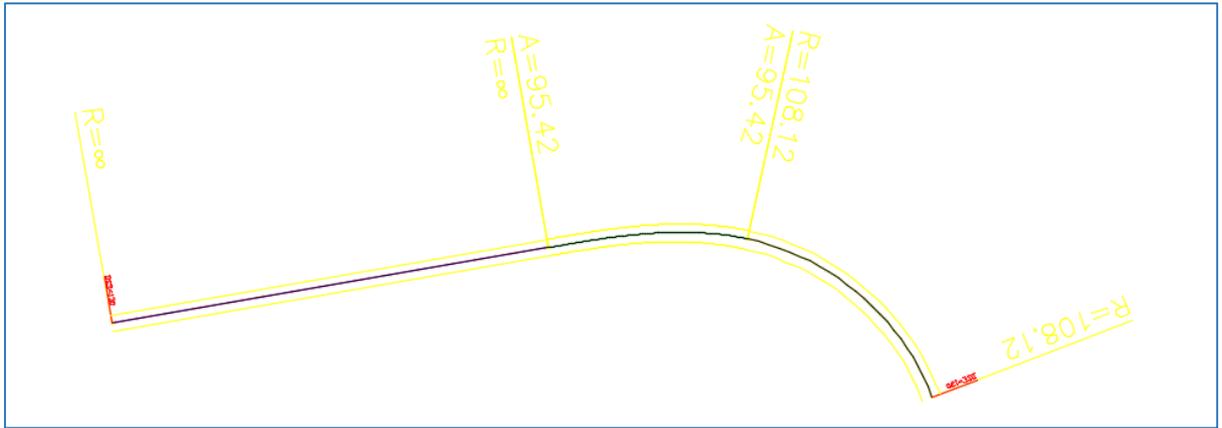
4. Convert Polyline to TP

Use the command Convert Polyline to Tangent Polygon to convert any polyline to a tangent polygon. On the basis of a tangent polygon defined, main elements are drawn and labeled.

1. Click on Convert Polyline to TP icon.

2. Select a polyline to be converted.
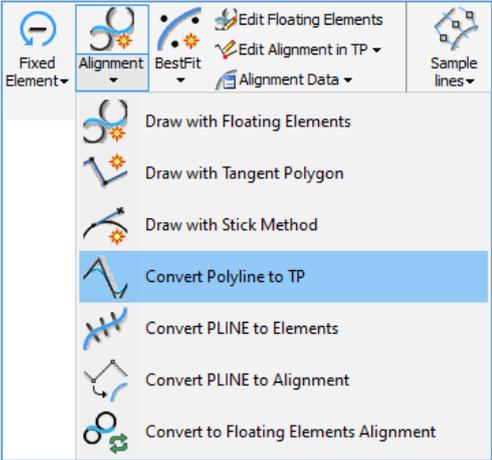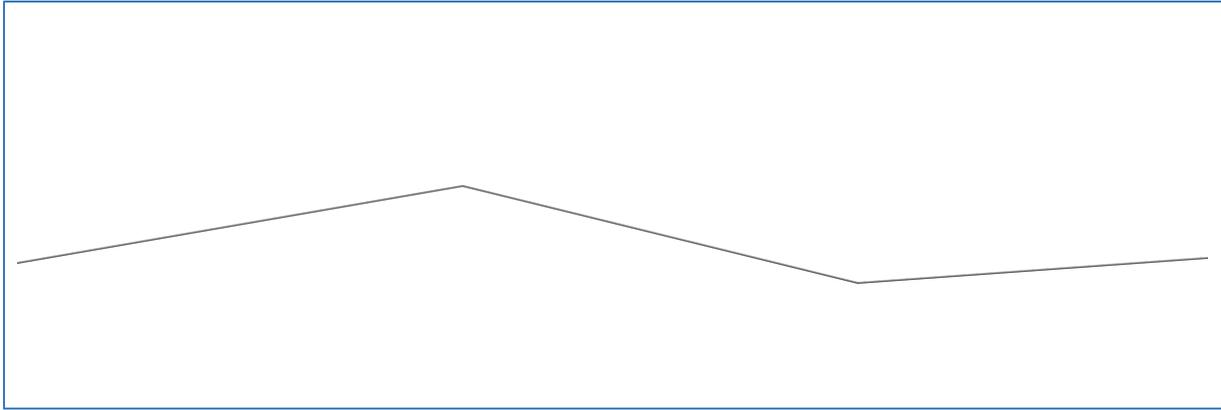
3. In *Create Tangent Polygon* click *OK*.

