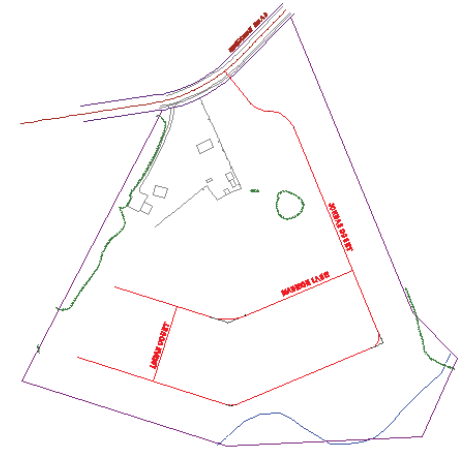


Chapter 5

- Designing in 2D Using Alignments
 - Topics
 - Understanding alignments
 - Creating alignments from objects
 - Creating alignments using the Alignment Creation Tools
 - Editing alignments
 - Applying design criteria files and check sets

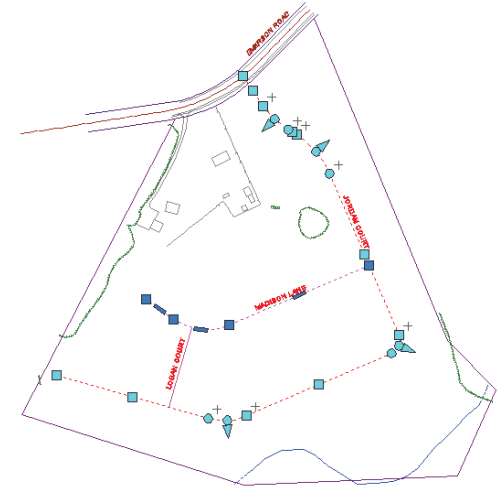
Understanding Alignments

- For long, linear designs such as roads, railroads, channels, and pipelines
- The initial single-line version of a linear feature
- Serve as the “backbone” for other parts of the design such as the following:
 - Profiles
 - Cross sections
 - Corridors
 - Others

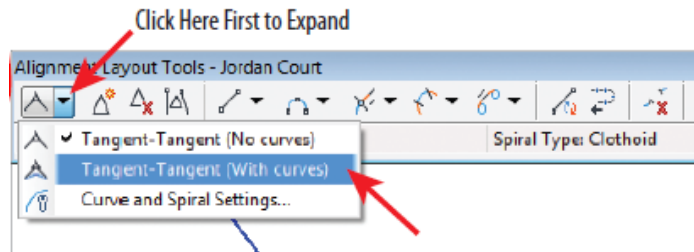


Alignments From Objects

- Sometimes it is easier to draw centerlines using basic AutoCAD.
- Then you can convert the lines, arcs, and polylines to alignments.
- Alignments are “smarter” than basic AutoCAD entities.
 - Geometric relationships such as *fixed* and *floating*



Alignment Creation Tools



- These are tools for drawing alignments “from scratch.”
- They enable curves to be drawn automatically at PIs.
- It is common practice to use temporary geometry to help determine where alignments should be.
- Alignment location is almost always dependent on existing physical and legal boundaries.

Alignment Terminology

ALIGNMENT TERMINOLOGY

Before jumping into the next exercise, you may want to review the following list of terms that you will find throughout the Alignment Creation Tools commands as well as other places within Civil 3D.

Tangents (alignment segments) The straight line portions of an alignment

Tangent (geometric condition):

- ▶ Touching or passing through at a single point
- ▶ In the case of a line and arc: perpendicular to a line drawn from the intersection point to the center point of the arc
- ▶ In the case of two arcs: intersecting in such a way that a line drawn from the center point of one arc to the center point of the other arc passes through the intersection point

Curves The curved portions of an alignment that have a constant radius

Spiral The curved portions of an alignment that change in radius from one end to the other

PI (point of intersection) The place where two tangents intersect or would intersect if they were extended

PC (point of curvature) The place where the curve begins

PT (point of tangency) The place where the curve ends

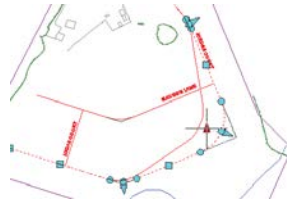
Free A line, curve, or spiral that is dependent on another alignment segment at both ends

Floating A line, curve, or spiral that is dependent on another alignment segment at one end

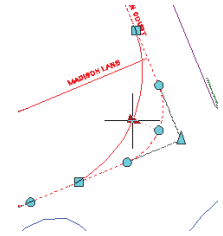
Fixed A line, curve, or spiral that is not dependent on another alignment component at either end

