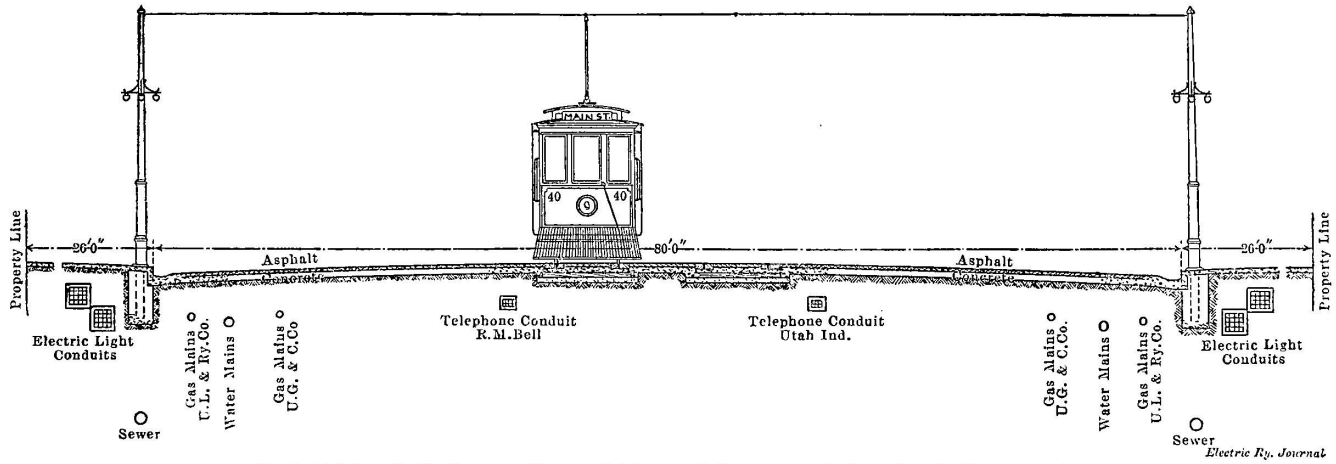
REHABILITATION OF THE UTAH LIGHT & RAILWAY PROPERTY

ABOUT three years ago the City Council of Salt Lake City granted the Utah Light & Railway Company a new 50-year franchise, and shortly thereafter control of the property passed to the Harriman interests. Since the change in ownership a plan of general reconstruction has been followed and a considerable portion of the rehabilitation is now completed.

The Utah Light & Railway Company has 100 miles of track, practically all within the corporate limits of Salt Lake City. This track, before reconstruction, was not in the best condition, because it had been built originally for much lighter cars than have been operated during the last few years. The track now being laid is of the latest approved type with high T-rails and concrete substructure. During the past three years the track has been rehabilitated as follows:



Utah Light & Railway—General Type of Street and Overhead Construction

1907	28.84 miles
1908	29.25 miles
1909 (to October)	20.00 miles

All of the work of track construction is done by company forces except the street paving, which is laid by the city contractor. The type of track structure adopted as standard for the Utah Light & Railway is made up of 7 in. 80-lb. T-rails in 62-ft. lengths laid on sawed carbolineum-treated ties spaced 16 and 13 ties to the rail. Two ties are used under each joint. The ties are ballasted with gravel, supported on a 6-in. concrete bed, and the foundation for asphalt paving is a layer of concrete beginning 6 in. below each rail and carried up to a height of 3 in. between the rails completely covering the ties. The following table shows the volumes of concrete, gravel and excavation per lin. ft. of double track, with 16 and 13 ties to each 62-ft. rail length:

Gage Lines.	Volume of Concrete Ties 4-ft. Centers.	Ties 5-ft. Centers.
7 ft.	.6516 cu. yd.	.6566 cu. yd.
6 ft.	.63306 cu. yd.	.63804 cu. yd.
	Volume of Gravel	
7 ft.	.1987 cu. yd.	.2022 cu. yd.
6 ft.	1987 cu. yd	.2022 cu. yd.
	Volume of excavation	
7 ft.	1.14228 cu. yd.	
6 ft.	1.1296 cu. yd.	