4. In *Draw lanes and widenings* select vehicle combination to calculate widenings.

5. The program converts a polyline to a tangent polygon.
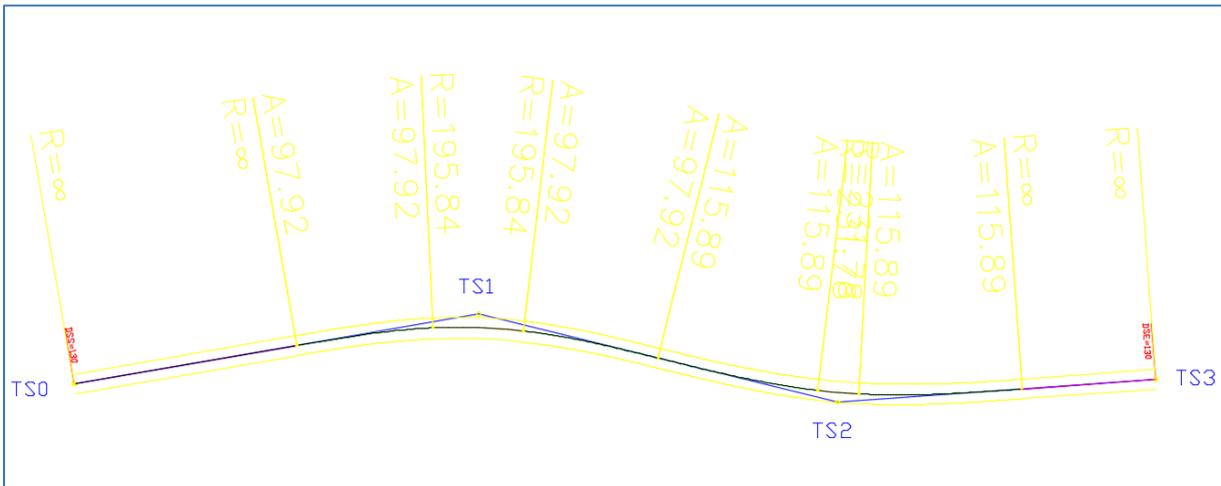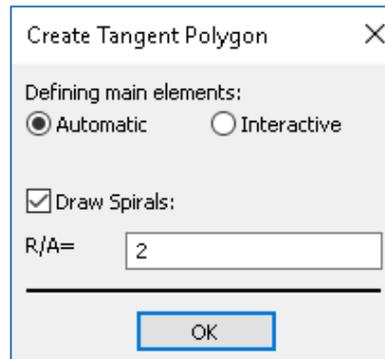
5. Convert Pline to Alignment

With command Convert Pline to Alignment, you can convert two-dimensional polyline in the horizontal elements of an axis.

1. Draw a polyline and arc.

2. Click on Convert PLINE to Alignment icon and select the polylines/arcs.

3. Straight polyline sections are converted to tangents and arcs to curves.

4. After converting the polyline to horizontal alignment elements, the original polyline is automatically erased from the drawing.

6. Create Best Fit Alignment

The command Create BestFit Alignment on the basis of the given sequence of points or the polyline calculates and draws BestFit alignment that best fits the given elements.

