Sixty-Three-Mile Railway Completed in Ten Months

Double-Track Line Connecting the Chesapeake & Ohio With the Hocking Valley Railway—Heavy Grading Resorted To in Order to Obtain Low Grades and Easy Curves

SPEED of construction was the governing factor in laying out the construction program for the new 63-mile double-track line that now connects the Chesapeake & Ohio Railway at Gregg, in Pike County, Ohio, with the Hocking Valley Railway at Valley Crossing near Columbus, Ohio. A protracted legal argument before the Interstate Commerce Commission over its approval of the project so delayed the start of work that when approval finally was granted, only ten months remained before the agreement would expire by which the Chesapeake & Ohio freight moved over the Norfolk & Western tracks from the end of the C. & O. line at Waverly to Columbus. In that time it was necessary to move nearly 1,000,000 cu.yd. of rock and more than 4,000,000 cu.yd. of earth and to place about 10,000 tons of structural steel and more than 100,000 cu.yd. of concrete in bridges and highway crossings, also to lay and ballast 63 miles of double track. Contracts for the work were let on Nov. 17, 1926. The first train was run over the line on Aug. 23, 1927. By the time the trackage agreement with the Norfolk & Western expired in September, trains were operating regularly over the new line.

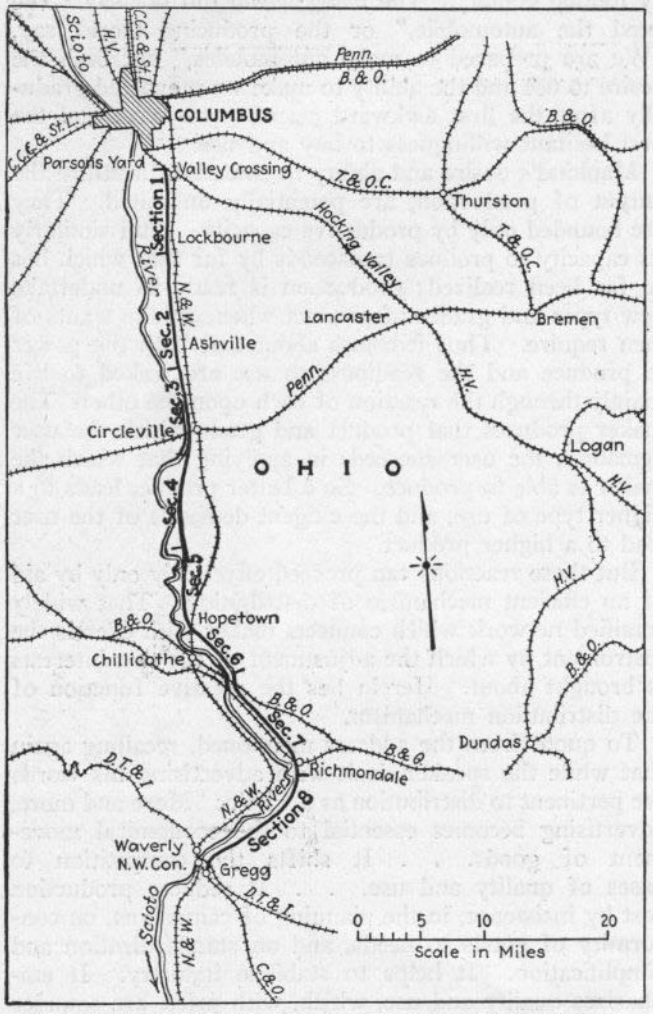


FIG. 1—NEW LINE OF THE CHESAPEAKE & HOCKING RAILWAY IN OHIO

The new railway was built by the Chesapeake & Ohio, under the corporate name of the Chesapeake & Hocking Railway, to bring into existence a complete railway line from the coal-producing states of Kentucky and West Virginia to the Great Lakes at Toledo. Its construction completes the project, begun in 1915, of building a connecting line between the Chesapeake & Ohio at Scioto-ville on the Ohio River and the Hocking Valley at Columbus. Before the war the line was built as far as the Norfolk & Western junction at Waverly (*Engineering News*, Jan. 6, 1916, p. 6). Continuation of the line from Waverly to Columbus makes it possible to run solid trains