

**Recommended Design Criteria and Functional/Operating Guidelines for a High,
Wide Load Detector**

Revised 2025 (5 Pages)

A. Purpose

This Manual Part recommends functional/operating guidelines for a high, wide-load detector

B. General

1. The system shall conform to Manual Part 11.1.1 Recommended Functional/Operating Guidelines for Electrical Safety.
2. The system should be fully protected against lightning and other voltage surges in rail, power supply leads, and output leads when installed in conjunction with surge protective devices (SPDs). See Manual Part 11.3.10 Purpose and Meaning of Terms Used in Surge Protection and Grounding. shall conform to Manual Part 11.2.1 Recommended General Practices for Electrical Surge Protection for Signal Systems and as required by the manufacturer.
3. The system and its mounting assembly shall not cause the rails to become grounded or shorted together.
4. The system shall not produce signals that interfere with other adjacent equipment.
5. Wheel detectors, if required, shall conform to Manual Part 5.1.50 Recommended Functional/Operating Guidelines for a Wheel Detector for Non-Vital Applications.

C. Environment

1. The system shall conform to Manual Part 11.5.1 Recommended Environmental Criteria for Electrical and Electronic Railroad Signal System Equipment, Class A and C or D.
2. The system should operate and perform its intended function without requiring adjustments during all-weather variations, including rain, sleet, snow, ice and fog.
3. The system operation should not be affected by sunlight, vehicle headlights or other light sources.

4. The unit should not be damaged by oils, grease, water, salt solution, and other chemicals found in a railroad environment.

D. Design

1. The system, including the supporting structure, shall not infringe upon the American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering, Chapter 28-Clearances, other applicable track clearances, or any other clearance requirements as specified by the railroad.
 - a. When a break-wire system is used, the wire and hardware could infringe on this clearance allowance. If it does the railroad must obtain a Variance Permit from the State or Provincial governing body (Corporation Commission) prior to installation of the detection system.
 - b. The Variance Permit could stipulate additional safety items that must be installed with the detection system. They typically are as follows:
 - (1) A light over the wire to illuminate the obstruction.
 - (2) A sign in approach to the wire indicating "Obstruction ahead, men on cars will not clear"
2. The system should be designed to permit easy mounting and alignment of detection units.
3. The system should be designed to permit easy replacement of consumable items such as light bulbs.
4. The design of detection units and supporting structures should be coordinated to ensure that movement of structure caused by wind, snow load, etc., shall not cause adverse effects to the system.
5. The following detection methods should be considered:
 - a. Electrical detection is typically a break-wire design where an energized conductor is suspended at the detection point. When this wire is broken a relay will be de-energized, and an alarm will be triggered. See Figure 5120-1 for Wide Load Detector and Figure 5120-2 for High Load Detector.
 - b. Sensing detection typically uses light or infrared emitter-receiver pairs to establish a detection clearance point. Refer to the manufacturer for installation criteria.

- c. Mechanical apparatus at the detection point may be used to de-energize a circuit, and an alarm will be triggered.

E. Operation

1. The system shall be designed to detect cars, engines, loads, or damaged items that infringe on a specific clearance outline as required by the railroad.
2. The system shall provide, as required by the railroad, either a momentary output or a continuous output each time the detector system operates. The system shall be capable of providing separate outputs for each portion of the system, as required by the railroad.
3. The system should be designed such that it shall not provide an output unless the detection system has been operated for a minimum period of time as specified by the railroad to minimize false operations.
4. The system should be designed to allow interface with track circuits or similar systems to permit operation only during train presence.
5. The system should be completely automatic.
6. The system shall operate for train speeds as specified by the railroad.
7. The system should be provided with a self-check feature to detect failures that prevent the system from properly detecting high-wide loads. An output should be provided in the event of failures.
8. The system should be designed either for stand-alone use or to allow interface to hot bearing detectors and other wayside systems.

