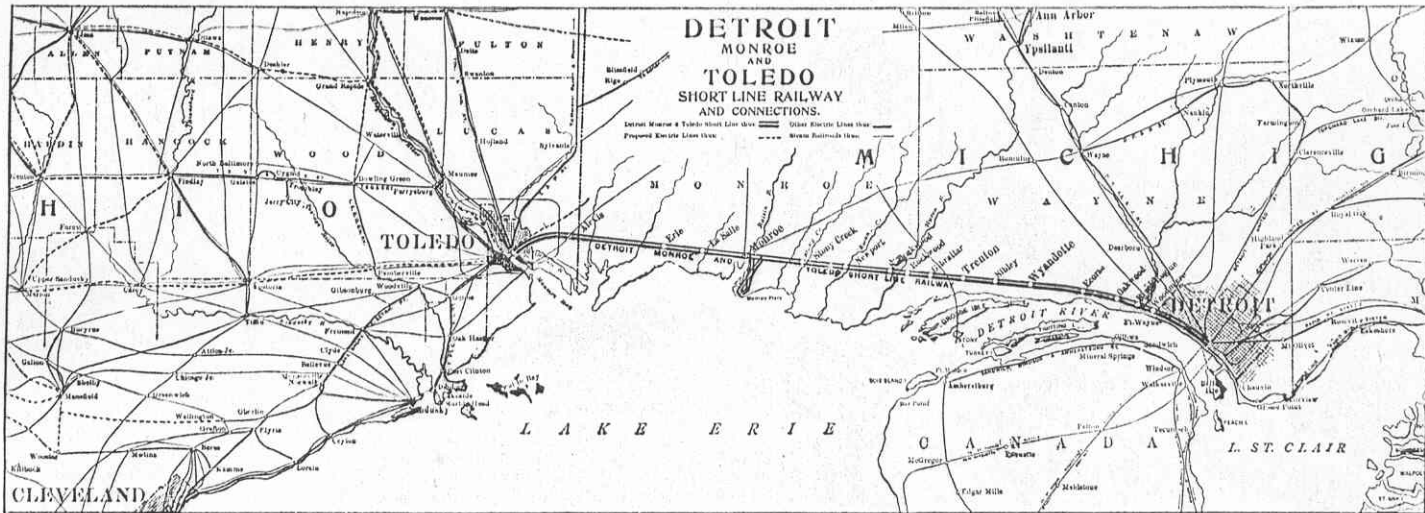


COMPLETION OF THE INTERURBAN LINK BETWEEN TOLEDO AND DETROIT

An important epoch in the development of interurban electric traction in this country was marked by the recent completion and opening for through traffic of another trunk line connecting two important electric railway centers. This line, the Detroit, Monroe & Toledo Short Line, will bear a special relation to interurban development in that it supplies the only missing link between the 1000 miles of interurban lines radiat-

in the Aug. 3, 1901, issue of the STREET RAILWAY JOURNAL. For the past year or so, however, subsequent to the abandonment of actual work upon the Everett-Moore line between Toledo and Detroit and the sale of its completed right of way and trackage to the Grand Trunk Railway, construction work upon the extension has been actively pushed by the company, as reorganized under the name of the Detroit, Monroe & Toledo Short Line, and the various sections have been opened up for service as rapidly as completed. The system has been operating as far north as Wyandotte, 12 miles south of Detroit, for



MAP OF THE COMPLETED LINE OF THE DETROIT, MONROE & TOLEDO SHORT LINE, SHOWING ELECTRIC RAILWAY CONNECTIONS AT DETROIT AND TOLEDO

ing into the State of Michigan from Detroit and the aggregation of electric lines in the State of Ohio, comprising over 1000 miles reached directly from Toledo and over 1500 miles reached by way of Cleveland. The possibilities of through ticket selling, and eventually the development of through traffic, that are thus made possible, are evident. In fact, only a short section of line remains to be completed east of Erie, Pa., when an unbroken trolley connection will be afforded through to Buffalo, N. Y.

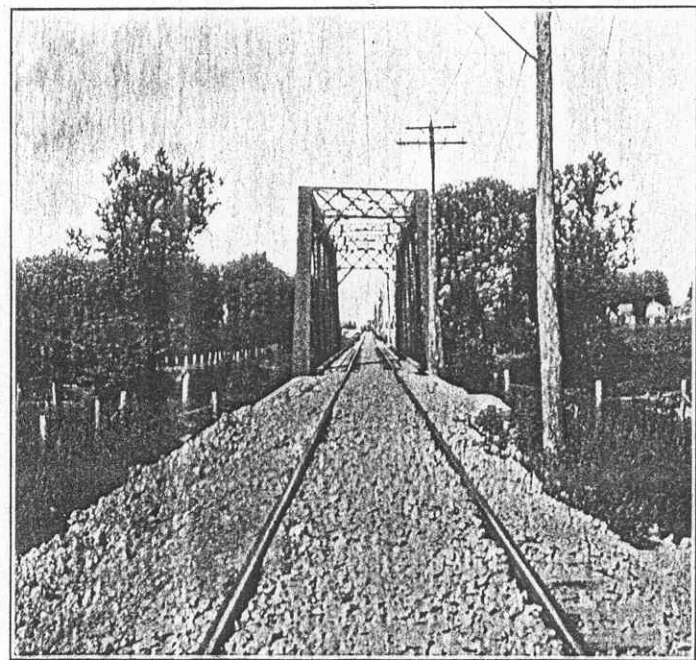
The importance of this event was signaled by a special through trip on Nov. 15 from Cleveland to Detroit and return. H. A. Everett, president of the Toledo Railways & Light Company, took a party of electric railway officials over the new route, making the run from Cleveland to Toledo over the lines of the Lake Shore Electric Railway Company, and from Toledo to Detroit over the new Detroit, Monroe & Toledo Short Line. The initial portion of the trip, a distance of 119 miles, was made in three hours and thirty-five minutes, and that over the new line, 56 miles, in one hour and thirty-seven minutes, the total time from Cleveland to Detroit, 175 miles, thus consuming only five hours and twelve minutes. This trip was considered more than usually significant by those in attendance. Mr. Everett's party included a representative from every electric line running out of Cleveland, among whom were: Warren Bicknell, president of the Lake Shore Electric Railway; F. J. Pomeroy, president of the Cleveland & Southwestern; C. W. Wason, president of the Cleveland, Painesville & Eastern, and J. J. Stanley, general manager of the Cleveland Electric Railway Company. J. C. Hutchins, president; F. W. Brooks, general manager, and E. W. Moore, director, of the Detroit United Railway, were also present. The new system was represented by Matthew Slush, president, and Judge C. J. Reilly, president of the Detroit & Toledo Construction Company, the company which has carried out the construction work.

The new work upon the Detroit, Monroe & Toledo Short Line embraces properly an extension from Monroe to Detroit, the section from Toledo to Monroe having been built in 1901 under the name of the Toledo & Monroe Railway, as described

several months past, pending the settlement of the difficulties connected with the entrance into the city of Detroit. This was finally arranged peacefully, and upon Nov. 5 through service was inaugurated.