of coal from the West Virginia coal fields to the Lakes at a high average speed without having to break them up for tonnage changes. It is estimated that the tonnage of coal originating along the Chesapeake & Ohio during the next five years will reach 60,000,000 tons annually, a large part of which will pass through the Columbus gateway.

Characteristics of the Line—The new railroad is double tracked for its entire length and has three center sidings, each capable of holding 125 cars. It is a low-grade line, matching northbound the Toledo division of the Hocking Valley, which is 0.2 per cent northbound and 0.5 per cent southbound, the loaded trains moving northbound. Trains of 8,100 tons are run northbound. There is one momentum grade at the connection between the old and the new lines near Gregg. The curvature is light, generally not more than 1 deg., the maximum being 3 deg., compensated.

All but one highway crossing and all railway crossings are at different levels. There are five railway and 42 highway crossings. A number of the latter were unusually costly to build, because in order to carry the highway over the new railway it also was necessary to carry it over an interurban electric railway that runs parallel to the new line for part of its length.

Stream crossings were not large, but were numerous, the total number of bridges being 56.

Construction Sections—For construction purposes the line was divided into eight sections, separate contracts being let for each section. Beginning at the north end, the country through which the line runs is rolling land, increasing in ruggedness as the south end is approached, there being little rock until the extreme south end of the line is reached. Section 1, at the north end of the line, is in a country that required very little cutting but a considerable amount of filling across low, wide valleys. The grade of the line in this section was fixed largely by the grade of the highways, elimination of all grade crossings being obligatory.

Material for the embankments was taken from borrow pits, chiefly from clay and gravel beds, which are charac-

