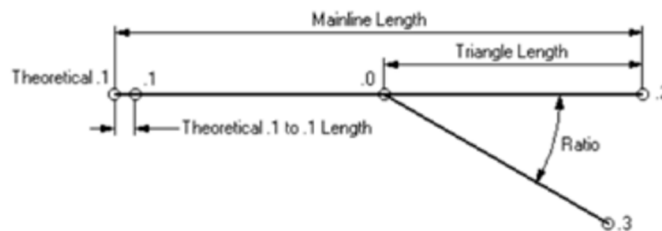
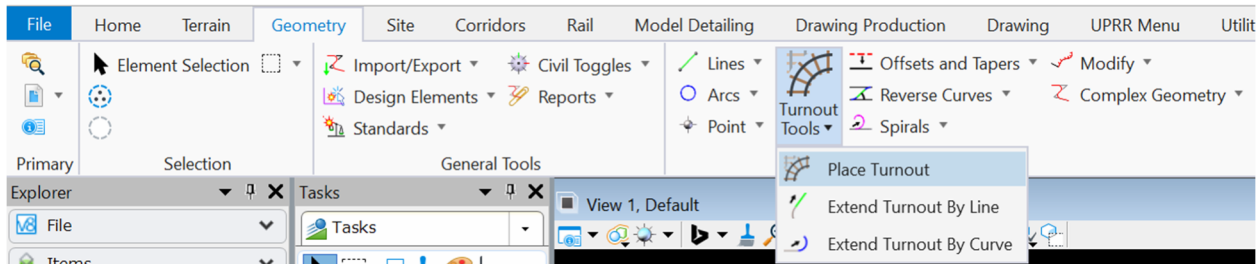


Turnouts Tools and Cells

OpenRail's native turnout tools contain a number of benefits such as laying out geometry, inventorying turnouts, and projecting point of switch locations onto profiles. The delivered Union Pacific Railroad workspace contains turnout definitions for Common Standard turnouts beginning at the point of switch and ending at the last long tie. These turnouts can be placed with "Place Turnout" command by point of switch, point of intersection, ending point on the straight side, or ending point on the diverging side. The software uses a numerical code for these relevant turnout points.



It should be noted that OpenRail's turnout tools model track centerline with an increased level of detail compared to the PI method, which simply takes a tangent between the point of switch and theoretical point of intersection and projects another tangent at the turnout's frog angle from the theoretical point of intersection. OpenRail's turnout tools require at least one curved element. The delivered AREMA dataset models the switch rails and closure curve as the turnout's centerline geometry. The UPRR delivered Common Standard turnouts also incorporate the closure curve.

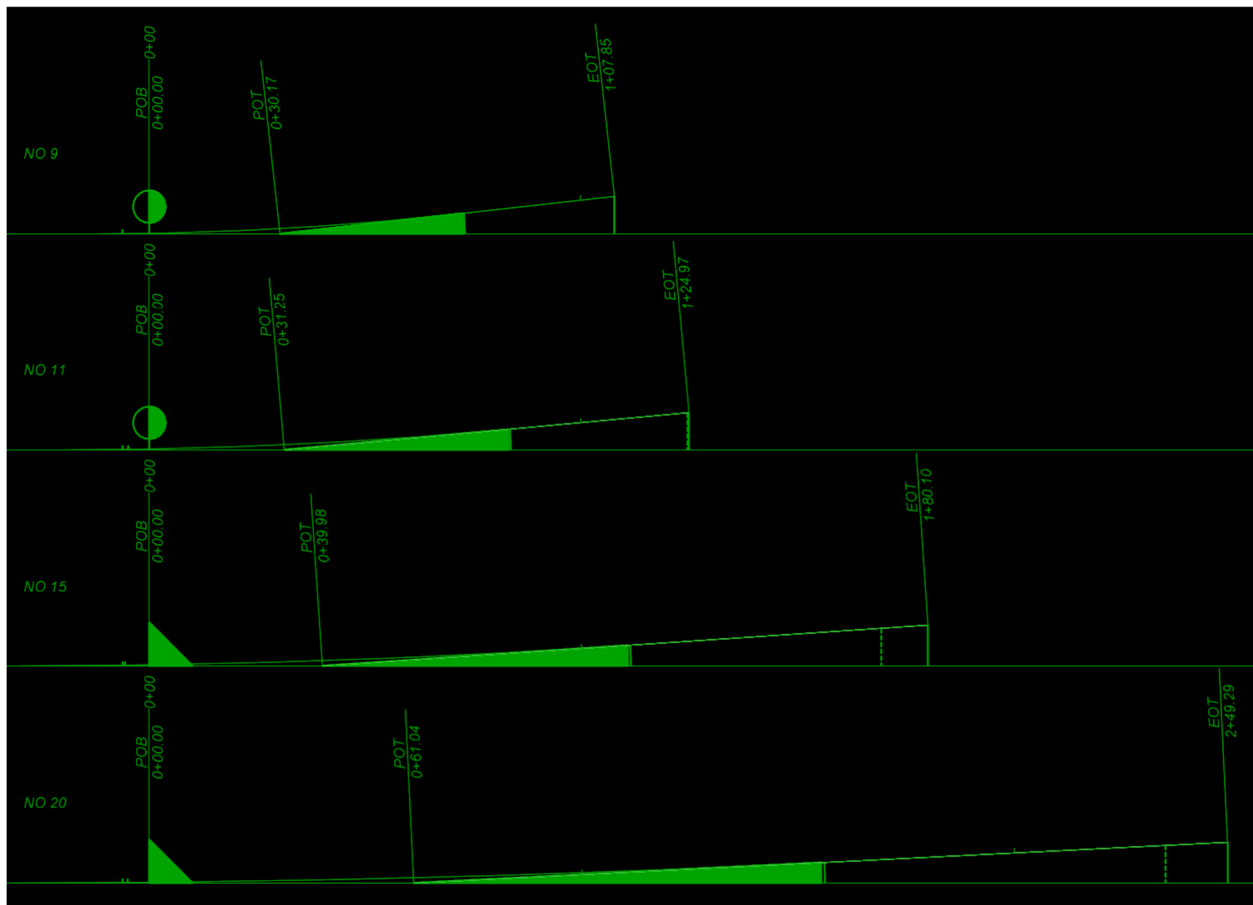
The AREMA Practical Guide to Railway Engineering addresses how stationing is reported through a turnout in Chapter 6:

The true geometries associated within the length of a divergent path of a turnout are complicated enough that several methods for their incorporation into alignment design have been developed to aid the designer. The first method, occasionally known as the 'PI method,' requires the designer to locate the PI of the turnout, thus defining the PS. The alignment chaining begins at the PS and follows the through portion of the turnout to the PI, then deflects the frog angle to the divergent alignment.

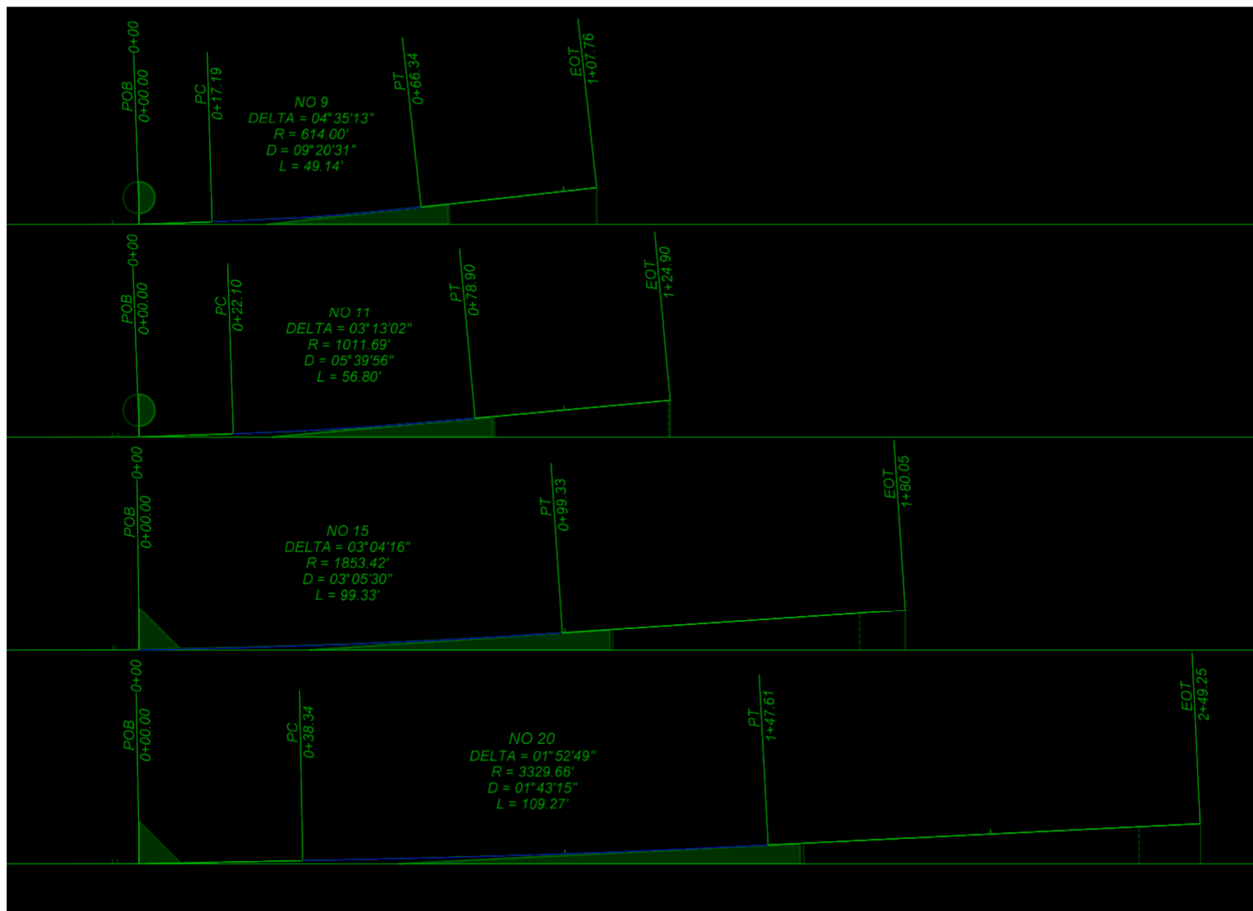
It must be noted from a pure geometric perspective, both methods represent approximations of the true geometry of a turnout. This results in minor differences in stationing through turnouts when both methods are compared. Eastern railways generally dictate the use of the PI method. Many western railways have incorporated the equivalent curve method. Some designers, through the use of computers, have begun to incorporate the actual geometry of turnouts into their alignment designs. Regardless of the method used, it should be noted before construction to avoid confusion.

