



Industry Track Inspection

Track Supervisor:

Phone Number:



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Introduction

You are being furnished this document as an aid in managing the asset you have in your track. The railroad attempts to make at least one annual inspection of all the industrial tracks served. This is done to help our customers and ourselves by not having derailments on your tracks.

If your tracks belonged to the Railroad we would be required to make at least monthly inspections and we would have to keep the track to at least a minimum standard established by federal regulations. Therefore, CN recommends that industrial tracks be inspected once a month by an employee of the Industry to which the tracks belong to.

If you do not have someone on staff or an outside contractor with some railroad experience we will attempt to show you a few of the really important items that someone should check on a regular basis. While it is not our responsibility to maintain your track, if you have a concern or question we encourage you to get in touch with your local Track Supervisor rather than have a derailment.

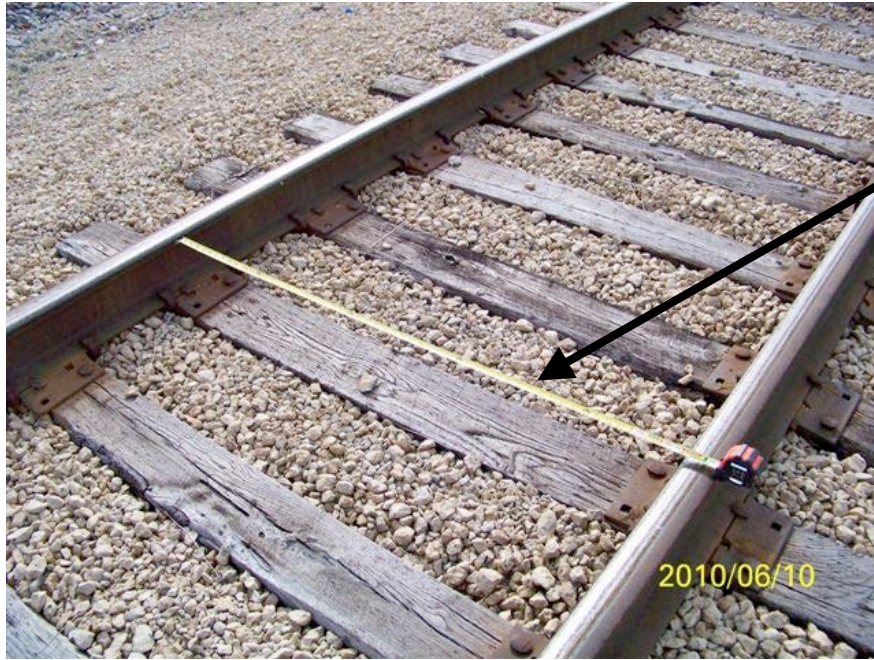


(Figure 1: Industry track)



Gauge

Standard gauge is 56 ½ inches. This is measured 5/8 of an inch under the top of the ball of the rail



(Figure 2: Measuring gauge with a standard tape measurer)



(Figure 3: Measuring gauge with a gauge measurer)

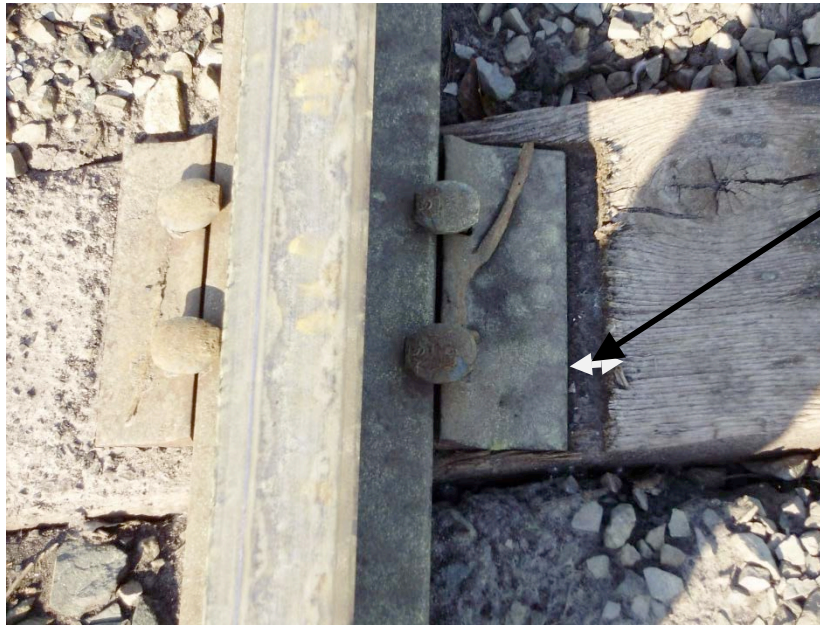


While we have some specialized tools for measuring gauge length, a simple measuring tape will be sufficient. The gauge cannot be any tighter than 56 inches. If you should measure gauge any wider then 58 inches you should notify someone with the Railroad before the next car or engine goes over it.