The concrete used in the track construction comprises a 1:3:7 mixture of cement, sand and gravel. Gravel for this track work is obtained from a large pit of the Oregon Short Line located on an extension of the electric railway just north of the city. This gravel is hauled in side-dump cars by electric locomotives for distribution along the streets. On the same line with the gravel pit is a stone quarry from which the principal portion of the crushed rock for street work is obtained. The rock also is hauled electrically and is locally distributed with dump wagons. The wagons for street distribution are loaded from a portable bunker which is set up on the street near the center of distribution. This bunker is made of timbers, each of which is numbered and so bolted together that they may be taken down and moved as the center of distribution changes. The cars carrying the stone are run over the bunker on a portable electric railway track from where they are automatically dumped into the large storage bin. Wagons are driven under the bin and loaded by gravity.

The joints in the 80-lb. track rails used in paved streets are made either with thermit welds or with continuous plates. In the latter case the rail ends are electrically connected with 300,000-circ. mil pin-driven American Steel & Wire 1-in. terminal bonds.

The streets in Salt Lake City are exceptionally wide, 132 ft., and the blocks unusually long, being 660 ft. from curb to curb, or 792 ft. from street center to street center. There are approximately seven blocks to the mile. The tracks are laid in the center of the streets and there is ample room for special trackwork with large-radius curves. On account of the large amount of curved rail needed for the reconstruction of the entire track layout in Salt Lake City, the engineering department has installed a rail-bending and cutting plant at the yards of the new shop property. The special-work track layouts are made with frogs and switches in which manganese steel rail and hard centers are used. This special work is supplied by the Pennsylvania Steel Company and William Wharton, Jr., & Company. The electric railway company bends its own curves in its rail shop, the equipment of which includes a large power-driven rail saw, bending rolls and a complement of forges, drill presses and smaller tools.

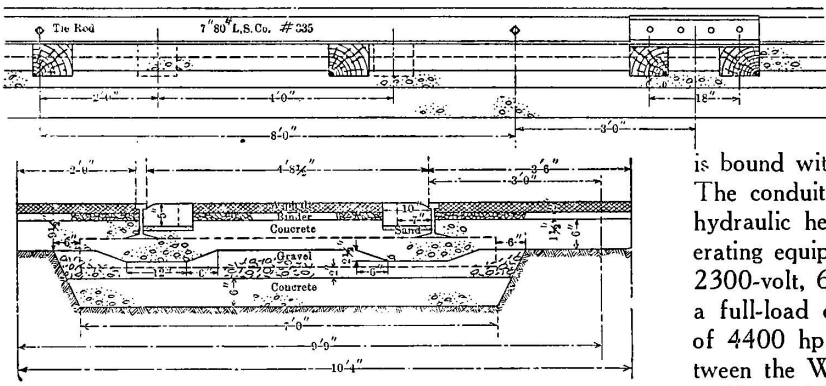
TROLLEY CONSTRUCTION

On all of the paved streets of Salt Lake City the center-pole type of trolley construction formerly used is being removed and the trolley wires supported by spans from poles set on the curb line. The very wide streets ranging from 60 ft.

to 92 ft. between curb lines and the resulting long spans, necessitated the use of 12 standard sizes of steel poles. On some of the streets these poles carry a few of the company's lighting and feed wires. Of these 12 standard sizes there are only four or five main sizes that are generally used. The poles range from 8-7-6 in to 10-9-8 in., vary in height from 28 ft. to 32 ft. and in weight from 650 lb. to 1575 lb. They are set in concrete and are given a backward rake of about 7 or 8 in. The steel poles are painted a red shop coat and finished with two coats of dark olive green.