Editing Alignments Graphically

- Grips
 - PI



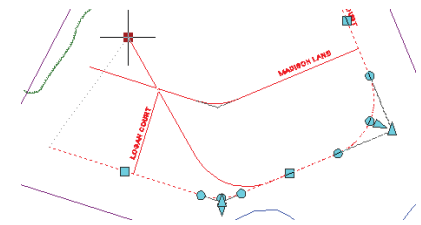
- Radius



- PC/PT



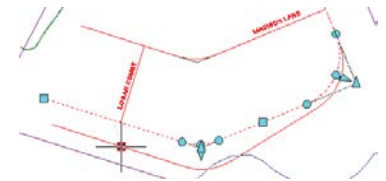
- Start/
End



- Pass-
Thru
Point

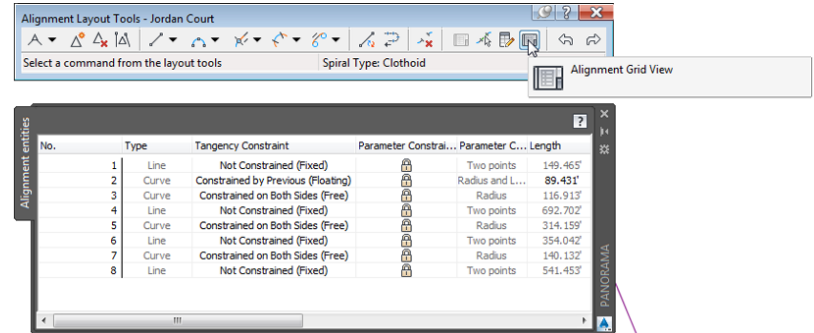


- Tangent
Midpoint

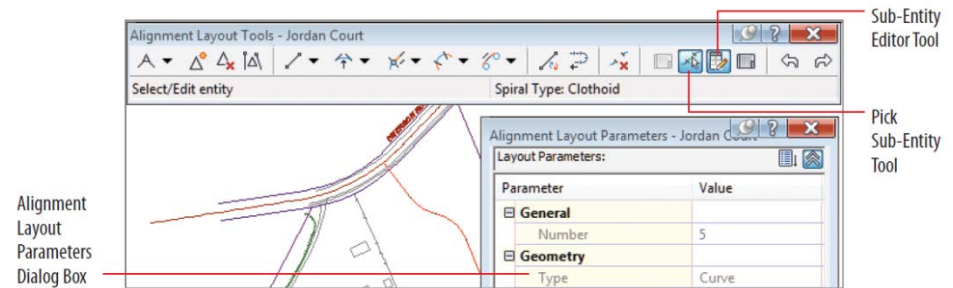


Editing Alignments Numerically

- Alignment Grid View



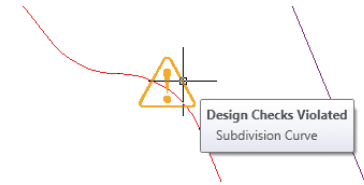
- Alignment Layout Parameters





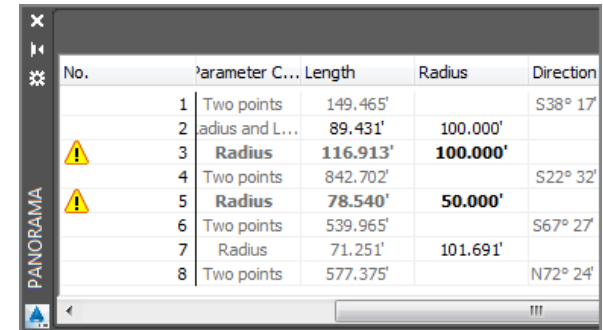
Design Check Sets

- These allow you to incorporate design requirements into your design.
- Design checks do not modify your design; they simply tell you when it's wrong.
- It's up to you to decide whether a violation should be addressed and how to address it.
- One or more design checks is grouped into a *design check set*.
- A design check set is applied from within Alignment Properties.



Design Criteria Files

- They are a bit more sophisticated than design check sets.
- They are stored in separate file with an XML format.
- Civil 3D comes with design criteria files based on AASHTO standards.
- These files can be copied and modified to meet local design standards.
- They behave the same as check sets; they display a warning, but action is up to you.



No.	Parameter C...	Length	Radius	Direction
1	Two points	149.465'		S38° 17'
2	radius and L...	89.431'	100.000'	
3	Radius	116.913'	100.000'	
4	Two points	842.702'		S22° 32'
5	Radius	78.540'	50.000'	
6	Two points	539.965'		S67° 27'
7	Radius	71.251'	101.691'	
8	Two points	577.375'		N72° 24'