

RESTRICTED SPEED RECONSIDERED.

Our 4' 8 1/2" Standard track gauge is commonly known to have stemmed from the ancient Roman Empire. The five foot axle width of chariot or wagon wheels matched well with the width of two abreast horses or oxen. The worn ruts in their network of roads across Europe and the British Isles further perpetuated this wheel spacing thru thousands of years, when English wagon builders were called upon to build the first experimental railcars in 1800. By adding cast iron flanges to the inside edges of cast iron wagon wheel treads, using ready made stores of axles, tooling and jigs, produced a gauge over the flanges of 4'8". The combination of these practical factors is historically responsible for our Standard track gauge, which will last in perpetuity.

What is not commonly known, however, is the history responsible for the 20 MPH component of our Restricted Speed rule (GCOR 6.27). Despite extensive research, it appears lost to recent history how the "not to exceed 20 MPH" was formulated. If I had to guess, perhaps this speed stems from prespeedometer days when our ancestral steam locomotive engineers used a pocket watch to calculate speed based on 30 telegraph poles to the mile, which continue to flank our tracks in some locations. In such days, 20 MPH would equate to one pole length traveled every 6 seconds. A pole length traveled every 5 or 7 seconds equates to 24 and 17 MPH, respectively. Otherwise, to know not the formulated reasoning, if any, behind the 20 MPH maximum, begs the question why this particular speed should last in perpetuity, too, particularly in the face of changing physical factors our ancestral R.R. rule writers couldn't have anticipated.

Most everyone reading this understands that Restricted Speed doesn't equal 20 MPH. Indeed, train movements at 5 MPH in near zero visibility conditions, paced by a 3 MPH walking lookout, is too fast for the walking lookout, and would therefore fail as Restricted Speed. Speaking of walking, let's talk about running,

which for a reasonably fit human is 15 MPH, equating to a 7.0 second 50 yard dash. This 15 MPH foot speed capability is why trainmen can "get off" moving equipment at this speed, in emergency situations, without falling. Speaking of 15 MPH, the current 20 MPH maximum Restricted Speed requires 75-80% more stopping effort, be it braking distance and/or braking force, than does 15 MPH. This is why 15 MPH trains are generally controllable on near level track with locomotive brakes alone, while 20 MPH trains are not. This is consistent with the formula of Force = Mass x Velocity Squared. The combination of these practical factors should serve as formula for a Restricted Speed reconsideration to 15 MPH, the physics of which, will cause it to last in perpetuity.

A second key physics factor, which cause Restricted Speed failures, is the growing weight of railcars. Certain classes of open top hoppers have a gross weight of 315,000 pounds. Imagine, one of these 4 axle railcars weighing more than an entire freight or passenger train did in the 1860's or 1870's, when a variation of the Restricted Speed rule also existed. Three inches of rain, or the equivalency in ice, is another 8,000 pounds for a total weight of 323,000 pounds or 40,375 pounds per wheel, which is over 10,900 pounds more per axle than our heaviest locomotives. Guess what? This weight factor doesn't end with gravity alone. As cars grow in weight, so does their wheel and axle diameters, causing massive amounts of new flywheel inertia. As we can now see, it's little wonder why the Restricted Speed rule is also growing. How? In popularity for field ops testing!

A third physics factor causing so many of our brothers and sisters to be suspended or fired are the lubricious improvements to roller bearings, wheels and track in particular. As we all know, track maintenance is a never satisfied mega-mouth to feed. To decrease track maintenance cycles and the related slow orders, we should appreciate the improved metallurgy of

rail, the growing weight of rail, the improving geometry of track, and the closer spacing of ties, also known as the tie-crib ratio. Further, we should truly appreciate the expertise and dedication of our track maintenance heroes. Please also appreciate, however, as rolling resistance of trains lessen, the terms and conditions of Restricted Speed increase in

difficulty, which requires a speed that allows stopping within half the range of vision short of : train, engine, R.R. car, men or equipment fouling track, stop signal, derail, ill-lined switch, looking out for broken rail, and not exceeding 20 MPH, currently.

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. A fourth cornerstone factor, if you will, is ourselves. In the face of all these physical changes, with regard to carbon base steel, is the non-change of the carbon based human. Depth perception, peripheral vision, instinct, intuition, judgment, I.Q., muscle memory, mental memory, learning curve, fatigue tolerance, stress tolerance, verbal communication, coordination, etc. will all remain constant. Further, we should anticipate a huge drop in Subdivision territorial knowledge if R.R. Divisions experience waves of consolidation such as those proposed in Southern California at BNSF. The concept of Restricted Speed will be bastardized by crewman, who will marginally memorize the details of one thousand or more miles of track, together with the thousands of Timetable details, General Orders, Superintendent Notices, System Special Instructions and their continual changes. In such super home terminals, a competent Conductor would need to be gifted. A competent Locomotive Engineer would need to be a sub-genius. I don't think I would qualify as either, and would therefore limit myself to a mind numbing 10 MPH maximum Restricted Speed, which requires 25% of the braking effort as does 20 MPH.

In conclusion, surveys of R.R. crewmen reveal an approval for a 5 MPH reduction in maximum Restricted Speed, when armed with the above knowledge. Union Local Chairmen, who typically handle the disciplinary case load for

Restricted Speed violations, see the potential for a significant drop in formal and non-formal investigations, hence support it , also. R.R. field management, however, is divided. Those who are genuinely interested in safety tend to embrace it, while officials overzealous in their testing absolutely oppose it. These latter officials usually lack business degrees and/or prior business experience, and try to support their careers by overzealous amounts of testing, rather than help build the R.R. business itself. Additionally, there is the "not invented here syndrome," which always provokes massive push-back, figuratively rivaling the buff and draft forces of our trains. With or without this push-back, we can all instantly limit ourselves to a 15 MPH maximum Restricted Speed, which is the level where it should have been, officially, since 1800!

Article 20 by Robert "R.B." Frank - Legis. Rep. BLET Div. 839 - Nov. 20, 2010

EDITORS NOTE: Brother Robert Frank (RB) has written 20 articles for the Capitol to Capitol magazine. It seems fitting and coincidental that this article, being the twentieth in his career, questions the need for a 20 MPH maximum speed under the current restricted speed rule. Brother Frank has over 35 years of injury free experience working on the railroad.

