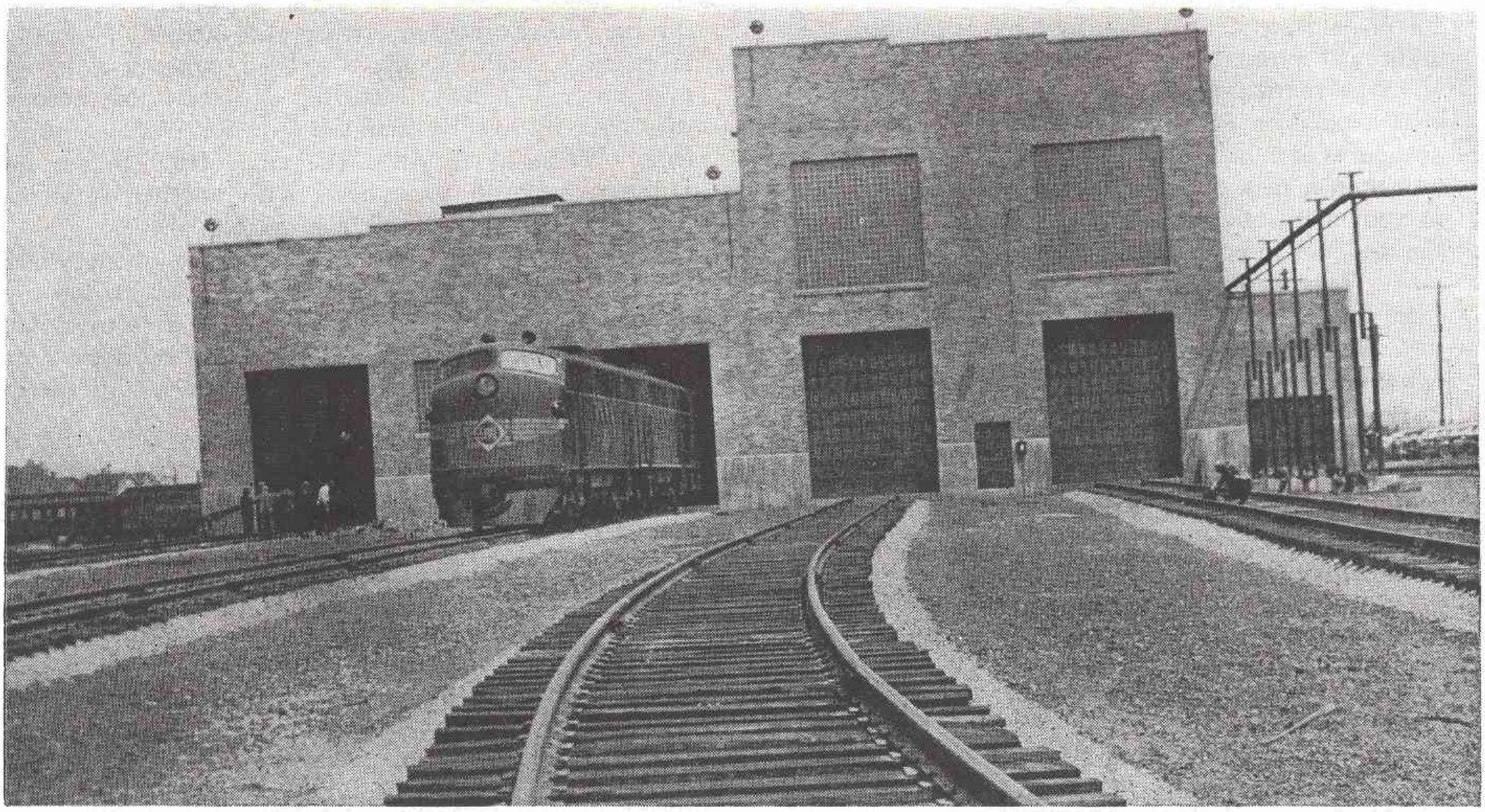


Westerly end of the shop building, showing a locomotive entering the service section

Erie Diesel Layout Has "Everything"

Installation at Marion, Ohio, has through-type arrangement, shops for maintenance and heavy repairs, and complete servicing plant — Many automatic features