THE NEW CONSTRUCTION

The total length of the system as now operated is 56 miles,

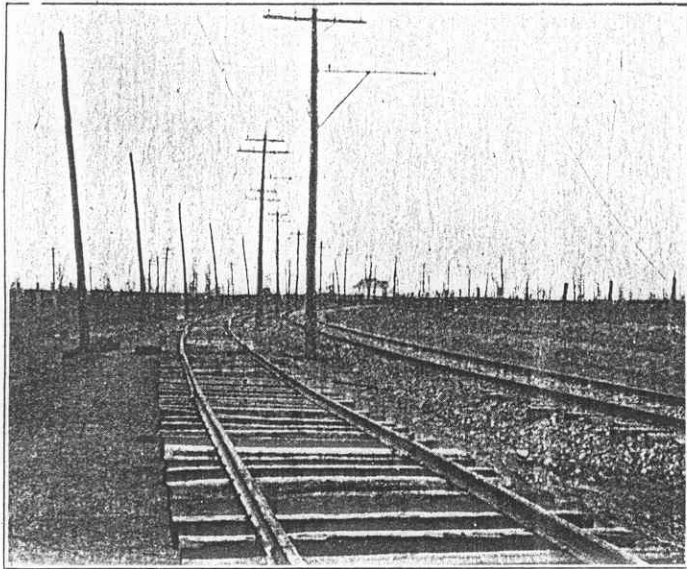


TYPICAL SINGLE-TRACK CONSTRUCTION NEAR ROCKWOOD, SHOWING ALSO BRIDGE OVER THE HURON RIVER

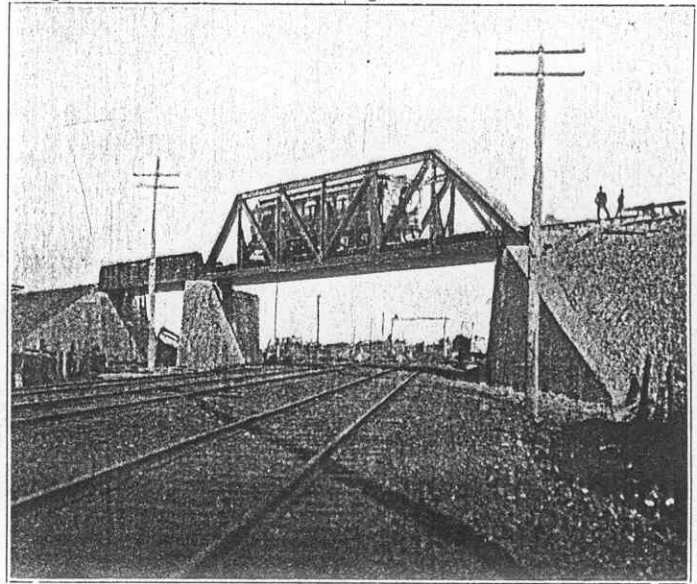
the newly completed extension from Monroe to Detroit embracing 35 miles of this distance. Upon the extension, as well as upon the older portion of the system, the road is built over a private right of way. Only in the three cities reached does the line operate over city streets; in Monroe the line traverses one

of the main streets for a distance of 2 or 3 miles, while in Toledo and Detroit the last 5 miles of the run to the terminal is made over the tracks of the local street railway company. In Detroit the company has provided a ticket office and waiting room at 28 Cadillac Square, past which the cars run in turning for the return trip, while in Toledo the union interurban station

bracket pole line occupying the center--in this way to add the second track in double-tracking, it is only necessary to build it on the opposite side of the pole line and add the trolley hanger brackets for that side. That double-tracking is to be attempted is evident from the fact that in the vicinity of Wyandotte the double track is completed for 10 miles. Also at many meet-



VIEW ILLUSTRATING TYPICAL USE OF DOUBLE-TRACK CONSTRUCTION ON CURVES, TO AVOID POSSIBILITY OF COLLISIONS, CARS TAKING RIGHT-HAND TRACK



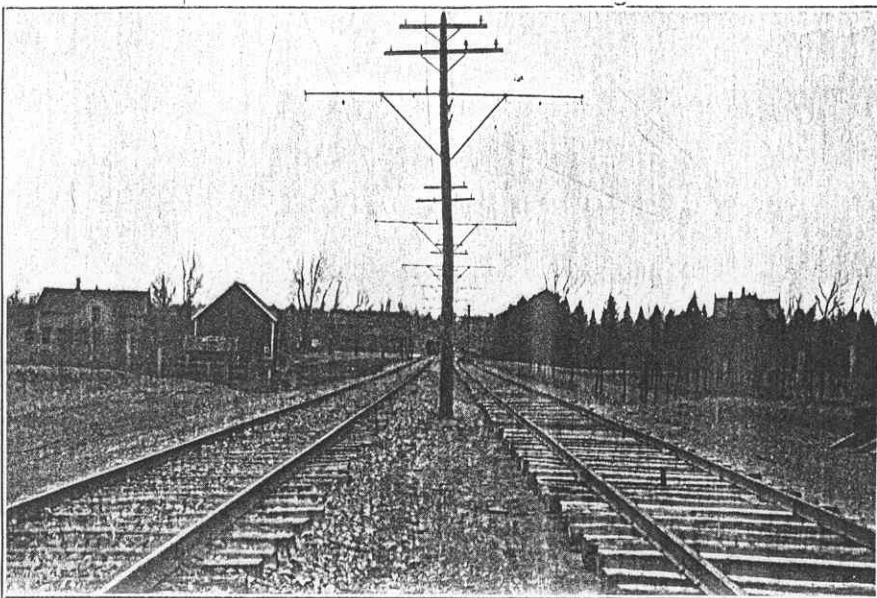
OVERHEAD CROSSING OF THE WABASH AND MICHIGAN CENTRAL RAILROADS NEAR DETROIT, SHOWING USE OF CONCRETE ABUTMENTS

near the corner of Superior and Adams Streets (described Oct. 25, 1902, page 704) is made use of as the terminal; in both cities these stations are convenient to the retail shopping districts and to all local city cars.

The construction work upon the extension corresponds in general to that upon the older portion of the road, as illustrated in the above-mentioned article descriptive of the Toledo & Monroe section. The advantage of a somewhat wider right

ing points the turn-outs are being made of unusual length, 1 mile or over, so that a direct approach is being made to double-track conditions.

As in the case of the Toledo & Monroe section, the roadbed is of the very best order, involving a construction that rivals the latest and most approved steam road practice. A 70-lb. standard A. S. C. E. section T-rail is used, while the ties are of cedar and oak, spaced 24 ins. between centers. The track is very heavily ballasted with broken limestone, which makes a very heavy and firm bedding; even at the beginning the cars operate with a characteristic smoothness, which indicates what may be expected from the line after settling in time to its ultimate level. The rails are pressed bonded for the return circuit with crown bonds, supplied by the American Steel & Wire Company, located inside the fish-plates. No all-copper return was considered necessary in the original installation, but the rails and the negative rotary lead at the power house are given an effective running water ground in the adjacent river bed.