(Figure 4: 58 inch gauge)

If you find gauge approaching the 58 inch mark, look at the ties on the outside of the tie plate to see if there are signs of movement. When we measure gauge we actually add this to the static gauge to determine how bad it really is. If you hire a contractor to fix this he can sometimes just add a few spikes but he will generally have to add a new tie to a location like this:



Add movement to gauge measurement. Determines how wide the gauge really is at worst case scenario.

(Figure 5: Plate movement)



Alignment

Alignment describes track that has moved from its original uniform position. It is measured by stretching a string out 62 feet along the rail and measuring the deviation at the middle. If this is greater than 5 inches call someone with the railroad before the next car goes over the track



(Figure 6: Measuring alignment)



(Figure 7: More than 5 inches of movement)

Some things that might cause this condition on your tracks are a sun kink, which is the track getting so hot from the sun that it expands and moves out of alinement, a vehicle or piece of equipment striking the track and moving it out of uniform alinement.

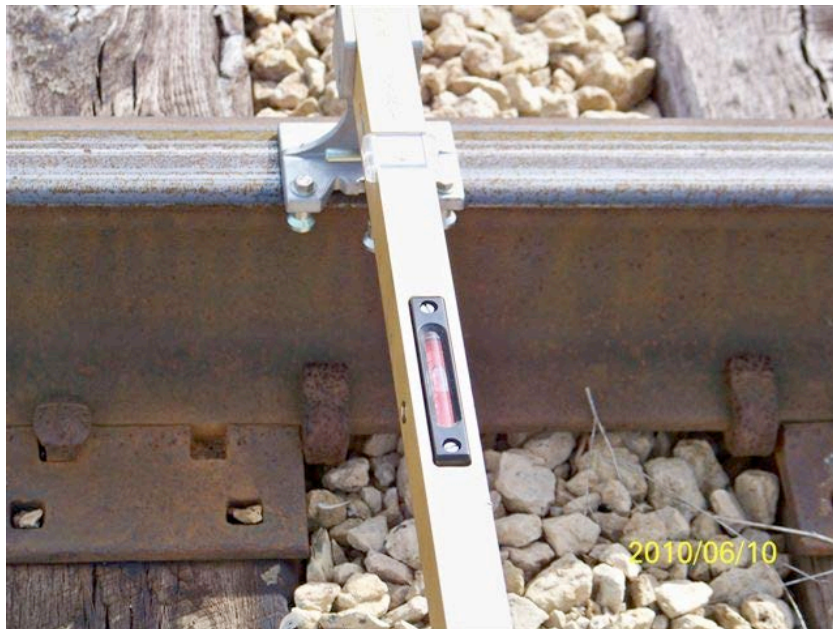


Track Surface

There are three types of track surface conditions you should watch for; crosslevel, profile, and warp. The tool we use to make these measurements is called a track level.



(Figure 8: Track level)



(Figure 9: Track level)