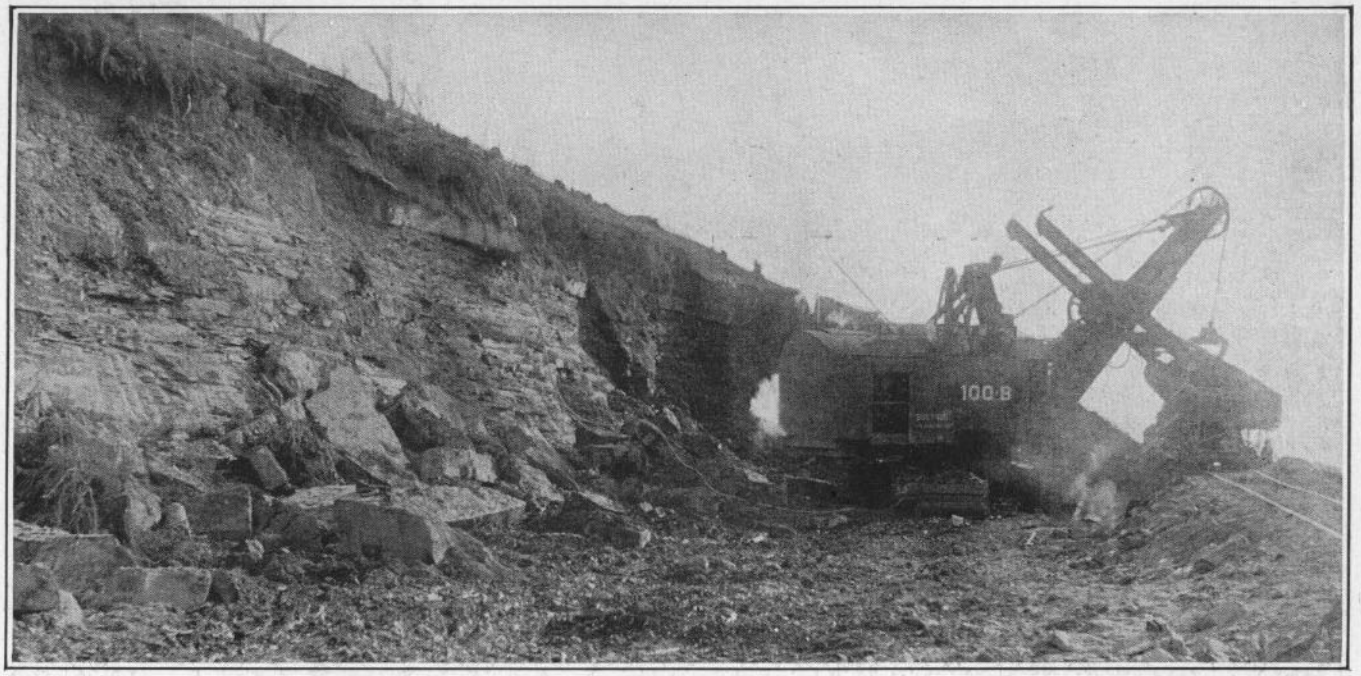


FIG. 2—CHARACTERISTIC ROCK EXCAVATION, USING LARGE STEAM SHOVELS

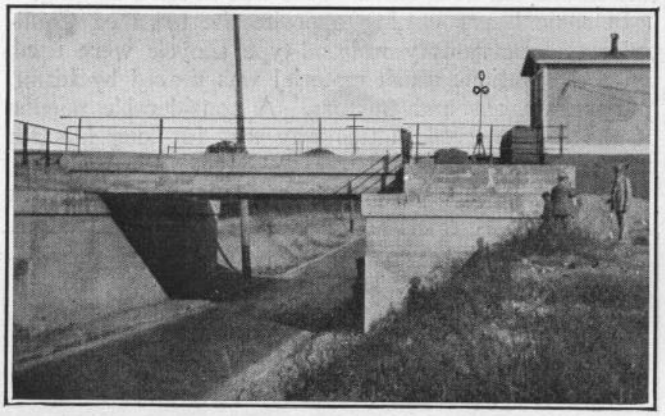
teristic of the country, not a difficult operation except that, as the work was done in winter, wet weather made the clay sticky and hard to handle.

Section 2—The second section had many light cuts and low fills in material which differed from Section 1 in that it was entirely of clay. Slides were not uncommon in the fills during wet weather. On Section 1 the excavating work was handled chiefly with small shovel outfits, but on this section a great deal of the material was moved with teams, the contractors maintaining two team camps, containing about 200 head of stock.

Section 3—The cuts and fills on the third section were unusually long, one fill being 9,000 ft. long and 5 ft. high, another fill 6,000 ft. long and 30 ft. high at the maximum point, and one cut 6,000 ft. long and 25 ft. deep. Large steam shovels were used in the excavating work, dipper capacities running up to about 3 yd., and excavated material was moved in 20-yd. and 12-yd. air-dump cars on standard-gage track carried on temporary trestles over the fills. The record for material handling on this section was 3,500 cu.yd. in one ten-hour shift. A notable feature of the filling work was the use of unusually substantial trestling in order to avoid delays due to derailments and to movement of the trestle during filling. As a result the contractor did not have a single derailment or a car over the bank during the whole operation.

