Liscad Alignments

Manager's Summary:

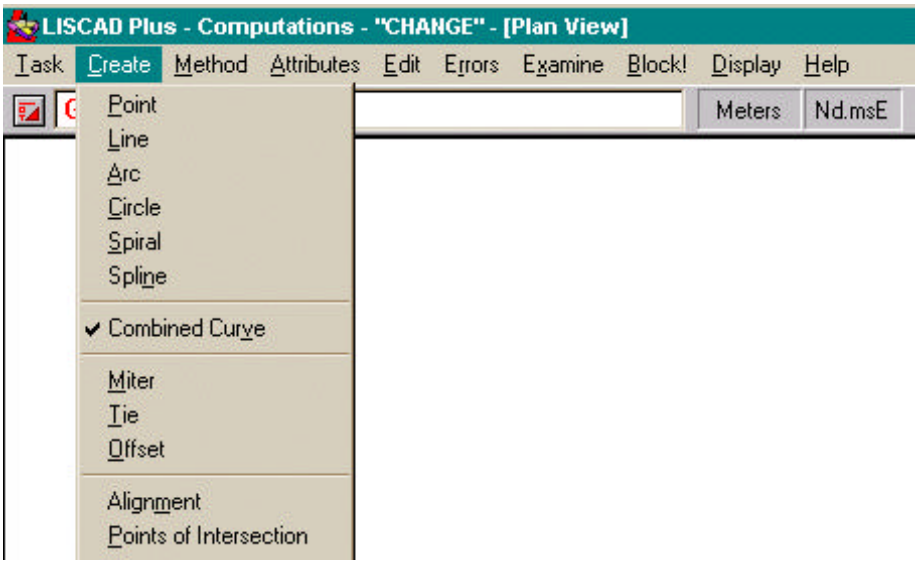
The alignment functionality is useful for creating alignments in Liscad to be used in the field for stakeout. Liscad alignments would be needed when the need for an alignment arises and no InRoads alignment data is available. Alignments used in conjunction with Liscad Coordinate Geometry can aid the field surveyor to efficiently perform the job.

User's Summary:

In Liscad, create points, lines, spirals, curves and combined curves as needed to represent the desired alignment. Source data could be any document that shows the data needed to construct the alignment. Construction plans or Right of Way maps for example.

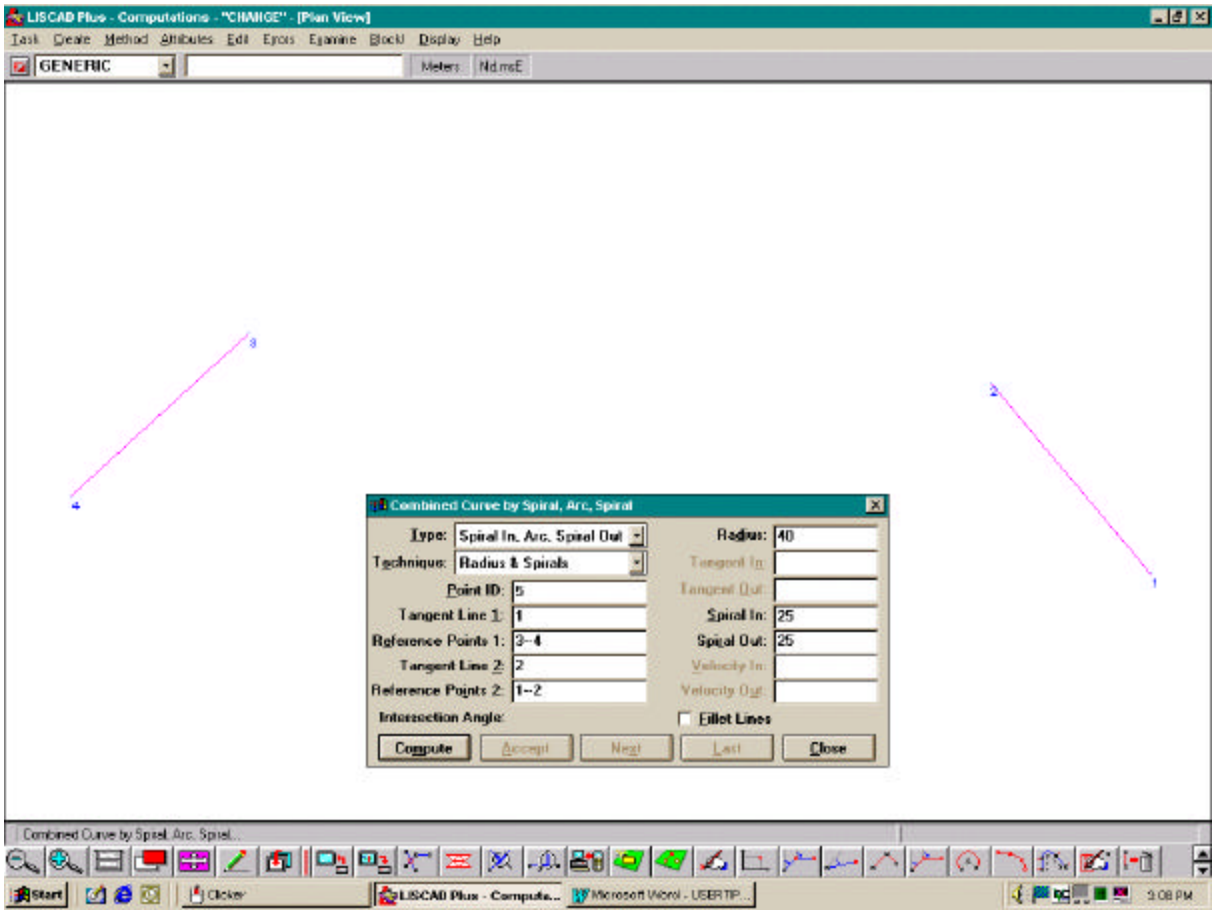
Technical Details:

Open Liscad. In the computations task create the configuration of the alignment by creating points, lines and curves to represent the desired alignment layout. If creating spiral, arc, spiral, which is common, use the combined curve option using the spiral and radius method.