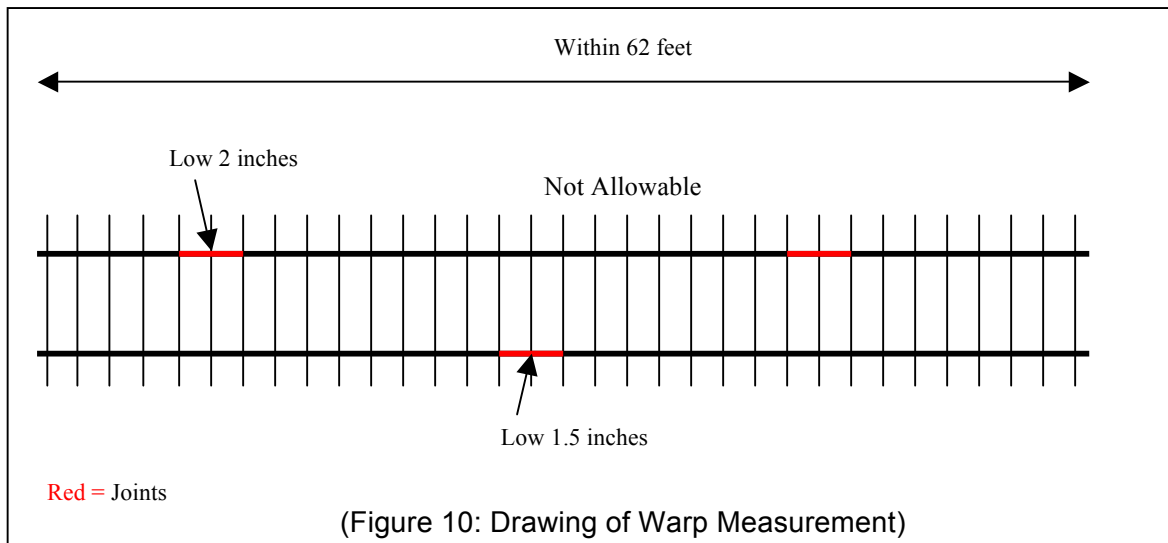


It is possible to check this with a long carpenters level or even a level put on a 2X4 but we need something that can tell us the relationship between the elevation of the two rails. We use a number of formulas to tell us what elevation we should have on the mainline based on the fact that we run much higher speeds. Basically on almost all industrial tracks we want the tracks level if the track is straight, and have a half inch of elevation if the track is curved. And of course the high rail should be the outside of the curve.

What do we do if the track is not at one of these two elevations? If the difference in crosslevel between any two rails is greater than 3 inches you need to notify the railroad. On curves this means you measure more than 3 ½ inches or more than 2 ½ inches the wrong way. If you are even getting close to one of these numbers and the track is muddy you should let us know. Federal regulations requires us to make our measurements under load and when the crosslevel is bad and the track is muddy, there is a much greater possibility that the track is going down even more under load. We have the tools to check this.

The next track surface defect we are going to discuss is called warp. This is a condition where one end of the car is going down in a low spot on one side and the other end of the car is going down on the opposite side.

We measure for warp by checking the cross level on one side and adding that measurement to what we have where it is low on the other side (see Drawing below). These two measurements have to be within at least 62 feet of one another. The limit for warp is 3 inches. So if one side is down 2 inches and the opposite side is down 1 ½ inches this would be a violation





Again if the track is muddy and can possibly be moving even more under load, contact the railroad before warp is over the 3 inch mark.

The third track surface defect we are looking for is called profile. In this case there is not any excessive crosslevel because both rails are going down a uniform amount. This condition might happen where maybe a small pipe has collapsed or the track is especially muddy right under an unloading spout. To measure this condition we need the 62 foot string we used in alinement (See Figure 6). Instead of stretching it along the side of the rail we place it on top and measure in the center of the worst spot. If this is greater than 3 inches, again you need to call the Railroad.

The way that these track surface conditions will be fixed by either you or your contractor is by tamping fresh rock or ballast under the track to remove the surface problem. If the problems are more than an isolated spot or two your contractor might suggest surfacing the entire track with a machine that raises and levels the two rails.



Ballast

Ballast or the rocks around your track does three functions. (1) Helps transmit the load of our cars and locomotives. (2) Maintains the track surface and keeps the track from moving out of alignment. (3) Provides adequate drainage for the track.



(Figure 11: Clean ballast)

It is hard to maintain your track and can be dangerous to our crews getting off equipment if your ballast gets fouled muddy and does not drain. Maintaining ditches and pipes help extend ballast life.



(Figure 12: Fouled and muddy ballast)



(Figure 13: Fouled and muddy ballast)



