Modifying Tangent Clearance Diagrams for Curved Tracks

Author(s): Van S. Fehr

NMRA Recommended Practices
RP-7.5
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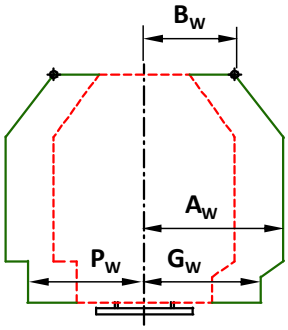
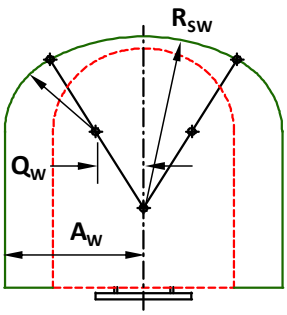
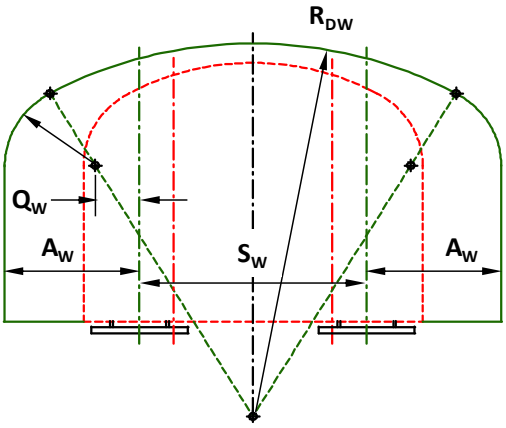
Before applying the procedures in this **RP-7.5**, you should familiarize yourself with **NMRA RP-7.1 Tangent Track Centers and Clearance Diagrams**, **NMRA 7.2 Curved Track Centers**, **NMRA 7.3 Curved Track Obstacle Clearances**, and optionally, the results the companion **NMRA Curved Track Center and Obstacle Clearance Assistant** produces (see **NMRA RP-7.6** for instructions on its use).



Bridge and Obstacle Clearance Diagram



Single Track Tunnel Clearance Diagram



Double Track Tunnel Clearance Diagram

Following guidance from the **AREA** and **AREMA**, the figure above shows the required modifications using green lines. For visual reference, the red dashed lines represent the tangent track clearance diagrams from the figures in **NMRA RP-7.1**. Any dimensions the figure above *does not* show remain the same as those tabulated in **NMRA RP-7.1**. The addition of the subscript **W** (for "wider") means a new value you must calculate using the simple instructions below.

To begin, you'll need some track center and obstacle clearances from **NMRA 7.1**, **RP-7.2** and **RP-7.3**. Each section below describes the values you'll need, and how to make the simple addition and subtraction calculations for the new dimensions. Alternately, you may use the **Assistant** to make the calculations for you. Once you have the new dimensions, laying out the modified diagrams using a ruler, a compass, and a 30-60 triangle, or in a Computer Aided Design (CAD) program, is straightforward.

Modifying the Bridge and Obstacle Clearance Diagram

From **NMRA 7.3** get the larger of the inside and outside obstacle clearances for the desired radius, S_S. Then make the following calculations in sequence to obtain the modified clearance diagram dimensions (Here, and for the two cases that follow, **T** is an intermediate calculation that does not have a corresponding clearance diagram dimension):

$A_W = S_S$
$T = A_W - A$
$B_W = B + T$
$G_W = G + T$
$P_W = P + T$

Modifying the Single-Track Tunnel Clearance Diagram

From **NMRA 7.3** get the larger of the inside and outside obstacle clearances for the desired radius, S_S. Then make the following calculations to obtain the modified clearance diagram dimensions:

$A_W = S_S$
$T = A_W - A$
$B_W = B + T$
$Q_W = A_W - R_C$
$R_{SW} = R_C + 2Q_W$

Modifying the Double-Track Tunnel Clearance Diagram

From **NMRA 7.3** get the inside obstacle clearance for the inner track radius, S_I. From **NMRA 7.2** get the track center for the inner radius, S_W, and add it to the inner track radius to get the outer track radius. From **NMRA 7.3** get the outside obstacle clearance for the outer track radius, S_O. Set S_S to the larger of S_I and S_O (tunnel portals and bores are symmetrical about their vertical centerlines). Then make the following calculations to obtain the modified clearance diagram dimensions:

$A_W = S_S$
$T = A_W - A$
$B_W = B + T$
$Q_W = A_W - R_C$
$R_{DW} = R_C + 2Q_W + S_W$

Additional Considerations

Prototype railroads avoid curved bridges as much as possible. With perhaps a few Modern era exceptions, civil engineers always design and construct railroad bridges using straight members, which means they are built parallel to chords along a curved track radius. As the chord gets longer, the inside dimension of a through bridge must get wider, beyond twice the A_W value calculated above. For that reason, railroads use chords that are as short as practical. A similar argument applies to the inside dimensions of girders or trusses on deck bridges. Unless you are modeling a specific prototype bridge, or willing to use the required larger width increase, you should avoid curved bridges on your railroad. Be careful using commercially available bridge models that may not be wide enough to accommodate curved track.

Curved track (single or double) tunnels require the width increase described above. Unlike bridges, tunnel bores can be curved. The curved track tunnel clearance diagram thus applies everywhere along the curved part of a tunnel. Many modelers build the inside of a tunnel only deep enough to hide the underside of the scenery. Tunnel portals must match the modified clearance diagram. Use caution when using commercially available tunnel portal models. They, too, may not be wide enough for use on curves.