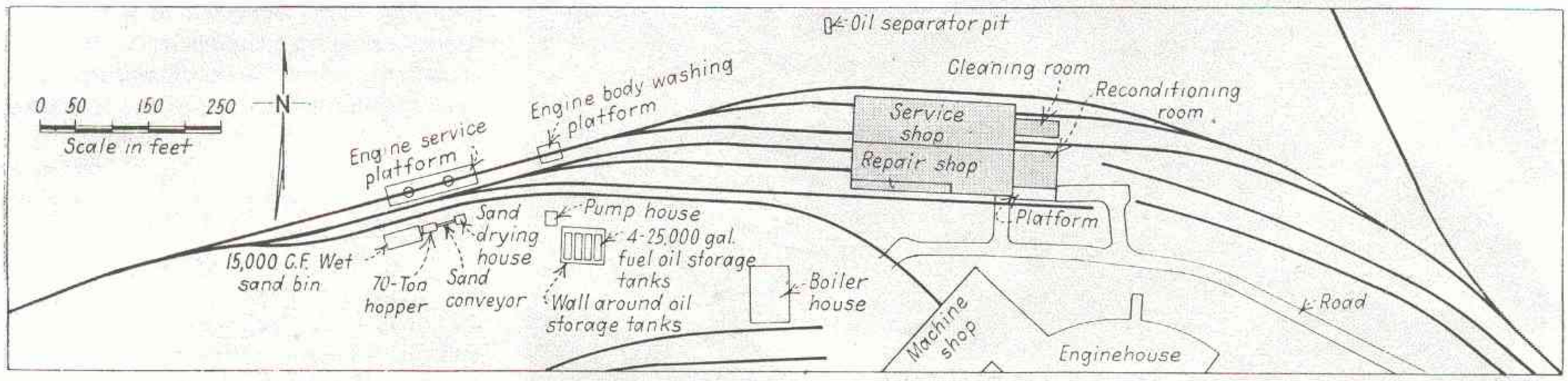
FOR inspecting, servicing, repairing and overhauling the Diesel-electric road freight locomotives in service on its main line between Meadville, Pa., and Marion, Ohio, the Erie has constructed complete facilities at the latter point, which are designed to minister to almost any conceivable need of the locomotives, with maximum efficiency and effectiveness and at minimum cost. These objectives were accomplished by giving special attention, in the design of the facilities, to achieving an efficient arrangement, mechanizing the operations wherever possible, making maximum use of devices for automatic operation, and providing the best possible working conditions for employees, with particular emphasis on proper ventilation and illumination, both natural and artificial.

The territory between Meadville and Marion includes the heaviest ruling grades (about one per cent in each direction) on the main line of the Erie between New York and Chicago. To overcome the operating difficulties formerly encountered, the railroad has placed six four-unit 5,400-hp. Diesel-electric locomotives in service for hauling freight trains over the 200 miles between these points, thereby eliminating the necessity of reducing tonnage. Marion, the westerly terminus of this territory, was already the site of an extensive engine terminal for steam locomotives. However, the new facilities that have been installed for handling the Diesel-electric locomotives are entirely independent of the existing terminal, with the one exception that the requirements for steam and air are furnished from the existing power plant.

Principal Units

The new installation, located immediately north of the terminal for steam power, includes a shop building of the combined type, with facilities under one roof for both running maintenance and heavy repairs; an outside fueling platform, with equipment for washing the running gear of the locomotives; fuel storage tanks and pumping equipment; a sand-drying plant with storage tanks and outlets at the fueling platform; and a power-driven, automatically-operated body-washing rack. The layout is of the through type; that is, the tracks extend entirely through the running maintenance shop, so that movement of the locomotives is in one direction only, with no backtracking. When a Diesel-drawn freight train pulls into Marion from the east, it proceeds to the freight yard west of the engine terminal, where the locomotive is detached and brought back to the new layout to be fueled, sanded and washed and then sent into the running maintenance shop. When necessary work has been completed the locomotive continues through the shop, returns to the through running tracks and proceeds back to the freight yard.

The main shop building is substantially rectangular and is 126 ft. wide overall and 222 ft. long, with the long dimension east-west. The service portion of the shop, including two through tracks with pits and platforms, is 62 ft. wide and is in the northerly part of the build-



Layout of the new Diesel shop and servicing facilities

ing, while the shop for making heavy repairs is in the southerly portion. Along the south side of the structure is a leanto 13 ft. wide and 140 ft. long for storing mounted wheel assemblies.

At the easterly, or exit, end of the main building are two extensions, both with first floor and basement levels. One of these, located between the two through tracks, is 22 ft. wide and 60 ft. long, with an office and facilities for cleaning parts on the first floor, and toilet and rest-room facilities for employees on the lower level. In the other extension, immediately to the south, which is 51 ft. wide and 60 ft. long, the main floor is used as a shop for reconditioning engine parts, while the basement level contains tanks, pumps and other equipment for storing, handling and processing lubricating oil. A covered platform, served by a spur track, extends along the south side of this extension.