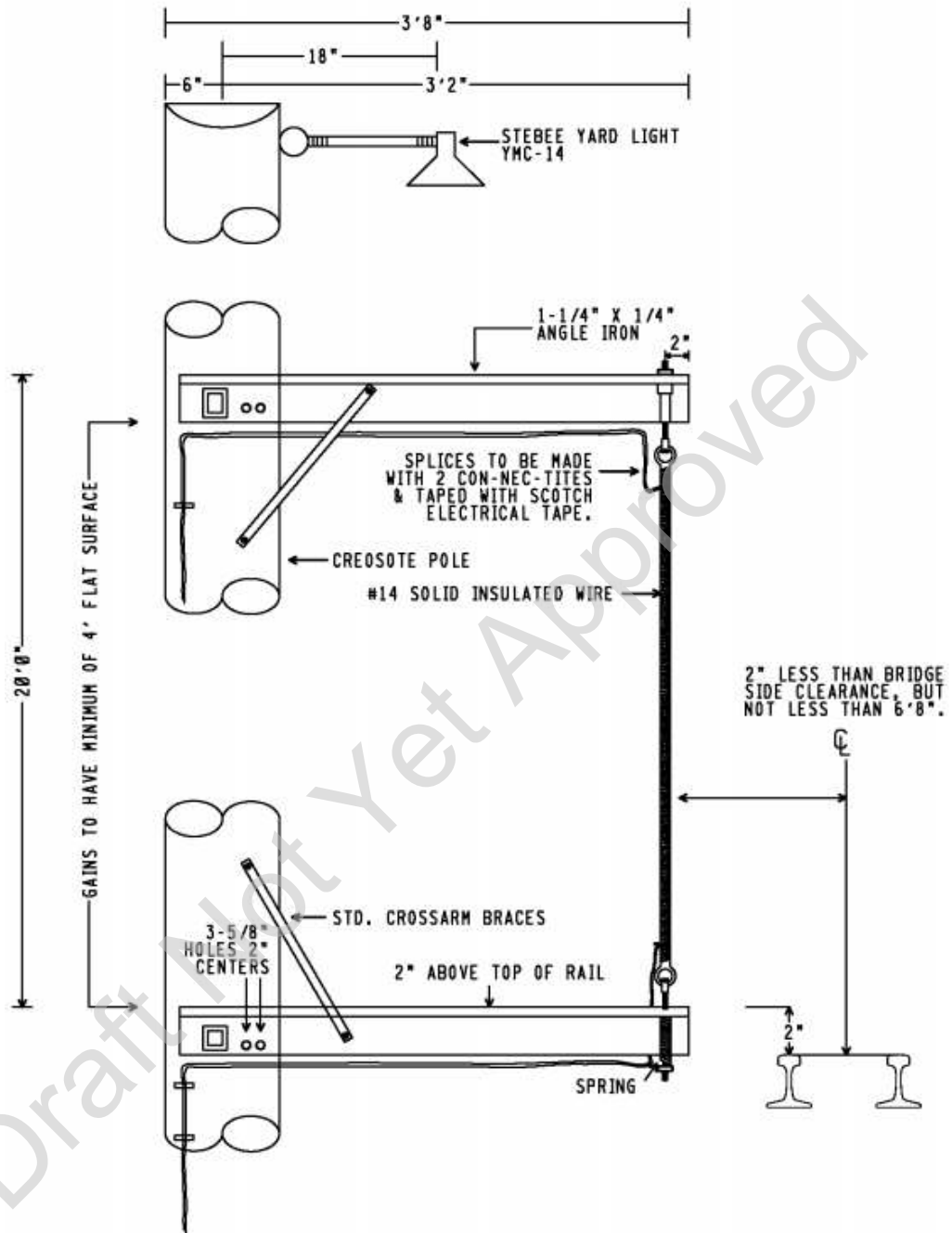


Figure 5120-1
Example of Break-Wire Wide Load Detector

