Z-Stuff IR sensors work best when aimed along the bottom edge of boxcars, reefers, etc. At this height they will stay triggered even if the train stops with the sensor between trucks.

For O-31 gauge Hi-rail tubular track mounted on 3/16" (5mm) cork roadbed, a sensor height of about 45 (+/-3) mm above table top works well. This is good for most cars including flatcars and hoppers. Unibody tank cars (without frames) won't work reliably, no matter the sensor height.

The DZ-1011 trackside sensor has the IR window located at 43mm above base. Mounting these on the same roadbed material as the track seems to work fine, though flush mounting flat on the table top should also work satisfactorily. They need to be mounted close to the track, about 20mm from the outside rail, so as to just clear a wide engine. 1011's have a very short 1 second delay after a train has passed before going back to green. This can cause annoying signal dropouts as a train passes. It can be mitigated by having the 1011 trigger a 1070, (which in turn triggers a 1008 relay), or a 1075. 1011's should not be used on curves due to likely overhang/underhang interference.

The DZ-1070 and 1075 sensors have their IR windows at only 30mm above base. So for these a single piece of roadbed is usually not high enough. They do work placed on a block of ½" or 13mm thick material (such as ½" homosote), giving an IR window height of ~43mm above table. They should be mounted 30 to 40mm from the outside rail. They can be used on inside curves.

The DZ-1040/1050/1060/1080 line of signal devices have the same lower "electrical cabinet" as the 1070/1075 sensors. So they will work fine on a ½" base also. But they also seem to work quite well mounted on the same roadbed material as the track; so they may have a more sensitive (or wider angle) IR sensor than the 1070/1075 devices.

A nice feature of 1011 sensors is that if two or more have their white outputs connected, they all go red when any one is triggered. This is great, but if they are used to trigger a 1008 relay or 1070/75 sensor, they will all stay dimly lit red, even when green. Not cool. A blocker diode (1N4148) can be used inline (cathode band to the 1011's) to force red to off when green is lit. And any triggered 1011 in the block will still trigger all others to red. Note in this case though, when the 1070/75 is triggered, it will NOT back-trigger the 1011's to red, because of the diode. Oh well.

1011's can directly drive a 1008 relay in parallel, but you can't use a red blocker diode in this case; it will cause the 1008 to stay triggered, even when none of the 1011's are triggered. Not good. To avoid this you can add a *dummy* 1070 sensor (not at trackside), and wire the 1011's through a blocker diode to activate it, as above. Wire the 1070 to activate the Z-1008 relay in turn. This eliminates the dim red 1011 issue. A bonus of this method is the 1070 has a 4 second delay (instead of 1 second) so it will stay triggered longer and prevent most signal dropouts as a train is passing.

1070's can be daisy chained (white to yellow) to operate a 1008 relay or a 1075, with no ill effects. You can also parallel 1070's to trigger a 1075; use a diode at each 1070, cathode band to the 1070. Otherwise they will lock up.   R. Stewart