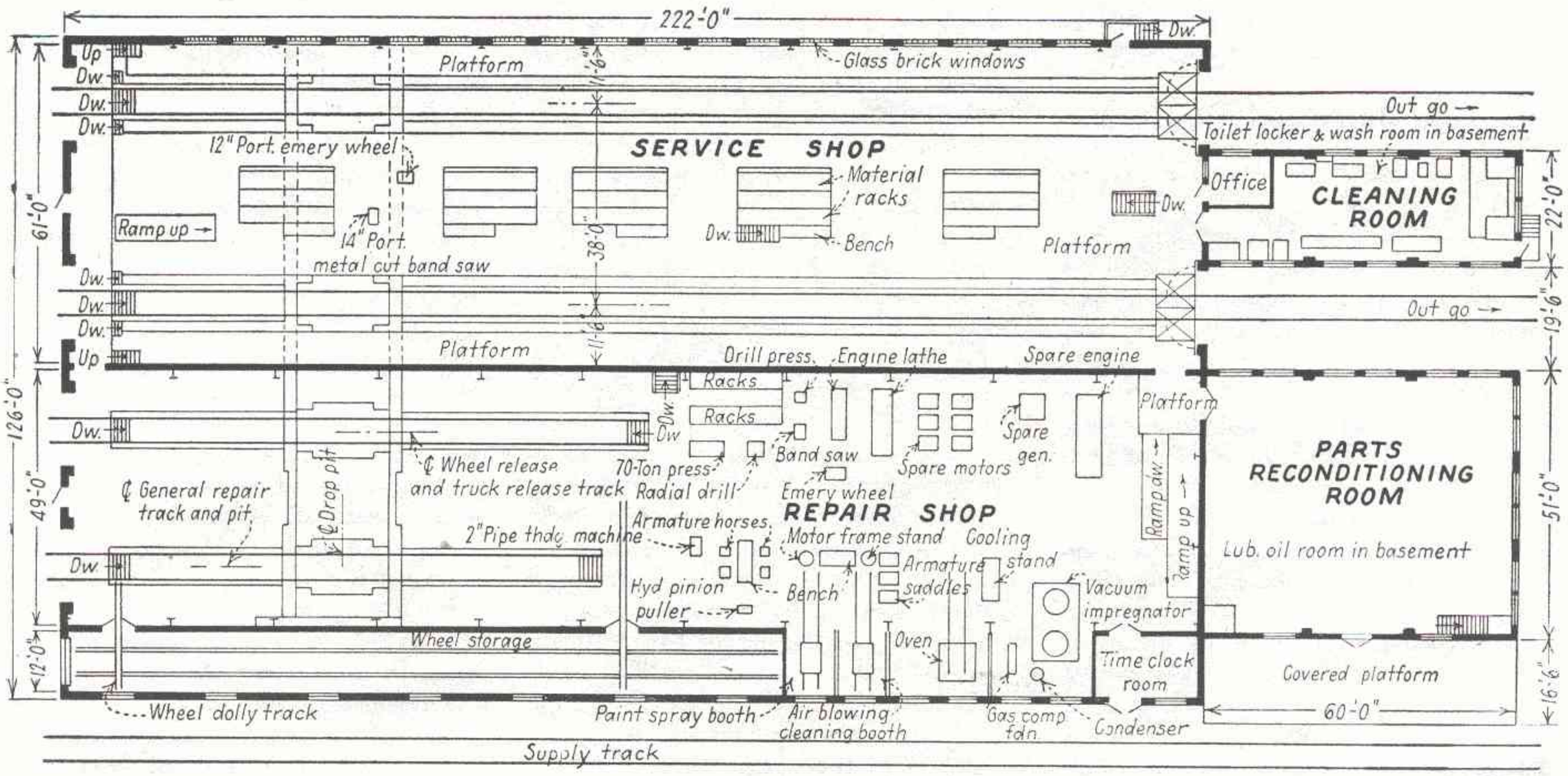
The shop building is of concrete, brick and steel construction, with a roof consisting of 2¾-in. Haydite slabs covered with three-ply built-up roofing. The main portion consists of two longitudinal bays, one for the service section, and the other, somewhat higher, for the repair shop. In both bays the roof structure is supported by transverse steel trusses framed into steel columns in the side walls, with the top chords of the trusses pitched downward toward the outside walls where roof gutters are provided for drainage.

Ample daylight illumination is supplied, partly by means of large panels of glass blocks in all exterior walls of the main building. Generous use is also made of conventional steel sash, with pivoted sections, for both illumination and ventilation. In the service section an additional source of daylight is a clerestory, 12 ft. in width, which extends along the center line of this bay for nearly its entire length. The side walls of the clerestory consist of continuous bands of steel sash, glazed with wire glass, which are movable to aid ventilation.

At each end of the service bay are two locomotive doors, which are of the motor-operated overhead type. They are of wood construction with large panels of wire glass. The two doors at the entrance end are automatically operated by means of "electric eyes" mounted on the exterior wall beside the door openings. These eyes are actuated both day and night by the headlights of approaching locomotives, permitting them to enter the building without stopping. Visors over the "electric eyes" prevent their being affected by the rays of the sun. After a locomotive has entered the building, push-button control is used to close the door.