DOUBLE-TRACK LINE CONSTRUCTION AS USED AT ALL TURN-OUTS TO PERMIT CARS PASSING AT SPEED

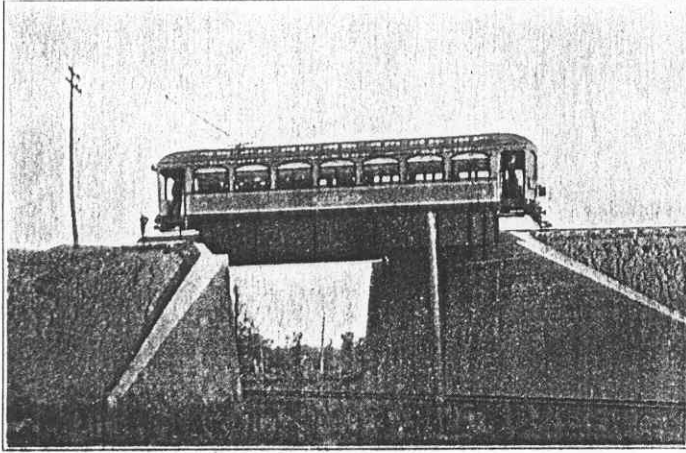
All culverts and bridge abutments are of concrete, with steel superstructures, and embrace the very best types of construction. Two accompanying views show the character of the bridge work, both bridges being overhead crossings of steam railroads. These filled inclines also involve the heaviest gradients encountered (from 1 per cent to 2 per cent) upon the line, as the country traversed is so generally level and the line so nearly

of way, however, is to be had on the extension, which follows a minimum of 66 ft. throughout; this will permit of double-tracking with the least possible trouble. In fact, the purpose of the general method of construction adopted is to provide for double-tracking without rearranging tracks or poles. As may be noted from views along the line, the present track is located toward one side of the center of the right of way, the side-

straight that no grades or curves of any importance are necessary. All steam railroads are crossed either above or below grade, with two exceptions, one a side track leading to a quarry and the other the main line of the Pere Marquette Railway in the city of Detroit, where an overhead crossing would be impossible. A view of the heavy double-track drawbridge over the River Rouge, just outside of Detroit, is

also given to indicate the permanent character of the steel work used. There is a considerable amount of marine traffic in this river, which necessitated the installation of a draw-bridge—this was built for double-tracking to provide in advance for the inevitable rapid development which such thorough and excellent methods will produce.

The drawbridge is mounted upon a center pier of great stability, and is provided with an electrically-driven turning mechanism. The pier is of solid concrete, resting upon piles



OVERHEAD CROSSING OF THE LINE OF THE DETROIT SOUTHERN RAILROAD NEAR TRENTON

driven to a depth of 60 ft. below the bottom of the river. The turning motor is of the railway type, taking current through a submarine cable, which also supplies the trolley wires upon the bridge. The motor-controlling mechanism is conveniently housed and arranged for facilitating operation. The two-span overhead crossing illustrated involves the combined crossing of the three-track right of way of the Wabash Railroad and a single-track branch of the Michigan Central Railroad. The other plate-girder overhead crossing is over the main line of the Detroit Southern Railroad, 2 miles south of Trenton.

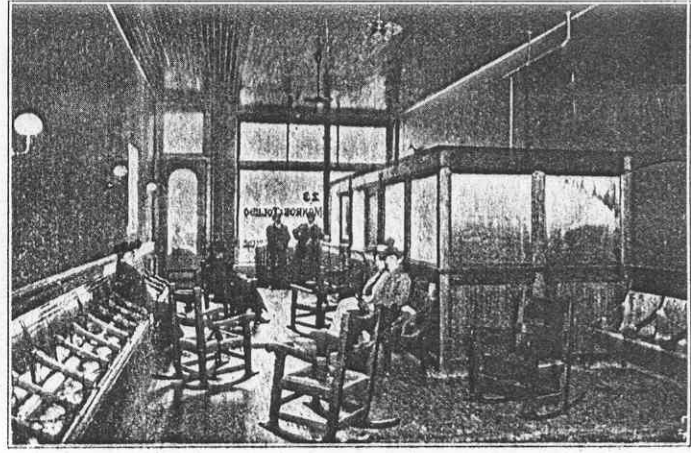
The standards of overhead construction adopted for the extension also follow closely those used upon the Toledo & Monroe end. The poles are of cedar, in general 35-ft. poles being used, set 6 ft. into the ground. Two cross arms, located near the top of the pole, carry the high-tension feeders, while the direct-current feeders are carried upon the bracket arm. The high-tension feeders are of No. 4 bare copper, while the direct-current feeders are of 500,000-circ. mils copper, bare also except in cities. The grooved section wire, No. 000, is used for the trolley line, and is installed in duplicate on all single-track sections. Two telephone circuits are carried upon the pole line in each direction from the power house, for use in the despatching system.

DISTRIBUTION SYSTEM

The operation of the extension required the addition of two sub-stations to the former electrical distribution equipment. One is installed at South Rockwood and the other at Ecorse. The former is illustrated in an accompanying photograph. The building used here serves for the combined purpose of a sub-station and freight and passenger station, this style of architecture being the adopted standard of the company for new construction. The sizes and arrangement of the rooms in the building are shown in an accompanying plan; the construction is of steel, brick and concrete, with tile

roofing, the result being as nearly fireproof as is possible.

Current is received from the transmission lines at the sub-stations at 15,000 volts, three-phase alternating, being stepped-down in oil transformers to 380 volts before entrance to the rotary converters. The rotaries deliver to the trolley lines at 650 volts direct current. Each sub-station has two 300-kw rotaries, which are fed by three 200-kw step-down transformers. The switchboard equipment is very simple and conveniently arranged for uninterrupted operation, consisting of one

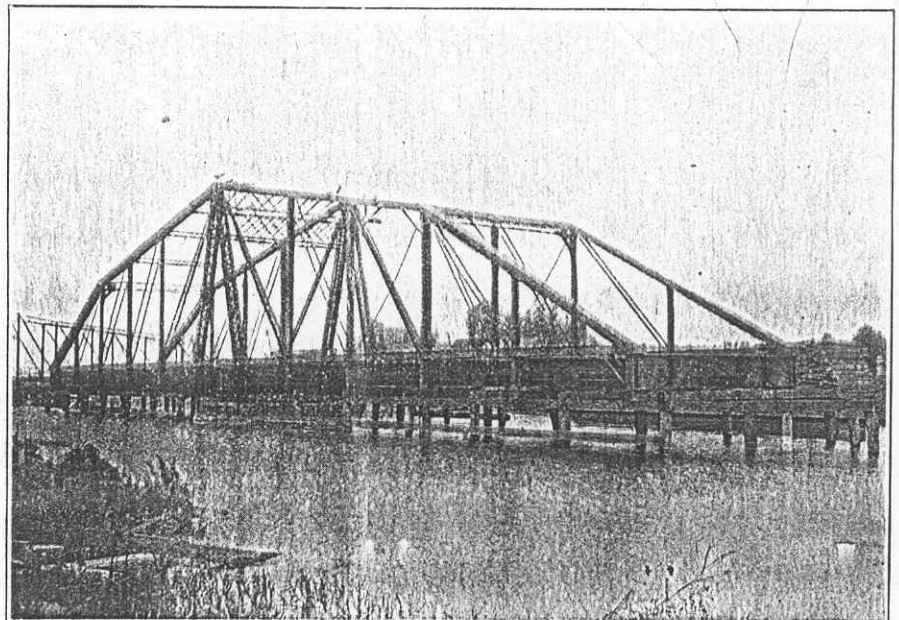


INTERIOR OF THE PASSENGER WAITING ROOM, RECENTLY ESTABLISHED AT DETROIT

transformer, two rotary and two feeder panels. Each sub-station feeds 3 miles to either side. The sub-station electrical equipment, as well as that in the power plant, was supplied by the Westinghouse Electric & Manufacturing Company.