Section 4—Digging on the fourth section was still heavier, the cuts being deeper and the fills higher, with one unusually large side hill cut, which was taken out by making a series of cuts, using a 2-yd. shovel and narrow-gage cars. The best record on this work, which

FIG. 3—HEAVY WORK IN CLAY AND LOOSE ROCK



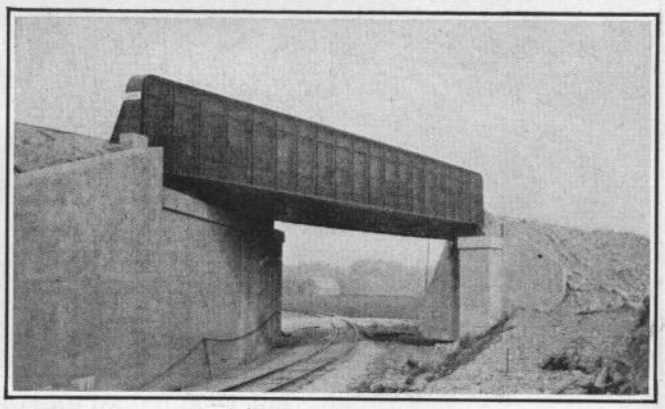


FIG. 4—TYPICAL BRIDGE WORK

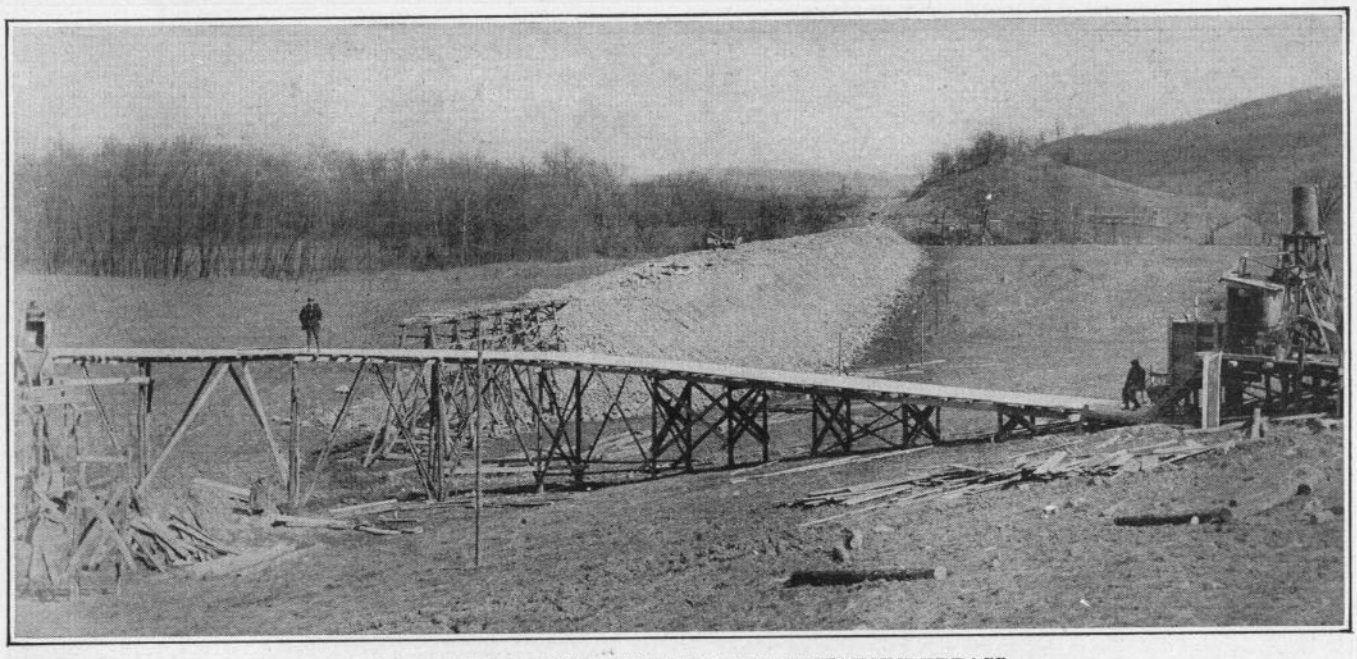


FIG. 5—CONCRETING PLANT FOR A HIGHWAY UNDERPASS

was in mixed clay and gravel, was 586 4-yd. cars in one nine-hour shift. The work included the diversion of Scippo Creek in order to eliminate two bridges.