Interior Arrangement

The service bay has two reinforced concrete engine pits, each of sufficient length to accommodate a complete four-unit locomotive, a depressed floor level 33 in. below the tops of the pit rails, and an upper working level at the eleva-



Floor plan of the shop building

One of the pits in the service shop, showing body supports at drop table in "out" position—also overhead engine exhaust system

tion of the cab floors, which consists of three platforms, one 6 ft. wide along each side wall and one 27 ft. wide between the two pits, all of them having timber decks supported on tubular steel columns. The edges of the platforms are protected by steel-pipe safety railings containing removable sections at the locations of the locomotive doors. Spaced throughout the length of the center platform is a series of enclosures with wood shelves for storing materials and small parts.

Movable Rails and Platforms

The three platforms extend the entire length of the service bay except for a space 8 ft. wide at the entrance end where the concrete floor is level with the top of rail. In the design of the exit end of the service bay, a problem was presented by the fact that, while it was desirable to have means of communication for workmen between the working areas on both sides of the tracks at both the upper and lower levels, this had to be done without interfering with the movement of locomotives out of the shop. Insofar as the lower level is concerned, this problem was solved by an ingenious arrangement at each track, by means of which a section of the rails can be swung out of the way when not in use so that passage may be had from one side of the inspection pit to the other without climbing over the tracks. To permit passage across the tracks at the upper working level the arrangement includes a movable section of platform at each track, which is similar to a double-leaf bascule bridge.

Normally the sections of the "bridge" are in the lowered position, permitting workmen to pass back and forth between the different sections of the upper working level, and the hinged sections of track rails are folded back against the east wall, leaving passageways between the various areas of the depressed working level. When it is desired to move a locomotive out of the building over one of the tracks, the "bridge" is raised, and, simultaneously, the movable rails are swung into position in line with the adjacent sections of track and the exit door is opened.

The movable portions of the platform and the rails are power operated by compressed air controlled by solenoid valves actuated by push buttons. There are two push-button stations for each movable arrangement, one on a pedestal on the upper level, within convenient reach of the cab windows of the locomotives, while the other is mounted on the wall near the door so that workmen also can control the positioning of the platform "bridges" and the swinging rails.

For changing out the trucks of the Diesel locomotives and transferring them to and from the repair shop, a 60-ton Whiting drop table is installed in the building. This operates in a transverse tunnel extending the entire width of the structure. Drop-table tops are provided over the tunnel at each of the two tracks in the service section of the building, as well as at two tracks with pits in the repair shop. For supporting the locomotive bodies while the trucks are being changed out an arrangement of retractable arms has been installed at each of the drop-table locations in the service section. This arrangement consists of two supporting arms, one on each side of the track, which may be extended to protrude 15 in. beyond the edges of the platform to engage the jacking pads under a locomotive body. When not in use the supporting arms are withdrawn into the clear, being actuated by compressed air controlled by separate valves for each support. Each arm is supported in and extends through a structural steel box girder spanning between steel pedestals on each side of the drop table pit.

Locomotive exhaust fumes and gases are removed from the service shop by eight smoke jacks with power-driven suction fans, four of which are arranged over each track in such a position that there is a smoke jack for each locomotive unit. Each of the smoke jacks embodies a 24-in. roof-mounted ventilator with a capacity of 4,760 cu. ft. per min., which draws the gases through a vertical asbestos-cement pipe, having a horizontal component about 14½ ft. long at its lower end, the latter being suspended from the underside of the roof by means of steel hanger rods. In the underside of each horizontal pipe are four intake pipes or hoods which are spaced and arranged to fit over the four exhaust outlets in the roof of each locomotive unit.

Illumination—Heating

General illumination for night work in the service shop, and also for auxiliary use during the daytime if needed, is afforded by fluorescent lights hung from the lower chords of the roof trusses, with additional lighting underneath the platforms in the form of incandescent fixtures, and 200-watt flood-type fixtures in the side walls of the engine pits.

Heating of the service shop is accomplished by four unit heaters placed under the central platform, with outer grills in the deck of that platform. The output from these heaters is also used to melt accumulations of snow and ice on the running gear of locomotives, by means of a system of ducts conveying the heat to wall grills in the pits at the locations of the locomotive axles.

A system of piping under the platforms in the service shop includes lines for lubricating oil, scavenger oil, distilled cooling water, compressed air and steam, with connections at appropriate intervals along the edges of the plat-

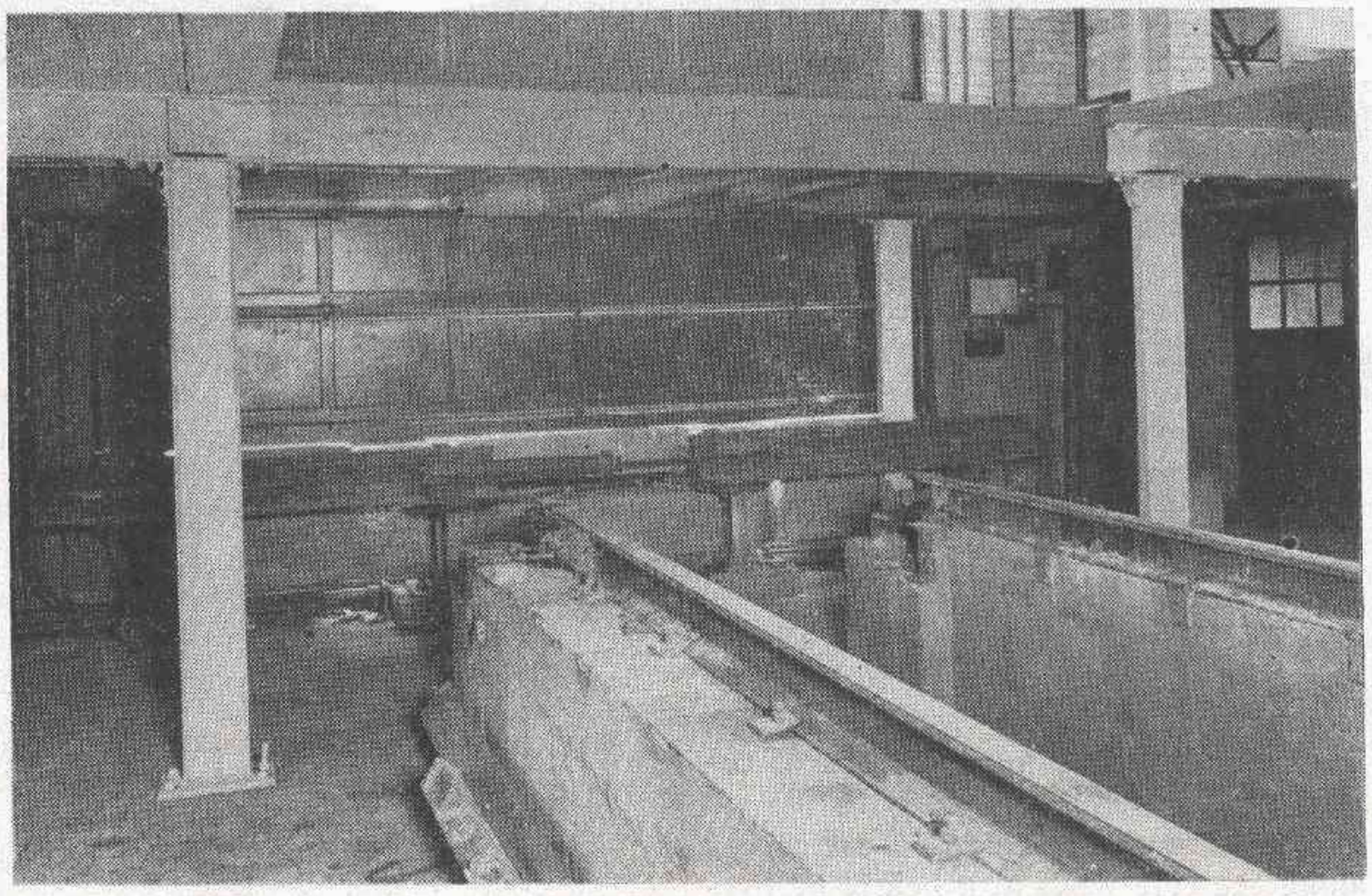
forms. Distilled cooling water for the locomotives is pumped from two 6,000-gal. storage tanks underneath the central platform. The supply of distilled water is furnished in the form of condensation from the steam sand dryer, from which it is delivered by steam trap discharge pressure to the two storage tanks. Also located under the central platform is a small motor-driven pump for pumping scavenger oil from the crank cases of the locomotives into lines leading to reclaiming equipment in the oil storage room.

Other Rooms

The parts cleaning room, located in the northerly extension at the east end of the shop, contains two cleaning vats at the extreme easterly end, which are served by a one-half-ton jib crane. Arranged along the southerly wall of this room are a cleaning tank for air filters, draining ovens for the various types of filters, and certain other facilities, all served by a 400-lb. mono-rail crane, the track of which runs nearly the length of the room. Other equipment in this room includes work benches, skid and waste boxes, filter racks and a tool locker, with an office, 10 ft. by 12 ft., located in one corner.

The rest room for employees, directly under the parts cleaning room, contains toilets, lockers, benches and tables. Washing facilities include two circular lavatories with hot and cold water. This room has a generous amount of window space for daylight illumination and, like the other rooms in the building, is heated by unit heaters.

The parts reconditioning room, which occupies the platform floor level of the other wing at the east end of the building, is equipped with such machines as emery wheels, a small metal band saw, a cylinder honing fixture, a portable drill press and necessary work benches.



Easterly end of pit in service shop with platform "bridge" closed and swinging rails folded against wall

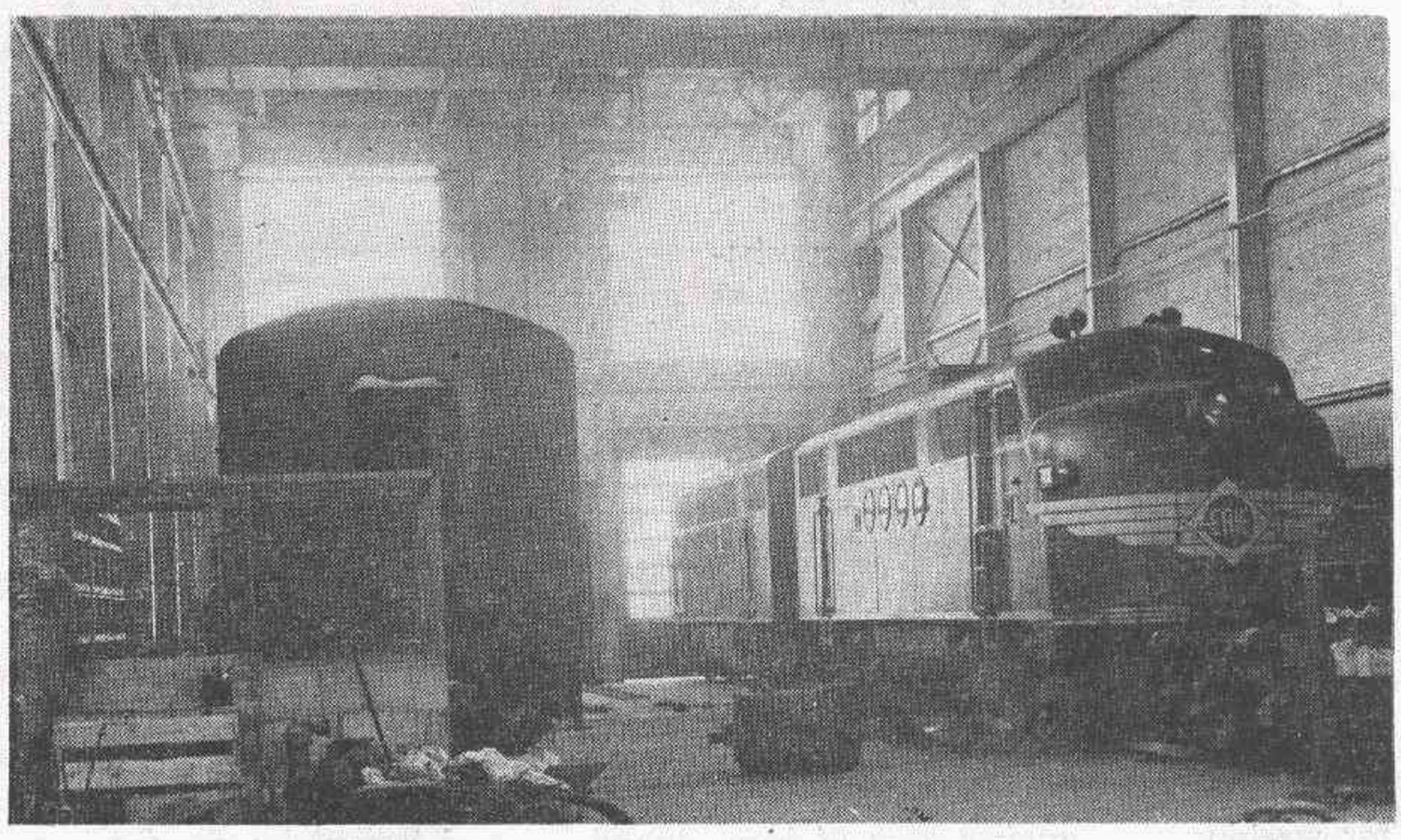
Repair Shop

The lubricating oil room, directly beneath the parts reconditioning shop, contains four 6,000-gal. horizontal tanks, two for new oil, one for scavenger oil and one for reclaimed oil. One of the tanks for new oil is insulated and heated with steam coils so that the oil may be preheated before being pumped into the crankcases of the locomotives. Other equipment in this room includes two motor-driven pumps for pumping oil to the outlets at the service platforms, or from tank cars into the storage tanks, and an oil purifier with a capacity of 75 gal.

The repair shop in the southerly portion of the main building is equipped for overhauling and making major repairs to the Diesel locomotives and their principal parts, such as the engines, generators and traction motors. This section of the structure has a single working level at the elevation of the two tracks which enter it from the westerly end. Each track is built in connection with an inspection and work pit of sufficient length to accommodate two units of one of the road Diesels, or an entire switching locomotive, and both of them are served by the 60-ton drop table and a 25-ton traveling crane with A-C dynamic lowering control. The crane has a suspended push-button station by which it can be controlled from the floor, or the station can be taken to the cab for cab operation.

The easterly portion of the repair shop, beyond the ends of the engine pits, is given over to the machine tools and other facilities required in making repairs. The machine tools, located principally along the north wall, include a 17-in. portable drill press, a 4-ft. radial drill, a 14-in. portable metal band saw, an 18-in. by 10-ft. engine lathe, a 36-in. by 16-ft. engine lathe, a 20-in. emery wheel and a 70-ton hand-operated rod press. This side of the building also contains truck material racks and, near the extreme easterly end, space for six spare traction motors, a spare generator and a spare Diesel engine.

Arranged along the southerly wall are a paint spray booth, an air-blowing cleaning booth, an armature baking oven and an armature vacuum impregnator. Also included in this general area are a 2-in. portable pipe-threading machine, a



Looking west in the shop for making heavy repairs

portable hydraulic pinion puller, a combination induction pinion heater and Magnaflux transformer, armature horses, armature saddles, an armature cooling stand, an induction heater for applying and removing roller bearing journal sleeves, and necessary work benches. The wheel storage area in the leanto along the southerly side of the main building has space for storing 57 pairs of mounted wheels. The wheels are moved to and from the storage area on two track-mounted dollies, with 14-in. gage, located at opposite ends of the nearest track in the repair shop.

Artificial lighting for general illumination in the repair shop is by 400-watt mercury vapor lamps, some of which are hung from the lower chords of the roof trusses, while others, with the reflectors arranged at an angle, are placed along the side walls at a height of 18½ ft. above the floor level. The engine pits have inclined wall lights.

The shop building and its appurtenances, both outside and inside, are painted in accordance with a definite color scheme designed not only to give a pleasing appearance but also to identify the functions of the various pipes or other parts.

Servicing Platform

The outside platform where the Diesel locomotives are fueled, sanded and their running gear washed is located about 500 ft. west of the shop building. This is a single-track platform built of reinforced concrete, 26 ft. 3 in. wide and 117 ft. 4 in. long. The rails are supported on short timber ties imbedded in the concrete, and a timber walkway about 5 ft. wide extends the length of the platform on each side of the track. Conduits are built into the platform for enclosing water, steam and fuel-oil lines.

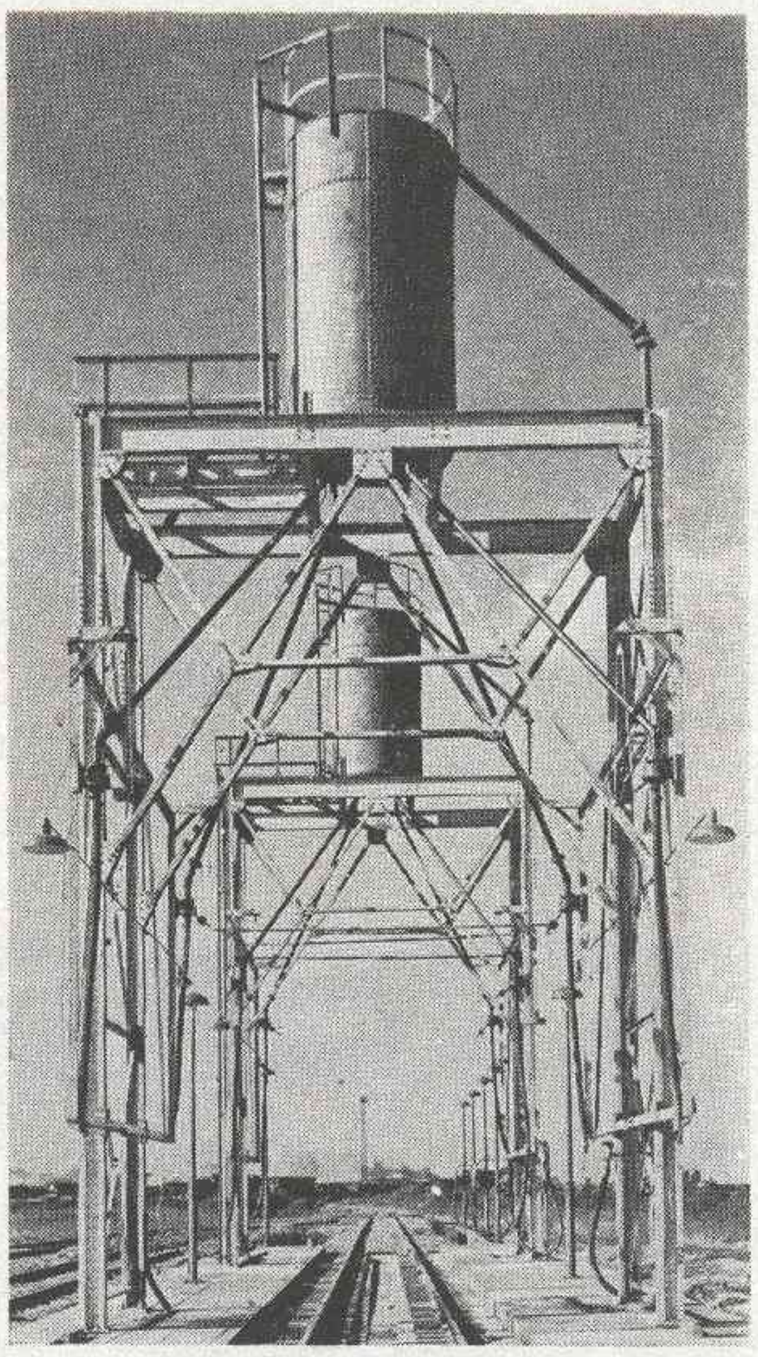
Supported directly over the fueling track on separate steel frames are two dry sand storage tanks, each with a capacity of 20 tons. Extending from each sand tank are four delivery pipes, two on each side of the track, each of which terminates in a length of flexible hose.