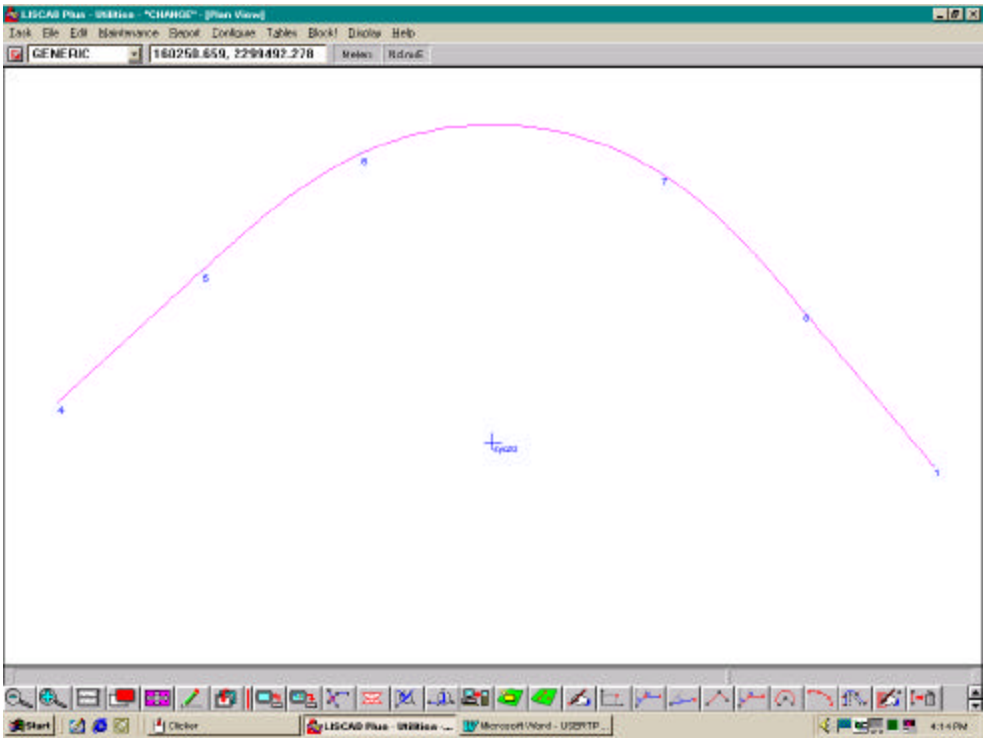
In this example two tangent lines are created. Next, in the **Computations Task<Create combined curve**. In the dialog box the type should be **Spiral In, arc, Spiral Out** and technique set to **Radius & Spirals.**

Activate the point ID field by clicking in it. Next click on the tangent line between points 3 and 4. The fields in the dialog box, Tangent Line 1 and Reference Points 1, will fill in. Repeat this for the line between points 1 and 2. Fill in the Radius field, in this example it is 40. Fill in the Spiral In and Spiral Out lengths, In this example, 25 for both.



Click on **Compute.** A temporary curve will be drawn in Liscad. If the curve looks correct, click in **Accept.** The curve will then be written to the screen.

New points are created automatically at the curve control points and at the radius point. You should delete the original points that were duplicated by the new. If you do not, there may be a conflict when the alignment is created. In this example delete points 2 and 3. See page 3 for the results.

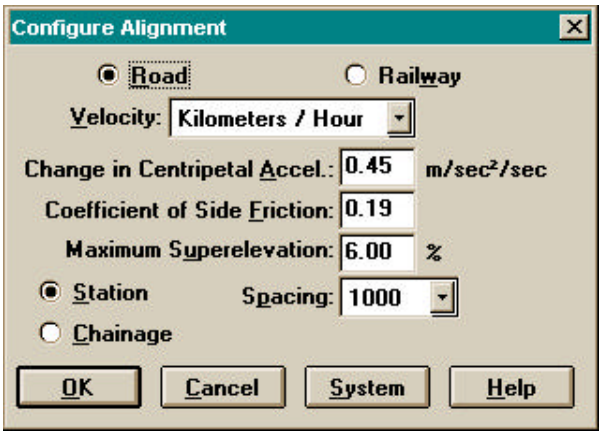


The next step is to configure alignments in the **Utilities <Task<Configure<Alignments**. The configuration shown below is typical for a metric project. Be sure that Station is selected and spacing 1000. Spacing of 1000 indicates that a metric station is 1000 meters. If using English units, spacing is 100 feet, which is a typical station.

The Road and Railway radio buttons differentiate between arc (road) and chord (railway) curve definition.

Once the configuration is done you save these settings by clicking on system. This is a one-time setup but should be checked to be sure that it is the way you need it to be.

Station radio button sets the display to 0+000. Chainage displays the distance from the beginning of the alignment as 0.000.



The convention of assigning attributes applies to alignments just as with any other element in Liscad. Go to **Computations Task<Attributes<Alignment**.

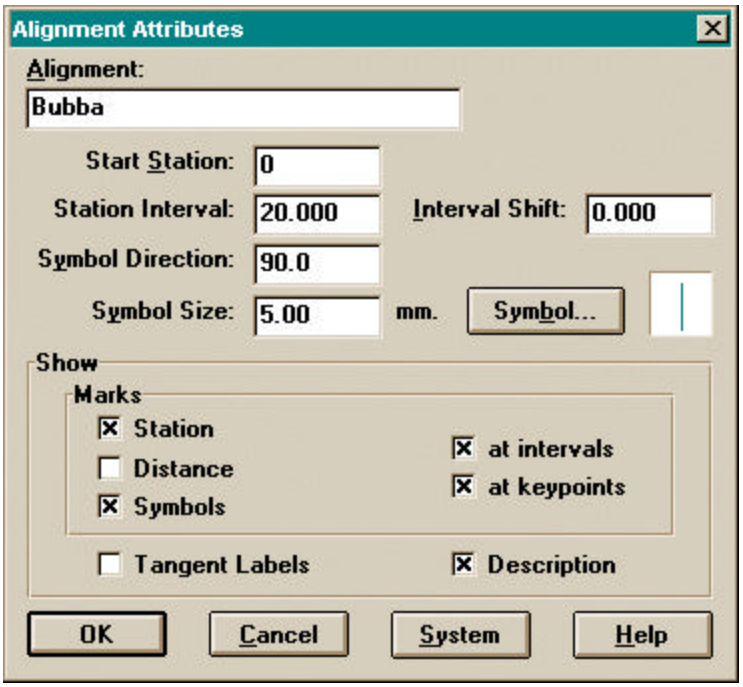
The alignment attributes dialog box as shown below allows you to specify certain things in the alignment. In this example, the name of the alignment is Bubba. If no name is specified, the default name will be Align 1 for the first and Align 2 and so on.

The Start Station is to enter the station of the beginning of the alignment to insure that the stationing is right. If the stationing is not right, go to **Computations Task<Edit<Alignment<Modify Station**.

