Coaling and Sanding Station on the Virginian Railway at Elmore

Reinforced-Concrete Structure with Crusher and Screen, Accommodating 200 Tons Each of Lump and Stoker Coal and 150 Tons of Green Sand

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A REINFORCED - CONCRETE coaling and sanding station, with screening and crushing facilities, bin capacity for 200 tons each of stoker coal and lump coal, and complete facilities for storing and drying sand, is a feature of the yard expansion recently completed on the Virginian Railway at Elmore, W. Va. The plant is electrically operated, with various safeguards against accident, and the layout is such that engines on four tracks can be supplied with both coal and sand, and coal cars on one track can be loaded for shipment to other points.

Elmore is 375 mi. from Norfolk. The grade between Elmore and Clarks Gap, a distance of 14 mi., known as Clarks Gap Hill, is the heaviest on the Virginian Railway, the maximum being 2.07 per cent, compensated for curvature, and the coal is transported up this grade in trains of from 60 to 70 cars of 50-ton capacity by three of the largest Mallet engines on the road. The long narrow yard is constructed on a bench in the hillsides where the tracks parallel the Guyandot River near the mouth of Barker Creek. Owing to the rapid growth of the coal business it was necessary to enlarge the yard and provide shop facilities which were completed the past year. A double track has also been constructed between Mullens and Taft, a distance of 5 mi., extending through the yard.

The shop facilities provided include a five-stall engine house with annex containing a machine shop, storeroom and wash room, a power station and an oil house, all of brick construction on concrete foundations; a reinforced-concrete ash pit 140 ft. long, a 200,000-gal. steel water tank, three water columns and the 400-ton reinforced-concrete coaling and sanding station. The buildings and yard are lighted by electricity, and a fire-protection system has been installed for the shop building. In order to make room for these improvements it was necessary to divert the Guyandot River and build in the bed of the old channel and on low ground adjacent thereto, which greatly increased the cost of the work. The shop facilities at Elmore are for light running repairs, the main shops being located at Princeton, W. Va., 35 mi. east of Elmore.