Arranged along one side of the platform are four fuel outlets, each consisting of a riser pipe with a gooseneck at the top to which is connected a length of hose about 15 ft. long, fitted at the end with a 1½-in. squeeze-type valve. Two of the fuel riser pipes are placed on the platform at the locations of supporting columns for the sand tanks, while the other two are located beyond the west end of the platform where they are fastened to and supported by tubular metal lamp posts on concrete pedestals. Arranged on each side of the platform are two Sellers high-pressure cleaning units for washing the running gear of locomotives.

Fuel for the Diesels is furnished from four 25,000-gal. horizontal steel storage tanks, placed nearby and surrounded by a concrete wall. To pump the fuel oil from tank cars into the storage tanks and from the latter to the locomotives, two 300-gal. per min. motor-driven pumps are located in a brick and concrete pump house adjacent to the storage tanks. As it is pumped from the storage tanks to the locomotive fueling rack, the oil is filtered by a 4-in. 10-element filter, and at the same time the quantity used is measured by a Bowser Exacto 3-in. oil meter having a capacity of 300 gal. per min. In addition, entrained air in the oil is removed by a de-aerating unit.

Sand Plant

The servicing layout for the Diesel locomotives includes a complete sand storage and drying plant that is highly automatic in operation. This includes a 750-ton open wood storage bin, from which the wet sand is transferred by a locomotive crane to a 70-ton concrete wet sand feeder hopper. From this hopper the sand is taken by a belt conveyor to a twin-unit steam sand dryer. As the sand is dried it falls by gravity into a gathering hopper, from which automatic gates control the flow over electrical vibrating screens into two sand drums. When these become full the sand is conveyed automatically by electric-eye controlled air pressure to the two overhead storage tanks at the fueling platform. After the wet-sand conveyors have been started by a push button, all operations involved in drying and elevating the sand proceed automatically. To assure a supply of sand at night, the plant is set in operation automatically when the tanks become half empty.



The outside servicing platform contains fueling and sanding outlets and truck-washing equipment

Car Washer

A Whiting car washer is so located on the lead track to the shop building that the locomotives are washed as they leave the fueling platform. The washer includes two vertical revolving brushes on each side of the track, and two vertical perforated spray pipes. Automatic control of the car washer is achieved with a combination line starter connected to a track relay so that when a locomotive shunts the track circuit by shorting the running rails, directly at the washer, a magnetic valve turns on the water and starts the four motors. When the locomotive has passed through the washer and the track circuit is again clear, the motors stop and the water is shut off. The ends of the locomotives and the vision windows are washed by hand.

Fire Protection

Fire protection is supplied by fire hydrants and hose lines, with nozzles of the fine-spray type for coping with oil fires, air-foam equipment and approved fire extinguishers, all of which are dispersed at strategic locations.

The new facilities at Marion were designed and constructed under the general supervision of J. W. Smith, chief engineer of the Erie, and C. H. Splitstone, assistant chief engineer; the design of the buildings was under the direct supervision of A. M. Knowles, then engineer of structures and now retired, and H. A. Dise, then assistant engineer of structures and now engineer of structures. Certain aspects of the design work were done in collaboration with C. F. McKinney, supervisor of tools and machinery, and G. E. McKinney, electrical engineer, representing W. Moore, superintendent of motive power, now retired. All work in the field was under the supervision of T. C. Wulling, resident engineer. The construction work was done under contract by the Hunkin-Conkey Construction Company, Cleveland, Ohio, except for the sand drying and handling facilities, which were furnished and erected by the Ross and White Company, Chicago, and the track work, which was carried out by company forces.