

# Northern Tier Passenger Rail Study

**massDOT**  
Massachusetts Department of Transportation

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## **Railroad 101 - Signals and Positive Train Control (PTC)**

The primary purpose of the railroad signal system is safety. The signal system detects trains travelling ahead, a broken rail, or a switch that is not open or closed as expected ahead of the train. A switch is an arrangement of specialized track components that can guide a train to another track. When the switch is closed, the train stays on the track it is on. When the switch is open, the train can move onto another track.

When the signal system detects these conditions, the train operator is notified so they can move the train safely according to the conditions detected. For example, if the signal system indicates there is a broken rail in the track ahead, the train operator will reduce the train to a speed that allows the operator to look for the break.

There are two basic ways of communicating signals to the train operator: wayside and cab signals. Both currently are in use on the Northern Tier corridor. In both systems, electrical current carries the signal indication through the tracks.

Wayside uses signal lights on poles along the side of the tracks. These are similar to traffic signals. The signals on the wayside indicate trains ahead, broken rail or a switch that is not in the expected position ahead of the train (either open or closed as defined above). The train operator must observe the wayside signal lights and then take the appropriate action such as stopping or reducing speed.

A cab signal system displays signals in the cab to the train operator. Using a cab signal system, a train operator is able to initiate speed changes and stopping when the condition on the track ahead changes instead of waiting for the indication at the next fixed wayside signal. Cab signal systems allow trains to receive signals more efficiently and keep trains moving closer to their Maximum Authorized Speeds (MAS).

A system that uses only wayside signals that has no remote control is called automatic block signal (ABS). Centralized Train Control (CTC) is a system in which an operator or train dispatcher remotely controls signals and switches.

A newer add-on to the signal system is a federally mandated Positive Train Control (PTC) System which is intended to prevent collisions. The PTC technology applies brakes to the train for speed reductions and stops the train when the signals indicate conditions that require such actions.

## **Construction Cost Estimation 101**

Construction cost estimating is the process of forecasting the cost for building an infrastructure project. Cost estimates consider factors that include materials, location, equipment, and labor. The level of certainty of a construction cost estimate depends on the level of design. There are different levels of design that correspond to the development phase of the project.

At Level 1, a project's feasibility is being assessed. At this stage, an Order of Magnitude Estimate is used to help evaluate a project's feasibility. This is where the Northern Tier study is.

At early stages of design, estimators build in contingency costs to account for the unknown elements of the project. As the project advances into more detailed levels of design, more about the existing site conditions and proposed design is known, so the amount of contingency in the estimate is decreased. For example, underground conditions may not be known, so contingency is added to the cost estimate until they are known.

The cost estimates for the Northern Tier Passenger Rail Study will be based on material, equipment, and labor costs from recent railroad construction projects in Massachusetts and surrounding states. The team will rely on Level 1 construction cost estimates which represent the overall order of magnitude costs and incorporate significant contingency costs to account for unknown but expected costs for construction.

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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>.

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