Three poles are set on each corner of a wide street intersection. Where there is an extensive special track work layout a 10-in. pole is set at the curb intersection and 8-in. poles are set 27 ft. along the curb in each direction. A part of the strain from the corner pole is transmitted to the auxiliary poles through heavy anchor cables. In the commercial district where the blocks are 660 ft. long between curbs the steel poles are set 107.17 ft. apart between the nearest of the group of three corner poles and are 18 in. back of the curb line. At grand union crossings the center bull ring, to which the curve pull-offs are attached, is supported by four heavy steel strand cables which in turn are supported by the poles at the curb intersections. An engraving shows the arrangement of pull-offs and the location of the overhead special work at such a crossing.

Ornamental cast-iron bases which are 30 in. high and 21 in. in diameter at the ground are placed around the butt of each



Utah Light & Railway—Standard Roadbed in Asphalt Pavement

of the steel poles within the commercial district. A lead ring is poured around the tops of these bases to provide a tight connection. These cast-iron pole bases were required by the city. Outside of the business district the center-bracket poles are being replaced with wooden poles painted green.

As the new tracks are laid throughout the city this pole reconstruction is completed and the existing No. 2 and No. 4 copper trolley wires heretofore used are replaced with No. 00 round wire supported by 5-16-in. stranded steel spans. These spans are insulated at the steel poles with Brooklyn insulators and at the wooden poles with 8-in. wood breaks. The trolley wire is connected to the span by the use of Ohio Brass, General Electric or H. W. Johns-Manville insulated hangers.

The removal of practically all transmission wires in the business district of Salt Lake City necessitated placing the railway feeders underground. The new feeders have been installed in vitrified clay ducts. These feeders vary in size from 500,000 to 1,500,000 circ. mils, and on the more important streets are laid so that there are three in parallel. Facilities are provided in conduit manholes so that in event of trouble to any portion of the feeders the damaged cables can be disconnected from the circuit and power fed with those cables which are in operating condition. A new system of negative buses has been installed in conduit on the streets surrounding the block containing the central power station, which is within the business district. This negative collection bus has cross sections equivalent to 6,000,000 and 3,000,000 circ. mils of copper and is connected to the tracks at frequent intervals.

POWER IMPROVEMENTS

The power generating equipment of the Utah Light & Railway Company includes both steam and water-power-driven generators. The water-power plants are located in the Wasatch range of mountains just east of the city. In the Cottonwood canyon, 16 miles southeast of Salt Lake City, the company's water-power plant has a capacity of 2000 hp, which is transmitted at high voltage to a receiving station in Salt Lake. A second plant in Cottonwood canyon has 4000-hp capacity, and a plant at the mouth of Ogden canyon, 37 miles northeast of Salt Lake City, has 5000-hp capacity. A 1500-hp reserve steam plant is located within the commercial district in Salt Lake City, and power is purchased from the transmission systems of the Telluride Power Company and from the plant of the Utah Sugar Company, located 85 miles north of the city. The switching of current from these several sources and the synchronizing of the company's water-power plants is controlled from a main receiving station in Salt Lake City equipped with water-cooled transformers and oil-break high-tension switches.

Construction work is now well advanced on a 4000-hp water-power plant which the company is building in Weber canyon, 14 miles east of Ogden. A hollow reinforced concrete dam 66 ft. long has been built across the canyon at this point. Water from the dam is conveyed to the power plant through a 72-in. wood-stave pipe 7050 ft. long, and 2000 ft. of 8-ft. concrete conduit. The wood-stave pipe is bound with 3-4-in. round steel hoops, placed 3 in. apart. The conduit is 9 in. thick and is heavily reinforced. The hydraulic head at the power plant is 180 ft., and the generating equipment consists of one 2500-kva Western Electric 2300-volt, 60-cycle alternator driven by a Pelton wheel with a full-load capacity of 3500 hp and a maximum capacity of 4400 hp. Duplicate transmission lines will be built between the Weber canyon plant and Salt Lake City.