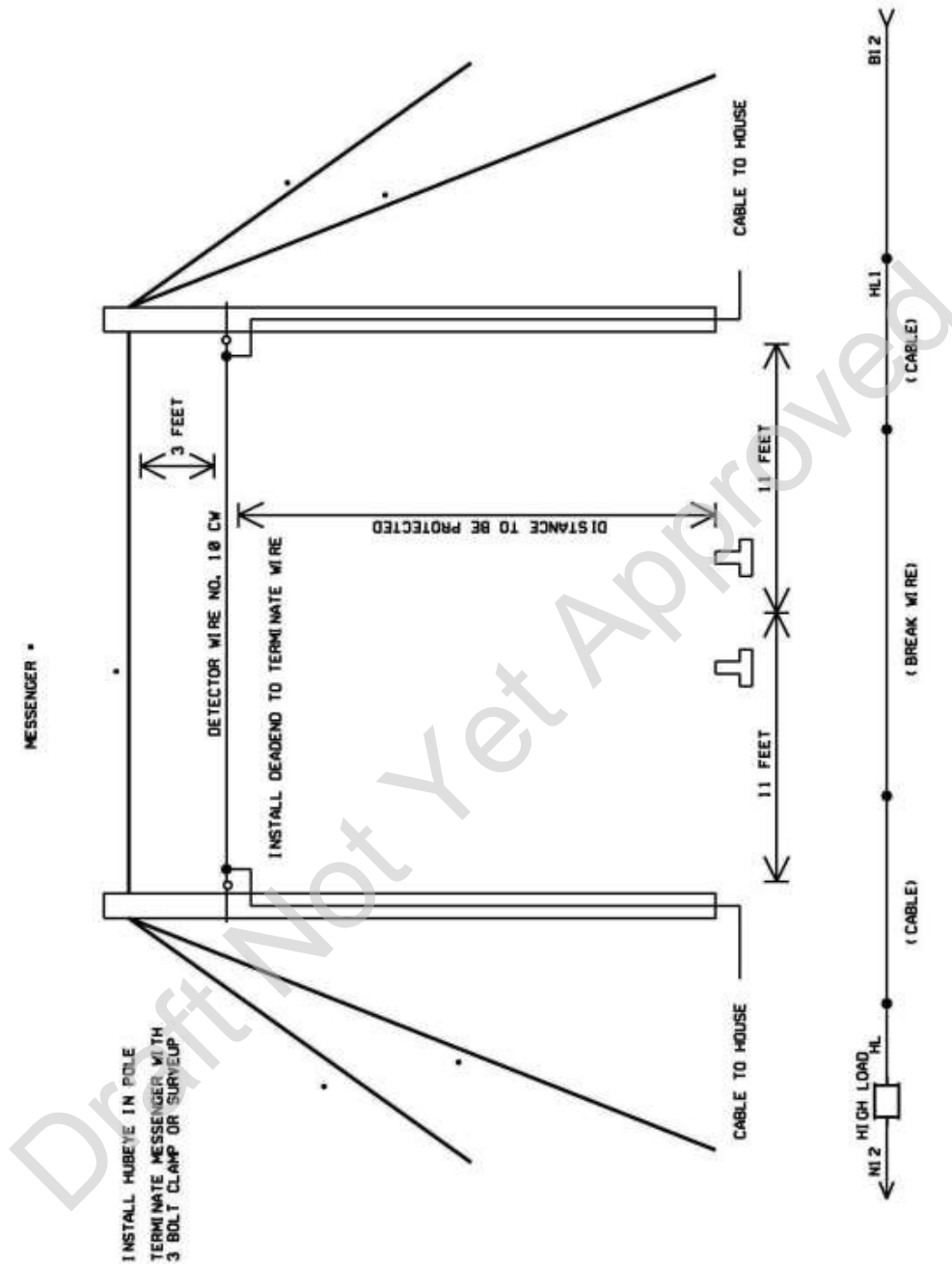


Figure 5120-2
 Example of Break-Wire High Load Detector