1. Click on Create BestFit Alignment icon.

2. After the start of the command *Bestfit Alignment* dialog box appears.

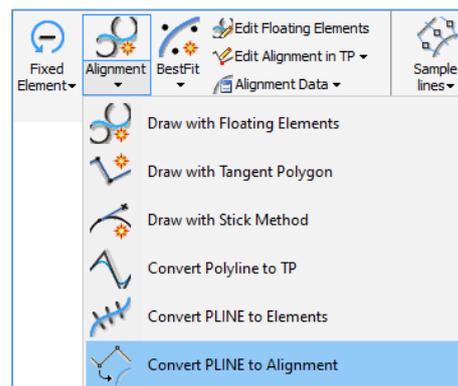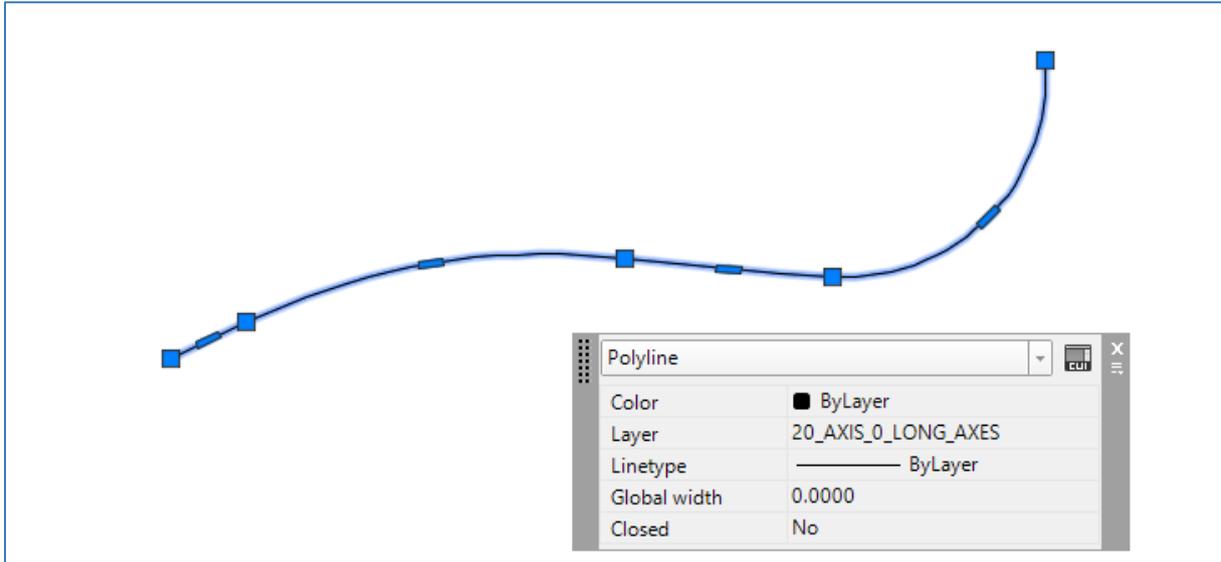3. As input data, it is possible to give one or two (parallel) sequences of points or one or two (parallel) polylines, where the program can read points from.
First specified whether BestFit alignment will be created from one or two sets of input objects.

- If you select option *One string*, the alignment will be created through a single set of blocks or Polyline vertices, representing roadway/railway alignment.
- If you select option *Two strings*, then it's required to select two different values for block's attributes, representing right and left roadway edges.
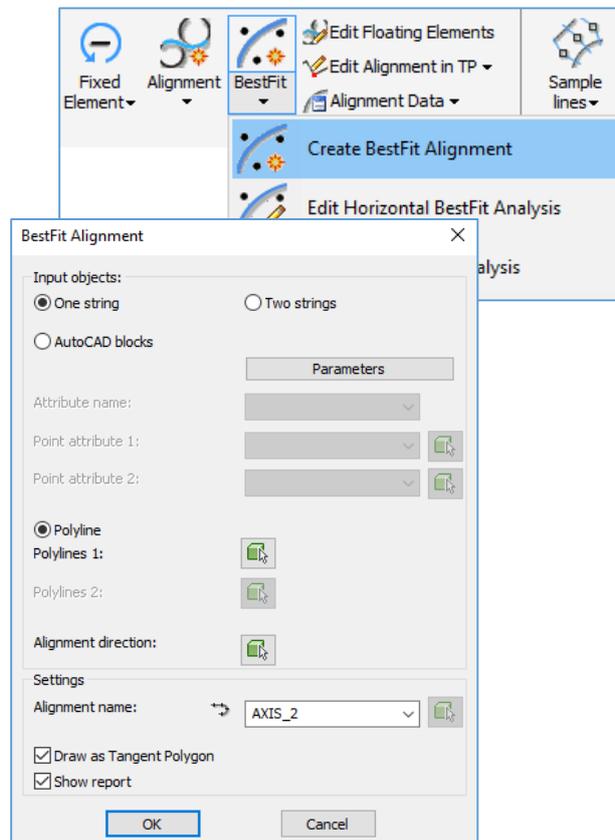
4. In the next step define what kind of data will be used.
   - If you select the *AutoCAD blocks,* you can define *Weeding setting* under *Parameters* button, which opens the right dialog box.

