Florida Tech Senior Design Project

Railroad Signaling Block Design Tool

**Project Scope:**

Develop a software application (tool) that verifies, and recommends improvements, in railroad signaling block design.

**Requirements:**

1. The software application shall include formulas on the following specific parameters stated below, that will be an intrinsic part of the analysis of signal block characteristics, and allow recommendations on signal block improvements.
2. Safe Braking Calculations – is the distance the train travels from when the train driver makes a full-service brake application to when the train stops (see figure 1).
3. Headway Calculations - headway is the time spacing between trains (see figure 1).
4. Runtime Performance Calculations – Run time is the time of travel between any two points, but is normally given from the start of a run – departure from the initial station, to the end of a run – arrival at the final station.
5. Clear Time Calculations – The clear time of a track circuit is the time from a train entering a track circuit to the time the rear of that train is clear of the track circuit ahead which permits this track circuit to return to the maximum cab signal speed provided by the block layout
6. Approach Locking Time Calculations - the locking of any route from a signal, when the driver has seen or may have seen a proceed aspect at a signal that would indicate to the driver that the former signal is displaying a proceed aspect. If the signal is replaced to danger, the approach locking prevents the immediate release of the route because it is possible that an approaching train may be unable to stop (see figure 1).

Below is a sample layout of the parameters the calculations is determined for 1, 2 and 5 above:



Figure 1 – Safe Braking Distance-Headway and Approach Locking Time

1. The software application shall include the capability for database and application user inputs for parameters such as train acceleration, train deceleration; maximum authorized track segment speed, operator reaction time, civil restrictions, track curve data, track grades and more.
2. With both the signaling design formulas in section I, and the data entry in section II, the software application shall perform automated analysis, and display the pertinent railroad signaling design output.
3. The output of the software application shall determine for any given Railroad Signaling Design the safe train braking distance, the train headway times, the run time performance, clearing times, and approach locking times given the paramaters entered into the system. The application shall support display and output of:

* Excel formatted Spreadsheet
* Track and Train Graphs
* Train Simulations

1. The Development Tools, Database technology selection, and specific output formats are to be determined during the initial stages of the project.

**GE Points of Contact:**

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