NORFOLK AND WESTERN MAGAZINE

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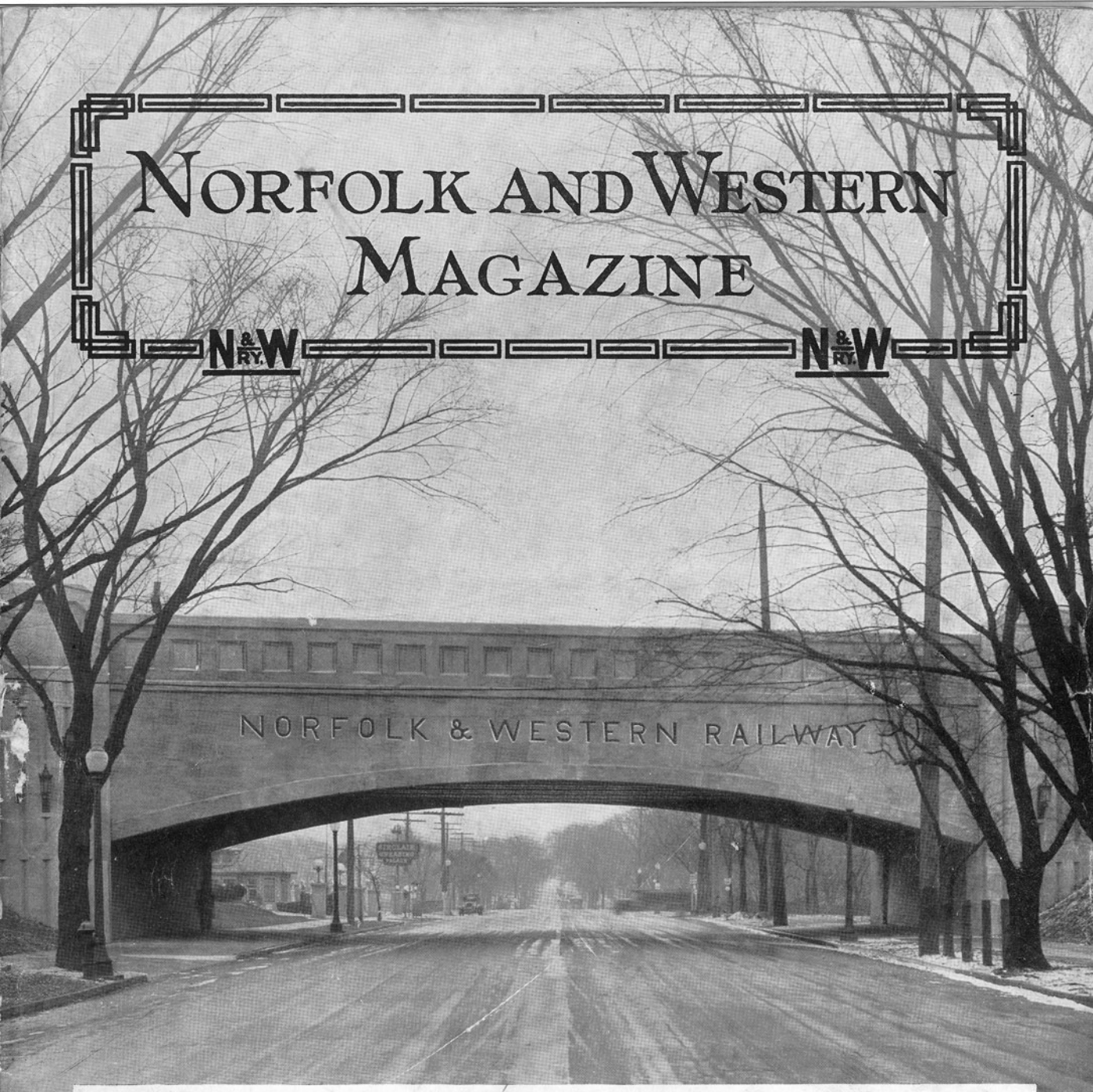

Broad Street, Columbus, Ohio

This underpass is a portion of our grade crossing elimination project just completed in the Ohio Capital at a cost of $4,000,000.00