The rapid increase in the number and size of the cars operated in Salt Lake City has made necessary several changes in the relay steam plant and the substation in Salt Lake City. During the past year two 1500-kw Allis-Chalmers motor-generator sets have been installed in the central station. Each of these units comprises a 4000-volt 60-cycle 3-phase motor direct connected to a railway generator. The installation of the two motor-generator sets at this plant has released two 450-kw rotary converters from railway service, and these are now used to supply power to the three-wire d.c. 250-500 volt commercial power circuit.

If the present rate of increase in the power demand continues it is expected that another railway substation will soon be needed in the southeast portion of the city. The company is now extending its tracks 12 miles south to Bingham Junction, and plans are under way for the construction of a railway substation to be located at Murray, which will feed this suburban division. The normal railway load has increased during the last two years from about 1500 kw to 2900 kw. The total rated capacity of the railway power supply without steam is 2500 kw, and with steam, 3050 kw.

ROLLING STOCK

The regular schedules require the operation of about 100 cars in summer. The total number of cars available is 144, of which about 15 are held in for inspection each day. During the last year the company has purchased 50 new semi-

convertible cars, which are now in use on the principal lines of the city. These cars are equipped with four 40-hp motors and air brakes. They have 6-ft. platforms and are 30 ft. long over corner posts and 44 ft. long over bumpers. The seating capacity is 44. The maintenance of equipment is carried on systematically. All cars are inspected every night, and after five days, or when, approximately, 1000 miles have been run, each car is taken off the road and given a general inspection during the daytime so that such repairs as are necessary may be made. It is planned to put each car through the shop for a general overhauling once each year.

The present shop facilities of the company have been in use for a long time, and plans have been made and work soon will be started on the erection of a large modern shop plant to be located on the same property with the new car house described later. The shop facilities will include the following:

Machine shop, 140 ft. x 160 ft.
Blacksmith shop and foundry, 140 ft. x 48 ft.
Carpenter shop, 120 ft. x 112 ft.
Paint shop, 120 ft. x 32 ft.
Store house, 120 ft. x 44 ft.

A transfer table 50 ft. wide and 280 ft. long will serve these buildings. Additional room is available for the future erection of buildings, which room is now in use as a material yard.