After defining the weeding options press *OK* and continue with the selection of the value of a point attribute that will be used for creating the BestFit alignment. In the *Attribute name* pull down menu select the attribute name of points and then in the *Point attribute* choose the value of a point attribute that will be used to create the BestFit alignment.

   - If you want to create a BestFit alignment from polyline, choose *Polyline* check box and select the polyline that will be used to create the alignment.
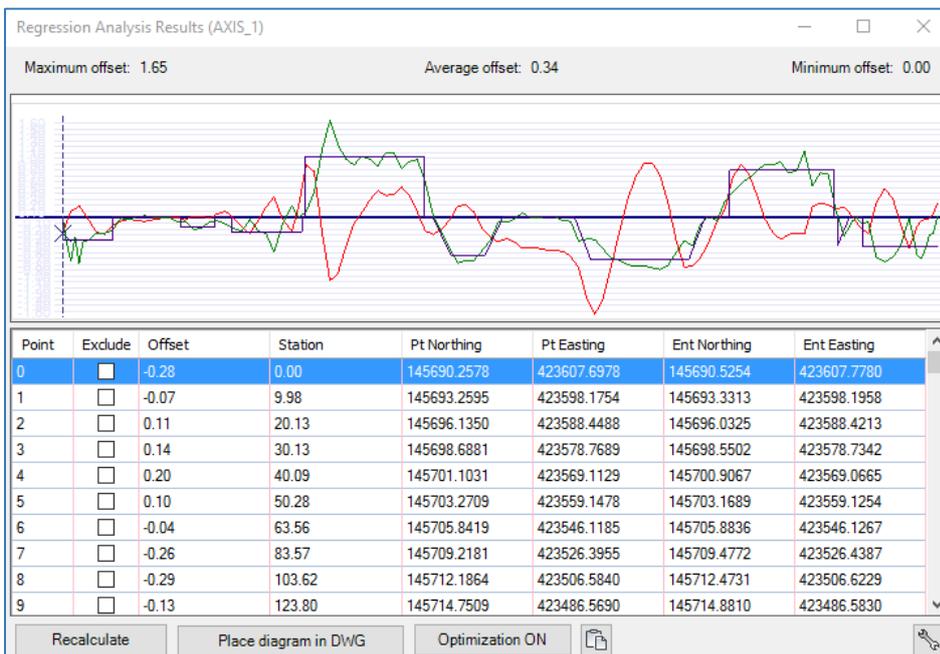
   -