POWER-PLANT EXTENSION

The power plant at Monroe, as originally built for the Toledo & Monroe Railway, provided for an equipment of considerably greater capacity than necessary to operate the entire system, and the wisdom of this provision was made evident by



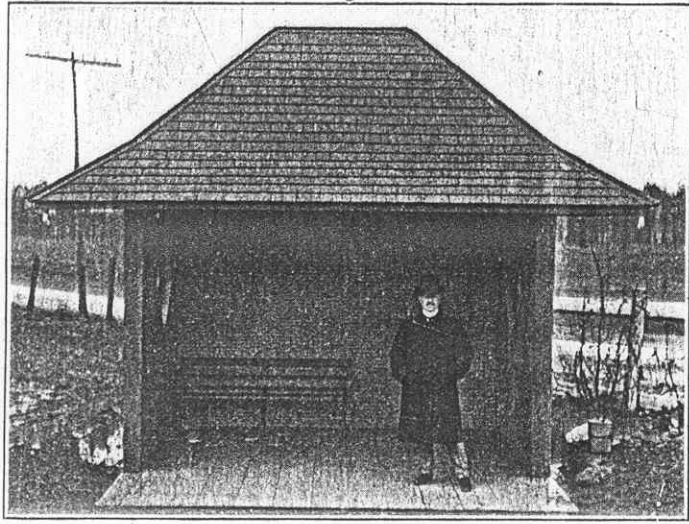
THE DOUBLE-TRACK DRAW-BRIDGE CROSSING THE RIVER ROUGE, NEAR DETROIT

the facility with which the increase of size was made. An idea of the extensions made in the power plant may be had from the plans of the same presented in the descriptive article of the Toledo & Munroe Railway on page 122 of the Aug. 3, 1901, issue. In the drawings of the plant there presented, the entire projected equipment, embracing five boilers and four generating units, are shown, but, while the building was built to its full

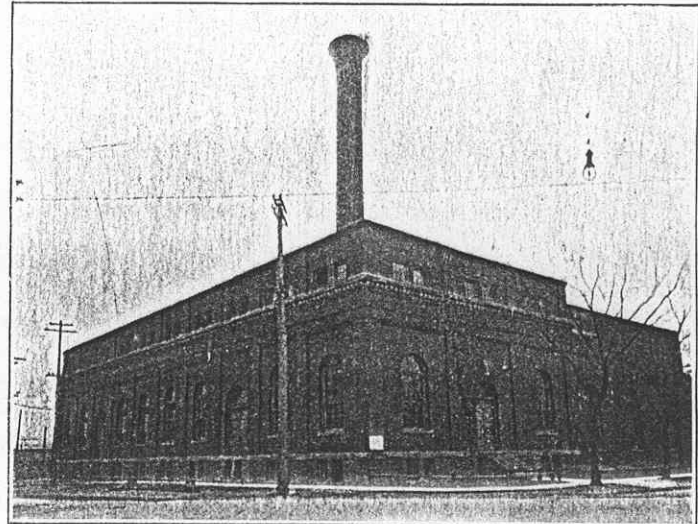
size at first, only the two boilers and two engines and generators at the switchboard end of the plant were installed. Recently, however, an additional boiler has been installed beyond the stack, leaving space still for two more, and also the third generating unit. The remainder of the space in the engine room is now partitioned off and occupied for the offices of the

furnace construction, with similar traveling chain grate stokers. A very flexible system of piping connections was provided, not only for boiler feeding and boiler room auxiliaries, but also for the high-pressure steam supply to the engines and pumps.

The engines are all, including the new one recently added, 18-in. and 36-in. x 42-in. compound-condensing Hamilton-Cor-



THE STANDARD TYPE OF SHELTER HOUSE USED AT ALL ROAD CROSSINGS FOR PROTECTION TO WAITING PASSENGERS

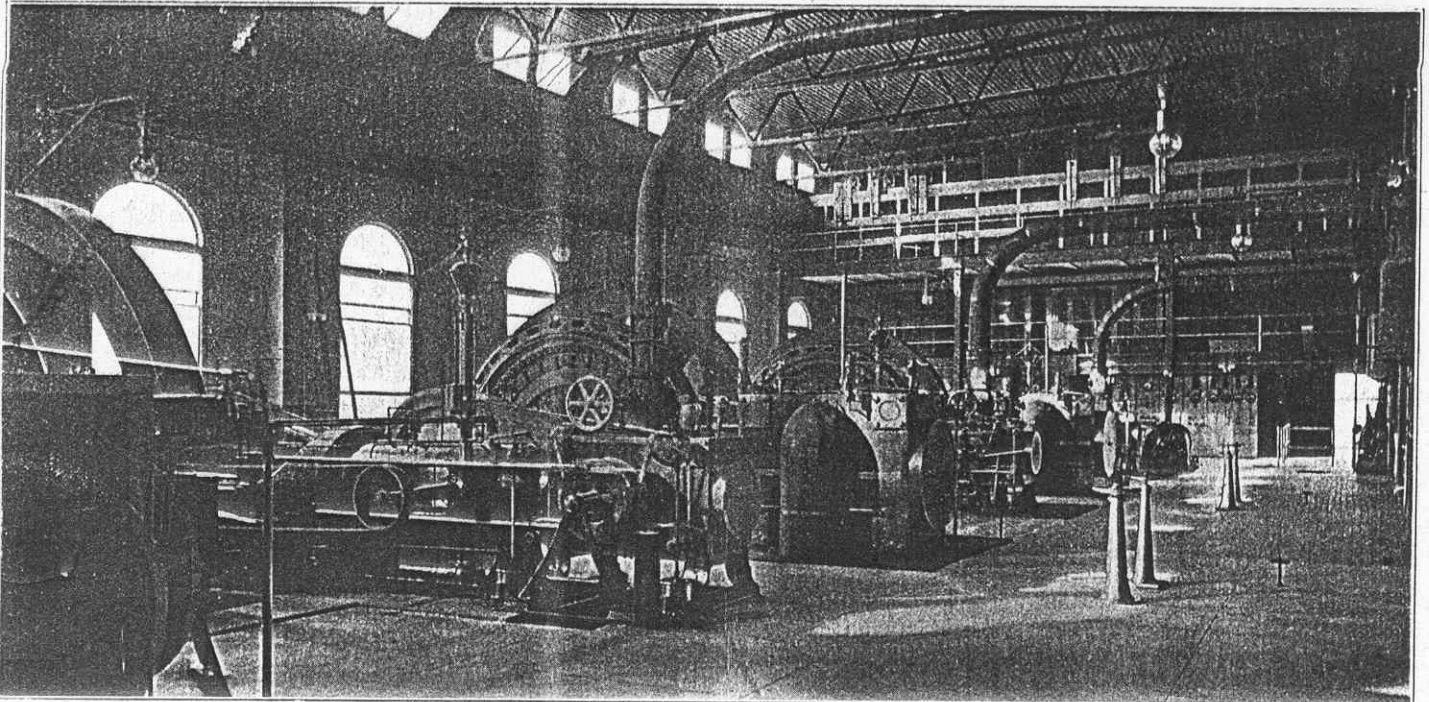


EXTERIOR VIEW OF THE MAIN POWER PLANT AND OFFICE BUILDING AT MONROE

company, here being located the office of Mr. Tarkington, the superintendent, the auditor's and the dispatcher's offices, besides, also, a locker room and recreation and bath rooms for the car service employees.

The power house is a large, convenient structure, 150 ft. x 109 ft., and is located about 250 ft. from the river, whence condensing water is had. It has a 165-ft. self-supporting steel

liss engines of the heavy-duty type, built by Hooven, Owens & Rentschler Company, Hamilton, Ohio, and each is direct connected to a 400-kw three-phase 25-cycle Westinghouse generator. The engines are rated at 600 ihp, at one-quarter cut-off and a speed of 100 r. p. m. The generators deliver at 380 volts, which passes directly through the switchboard to the rotary converters at the station or to the step-up transformers. There



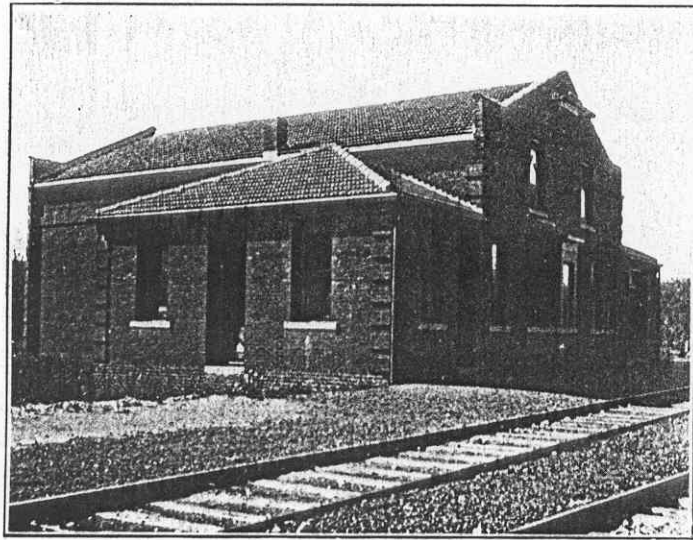
VIEW IN ENGINE ROOM OF THE ENLARGED POWER PLANT, SHOWING ARRANGEMENT OF GENERATING APPARATUS

stack, with draft controlled by Spencer draft regulators, and is mounted upon a massive foundation. The original boilers are 600-hp Babcock & Wilcox water-tube boilers with extension furnaces, but the new boiler is a Cahall horizontal water-tube boiler, of similar size, with traveling chain grate, all of which was furnished by the Aultman & Taylor Machinery Company, Mansfield, Ohio. The extension furnaces under the original Babcock & Wilcox boilers are also now being replaced by standard

are two 300-kw rotaries located in the power plant, this rotary equipment being in duplicate of that at the new sub-stations. The exciters include a steam and a motor-driven unit, the latter being used in preference to the steam-driven unit.

The switchboard equipment is located at the north end of the building beneath the gallery which carries the step-up transformers. It contains thirteen panels at present, including, from left to right, two exciter panels, three generator panels,

four high-tension feeder panels and four 650-volt direct-current rotary and feeder panels. Spaces are left for one more generator panel and two more high-tension feeder panels. The step-up transformer equipment consists at present of three 135-kw and three 300-kw transformers. The electrical ap-



THE DEPOT AND SUB-STATION AT SOUTH ROCKWOOD, SHOWING STANDARD COMBINED CONSTRUCTION

paratus was supplied by the Westinghouse Electric & Manufacturing Company.

ROLLING STOCK

The rolling-stock equipment now includes twenty-one passenger cars, two express cars and two freight or construction locomotives. The company also owns thirty-five freight cars, including box, flat, gondola and ballast cars, with which it is carrying on a considerable freight business; these were used in the construction work upon the road, but are now being retained for regular service.

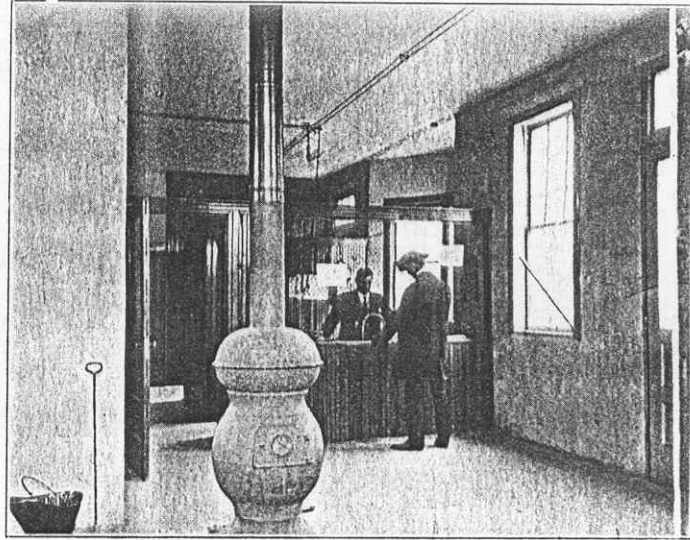
The new cars bought to provide for the extension include twelve 30-ton cars, 52 ft. long, which were built by the John Stephenson Company. They are mounted on Peckham extra heavy M. C. B. trucks, and are equipped with four No. 76 Westinghouse motors (75 hp) and L-4 Westinghouse controllers. The cars are all equipped single-ended, with the control apparatus located in the enclosed front platform, used as a cab; this greatly simplifies the car wiring and, under the system of operation adopted, is found to be fully as effectual. Furthermore, it may be stated that the plan of using single-ended cars and turning them at terminals, is meeting with favor in many other interurban installations.

The cars have interiors nicely finished in dark mahogany, and are divided in two compartments, that in front being the smoking room (seating sixteen), while the rear portion is the main passenger section (seating thirty-eight). At the rear of the main compartment is located a water closet compartment. The seats are finished in red plush in the main compartment and rattan or pantasote in the smoker. The cars present a beautiful external appearance, being finished in bright yellow; an external view of one of the cars is presented in an accompanying engraving.

The total weight per car is 60,000 lbs., of which only 25,000 lbs. is in the car body, the remainder, 35,000 lbs., being below, thus bringing the center of mass very low. Of the 35,000 lbs. below the car body, the trucks weigh 16,000 lbs. and the motors 16,000 lbs., while the air-brake equipment, storage tanks, etc., make the remaining 3000 lbs. The cars are all equipped with the Holland roller-bearing trolley base, supplied by the Holland Roller Bearing Trolley Company, Cleveland, Ohio. Other features to be noted are United States headlights of the Moshier type, Knutson trolley retrievers and Van Dorn No. 11 radial type couplers.

STORAGE AIR BRAKES

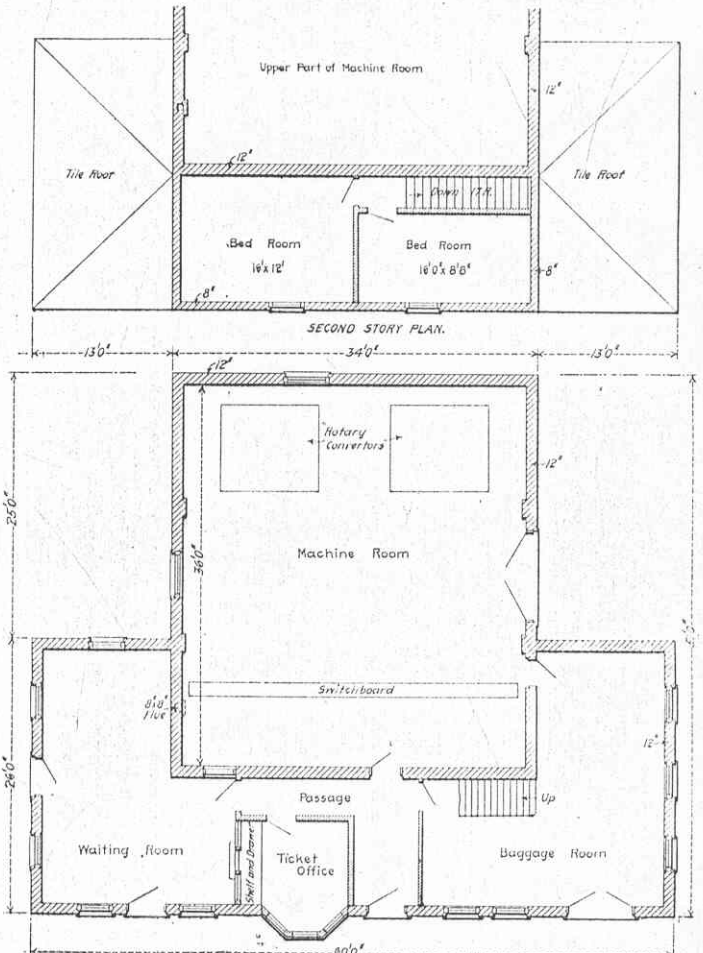
A novel feature of this road's equipment is to be noted in the use of the storage air-brake system. This method was installed some time ago upon the older cars used upon the Toledo & Monroe section, after quite a thorough investigation by the



VIEW IN WAITING ROOM OF THE SOUTH ROCKWOOD DEPOT, LOOKING TOWARD TICKET OFFICE

officials of prevailing braking systems. It was thought that the advantages to be gained from the use of the large central air compressor plant, from which storage tanks upon the cars should be filled occasionally, seemed to weigh out of consideration any other scheme. The new system has proven very economical, and in practical operation is very satisfactory.

The details of the system follow in general the lines of the systems that have been installed in Detroit, St. Louis and else-

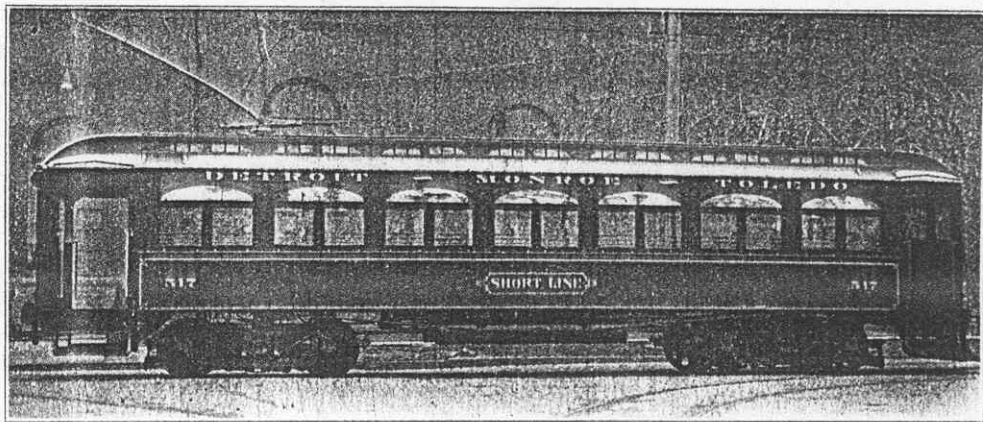


DETAILS OF THE STANDARD COMBINED SUB-STATION AND DEPOT BUILDING CONSTRUCTION USED UPON THIS SYSTEM

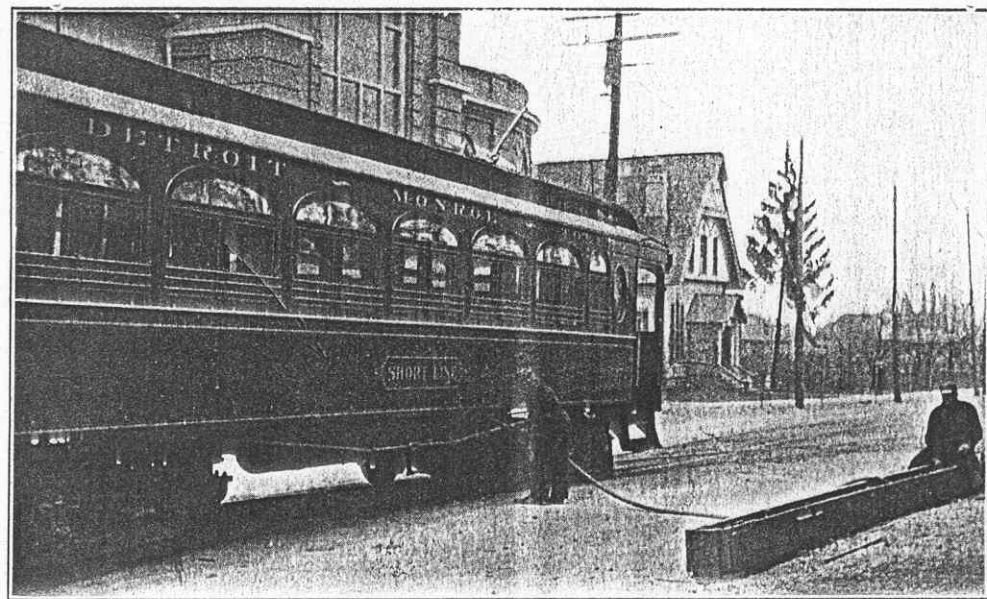
where. Each car is equipped with two large storage tanks; these tanks deliver at a pressure of 250 lbs., through a pressure-reducing valve to a small service reservoir, from which the brake connections are made in the usual manner. The air-brake equipment was supplied by the Westinghouse Traction Brake Company, the style of system used being the Westinghouse straight-air system, type SM-1.

The compressor, which is a Hall two-stage steam-driven machine, is installed in the basement of the engine room, together with the storage and cooling tanks. It has ample capacity for the operation of the road, and is controlled automatically by the pressure in the storage tanks. Delivery is made to cars at the side of the power house, next to the car house, through a long hose which is

tional safety is insured by the use of a despatching system. Telephone booths are located at every passing track from which the motormen call up the dispatcher and receive orders for proceeding in case of disarranged schedule, etc. These tele-



THE NEW STANDARD OF PASSENGER CAR FOR HIGH-SPEED OPERATION



VIEW OF CAR AT THE STORAGE-AIR SYSTEM STATION AT THE MAIN POWER STATION IN MONROE, SHOWING METHOD OF CHARGING THE CAR RESERVOIRS WITH THE HIGH-PRESSURE AIR

phone booths are lighted electrically at night, in connection with the switch lights.