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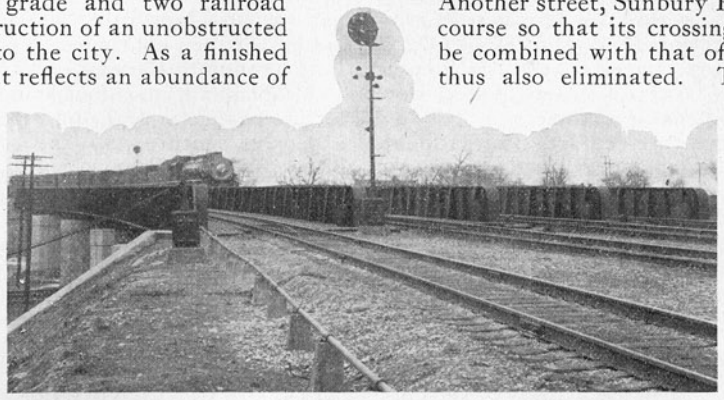
FEBRUARY, 1931

The Columbus Grade Crossing Elimination And Yard Extension Improvement Is

A FINISHED JOB

THE Norfolk and Western's entrance to Columbus, the "gateway to the West," has been improved by the building of 25 miles of additional track, the elimination of 10 grade and two railroad crossings, and the construction of an unobstructed four-track main line into the city. As a finished project the improvement reflects an abundance of credit upon all who had a part in the work. The big job was begun in October, 1928, and it was brought to a successful conclusion in the same month of last year. Finishing touches were applied later which brought its external appearance to near-perfection. As it stands now, the Columbus grade-crossing elimination and yard extension undertaking is something of which both the city of Columbus and the Norfolk and Western may well be proud.



"The Skipper," Train No. 84, passing over the new four-track steel and concrete bridge across the Pennsylvania and B. & O. tracks

As explained on page 263 of the April, 1929, issue, the difficulties surrounding the construction work were numerous. There was a tremendous amount of filling, excavation and masonry work to be done in the face of heavy railroad and street traffic. There were streets to be changed in course, in addition to the elimination of crossings. And there was a great bridge to be built over two other railroads without interrupting their traffic. However, due to the splendid cooperation shown by all of the departments of our railroad—the Operating, Maintenance of Way, Motive Power, Telegraph, Signal and Valuation Departments, which worked hand in hand with the Engineering Department—and the city of Columbus and Franklin County, the entire job was finished almost without a hitch. Much credit should go to C. E. Armstrong, assistant engineer, who, working under the supervision of W. P. Wiltsee, chief engineer, with Resident Engineers J. P. Maloney and V. D. Johnson, directly supervised the actual construction.

The two greatest features in the changes made were the raising of the track level in its approach from Bannon to Joyce Avenue Yard on an average of 20 feet above the old level, and the changing of the course of the line between Mt. Vernon Avenue and the east end of Joyce Avenue Yard so that the mouth of the yard was extended and straightened. This change in line also facilitated the elimination of the Pennsylvania-B. & O. grade crossing.

The value of the grade crossing elimination angle of the job to the city of Columbus is most apparent. A total of nine street crossings in the city and one highway crossing in the county were placed under our tracks through underpasses. Two of these streets, Clifton Avenue and Bryden Road, were entirely new crossings, previously having had no outlet across the railroad. Another street, Sunbury Road, was changed in its course so that its crossing of the railroad would be combined with that of Maryland Avenue and thus also eliminated. The entire cost of the elimination of these street crossings from Mt. Vernon Avenue north was borne by the Norfolk and Western while from Mt. Vernon Avenue south the railway paid 65 per cent of the cost. (Since our line runs almost due north and south in its approach to Joyce Avenue Yard from Bannon, strict compass directions will be adhered to in this article. Usually our railroad is spoken of as running "east" and "west," but for the sake of clearness, the real directions will be used.)

The value of the improvement to our railroad lies chiefly in the saving of delay to trains moving into and out of Columbus because of the old P. R. R.-B. & O. crossing near Maryland Avenue, and the heavy curve and grade at the eastern end of Joyce Avenue Yard.