5. Check *Draw as Tangent Polygon* to design an alignment with tangent polygon.
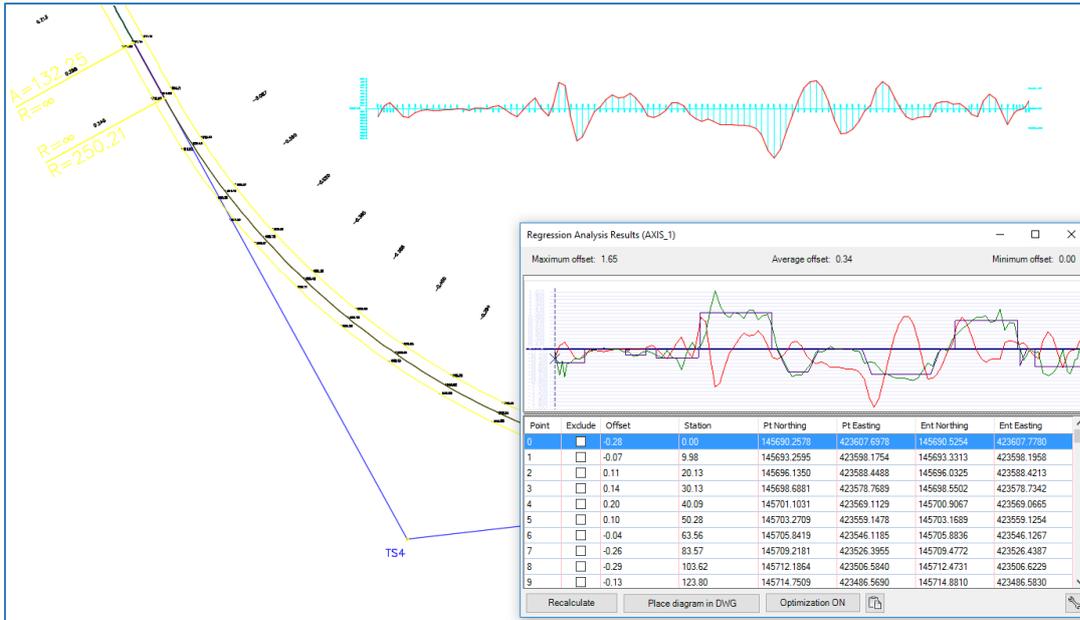
6. Check the *Show report* check box to draw BestFit reports, including the regression analysis result.
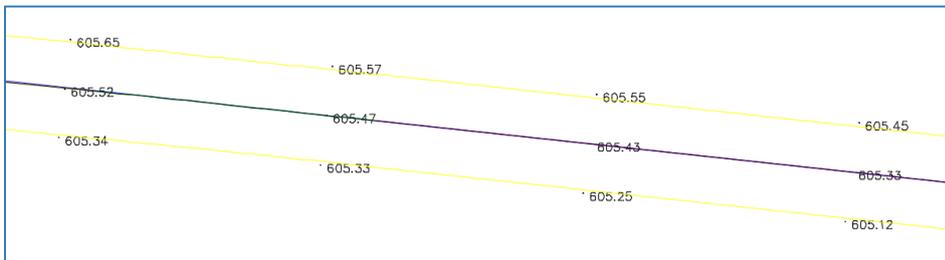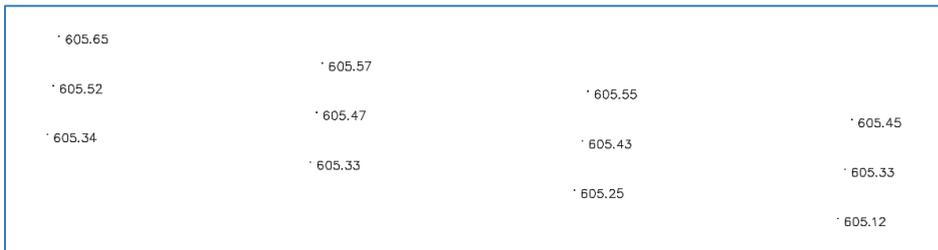
7. Confirm with *OK.*

8. In Draw lanes and widenings select vehicle combination and confirm with OK to draw the widenings.

9. Output data is the alignment with main elements that best follows the course of the given elements. To input regression analysis results in the drawing select *Place diagram in DWG* and define the location of the report in the drawing.

Weeding options dialog box:

Spirals
R/A: 1.0
Detect straight lines
min R/A: 3.0
Draw centerline
   Draw centerline as Intersection line
Weed
Angle Tolerance: 0.000
Suplement
Distance 1.000
Optimization of elements (can take a long time)
OK   Cancel

Regression Analysis Results (AXIS_1)

Maximum offset: 1.65   Average offset: 0.34   Minimum offset: 0.00

Point	Exclude	Offset	Station	Pt Northing	Pt Easting	Ent Northing	Ent Easting
0	☐	-0.28	0.00	145690.2578	423607.6978	145690.5254	423607.7780
1	☐	-0.07	9.98	145693.2595	423598.1754	145693.3313	423598.1958
2	☐	0.11	20.13	145696.1350	423588.4488	145696.0325	423588.4213
3	☐	0.14	30.13	145698.6881	423578.7689	145698.5502	423578.7342
4	☐	0.20	40.09	145701.1031	423569.1129	145700.9067	423569.0665
5	☐	0.10	50.28	145703.2709	423559.1478	145703.1689	423559.1254
6	☐	-0.04	63.56	145705.8419	423546.1185	145705.8836	423546.1267
7	☐	-0.26	83.57	145709.2181	423526.3955	145709.4772	423526.4387
8	☐	-0.29	103.62	145712.1864	423506.5840	145712.4731	423506.6229
9	☐	-0.13	123.80	145714.7509	423486.5690	145714.8810	423486.5830

Recalculate   Place diagram in DWG   Optimization ON

An example of a sequence of points:

An example of a sequence of two polylines: