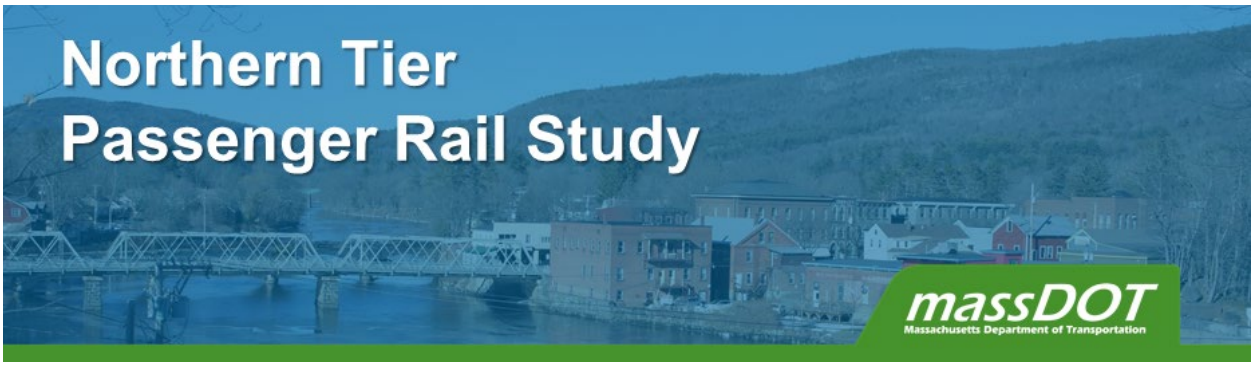

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Railroad 101 - Meets and Passes

Railroads of all kinds - freight and passenger, private and public - have always tried to invest carefully in their infrastructure. As track, signals, locomotives and other railroad infrastructure are expensive to acquire, operate, and maintain, railroads try to carefully plan how to design their services and infrastructure to be cost-effective.

In the case of the actual right of way configuration, a railroad will try to optimize the track and related equipment it builds to carry the trains it needs to serve its customers. Often this means that the railroad will design its system to minimize areas of double track. This is true of the Northern Tier. The railroad will model the planned service and use the outputs to identify locations where double track is needed to support trains operating in the same area in opposite directions.

The railroad can build long segments of double track, or it can build shorter lengths of double track called "passing sidings." In each case, there are interlockings comprised of switches that make the transition between the single track and the double track segments. The railroad will schedule its passenger and freight trains to make the most efficient use of these transition points.

The goal is to keep all trains moving. Ideally, two trains moving in the opposite direction on double track will pass each other and not slow down or stop. However, the schedulers need to plan for possible delays in the service. Therefore, the schedules provide for "meets" at the interlocking. The train on the double track will be held by the train dispatcher with a stop signal to meet the train approaching on the single track. When that train "passes" the train being held and "clears" the single track, the train being held is given a signal to proceed onto the single track.

Managing an efficiently built railroad requires careful scheduling and management of train operations to keep trains moving with "meets and passes."

Railroad 101 - Why do steel wheels work so well on steel rail?

The answer lies at the location where the wheel meets the rail, also known as the contact patch. The size of the contact patch can vary based on several factors. They include rail and wheel type, how worn rail and wheel are, and the weight of the train that is exerted on the contact patch. In general, though the contact patch can be thought of as the size of a coin.

The modern standard for weight of a freight car is 286,000lbs arranged on 4 axles (8 wheels), or 35,750lbs per wheel. Thanks to the strength of the steel wheel and steel rail, the contact patch remains small when compared to a semi-truck's rubber tires on asphalt pavement. The small contact patch produces very little resistance. Some resistance is necessary for the wheels to turn and move the train, but minimizing the resistance allows many rail cars to be moved in a train with relatively little effort.

Physics also play a role in the design of the wheel profile and the track. Superelevation of the track through turns allows the large mass of rail equipment to negotiate curves at the desired speed. Also, each rail of the track is tilted inward at a 1:40 ratio. This helps to distribute the load of the rolling stock and optimizes the contact area where the rail and wheel meet. Therefore, the tread of the wheel is also tilted at a ratio of 1:20.

This conical shape of the wheel tread, in combination with the flange, allows the rail equipment to guide itself through curves and keeps the equipment centered on the rails in tangent or straight sections of track.

The Massachusetts Department of Transportation (MassDOT) is conducting a study to examine the benefits, costs, and investments necessary to implement passenger rail service from North Adams to Greenfield and Boston, with the speed, frequency, and reliability necessary to be a competitive option for travel along this corridor. Please visit the Study website for more information on the project: https://www.mass.gov/northern-tier-passenger-rail-study.