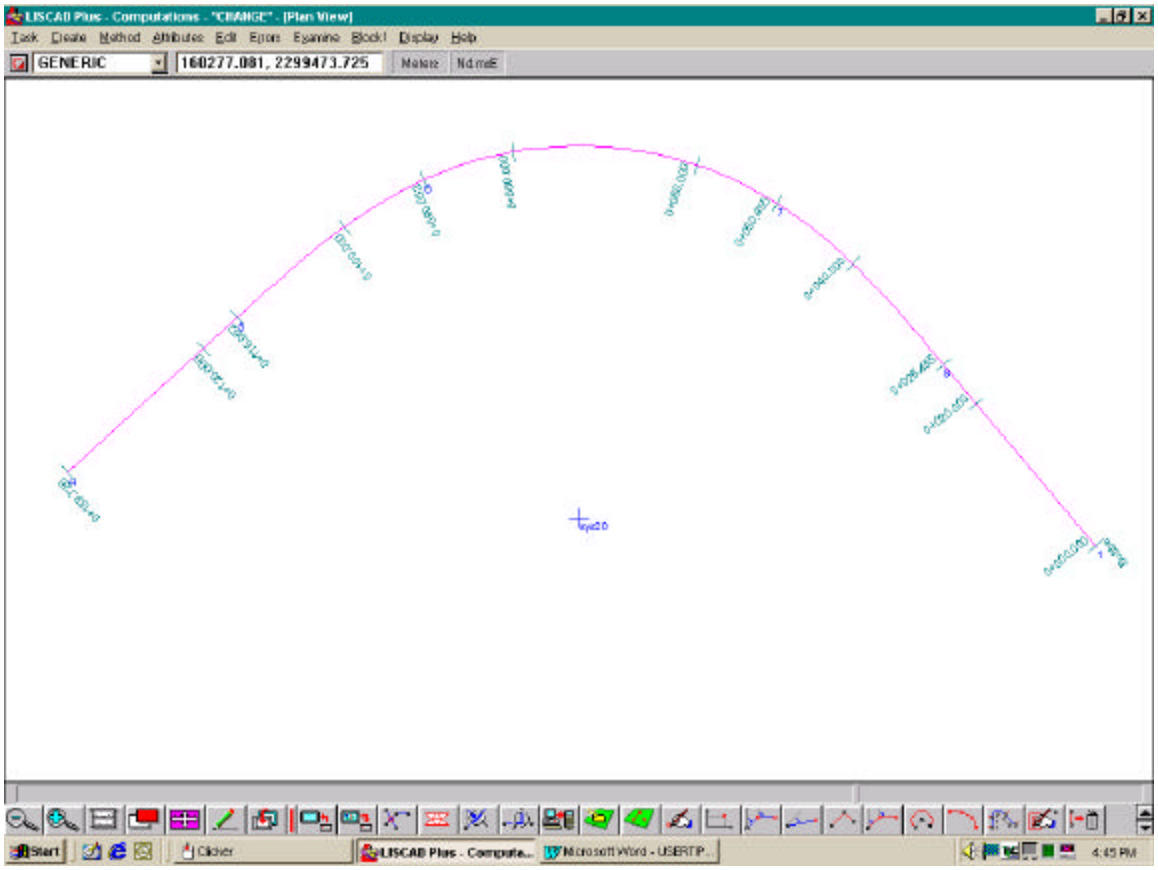
Specify a station interval. This example uses 20.

The first time you will have to select a symbol for the tic marks. The symbol can be chosen by clicking on the Symbol button.

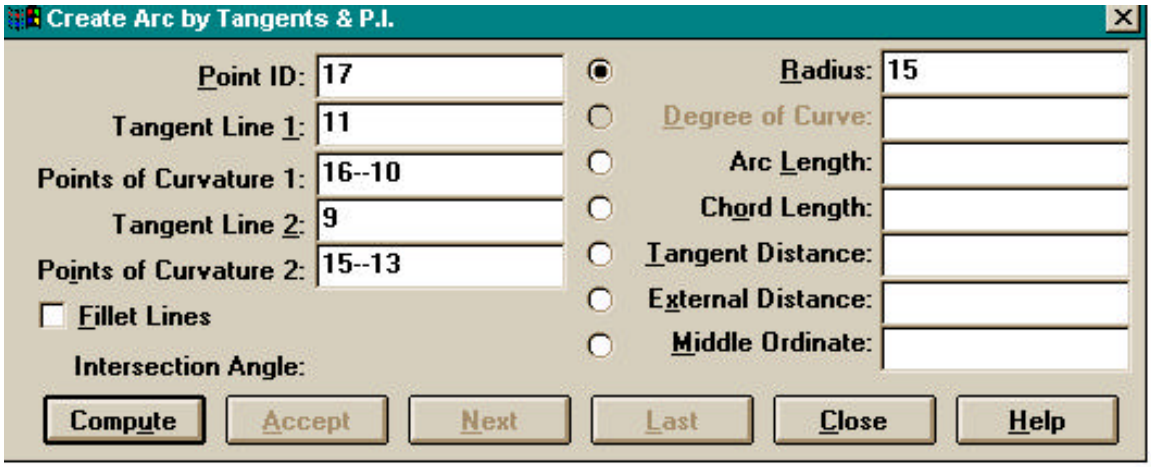
The lower portion of the dialog box has user definable check boxes to show certain things about the alignment.

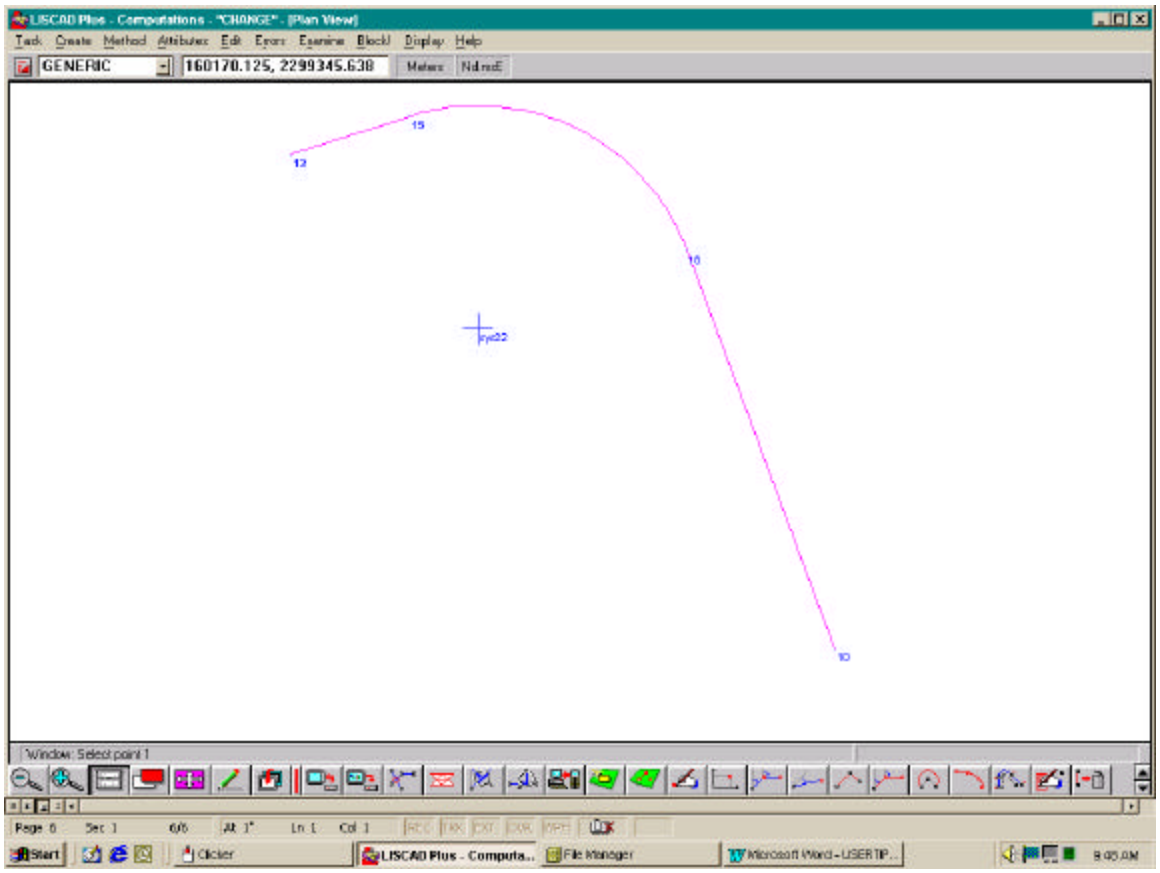


The alignment can now be created. In the **Computations Task<Create Alignment**. Select which method to use. Several methods are available. The easiest to use is **Trace**. To use this method simply click near the beginning of the alignment. The alignment is created and is shown on page 5. If stationing goes the wrong direction, go to **Computations Task<Edit<Alignments<Reverse**.