The difference in stationing between these two methods is noted below:

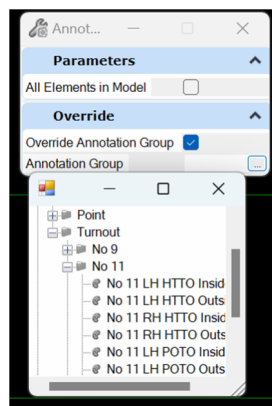
PI Method



Closure Curve



Turnout tools can be used to quickly lay in conceptual alignments especially where OpenRail's parametric geometry is used. Native Microstation cells using the "Place Cell command" will not constrain to points or move dynamically along civil geometry. If the user would like to visually see the turnout cell symbology relative to the centerline turnout geometry, Annotation Groups have been provided to constrain a decorator cell symbol to the turnout feature. These are best applied through the use of "Override Annotation Groups" and applied to each type of turnout individually.



The delivered turnout cell library has been updated with metadata to add capabilities to label and inventory turnouts. A common practice may be to develop alignment centerline geometry with OpenRail's turnout tools, but place the cell within in a trackwork file that contains all the specific business data (see Alignment, Features, and Item Types). The example below demonstrates which fields are auto populated if the legacy dropdown menu is used.

Corridors

Rail

Model Detailing

Drawing Production

Drawing

UPRR Menu

Utilities

Collaborate

View

Help

UPRR General

Text and Dimensions

Track Design

Site - Civil

Straight Line

Turnouts

Basemap

Annotations

Notes (No Box)

UPRR Notes

Contractor Notes

Place Text

Place Dimension

Standard Callouts

Civil Labeler

Place Drawing Area

Left

Right

Hand Throw

Power

Pt. Sw. - Inside

Pt. Sw. - Outside

Pt. Int. - Inside

Pt. Int. - Outside

No. 9


No. 11

No. 15

No. 20

No. 24

Legacy Turnouts




TO Attributes

TO-ID	TO-1
Number	9
Hand	Left
Type	Hand-Throw
Operator	Inside
Switch Rails	
Reference Alignmer	
Switch Station	
Frog Type	(None)
Rail Size	(None)
Rail Joints	(None)
Tie Type	(None)
Scope of Work	(None)
Shorthand	No. 9 LH HTTO
WorkBy	(None)
UOM	EA
Count	1
TypeOverride	
BidItem	

Reports and dynamic callouts will use these greyed out fields which are a property of the cell. Project specific information will need to be populated in the same file that the cell was placed for the other fields.

Turnouts										
TO-ID	Type	Number	Hand	Operator	Reference Alignment	Switch Station	Frog Type	Rail Size	Rail Joints	Tie Type
TO-1	Hand-Throw	9	Left	Inside			SMSG	136	CWR	Wood

INSTALL NO. 9 LH HTTO SMSG, 136#, WOOD, SWITCH STAND INSIDE



Note: If this method is used, the user will need to pay careful attention not to mirror cells and use the dropdown menu, instead. Otherwise, a left hand turnout may be reported as a right hand turnout or visa versa.