The amount of both through and local traffic that has already been worked up is remarkable—in fact, it may truly be stated that here a large amount of traffic has been created. Considering, for instance, that the through round trip rate between Detroit and Toledo is \$1.50, as compared with \$2.60 upon the two steam roads which it parallels, and, in addition, that hourly service is given, the reason is not hard to discover. Furthermore, the electric line lands the passenger at any point he may desire within the city and not in a depot at one side and out of the way. The time consumed per trip (two and one-half hours, according to the present schedule) is not excessive as compared with that of the steam

usually kept in a box alongside the sidewalk. It is found that the tank capacity, provided upon each car, is sufficient to supply braking for more than two complete round trips under normal conditions of operation.

OPERATION

The very favorable physical conditions offered for high-speed operation by the level nature of the country traversed are of great importance, yet, on the other hand, it is interesting to note the careful preparations that have been made in construction to further the possibilities of a high-speed schedule. All switches at turn-outs are laid out with long leads and No. 12 frogs, so as to permit passage to either side at high speed, while passing tracks, which are spaced 2½ miles apart throughout, are, in many cases, lengthened out to a mile or so in length to permit cars to continue on their run in passing—an impossibility with short passing sidings. Furthermore, addi-



THE QUARRY AND STONE-CRUSHER PLANT AT NEWPORT, OPERATED BY THE RAILROAD COMPANY, FROM WHICH 60,000 CU. YDS. OF STONE BALLAST HAS BEEN REMOVED FOR TRACK BALLASTING

roads, the latter being slightly over two hours. While the trip time of two and one-half hours has been determined upon for the coming season, the extreme ease with which the schedule

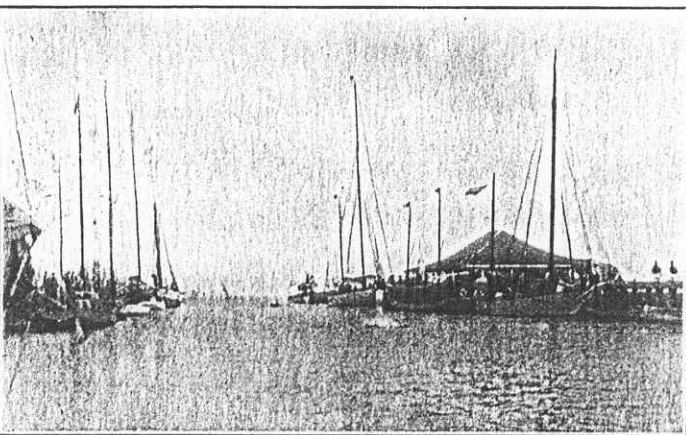
is maintained tends to indicate that it would be no hardship for the cars to make the run in less than two hours. After the roadbed is thoroughly settled, it is intended to cut the schedule time per trip down to two hours.



THE BATHING BEACH AT MONROE PIERS, A SUMMER RESORT ON LAKE ERIE, REACHED BY A BRANCH OF THE SYSTEM AT MONROE

In addition to passenger and express traffic, the road is handling a large amount of freight, thirty-five miscellaneous freight cars having been provided for the purpose. The first attempt in this direction was made in hauling coal from Toledo to the power plant, and subsequently a very considerable amount of freight traffic has developed, and this with very little effort on the part of the officials. Direct access is given to many industries, as a result of which shipments will be much more convenient over the electric line than by the steam roads. The city of Wyandotte, 12 miles south of Detroit, stands third among the cities of Michigan in point of freight shipments, while the country traversed further to the south is notable for being a prosperous farming district. Recently a contract was carried out for delivering 4,000,000 brick for the construction of the new St. Mary's Academy at Monroe, involving the delivery of 800 carloads up to date. At present two freight trips are being made each way daily, but it is evident that the rapid development will soon demand an increase.

A valuable industry in the form of a limestone quarry is owned and operated by the company at Newport, having thus far been operated to the extreme of its capacity to supply crushed stone for ballasting the new track. But, subsequently,



TYPICAL YACHTING SCENE AT MONROE PIERS IN SUMMER

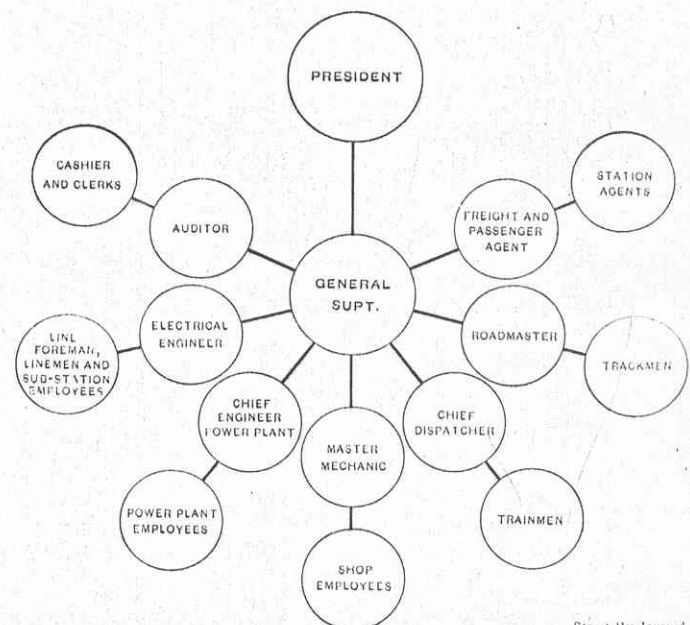
it is expected to operate the quarry as a separate company for supplying stone in carload lots anywhere along the line; it is already found that there will be a large demand for the stone in the various grades. Adjacent to the right of way is located the steam power plant for operation of the rock drills in the

quarry, the crusher and storage bins for the various grades of stone being electrically operated—this, together with a general view of the quarry, is illustrated in a photograph on the opposite page.

PARK DEVELOPMENT

A valuable side extension of the system was built a year ago at Monroe, which will serve as an important traffic feeder in summer time. This is a branch 4 miles long leading from the main line to Monroe Piers, a beautiful summer resort upon Lake Erie. The accompanying photographs give an excellent idea of the advantages of this location as a watering place, and illustrate the popularity which it developed last summer as a result of the accessibility given it by the entrance of the trolley system.

Monroe Piers is one of the most popular summer resorts of the Middle West, and every summer visitors flock there from the South and West. Around the Piers and Monroe, the descendants of the old French settlers have made a last stand for individuality, and there is a halo of romance and adventure spun around the country. In the days before Toledo appeared upon the map, the mouth of the Raisin was famous as a fishing and hunting ground. To-day the different clubs along the River Raisin own the thousands of acres of marsh land and the game



ORGANIZATION CHART OF THE DETROIT, MONROE & TOLEDO SHORT LINE

is carefully protected. Pleasant Bay, a cove at one side of the Piers, is an ideal hunting ground for ducks; snipe, plover and woodcock are bagged there during the year. Also, from early spring till late fall, fish are plentiful, and the Raisin River and the lake are dotted with fishing parties. At this point also is to be found the only desirable bathing beach upon the western end of Lake Erie, which will make the resort especially attractive.