Circular or simple curves can be constructed in a similar manor. Arcs can be created by various methods. The most useful is the create arc by Tangent and P.I. method. Click on tangent lines one and two to fill in the fields in the dialog box shown below. Fill in the radius or select and fill in the Arc Length, Chord Length,Tangent Distance depending on which values are known. Click on **compute** and then on **Accept** if right.



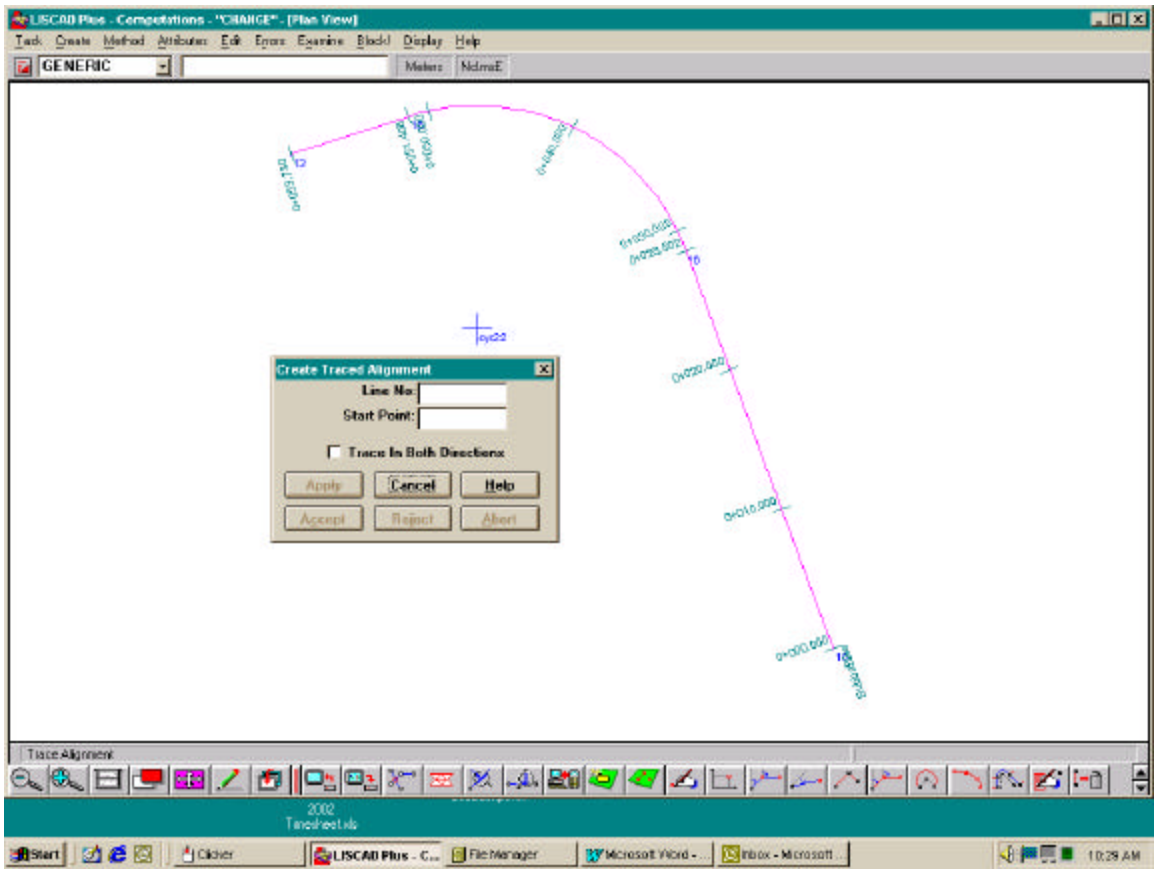


The results of the arc creation are shown above. As in the creation of the combined curve creation, this method creates duplicate points at the beginning and end of the arc if the tangent lines were created. Before creation of the alignment you will need to delete the original points leaving a single point. This is important because when creating the alignment if two points represent the same location the alignment may not be created past this point.

Having created the lines and arc where you want the alignment to be you can then create the alignment. Remember to go to set the attributes for this alignment in the **Computations Task<Attributes <Alignment**. Name the alignment and specify the beginning station.

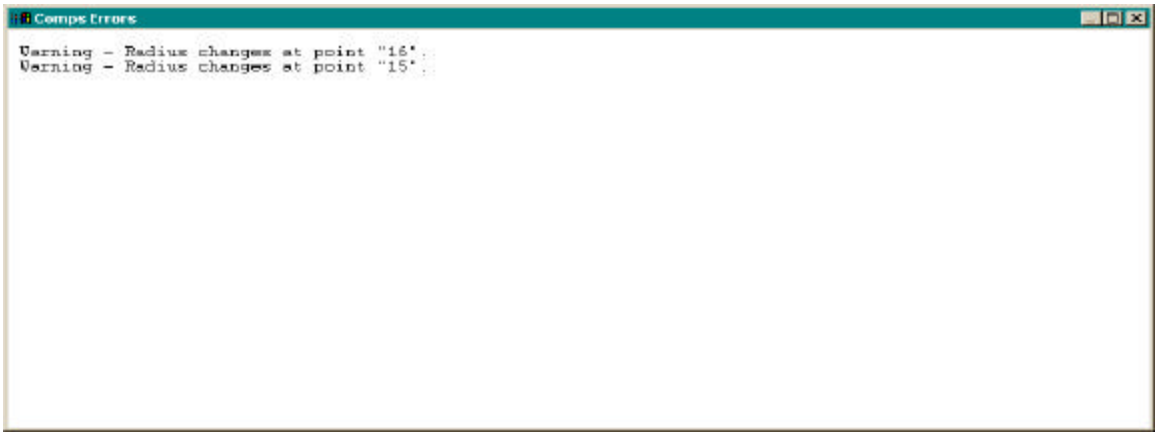
In the **Computations Task<Create<Alignment<Method<Trace**. Click near the beginning of the alignment and the alignment will be created.

See page 7 for the results.

