Introduction

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Classification yard design and freight car performance were the featured topics at the third railroad classification yard workshop, October 19-21, 1983, in Toronto, Ontario, Canada. The program included presentations at three working sessions and a keynote address by William J. Harris, vice president of research and testing at the Association of American Railroads. The workshop closed with an inspection tour of the Canadian Pacific (CP) Agincourt Yard.

Deregulation and the impact of large railroad system mergers are the new challenges for the railroad industry, Harris told the workshop audience. Deregulation has also affected traffic by car type as well as railroad classification yards according to J.A. Hagen, senior vice president of marketing and sales, Consolidated Rail Corporation (Conrail), who addressed the workshop's luncheon following the second session.

A session reviewing knowledge of freight car rollability and prediction of car performance was led by John F. McGinley. It included a panel discussion by the authors of written presentations and discussion of the causes and results of the principal characteristics of rolling resistance by Alexander Wilson of Union Switch and Signal Division, Charles N. Morse of General Railway Signal Company, and Earl E. Frank of Abex Corporation.

The second session covered yard-control systems; Alain L. Kornhauser of Princeton University presided. The third session covered yard design tools and practice; Carl M. Martland of Massachusetts Institute of Technology presided.

Agincourt Yard, recently converted from its original analog system to digital computer control, was the site of the workshop's final session. Hosts for this tour were CP general manager G.A. Swanson and B.F. Dixon, assistant superintendent of Agincourt Yard.

As chairman of this workshop, I emphasize, in summary, that the rollability of cars remains one of our greatest unknowns and that equating the measured rolling characteristics of cars with their true performance remains an open field for further research. I believe that even the future need for yards is in doubt. With boxcar traffic moving in Trailvans and other traffic moving in unit trains, industries are changing their transportation requirements, which significantly affects the need for and the design of classification yards. If the rail industry is to continue to grow, the role of the railroads for best serving the nation must be determined.

Below are listed 16 yard design suggestions, previously outlined at the first classification yard design workshop, held in Chicago in 1979 (1). These yard design features may or may not suit all requirements, but based on my 30 years of experience, I believe that they can serve as guidelines. They are as follows:

1. A hump yard should never be built unless it is needed, and two hump yards should not be built at the same location. The site for a yard requires a sufficient number of originating and terminating cars to justify its cost. If there are more cars than can be handled through one yard, a site at another terminal should be located to construct the second yard. The number of times cars are switched should be minimized.
2. Construction of a receiving yard in line or parallel to the classification yard is dependent on the terrain and the size of inbound trains. If the site for a yard has sufficient width and the majority of trains are short (less than 80 cars), I recommend use of the parallel receiving yard. A yard primarily to be used for long road trains is normally suited for an in-line design.
3. The classification yard should be a teardrop design with the long track in the center and short tracks on either side. This provides minimum curve resistance for the majority of the cars. If the yard is a high-volume yard with two parallel departure yards, the teardrop design also provides greater operating flexibility in classifying cars to tracks.
4. The departure yard should be parallel to the classification yard. A parallel departure yard will minimize interference in assembling trains and provide greater use of the classification tracks.
5. The receiving yard and departure yard should be constructed with wide track centers to provide access to the cars for bleeding of air brakes and car inspection.
6. The distance between the receiving yard and the hump crest and between the hump crest and the clearance point in the classification yard should be kept to a minimum. It is desirable to minimize the time to shove a cut up the hump from the receiving yard, and it is critical to maintain a short distance between the crest and the body of the yard because this is the region of potential catchup; this distance governs the humping speed.
7. The lead between the receiving yard and the hump should be constructed with No. 10 turnouts; 75 ft of tangent track should be the minimum distance between reverse curves to prevent long lightweight cars from lifting off the track while they are being shoved up the hump.
8. The vertical curve at the hump crest should be at least 80 ft (approximately 12 ft per degree of change). The flat vertical curve will reduce problems that result from the uncoupling of long cars.

9. I recommend constructing 10 track groups with a maximum curve of 12 degrees 30 min. The total central angle should be kept to a minimum, and, if necessary, depending on the total number of classification tracks, two master retarders may be required. Curve lubricators on both rails should be installed below the group retarder to reduce curve resistance.

10. The initial hump grade at the end of the crest vertical curve should be 5 to 6 percent. This will achieve maximum separation between cars.

11. The classification yard body should be graded at 0.08 percent and track centers constructed at 14 ft. The minimum track length should be 30 cars; the maximum (depending on the total number of classification tracks) should be 60 to 80 cars.

12. Inert retarders should be located 300 ft from the end of the clearance point on a +0.3 percent grade.

13. The end of the classification yard should be built with No. 8 turnouts in a tandem ladder arrangement at about an 18-degree angle. The number of tracks connected to separate ladders is a function of the yard size and car volume. If two crews are used, the yard should be subdivided into four leads.

14. Two or three stub-end pullout leads (depending on the size of the classification yard) should be used to connect the classification yard with the departure yard. These pullout leads should be constructed on a zero grade and about 10 car lengths longer than the longest classification track. Power-operated crossovers should be installed to permit parallel moves. The distance between the pullout leads and the classification yard and between the pullout leads and the departure yard should be kept as short as possible. Pull distance should be sacrificed for shove distance.

15. The car repair tracks should be located between the classification yard and the departure yard and accessible from both the hump and the pullout.

16. The locomotive service and repair facilities should be located between the receiving and the departure yards.

REFERENCE

1. Proceedings of the Workshop for Classification Yard Technology. Federal Railroad Administration, Rept. FRA-ORD-80-17, Dec. 1980. NTIS: PB 81-143315.

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