

SOME SUGGESTIONS AS TO THE SELECTION OR DEVELOPMENT OF A BASIS FOR A CORRECT SYSTEM OF RAILWAY SIGNALING.*

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The first question that may be asked is, "What is a railway signal in the ordinary meaning of the term?" It may be answered as follows: "A device used to convey certain information to a train crew to govern them in controlling the physical movement of their train." Before starting on the discussion in relation to the development of the system, or the selection of a basis for a system of signaling, certain assumptions may be made.

(1) Signals are used to a sufficient extent on practically all roads to make it necessary to have some system of signaling.

(2) In designing a system of signaling, the first question naturally is, "For what purposes do you want to use the signals?"

(3) We know from past experience that signals are required for the following purposes:

- (a) Blocking or spacing of trains.
- (b) Interlocking or protection of fouling points.
- (c) To show the position of switches, drawbridges, etc.
- (d) A variety of other purposes, such as stop signs, slow boards, etc.

The next logical step, it seems to the writer, is to make a preliminary study of the indications required, and the colors and combinations available to give them. (Definition of "Indication": The word "Indication," as used in this discussion, refers to the name or description of the signal aspect, or rather the meaning of the aspect to the engine-

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SPECIFICATIONS.

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work of any kind in connection therewith. One half the cut-off will be paid for.

40. **Rings and Shoes, How Paid For.**—Rings shall not be paid for, but shoes will be paid for at the specified rate per shoe.

SHEET PILING.

41. **Points.**—Sheet piles shall be cut at the end, so as to form a point at one side and not in the middle, and when driven, this point shall be kept next to the pile previously driven to insure contact.

42. **Broken Joints.**—Where there are two or more rows of sheet piles, they shall be driven with broken joints.

43. **How Paid For.**—Sheet piling will be paid for at the specified price per thousand feet board measure left in the work.

Masonry.

44. **Classes of Masonry.**—All stone used in the different classes of masonry must be sound hard stone free from dry-

and cracks, subject to the engineer's or the inspector's approval and the classes of masonry will be of the following description.

45. **First-Class Masonry.**—First-class masonry work will consist of rock faced ashlar work, laid in regular horizontal course, having parallel beds and vertical joints of not less than ten or more than thirty inches in thickness, decreasing in thickness regularly from the bottom to the top of the wall.

46. **Stretchers.**—Stretchers shall not be less than two and one-half ($2\frac{1}{2}$) feet nor more than six (6) feet in length, and not less than one and one-half ($1\frac{1}{2}$) feet in width, nor less in width than one and one-fourth ($1\frac{1}{4}$) times their depth.

47. **Headers.**—Headers must not be less than three and one-half ($3\frac{1}{2}$) feet nor more than four and one-half ($4\frac{1}{2}$) feet in length where the thickness of the wall will admit of same, and not less than one and one-half ($1\frac{1}{2}$) feet in width, nor less in width than they are in depth of course. The beds and sides of the stones shall be cut before being placed on the work, so as to form the joints not exceeding one-half ($\frac{1}{2}$) inch in width. Every stone must be laid on its natural bed, and all stones must have their beds well dressed parallel and true to the proper line, and made always as large as the stone will admit of. The vertical joints of the face must not be less than eight (8) inches in from the face, and as much more as the stone will admit of, all corners and batter lines to be run to neat line and the projections of the rock faces must not exceed four (4) inches beyond the face or draft lines of the masonry. The masonry shall consist of headers and stretchers alternating so that at least one-fourth of it shall consist of headers extending entirely through the wall, and every header shall be immediately over a stretcher of the underlying course; the stones of each course shall be so arranged as to form a proper bond with the stones of the underlying course, and a bond of less than one foot will in no case be allowed. The whole of the masonry must be laid in good cement mortar and each course shall be thoroughly grouted before the next course is laid, and no hammering will be allowed on the wall after the course is set; if any inequalities occur they must be carefully pointed off.

48. **Backing.**—The backing shall be of good size, well-shaped stones, laid so as to break joints and thoroughly bond the work in all directions, and leave no space between them over six (6) inches wide, which spaces shall be filled with small stones and spawls well grouted.

49. **Foundation Courses.**—All foundation courses must be laid with well selected, large flat stones, not less than twelve (12) inches in thickness, nor of less superficial surface than fifteen (15) square feet.

50. **Bridge Seats and Tops.**—All bridge seats shall be bush hammered to receive bed plates. All tops of walls shall be finished with a coping course of such dimensions and projections as the plans of the engineer may require. Dressed and cut to a true surface on top and front edges, in conformity with diagram for same which will be furnished by the engineer.

51. **Second-Class Masonry** shall consist of broken or random ranged rock work of the best description. The face stones shall be dressed to their uniform thickness throughout before being laid, but not hammered, and shall be laid with horizontal beds and vertical joints on the face. No stones shall be less than eight (8) inches in thickness. There shall be at least one header to every three stretchers, and both header and stretcher shall not be less than three (3) feet in length, and fifteen (15) inches in width where the thickness of the work will permit.