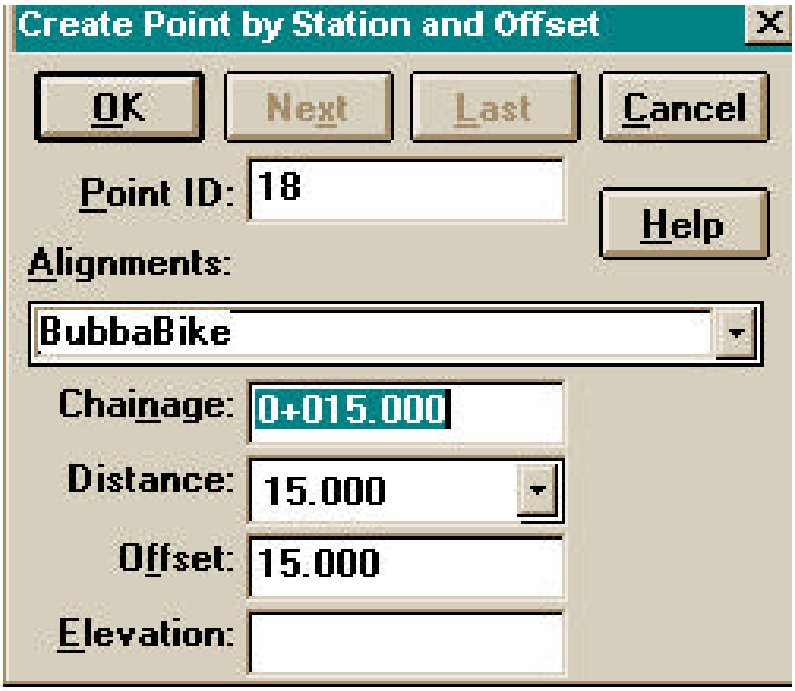


To validate or check the alignment, go to the **Computations Task<Examine<Validate** Alignment. Errors and warnings will be shown and a button to view or print will be shown.

When validating an alignment that contains circular curves, a warning appears, indication that the radius changes. This, although irritating, is just a warning and does not adversely affect the alignment.

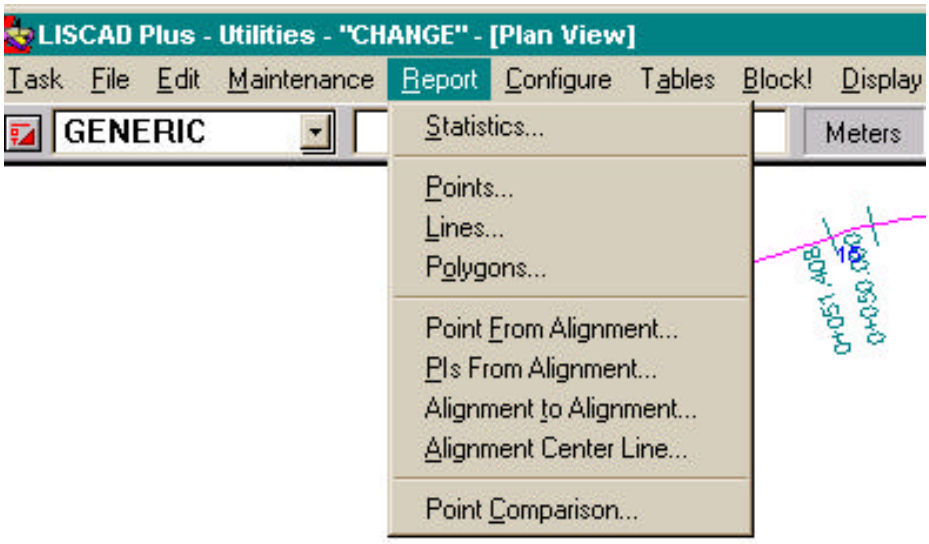


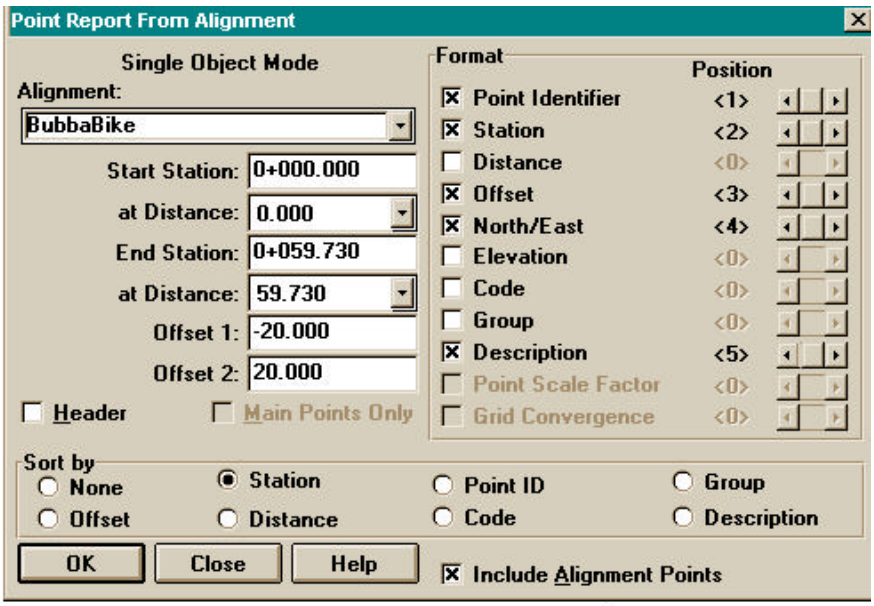
Points can be created by station and offset from the alignment. In the **Computations Task<Create Point<Method<Station & Offset**. In the dialog box shown below, select the alignment, In this example BubbaBike, enter the Station in the chainage field, the desired offset in the offset field and an elevation in the elevation field if needed. Click **OK.** The point will be created.



Points can be created using any of the point creation methods to place points in needed locations for stakeout.

Four reports can be generated for alignment. Point from Alignment, Pis from Alignment, Alignment to Alignment and Alignment centerline.