Sections 5 and 6—One contractor handled both Sections 5 and 6. As in Section 4, the material handled from the cuts was largely clay and gravel, and the work was complicated by the large amount of rain that fell throughout the winter. A 40-ft. cut 3,600 ft. long through yellow and blue clay and cemented gravel was the toughest proposition in the grading work. It was taken out in benches, using a 2-yd. shovel served by three trains of twelve 4-yd. dump cars hauled by gasoline locomotives. The record on this cut was 398 4-yd. cars in one ten-hour shift. This was in hard digging.

In some heavy cutting opposite the town of Chillicothe two heavy-duty railroad-type shovels were used. On these sections much material was moved by teams, graders, wagons and tractors. A considerable portion of the earth moved in this way was for long fills for highway overcrossing.

Section 7—This section, except for some work at the south end, was perhaps the most level section on the entire line. The grading consisted in making long shallow fills and small cuts, most of the work being borrow excavation. For this reason numerous small grading outfits were used and many teams of horses or mules.

Section 8—Some of the heaviest digging on the whole line was encountered on the eighth section in the hill region at the south end of the line. Except for the top soil, which was clay, the cuts were in heavy gravel, shale and rock. The yardage moved here surpassed that moved on any section, amounting to 1,150,000 cu.yd.

Labor—Local labor was employed as much as possible. Its use not only reduced the number of camps and boarding cars but also provided a better class of workmen, as the majority of the men so employed were farmers or farm hands. These men were only too glad to get extra work during the winter season, some of them driving long distances in their own cars back and forth to work each day.

When the work was at its height, two shifts of men were used, the shifts working about eleven hours each.