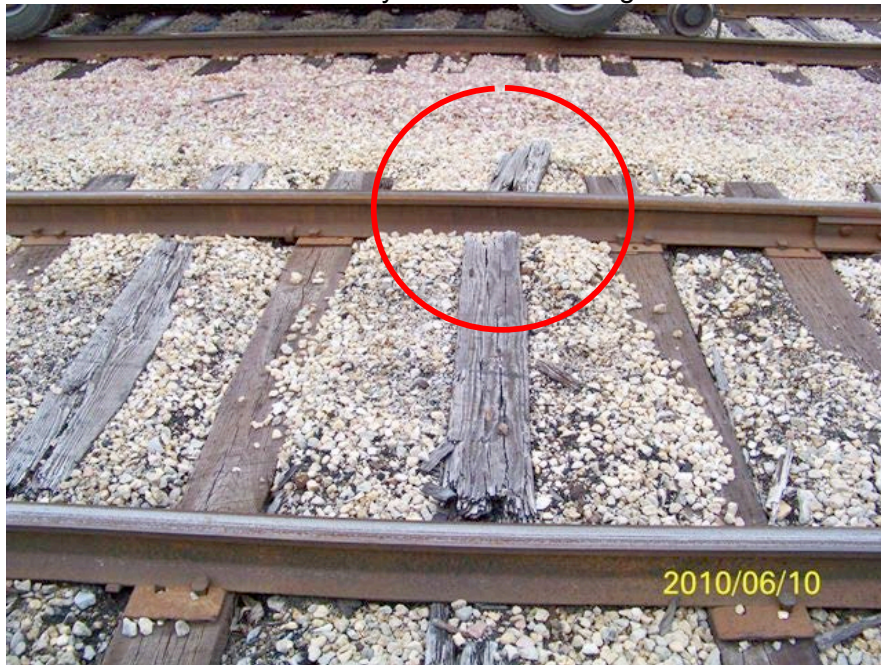
Crossties

Crossties hold gauge, and help to maintain track surface. On an industrial track as a bare minimum at least every fourth tie should be a good tie. If you are having trouble with gauge or surface you may need some better crossties. You must have at least one good crosstie within 48 inches of a rail joint.



(Figure 14: Tie at joint)

Ties are considered defective when they are broken through



(Figure 15: Broken tie)



Split to the point ballast can work through:



(Figure 16: Picture of split tie)

Deteriorated to the point the tie plate can move ½ inch:



(Figure 17: Deteriorated tie)



Cut more than 40% through by tie plate:

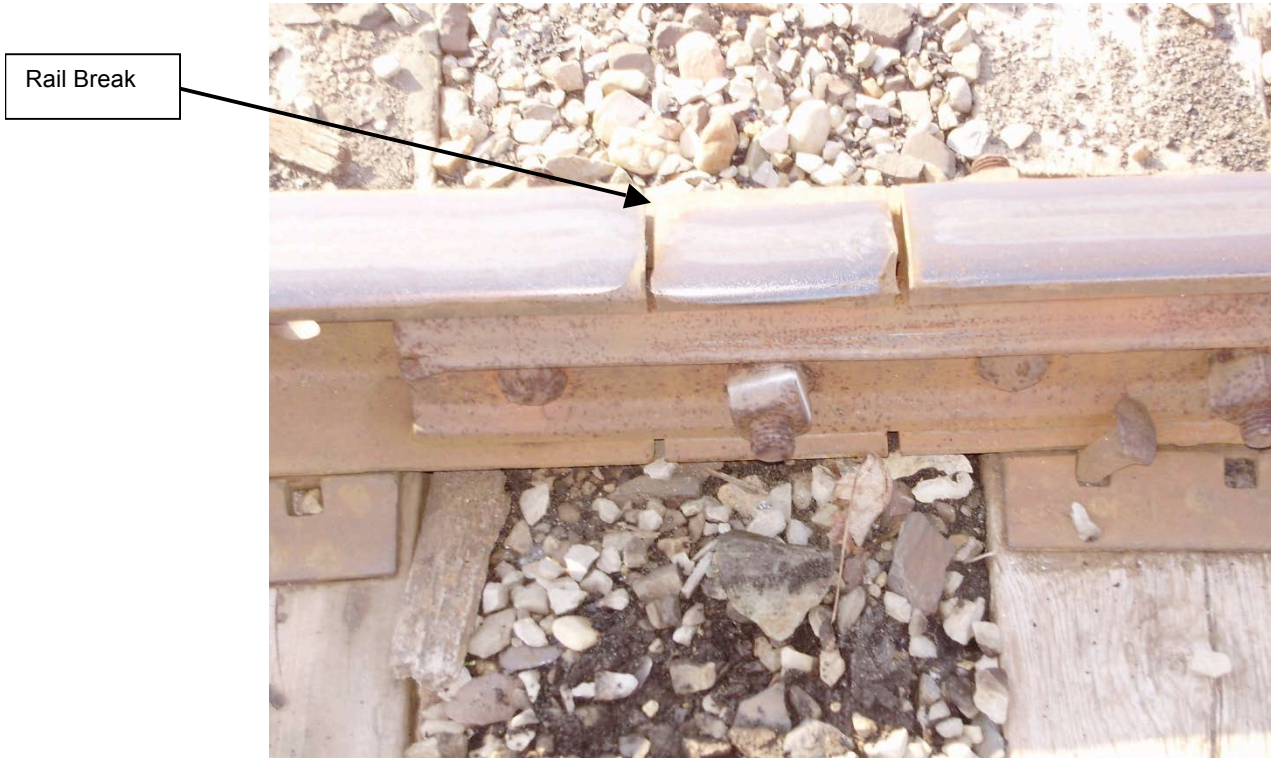


(Figure 18: Cut tie)



Defective Rails

Broken rails are the leading cause of track caused derailments. The railroad spends a large amount of money checking our rails for internal defects with an ultrasound system to protect our railroad. Very few industrial tracks will be checked by this system so it is important to keep an eye open for rail breaks and catch them as soon as possible. When rail is broken it must be changed before another car or locomotive may pass over it. Do not allow your contractor to use a torch on any new rail he is putting in.



(Figure: 19: Rail breaks)



Rail joints

Joint bars hold ends of rail together. They are required to be of a size that fits on the rail you have. If a joint bar is cracked or broken between the middle two bolt holes it must be replaced. There must be at least one bolt in each rail end at a joint. Do not allow your contractor to torch cut bolt holes. They cannot be worn to allow excessive vertical movement. If the rail at a joint is mismatched more than $\frac{1}{4}$ inch it must be corrected.

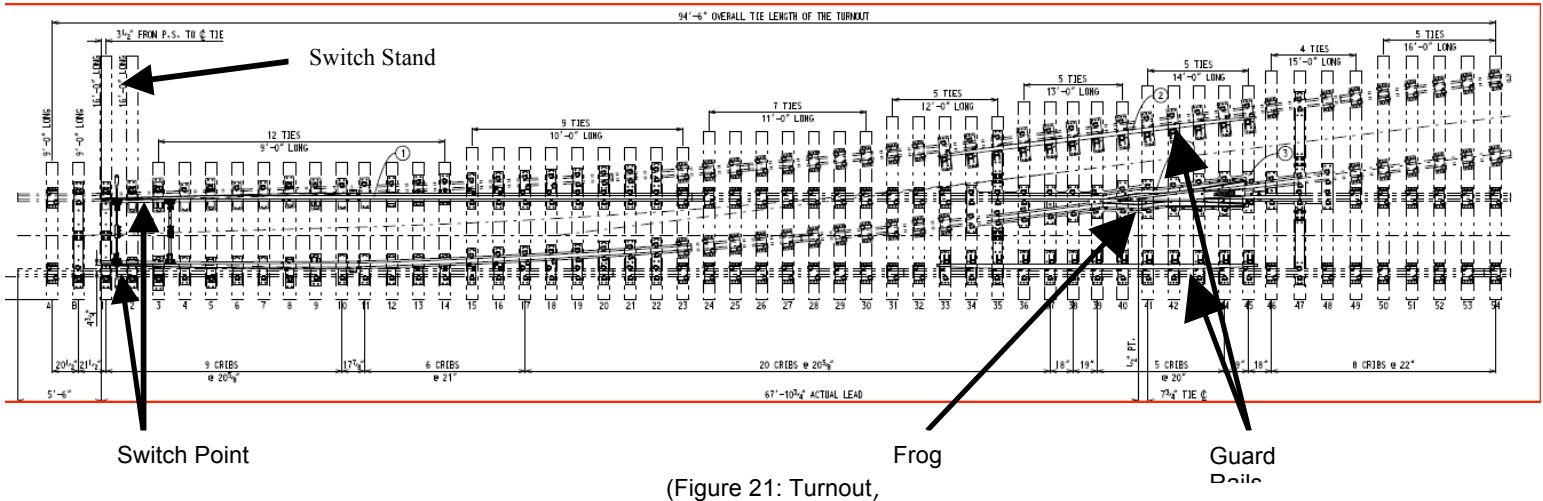


(Figure 20: Cracked joint bar)



Turnouts

A turnout is where one track separates from another. On the drawing below the various components of a turnout are listed and we will discuss what problems are associated with each. The Railroad maintains the initial turnout where your track leaves the mainline. For some industries there is not another turnout on your track while others may have several



(Figure 21: Turnout,

Turnouts are such an important a piece of track and cause so many problems that we are required to make more restrictive inspections on the turnouts we maintain

One of the most common defects is a gapped or ill-fitting switch point. A gapped or badly worn point can allow a car to go down the wrong side which will cause the car to derail about ten feet back from the point.