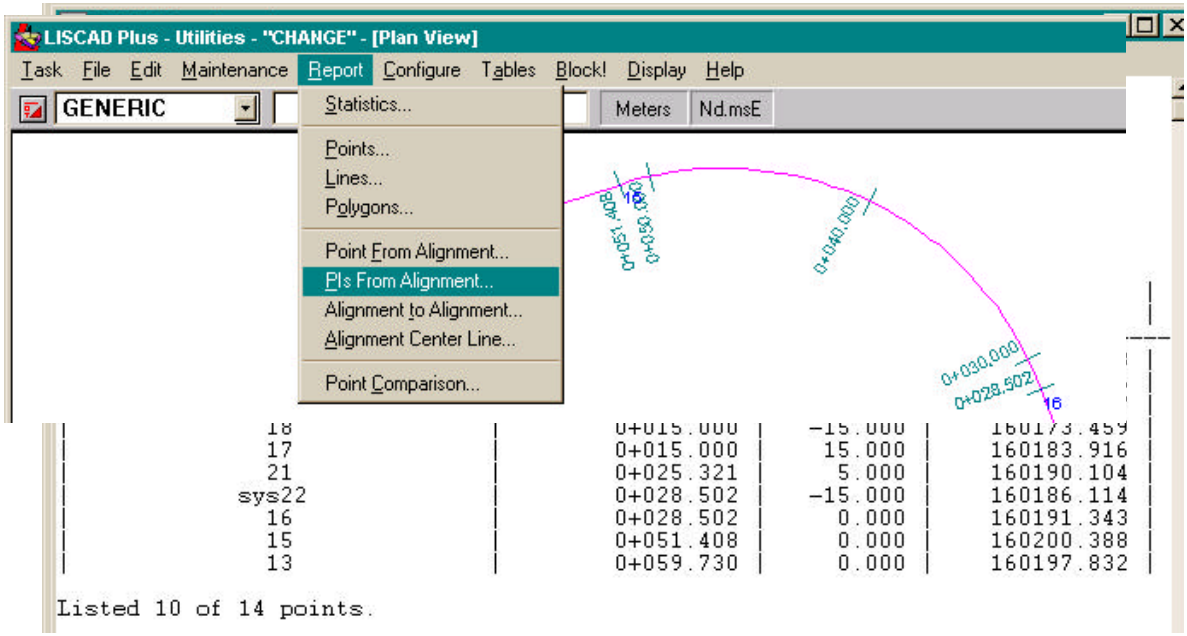




Point Report From Alignment

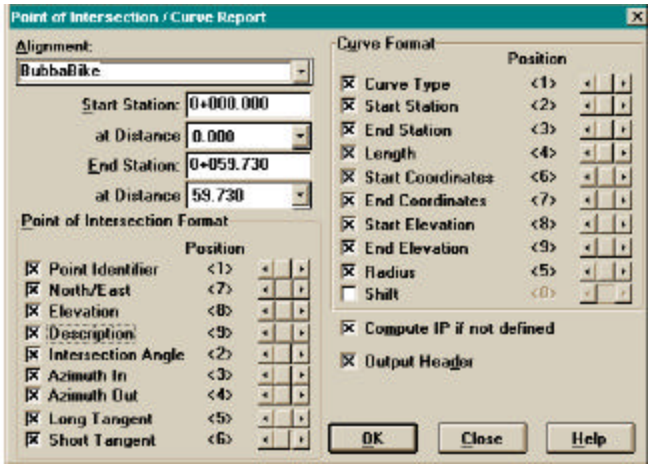
In this example, BubbaBike alignment is selected. The input used is Offset 1 = 20.000 left and Offset 2 = 20.000 right. The format is user definable. The selected format is Point Identifier in the first position, Station in the second position, Offset in the third position, North/East in the fourth position and Description in the fifth position. It is sorted by Station.

This report (shown below) will report all points, which fall inside the specified 40 meter corridor, 20 meters each side of the alignment plus the alignment centerline points. Uncheck Include Alignment Points if the offset points only are needed.



Points Of Intersection/Curve Report

The PIs From Alignment report is also user definable to report on the details of and alignment. An example is shown below.

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LISCAD Plus Report: Point of Intersection Report
Tuesday, February 05, 2002   13:04

                    File: CHANGE
              Projection: Plane grid
               File Date: Thursday, November 15, 2001
             Survey Date: 25 October, 2001
              Field Party: 7142
                Operator: brinton
             Description: Creating alignment L1 vilnis

Distance Units: Meters


Alignment: BubbaBike

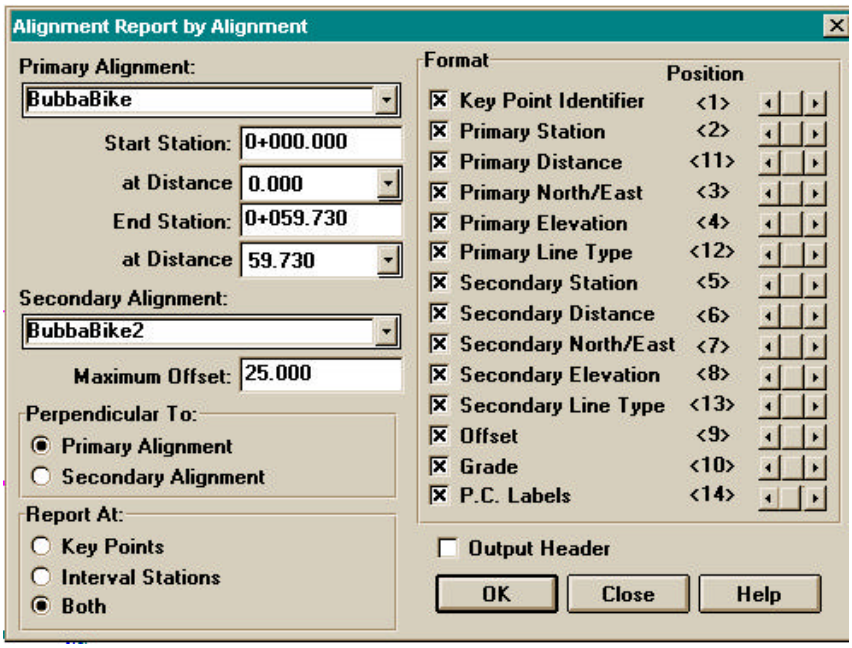
        Intersection Angle   :   N87°29'38"W
                Azimuth In   :   N20°24'01"W
               Azimuth Out   :   S72°06'21"W
              Long Tangent   :   14.358
             Short Tangent   :   14.358
                     North   :   160204.800
                      East   :   2299367.900