It is the intention of the company to develop this resort as rapidly as possible. Increased facilities will be provided for handling passengers and through cars from Toledo and other points will be run to the Piers as travel warrants. The public in the vicinity of the line have welcomed the advent of this branch, particularly on account of the general lack of watering places in that country, and the company will anticipate the demands of this traffic by establishing a schedule which will be adequate for safely and effectively handling it.

The officials of the Detroit, Monroe & Toledo Short Line are as follows: President, Matthew Slush; vice-president, C. A. Black; secretary, Elisha H. Flynn; treasurer, Charles R. Hannan; general superintendent and purchasing agent, W. B. Tarkington. Mr. Slush has been prominently identified with the or-

THE EQUIPMENT OF THE EAST BOSTON TUNNEL

The larger engineering problems met in the construction of the recently completed East Boston Tunnel have been discussed to a greater or less extent in the technical press and in the reports of the Boston Transit Commission, but comparatively little has been printed in regard to the equipment of the tunnel. In considering some of the particular features of interest in connection with the roadbed, track, lighting, power supply and ventilation systems, the main physical characteristics of the tunnel will first be outlined.

The length of the tunnel is about 7450 ft., measured along the tracks from Maverick Square, East Boston, to Court Street, in the city proper. There are two tracks in the tunnel, one for eastbound and the other for westbound traffic. The tunnel is noteworthy by reason of the absence of sharp curves, its liberal size, depth and extended length under the harbor. The shortest radius curve is 230 ft. in central radius. The next sharpest curve has a radius of 2000 ft., and the next 3000 ft. At its deepest point the tunnel's bottom is approximately 40 ft. below the 40 ft. dredging line at the bottom of the harbor. The maximum grade is 5 per cent. On the east end of the tunnel grades vary from 4.7 to 5 per cent through a continuous run of about 2000 ft. In point of cross-section the tunnel is designed to accommodate the elevated cars in use on the Boston

MEASURES ADOPTED BY THE CLEVELAND & SOUTHWESTERN TRACTION COMPANY TO OBIVIATE THE SPITTING NUISANCE

General Manager Nichol, of the Cleveland & Southwestern Traction Company, has started a crusade against men who expectorate on the floor of cars. Cars have signs warning against the practice, and conductors are instructed to warn violators

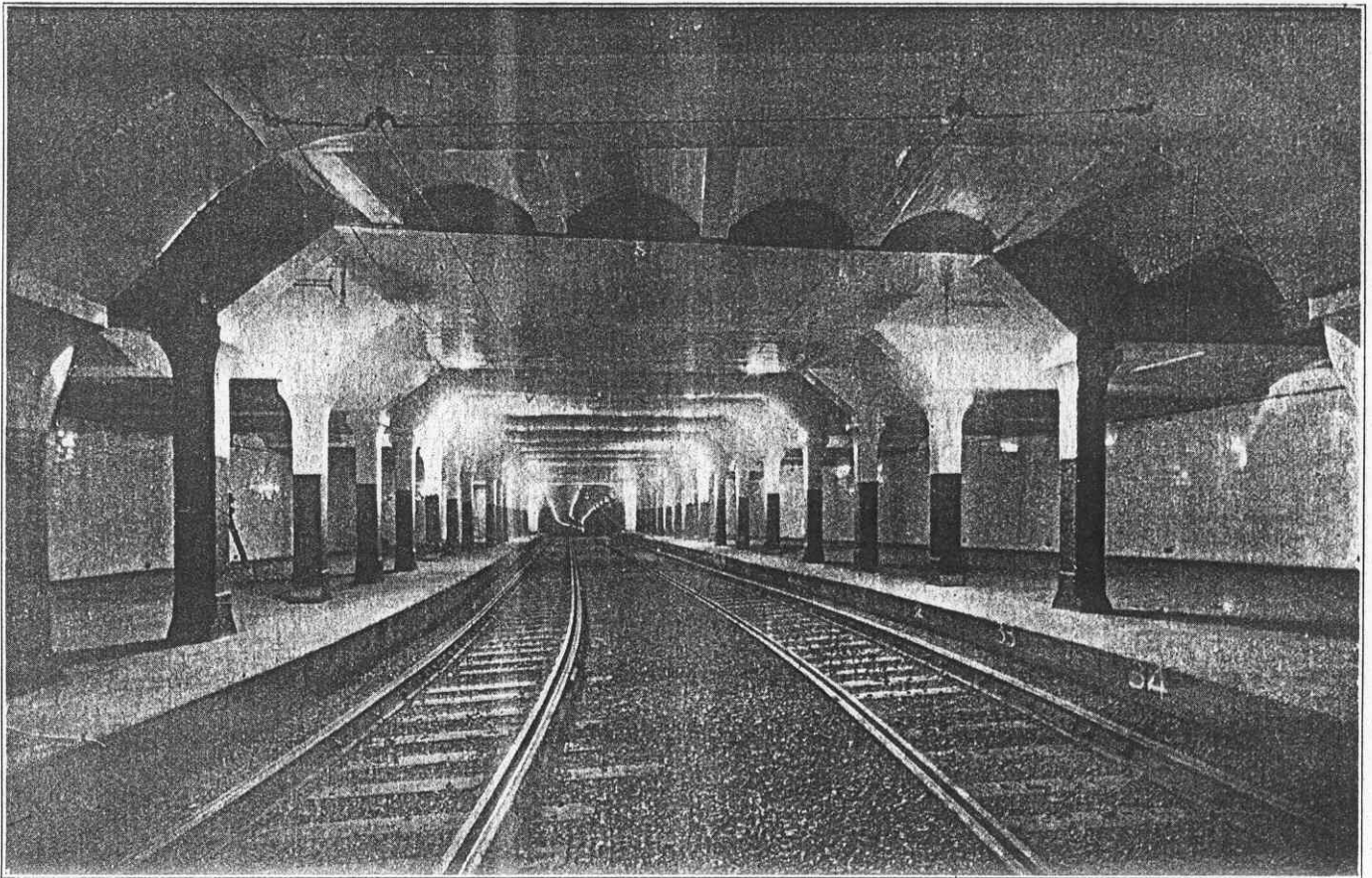


FIG. 1.—EAST BOSTON TUNNEL, DEVONSHIRE STREET STATION

of the rule. This has not stopped the practice and the company is now securing the names of habitual violators, and proposes to arrest some of them. Some time ago, General Manager Nichol adopted the policy of removing cuspidors from the smoking compartments of cars, believing that such receptacles were unsanitary and obnoxious, also believing that if a man did not find a cuspidor he would be apt to expectorate out a door or window.

This theory worked well in summer when all the windows of the car are open, but resulted in spitting on the floor during the winter.

Elevated Railway Company's system, although the present plan is the operation of the company's standard type of surface car in the tunnel. Two underground stations, Court Street and Devonshire Street, are at present in use, and one at Atlantic Avenue will be opened for business as soon as it can be completed. The tunnel walls, including the upper arch and the invert, are made of concrete, which is reinforced by steel tie rods at a few special points. The tunnel is below ground throughout its entire length, except where it comes to the surface at Maverick Square. At present there is no physical connection between the tunnel tracks at Court Street station and