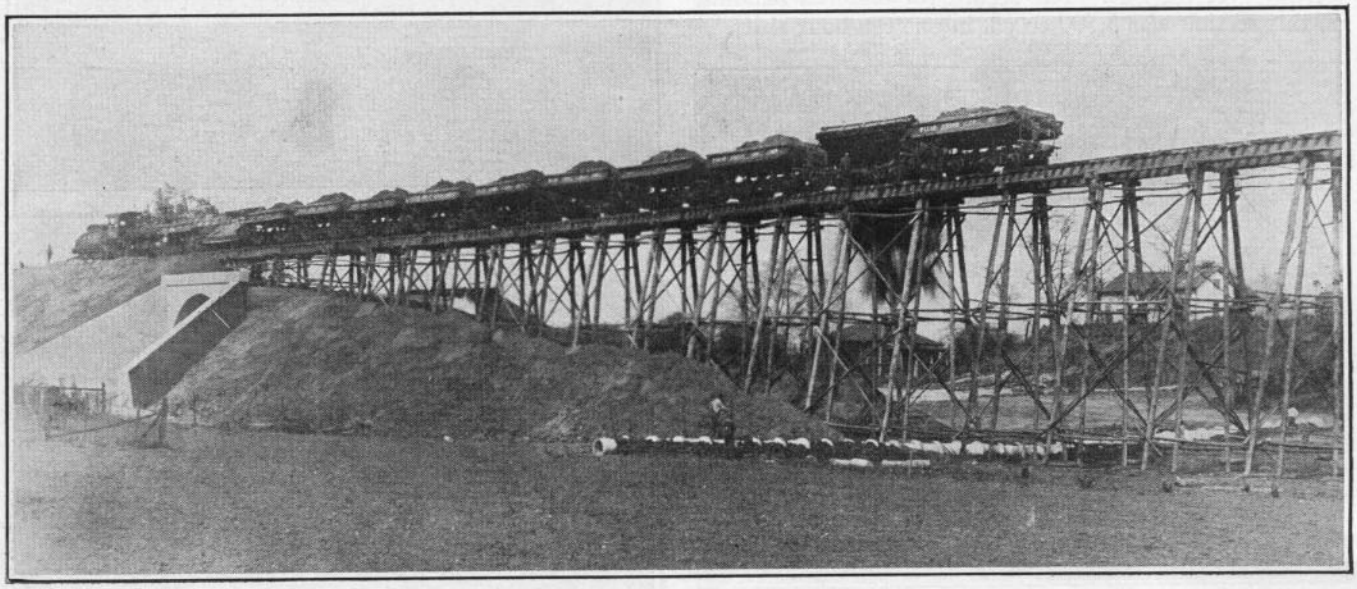


FIG. 6—BUILDING ONE OF THE HIGH EMBANKMENTS

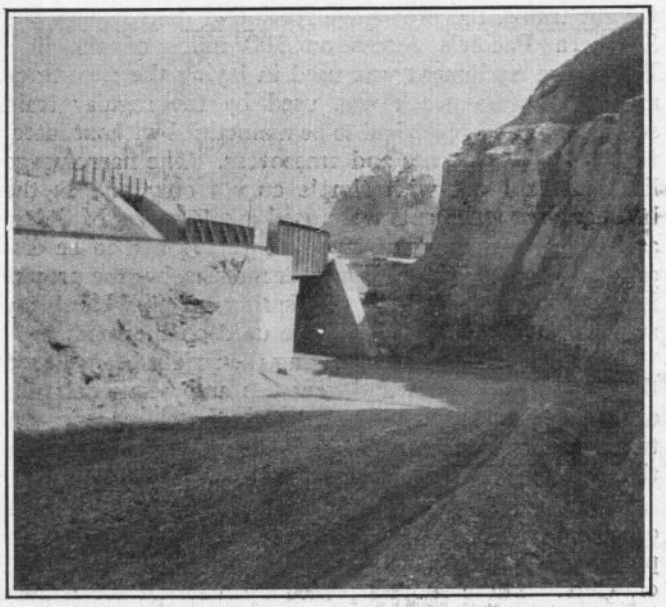


FIG. 7—SEPARATION OF RAILWAY AND HIGHWAY GRADES
Highway and D. T. & I. Railroad relocated for complete separation of grade. Railroad passes under the new line beyond the highway underpass.

Track Work—Tracklaying and ballasting were done by contract. The track was laid with 100-lb. rail on tie-plates punched for both 100-lb. and 130-lb. rail. This arrangement will make it possible to relay the track with 130-lb. rail when the present rails need renewing, without having to renew the plates, at the same time permitting the use of lighter rail during the construction period, when rail may become surface bent or otherwise damaged.

The preliminary ballasting was done with pit-run gravel from local pits. Final ballasting will be done with washed gravel. Ties are of hardwood, mostly oak, all ties except white oak being creosoted.

Bridge Work—Railroad bridges were designed for Coopers E-70 loading. Two types of decks were employed, open decks for stream crossings and ballasted decks for highway crossings. Typical examples are shown in Fig. 4. Concrete work for the bridges and culverts generally was sublet. For most of the structures the contractors set up mixing plants close to the work, but in one instance, where a considerable amount of concrete was required for jobs close together, concrete was distributed by truck from a central mixing plant.

In most instances cast-iron pipe was used for culverts under high fills, but in some locations concrete pipe, heavily reinforced, was used instead.