                Curve Type   :   Arc
                TC Station   :   0+028.502
                CT Station   :   0+051.408
                    Length   :   22.906
                    Radius   :   15.000
                TC North     :   160191.343
                TC East      :   2299372.905
                CT North     :   160200.388
                CT East      :   2299354.237
```

The third report is Alignment to Alignment. This is used to report between two alignments. Pick a primary and a secondary alignment. Define which alignment to report perpendicular to. Define which points to report, Key Points, Interval Stations or both.

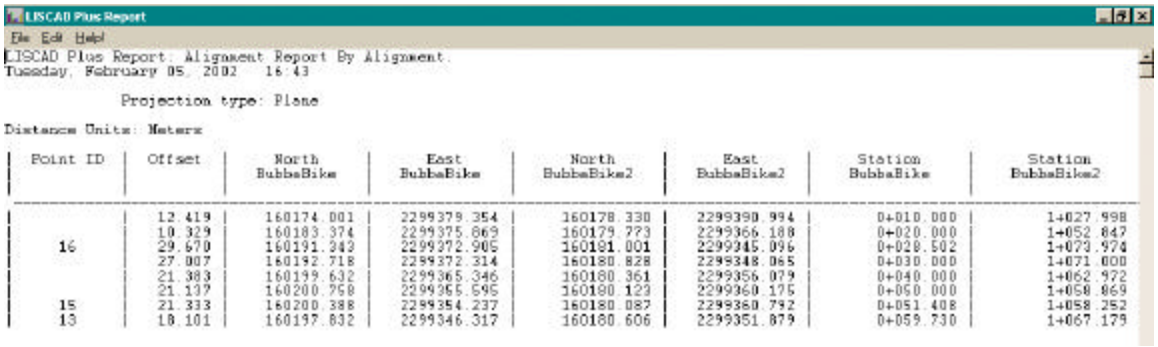
The user format and position are user definable depending on what your needs are.

Maximum Offset is a required field. Enter the maximum offset from the primary alignment beyond which any secondary alignment relationship will not be reported.



Alignment To Alignment Report

The following page shows two alignments, BubbaBike and BubbaBike2. Below is an example of the report showing the relationship between the two alignments. Part of the report is not shown because it is a very wide report.



LISCAD Plus Report

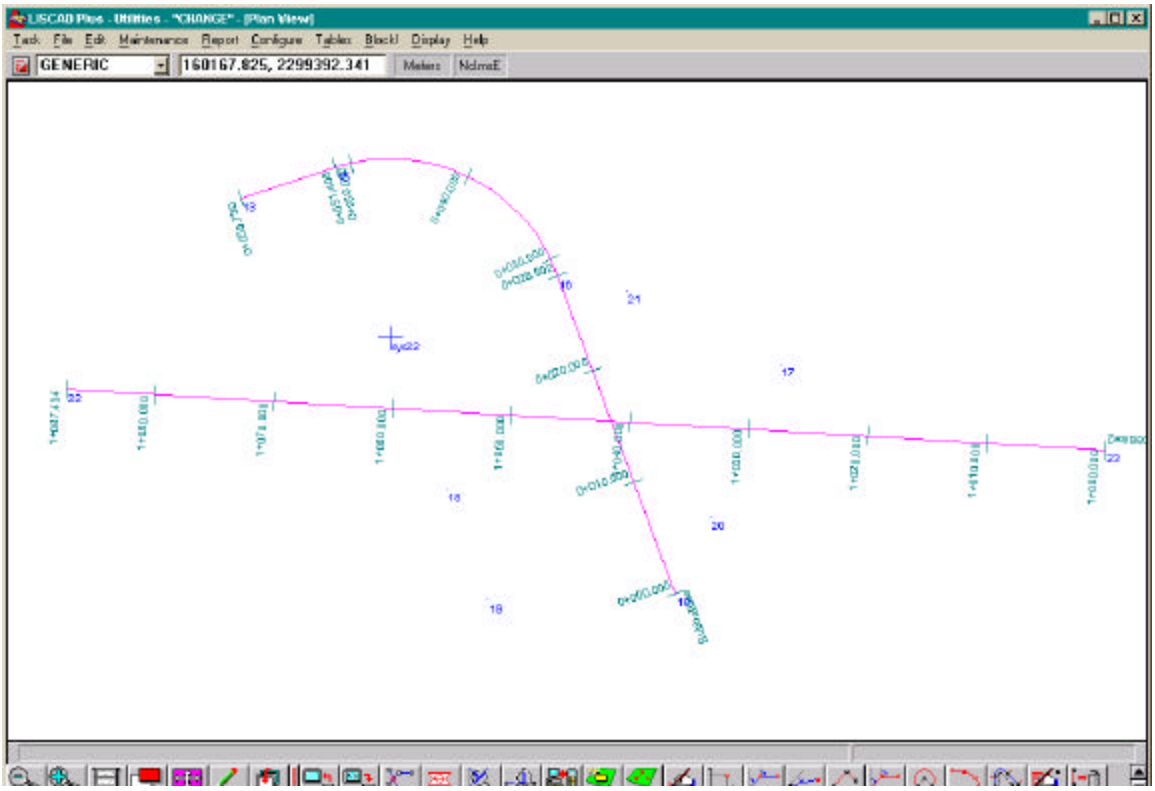
File Edit Help

LISCAD Plus Report: Alignment Report By Alignment
Tuesday, February 05, 2002 16:43

Projection type: Plane

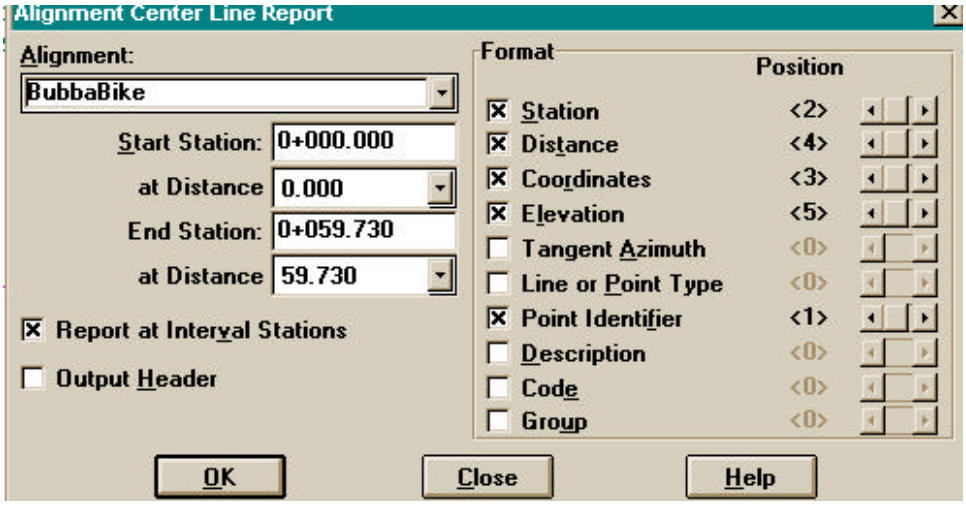
Distance Units: Meters

Point ID	Offset	North BubbaBike	East BubbaBike	North BubbaBike2	East BubbaBike2	Station BubbaBike	Station BubbaBike2
	12.419	160174.001	2299379.354	160178.330	2299390.994	0+010.000	1+027.998
	10.329	160183.374	2299375.869	160179.773	2299366.188	0+020.000	1+052.847
16	29.670	160191.343	2299372.905	160181.001	2299345.096	0+020.502	1+079.976
	27.007	160192.718	2299372.314	160180.828	2299348.065	0+030.000	1+071.000
	21.383	160199.632	2299365.346	160180.361	2299356.079	0+040.000	1+062.972
	21.137	160200.758	2299365.595	160180.123	2299360.175	0+050.000	1+058.869
15	21.333	160200.388	2299354.237	160180.087	2299360.792	0+051.408	1+058.252
13	18.101	160197.832	2299346.317	160180.606	2299351.879	0+059.730	1+067.179



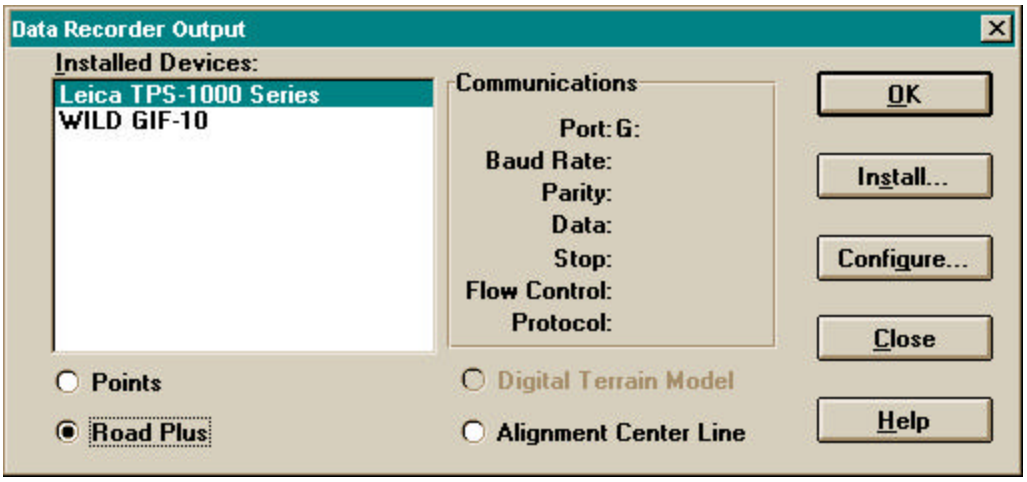
Alignment Report