(Figure 22: Gapped Switch Point)



If the switch point gets chipped and worn down it can also cause a car to go the wrong way. The switch points must be repaired or replaced if they have the following conditions:

- Chipped deeper than 7/8 inch below the top of the stock rail.
- Chipped $\frac{3}{4}$ inch deep longer than 4 inches.
- Chipped 5/8 inch deep longer than 7 inches.
- Chipped and has unprotected vertical surface that is 5/16" or wider, $\frac{3}{4}$ " below the top of the stock rail for a Samson Switch.

Note, when the switch points are to be replaced the associated stock rails must also be replaced.

It is very important that the switch stand be firmly attached to the ties. A loose switch point can let the point get gapped. Shake the handle of the switch stand. To assure the switch closes correctly and tightly, insert a 1/8" shim between the stock rail and switch point. If you are able to lock the switch in place with the shim inserted the switch must be adjusted.

There should be a guardrail on both sides of a turnout. These keep the wheel of a car from going down the wrong side of a frog. There are some frogs that are self-guarded. There are a number of different types of guardrails but the most important thing to check is to make sure all of the bolts are in.

There are a number of different types of frogs and the required measurements are beyond the scope of this booklet. Most modern frogs are made with a material called manganese steel. This steel will crack and chip. Although these are not desirable conditions they are usually not dangerous until big chunks break out or the frog cracks all the way through. If a frog point is chipped, broken, or worn more than 5/8" down and 6" back, then the frog should be replaced



Snow and Ice

If you have a turnout on your property it is your responsibility to keep the point area clear of ice and snow. Snow can hold a point open enough to cause it to gap and cause a derailment. One of our most common derailments on an industry track during the winter is a build-up of snow and ice in the flangeway of a road crossing.



(Figure 23: Snow Packed Switch)



(Figure 24: Cleared switch)

When you are dealing with snow and ice conditions please think of our crews. They will be dropping off equipment on your property. Anything you can do to cut down on the ice and snow would be appreciated and try to keep the walkways clear of debris.



Other

Drainage

Adequate roadbed and drainage must be maintained at all times. Drainage must be given special attention at the following locations: switches, frogs, diamond crossings, grade crossings, and other places with limited vertical and side clearance.

Vegetation

Vegetation must be kept to a minimum. A weed control program should be in place to control vegetation growth in and around tracks. Excessive brush and weeds should not be allowed.

Clearances

Horizontal and vertical clearances to be maintained as per CN's requirements.

Fencing

Fencing to be maintained to secure the property where required. Access by CN crews is to be provided as required to perform switching and inspections.

Derails

Derails should be properly secured in accordance with the manufacturers recommendations where required. CN recommends the use of either the Hayes EB (hinged type derail) or the Hayes HB (sliding type derail).

Bumping Posts

Bumping posts shall be properly maintained. CN recommends the use of Hayes Type WG or HD (or equivalent) for the designated rail section. If earthen bumping posts are used, they should be located 10 feet from the end of track, with 10 ties in front of and all ties behind it fully anchored.

Road Crossings

For road crossings, rail joints shall be kept clear of crossings and where practicable should not be located closer than 25' to the edge of the crossing. Drainage of the track at crossings must be properly maintained at all times. Maintain a flangeway space of not more than 3" or less than 2" deep, and not less than 2 ½" or more than 3" wide. Crossing sightlines are to comply with all regulatory requirements.



Summary

If you are a regular shipper being without your track may be more costly to you than the expense of repairing the track. That is certainly true for the Railroad if one of our locomotives is trapped on your property behind a derailment. The cheapest and most efficient way is to catch problems before they get too large, and repair them before they cause a derailment. These tracks are your responsibility but we are a partner with you. Their upkeep is your responsibility but we will be happy to tell you how much needs to be repaired or if you are getting a fair price. Please do a regular check on your track. We would much rather come by and check your bad gage with you than to have a call that our locomotive is stuck on your property.