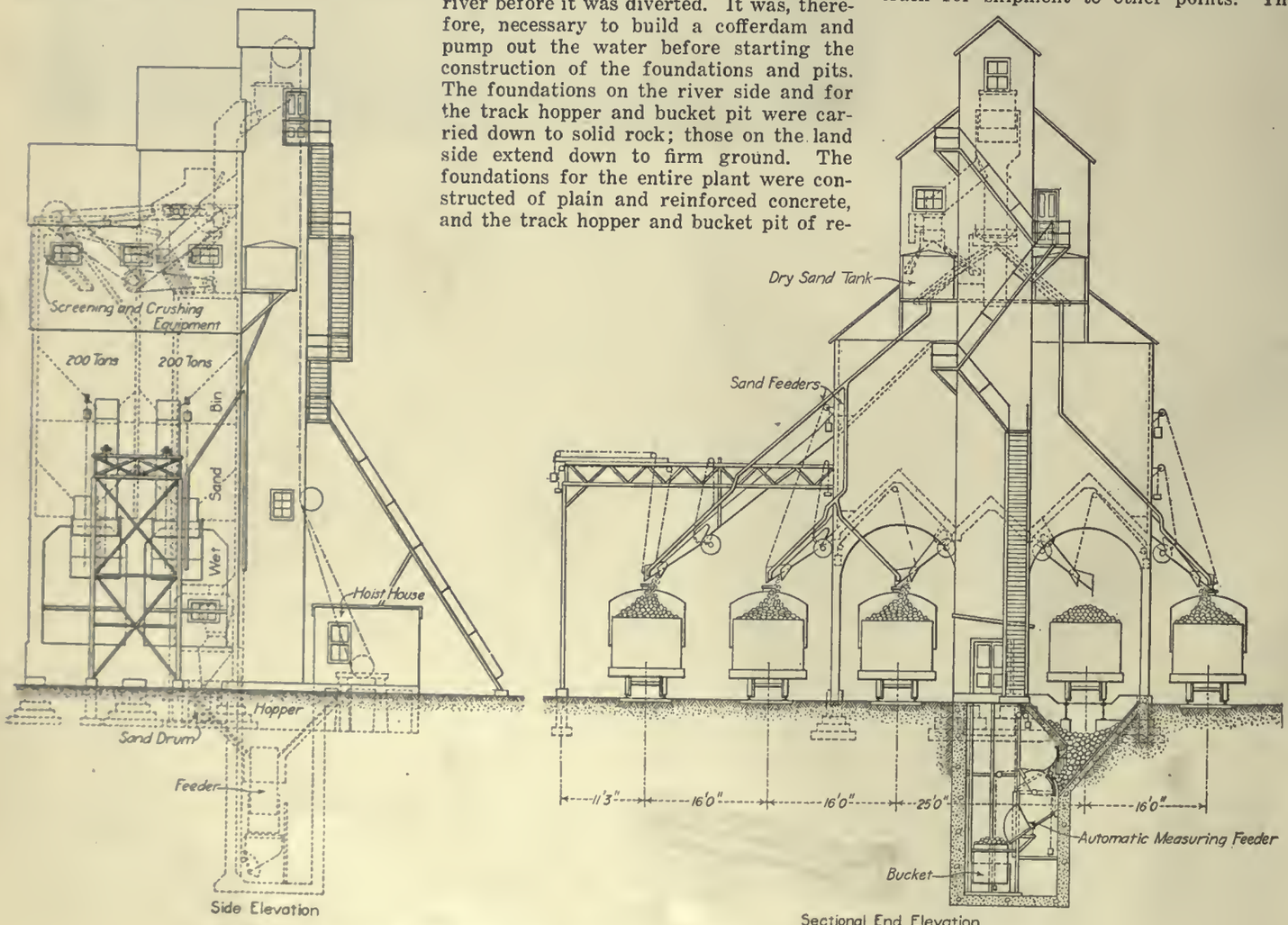
DESCRIPTION OF COALING STATION

The 400-ton coaling and sanding station was constructed partly in the bed of the river before it was diverted. It was, therefore, necessary to build a cofferdam and pump out the water before starting the construction of the foundations and pits. The foundations on the river side and for the track hopper and bucket pit were carried down to solid rock; those on the land side extend down to firm ground. The foundations for the entire plant were constructed of plain and reinforced concrete, and the track hopper and bucket pit of reinforced concrete, all mixed in the proportion of one part of Portland cement, three parts of clean sharp sand and five of crushed stone small enough to pass a 1½-in. ring. The track hopper and bucket pit were made watertight below high water. Reinforced-concrete wrecking piers are provided the full width of the columns parallel with the tracks to a height of 5 ft. above the top of rail.

The reinforced concrete for the coal pockets, wet sand bin and hoist house was mixed in the proportion of one part Portland cement, two parts clean sharp sand and four parts crushed stone small enough to pass a ¾-in. ring. The inside surfaces of the pockets and receiving hopper were covered with neat cement, put on wet with the balance of the concrete so as to insure a homogeneous mass, and given a steel float finish so as to make them entirely self-clearing of coal. The inclosures over the coal pockets and the bucket tower from the top to the ground are constructed of structural steel covered with rust-resisting galvanized American ingot iron siding and roofing No. 18 gage. A steel stairway is provided for reaching the upper housing of the plant.

TWO KINDS OF COAL HANDLED

The coaling station is provided with screening and crushing facilities for making stoker and lump coal. There are two 200-ton storage pockets, each extending the full width of the coaling station, one for stoker coal and the other for lump coal. Both kinds are delivered on four tracks for coaling locomotives, and on the receiving track for shipment to other points. The



ELEVATION SHOWING GENERAL ARRANGEMENT OF ELMORE COALING AND SANDING STATION

coaling tracks are the two main-line tracks, the switching track and the outside run-around track. Provision is made in the pockets so that either stoker coal or lump coal can be delivered to the outside main track in case the pockets are not entirely filled with coal. This is accomplished by the construction of shelf pockets in the top and on the main-track side of the 200-ton pockets. The coaling gates are of the rack-and-pinion undercut type operated with chains from elevated platforms, except those of the westbound main track, which are undercut gates operated by levers from the tenders of locomotives.

The coal is elevated with a 2½-ton Holmen type counterbalanced bucket, having an elevating capacity of 75 tons per hour. The reversible hoist is located in the hoist house at the side of the tower and is equipped with cut-steel silent herringbone gears. The hoist is manufactured with heavy I-beam base bolted to concrete foundations and is direct connected to one 25-hp direct-current General Electric motor. The motor is complete with solenoid brake to prevent the dropping of the bucket in case the current is cut off. The bucket is equipped with automatic control apparatus of the Cutler-Hammer make, which consists of an automatic motor controller located in the hoist house, operated by four hatchway limit switches located near the top of the hatchway, two of these switches being actuated by the balance weights and two by the coal bucket. These limit switches and solenoid brake automatically stop the motor at the bucket discharge point on each trip, preventing any possibility of overwinding the bucket on the sheaves.

Operation

Run-of-mine coal is dumped into the track hopper, where it flows by gravity into a Schraeder automatic measuring feeder. This machine measures the desired amount of coal and discharges it automatically into the Holmen bucket. The feeder is rotated and emptied by the ascent and descent of the Holmen bucket, preventing any possibility of overflowing the bucket or flooding the pit.

The bucket is elevated automatically to the top of the tower and discharges into an equalizing hopper, from which it is fed by an apron feeder to the shaking screen. All the coal passing through the 1½-in. round perforations in the shaking screen flows by gravity into the pocket for stoker coal. The coal passing over the end of the shaker screen which does not go through the perforations flows by gravity into a 200-ton concrete pocket. Both of these kinds of coal are delivered on four tracks for coaling locomotives and on the receiving track for shipment to other points as previously stated.