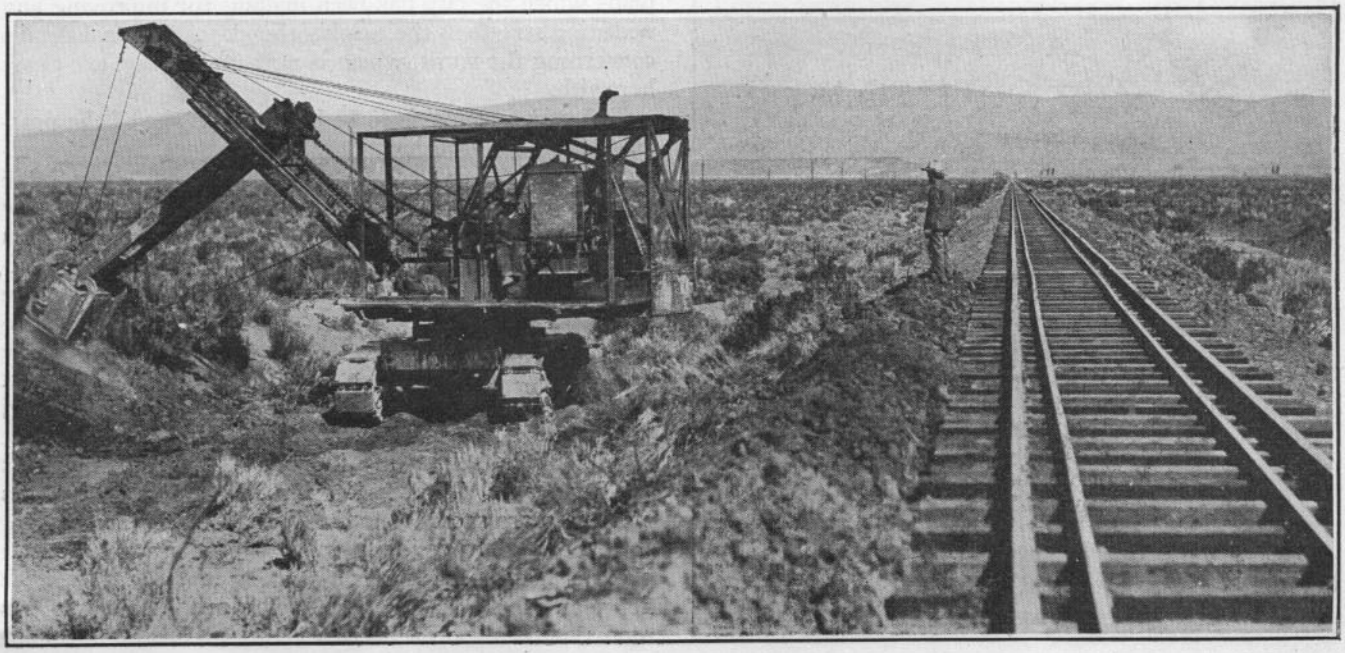
Engineers and Contractors—The work was in direct charge of W. Michel, chief engineer of the Chesapeake & Hocking, and C. A. Whipple, district engineer, with resident engineers on each section as follows: C. E. Butler, C. P. Essman, E. E. Nelson, J. S. Stevenson, W. H. Eary, T. S. Pattison, E. J. Jones and E. H. Adams. The contractors were the Fritz-Rumer-Cooke Company, the Ferguson-Edmondson Company, the Sturm & Dillard Company, the Dominion Construction Company, the Walsh Construction Company (Sections 5 and 6), the A. Guthrie Company, Inc., and the H. W. Nelson Company.

Broadgaging the N-C-O Railway

In Four Months 100 Miles of Wider Track Laid. Road, Organized in 1880, Now Controlled by Southern Pacific

A NEW LEASE of life has come to the Nevada-California-Oregon Railway as the result of broadgaging the line following the transfer of control to the Southern Pacific. The northeastern part of California, through which this line runs, has the climate and rainfall and fertility that make the territory highly productive, but development has been long held back because produce could not be shipped to distant markets without reloading. This handicap is being eliminated by connecting the line with the Southern Pacific system and broadgaging the track, which was about two-thirds completed in 1927 and will be finished early this year.

The N-C-O Railway had its beginning in 1880 as the Nevada & Oregon Railroad Company, formed to construct a line from Reno, Nev., to Beckwith Pass, Calif.



TYPICAL ROADBED WIDENING OPERATION ON THE N-C-O.