Other benefits to the railroad have come as the result of the change in line from Mt. Vernon Avenue to the yard, the extension of the yard and the raising of the track level. The eight degree curve at the east end of the yard has been cut down to four degrees and the curve has been shortened. The yard has been extended; additional trackage has been laid. Today its capacity is 3,750 cars. Before the improvements were made its capacity was 1,600 cars. The ascent from the Franklin County Infirmary to the yard, stretching over a distance of four miles, has been lightened from a maximum grade of .7 per cent to a maximum grade of .4 per cent.

These changes mean that long trains en route from Bannon to Columbus can enter the yard proper without an intermediate stop. With its enlarged capacity Joyce Avenue Yard can now handle a maximum number of cars without shifting and without the blocking of important tracks. There is plenty of storage space for coal cars. The Pennsylvania Railroad's yard of 10 tracks adjoining our yard on the north has also been extended and our loaded coal cars en route to the lakes can be pulled into this yard without additional switching or delay.

As far as train operation between Bannon and Columbus is concerned, there will be no congestion. Where prior to the improvement there were only two tracks between Bannon and Joyce Avenue Yard, now

there are three tracks between Bannon and Bryden Road, and four between Bryden Road and the east end of the yard.

If you have available a copy of the MAGAZINE for April, 1929, it will be interesting to compare the pictures on pages 263, 264 and 265 with the illustrations accompanying this article. As far as possible, all of the pictures with this article were taken from exactly the same spots as those appearing in the April, 1929 issue and they clearly show the changes which have been made.

An enormous amount of steel, concrete and filling material was used in the construction. Perhaps a few figures illustrating this feature would be interesting. All of the 10 underpasses were built of concrete, reinforced with steel. They required a total of 30,912 cubic yards of reinforced concrete and 1,963 cubic yards of mass concrete. Over 2,000 tons of steel were used to reinforce these structures alone.

All of these underpasses received artistic treatment, are well-lighted, and harmonize perfectly with the section of the city through which this part of the line passes. The streets through the underpasses are 50 feet wide between curbs at Main Street, Bryden Road and Broad Street. The other streets are 36 feet wide between curbs. The concrete sidewalks bordering these underpass streets are 12 feet wide. The Leonard Avenue underpass is the largest of them all. It required nearly 7,000 cubic yards of concrete, alone. It is 394 feet wide, has an inside clearance of 16 feet and carries 30 tracks on its top—the east end of Joyce Avenue Yard. In order to make the foundations of these underpasses more secure, over 45,000 lineal feet of creosoted piling was used.

Just south of the Leonard Avenue underpass a large reinforced box culvert, with inside dimensions of six by six feet was built to provide for drainage. Twenty-five tracks are carried over this culvert, which required 703 cubic yards of concrete and 61,209 pounds of reinforcing steel.

Another beautiful piece of masonry work may be found at Nelson Road, between Fair Avenue and Broad Street. Here the line ran so close to the street it was necessary to build a concrete retaining wall in order to support the filling. This retaining wall is also built of reinforced concrete and is 26 feet high above the curb of Nelson Road with a four-foot foundation. It is 973 feet long and contains 5,543 cubic yards of concrete.

Two contracts were let for the grading and masonry work. The contract for the work on the south end was awarded to Morris, Gray & Hunter, of Roanoke, while the contract for the change in line and yard extension north of Mt. Vernon Avenue was awarded to Harry M. Waugh, of Bluefield. A total of 1,766,030 cubic yards of material were required for the filling. Of this amount 873,228 cubic yards were taken from the borrow pit just south of Joyce Avenue Yard by Mr. Waugh for the change in line and extension of the yard. From other borrow pits near the Infirmary and Reese (three miles south of Valley Crossing) 618,140 and 274,660 cubic yards, respectively, were removed by Morris, Gray & Hunter for the grade crossing elimination work, on that part of the improvement south of Mt. Vernon Avenue.

With this filling it was possible to raise the new grade gradually from 0 at Infirmary to 18 feet above the old level at Livingston Avenue, 20½ feet above the old level at Main Street, 21.7 feet at Bryden Road, 22.3 feet at Fair Avenue, 25.6 feet at Broad Street, 26.9 feet at Long Street, 24.9 feet at Clifton Avenue, and 20.2 feet at Mt. Vernon Avenue. Beginning at the Infirmary, the new line ascends on a grade of .0609 per cent to Main Street where it reaches a .3 per cent grade. It then continues on a .4 per cent ascent from Fair Avenue to the east end of the yard.

Although a tremendous amount of filling was required for the change in grade and the yard extension, a more expensive feature was the construction of the new bridge over the Pennsylvania and Baltimore and Ohio tracks near Maryland Avenue. This bridge is built of five spans of mass concrete with reinforced concrete abutments. It carries a steel superstructure containing 4,500,000 pounds of structural steel. The bridge is 408 feet long, carries four tracks across the top and is 25½ feet high above the Pennsylvania and B. & O. tracks. A total of 5,934 cubic yards of concrete reinforced with 233,434 pounds of steel went into the construction of this bridge. As additional reinforcement, 82 tons of track rail were used. While the new bridge spans only four tracks at the present time, it is long enough to cover 10 additional tracks.

Besides involving changes in telegraph, telephone, water and sewer lines, which were made by the Norfolk and Western, the project involved the construction of two new floodlight towers, the relocation of another tower, the relocation of signals, switches and tracks, and the building of a new interlocking plant. One of the new floodlight towers was erected about 800 feet west of Leonard Avenue, while the other one was built near the new interlocking tower. The new interlocking tower, christened, "JO," is built of brick and is located a short distance northwest of the new P. R. R.-B. & O. bridge. It is equipped with the most modern mechanisms and controls the lead switches and crossovers on the tracks leading into Joyce Avenue Yard. Its sphere of control reaches farther east, moreover, for a distance of three miles including in its scope 23 switches, eight crossovers and two single switches. The switches are thrown and locked by electro-pneumatic action.

To serve industries located on both sides of the new high grade line, some of the old and temporary tracks were allowed to remain. The temporary westbound track, which was laid in order to allow the grading to progress without interruption of traffic, was converted into an industrial track serving industries east of

(*Turn to page 68*)

(1) *This picture shows the Leonard Avenue underpass. Compare this picture with the one in the middle of page 265 of the April, 1929, issue.*

(2) *The new high grade four-track main line between Broad Street and Fair Avenue. On the right is Franklin Park and on the right bank of the fill may be seen the shrubbery planted to conform the appearance of the filling with that of the park.*

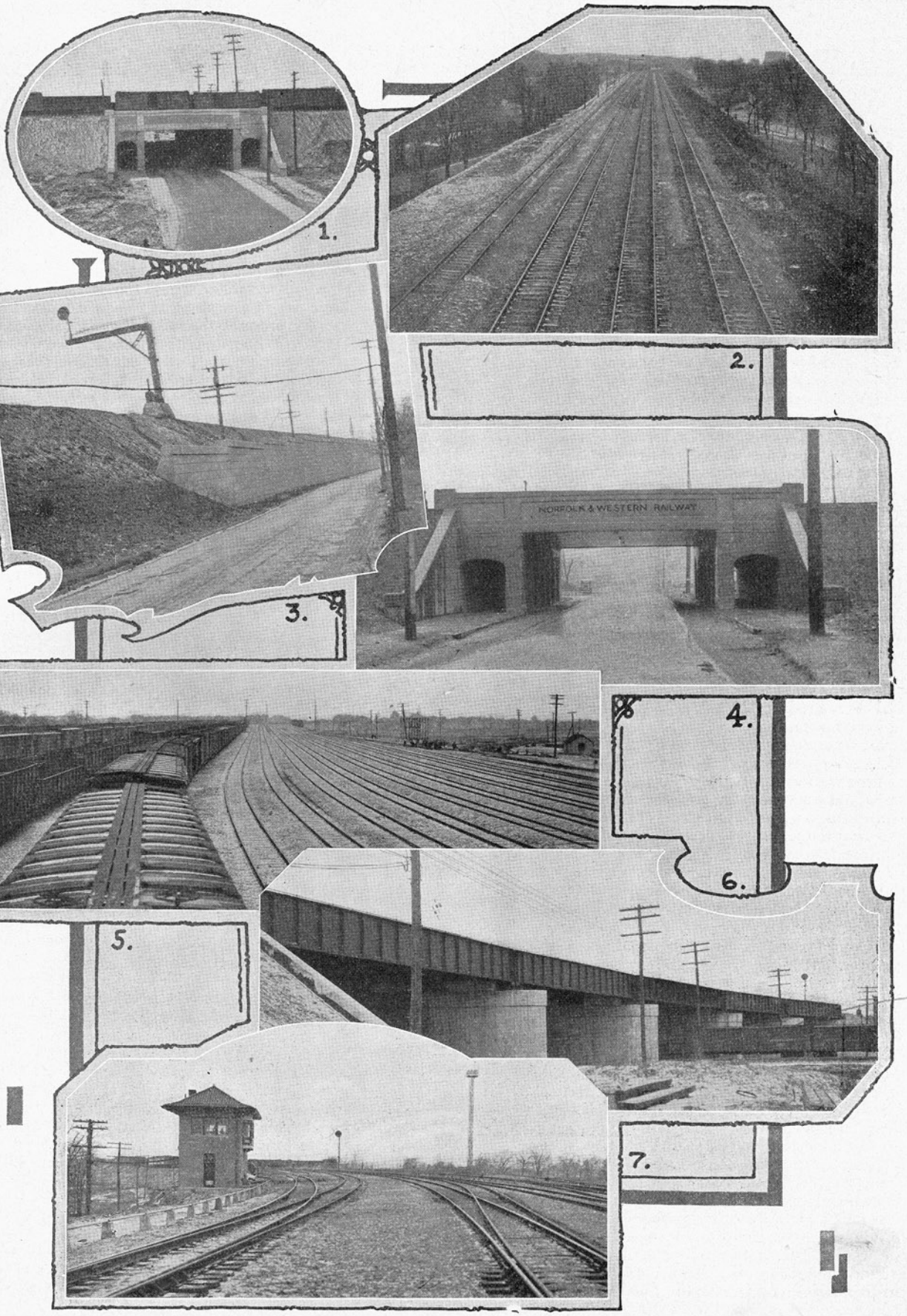
(3) *The Nelson Road retaining wall. The grade is about 24 feet high at this point.*

(4) *The Livingston Avenue underpass, looking east. Compare this picture with the one on page 263 of the April, 1929, issue.*

(5) *The east end of Joyce Avenue Yard looking southeast. Between the group of workmen and the building at the right may be seen the old tracks. This picture gives an idea of how the east end of the yard was straightened. Compare this picture with that on page 264 of the April, 1929, issue.*

(6) *A close-up of the new five-span reinforced concrete and steel bridge over the Pennsylvania and B. & O. tracks.*

(7) *A view of the south or east end of Joyce Avenue Yard, showing the new interlocking and floodlight towers.*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NORFOLK & WESTERN RAILWAY
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A Finished Job

(*Continued from page 64*)

Livingston Avenue. An additional team track was laid at Main Street on the east side of the main line and these two tracks together with the Gwinn Milling Company track (on the west side of the new line) descend from the high grade by means of a ramp. Another team track has been laid on the west side of the main line just north of Livingston Avenue and a low grade line has been laid on the east side of the main line to the Powell Lumber Company plant and to the Long Street team tracks.

Provision for additional comfort for our passengers who use the rail-air service inaugurated some time ago between Norfolk, Columbus and the West will be made. This will take the form of a permanent passenger shed, which will be constructed at the Broad Street underpass for the convenience of passengers who are transferred from this point to Port Columbus. Temporary steps have already been built leading down from the high grade to the street for the use of these passengers and permanent steps will be built later.

In addition to being engineers, it was necessary for Messrs. Armstrong, Maloney and his associates to perform the duties of landscape artists. The new line passes for a short distance through Franklin Park. Therefore, in order to conform the appearance of the grading to that of the park and adjacent territory it was necessary to landscape the slopes of the line through this section. Starting at a point 500 feet south of Livingston Avenue and extending northward 2.3 miles to the B. & O.-P. R. R. bridge, the slopes of the new fill were covered with a special soil and then planted with honeysuckle and shrubs. Approximately 700,000 square feet of surface was given this special treatment. The grade on both sides between Fair Avenue and Broad Street, through Franklin Park was specially-sloped and planted with shrubs specified by the park commissioners. These shrubs were purchased from an Ohio nursery.

It was to be expected that a job as large as this probably would be finished later than on scheduled time. It wasn't. It was promised by October 1, and it was finished by then. Eastbound trains began to run over the new high grade line on April 1, 1930, and westbound trains began operating over it on June 1, last year.

The completion of the Columbus improvements brings to a successful conclusion a program inaugurated by the Norfolk and Western and the city of Columbus in 1911. At first it was rather difficult to get all parties together on the plans and methods of such an undertaking, and the World War caused an interruption that delayed the work for four years longer. After the war the subject became active again and, additional studies were made for detouring the railway tracks by a change of line to the east. Finally, in 1928, all obstacles in the way had been removed and the actual work on the big project was begun in October of that year.

All-Steel Box Cars

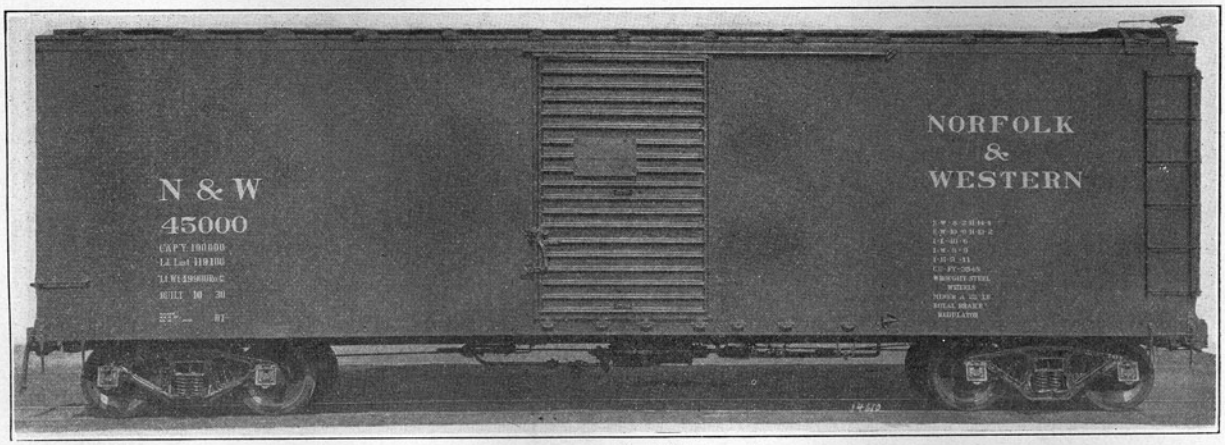
By J. E. ECHOLS, *Foreman, Freight Car Shop, Roanoke Shops*

IN THE June, 1927, issue of our MAGAZINE there appeared a story of the building of our all-steel BS four-door automobile box cars, at Roanoke Shops. Also in that issue were a number of exhibits, showing the different operations from the time the wheels were unloaded at the Freight Shop until the car was completed and ready to be delivered to the Transportation Department for service.

The inside dimensions of the new BT and BS all-steel box cars are practically the same, the only difference being that the Class BT cars, of which 500 are now under construction at Roanoke Shops, are lined with 13-16-inch tongue and groove lining, and the BS cars had their ends lined with 13-16-inch tongue and groove lining and only part of the side, the remainder of the side lining being 1¾ inches thick.

Both the BS and BT box cars have a floor 2¼ inches in thickness. However, in the BT cars a top floor is laid, butt-joined, 13-16 inches in thickness. In the door opening, this top floor is laid crosswise of the car. From the door opening to the ends of the car the flooring is laid lengthwise. The top floor is secured to the car by nailing it down to the first floor, beginning four inches from the ends and spacing the nails 25 inches apart throughout the length of the board. The idea of the second floor is that it can be readily and economically removed and replaced when the floor becomes soiled with oils, grease, etc., thereby making the car suitable for all kinds of lading.

The illustration shows a single-door all-steel car, Class BT. On the side of the car it will be noticed that the stencilling shows the dimensions of the car, the cubical capacity, lightweight, and total weight loaded.



One of the new 50-ton Class BT all-steel box cars