If the screening process above described does not give sufficient stoker coal, the run-of-mine coal discharged from the Holmen bucket may be diverted to a 30 x 30-in. Jeffrey single-roll crusher, the rolls operating at a speed of 50 ft. per minute. This crusher is of sufficient capacity to crush all the coal elevated into stoker size. It then passes into the stoker pocket.

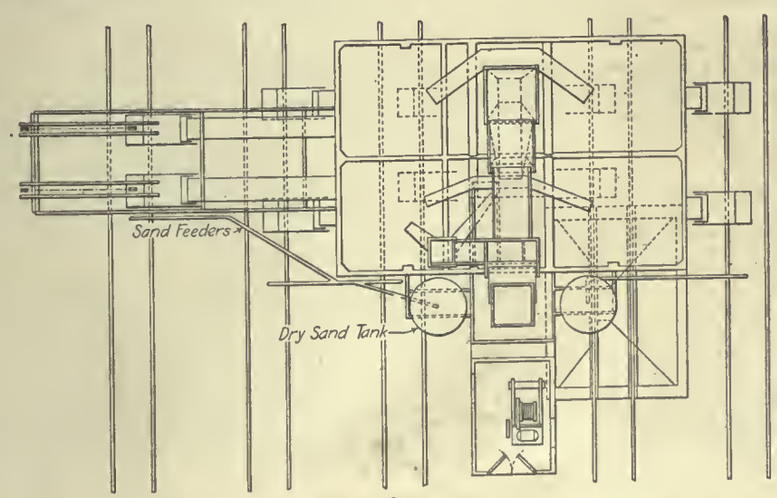
The plant is so designed that if the apron feeder, the shaking screen and the coal crusher are disabled, or if they are not needed, either stoker coal, lump coal or run-of-mine coal can be elevated and discharged direct into either of the 200-ton pockets as desired.

Handling of Sand

The green sand is dumped into the concrete receiving hopper and handled in the same manner as the coal through the measuring feeder and the Holmen bucket, and is discharged into a reinforced-concrete green-sand storage bin having a capacity of 150 tons. The green sand from this bin flows by gravity to a standard coal-burning sand dryer, whence the dry sand drops upon an inclined screen where foreign matter is eliminated. The dry sand dropping through the meshes in the screen passes to a standard sand drum from which it is elevated by compressed air to two steel dry storage tanks, each of 10 tons capacity. The dry sand then flows by gravity through 3½-in. discharge pipes to moisture-proof undercut sand valves, complete with telescopic spouts for sanding locomotives on four tracks.

The apron feeder, shaking screen and single-roll crusher are operated through belt and chain drives by a 25-hp General Electric motor. Walkways have been installed in the upper housing to make all screening, crushing and elevating machinery accessible to the operator. The stairways and walkways are equipped with steel railings and a steel ladder is installed in the bucket pit. A winch has been provided on the hoist motor for pulling cars on the receiving track if necessary.

The operation of the shaking screen and other machinery in the top of the coaling station does not cause appreciable vibration of the building.



PLAN OF NEW COALING AND SANDING STATION AT ELMORE

REINFORCED-CONCRETE COALING STATION

The plant was designed and constructed by the Roberts & Schaefer Company, of Chicago. Preliminary tests developed a number of defects which were remedied by the contractor, and the coaling station was placed in operation July 1, 1914. Stoker coal is only being used at present in the large Mallet engines on Clarks Gap Hill, but lump coal is being shipped to other points on the road. The cost of the coaling and sanding station complete was about $30,000.

Foreword of Good Roads Year Book for 1915

ROAD building statistics for the United States collected by the American Highway Association and soon to be published in the official Good Roads Year Book for 1915, show that more than 34,000 mi. of surfaced roads have been constructed during 1913 and 1914 and that during the 10-yr. period from 1904 to 1914 more than 96,000 mi. have been completed. In 1904 there were only 153,000 mi. of surfaced roads of all types in the United States. While the average mileage constructed per annum during the past 10 yr. is 9600, the total completed for 1914 exceeded 18,000. About 30,000 mi. of highway have been completed with the aid of State funds, of which over $200,000,000 have been expended. The State aid movement began in 1892 and has therefore continued for 22 yr. Only recently has it gotten well under way as the results accomplished for 1913 and 1914 comprise a total of 10,000 mi. of State aid highways completed, or in 2 yr. time one-third of the entire mileage constructed with the aid of State funds has been completed. Only six States now, out of a total of forty-eight, are without State highway departments and thirty States have granted actual money aid to the building of roads.

ROAD CONSTRUCTION along the Columbia River between Portland and the sea is costing about $1,000,000.