The final report is an Alignment Centerline Report. It is to report only on the centerline. The dialog box shown below is much the same as the others. Select the alignment and define what you want reported and the order in which they are in the report.

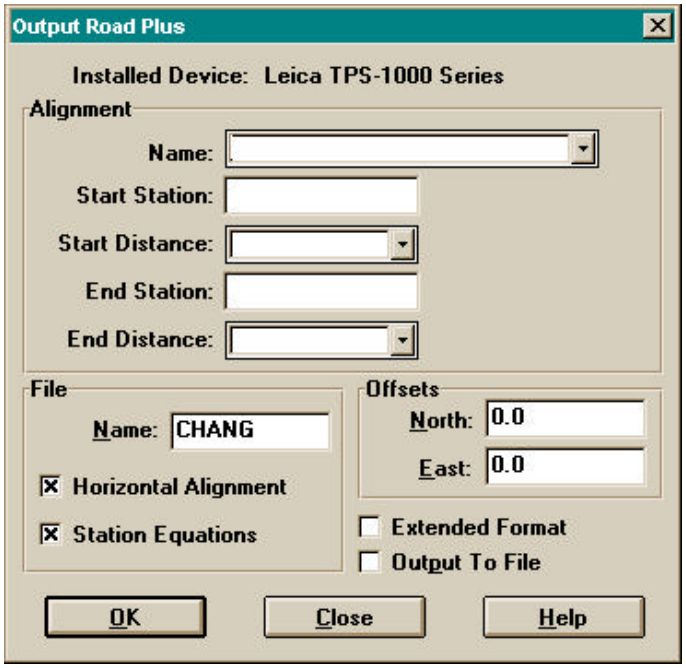


To output the alignment from Liscad and translate to GSI format on the PCMCIA card is much the same as outputting coordinates, with a couple of twists.

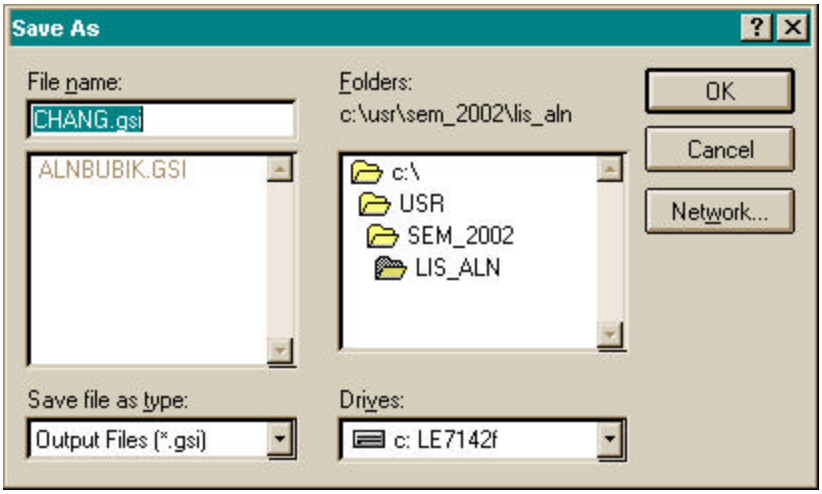
Go to the **Field Transfer Task<Output<Data Recorder.** For use with RoadPlus, check the radio button next to **Road Plus**. Under installed devices, select **Leica TPS-1000 series**. If the communications port is consistent with the card slot on your computer, the data can be sent directly to the card. If not click on configure and select the port that your card is in.



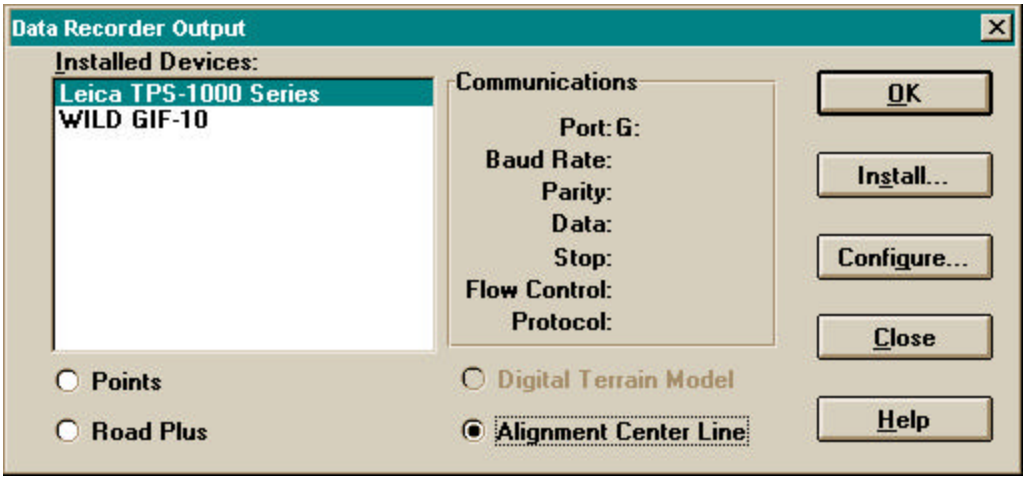
Click **OK**. The Output Road Plus dialog box will come up. Select the alignment to output, check **Extended Format** (16 character GSI Format.) Extended format is recommended for stakeout. Click **OK**. A message will ask if the Data Recorder is ready. If it is Click **OK** and the alignment will be sent to the PCMCIA Card.



Output to a file is another option. Check the **Output To File** box and click **OK**. The dialog box shown below will appear. Name the file and specify the path where the file will be located. Click **OK**. The file would then need to be moved to the PCMCIA Card before use in the TCA 1800.



Another option is to output the Alignment Centerline. This is done by checking the **Alignment Center Line** radio button. This option outputs the centerline coordinates for stakeout without using RoadPlus.



Below is a GSI file of the Alignment centerline output.

*110001+0000000000000010 81..10+0000002299379354 82..10+0000000160174001
*110002+0000000000000010 81..10+0000002299382840 82..10+0000000160164628
*110003+0000000000000013 81..10+0000002299346317 82..10+0000000160197832
*110004+0000000000000015 81..10+0000002299354237 82..10+0000000160200388
*110005+0000000000000016 81..10+0000002299372905 82..10+0000000160191343
*110006+0000000000000020 81..10+0000002299375869 82..10+0000000160183374