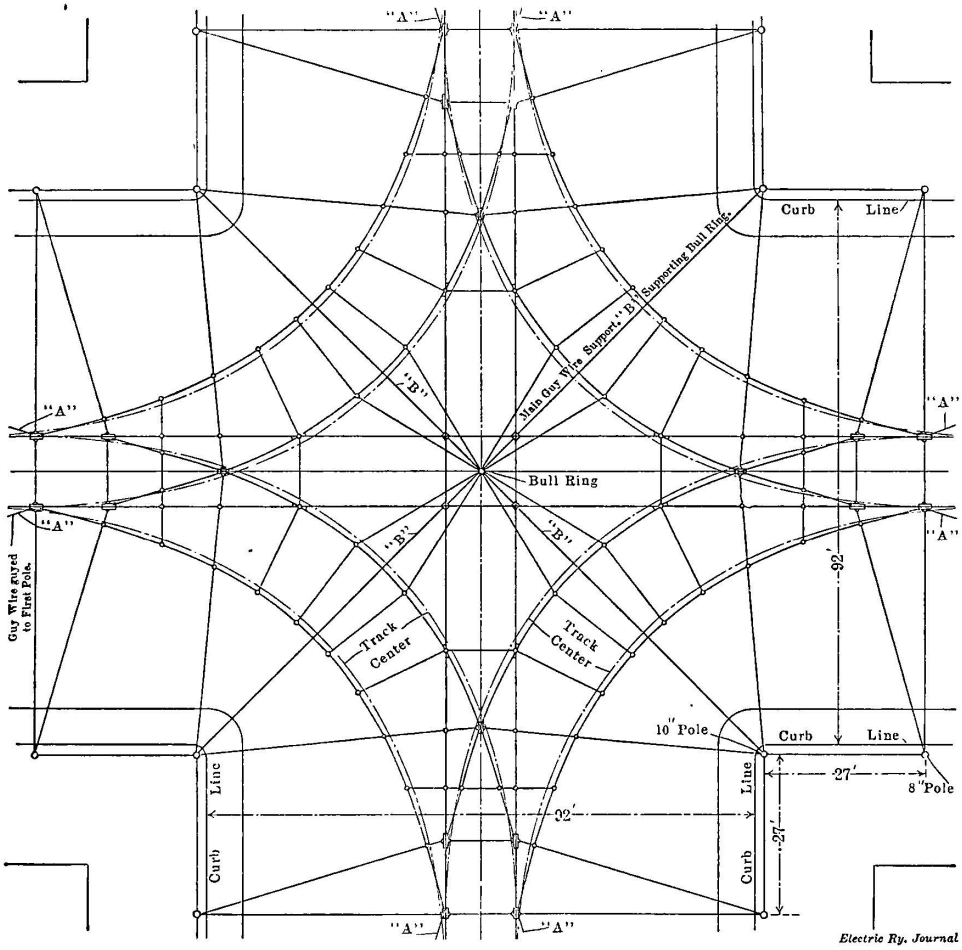
NEW CAR HOUSE

A new fireproof car house with a capacity for 144 double-truck cars has just been completed. This structure and the shop buildings soon to be erected will occupy an entire block 680 ft. square located six blocks east and five blocks south of the business center of the city. The new car house is 430 ft. long by 229 ft. wide, and has 16 through tracks laid on a 1 per cent grade sloping toward the rear of the building. At the front of the building these tracks join in a ladder leading to a double-track line on Seventh East Street. This special track work, which is illustrated, was largely built in the company's plant earlier mentioned. It is made up of 65 lb. rails and Wharton manganese steel frogs. At the rear of the car house the 16 tracks are connected, eight with each of two ladder tracks leading to the lines on Fifth South Street. This arrangement of double-ladder tracks will permit the handling of two cars at a time between the car house and the street, or will permit the simultaneous movement of one car between the car house and the street and another between the car house and the shop transfer table. The track layout as shown in the ground plan is such that three cars may be sent out to service in either direction at three corners of the shop and car house property.

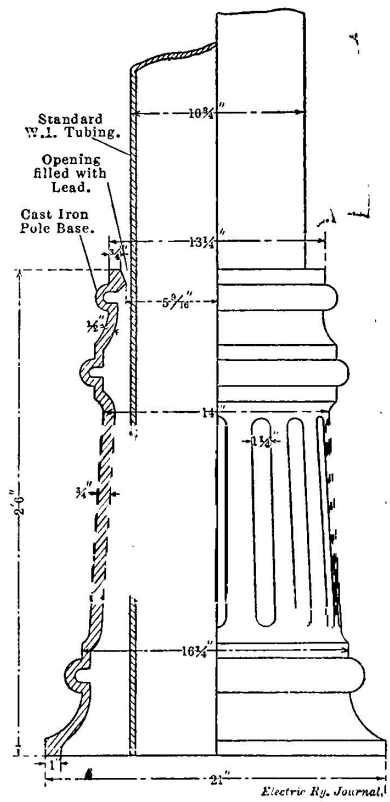
Within the car house the tracks are laid on concrete pit walls for a length of 220 ft. The pit floors have a 1 per cent grade and are of concrete construction with depressed troughs on either side, which are designed to collect drippings from snow brought in by the cars and quickly lead them to the sewers, thus affording a dry floor. All of the pits are piped for hot-water heating. The pit space is illuminated with 16-cp lamps set 10 ft. apart, staggered on opposite walls.

The car-house superstructure is subdivided into four 4-track bays with concrete floors. The floor of one bay is 2 ft. below the level of the track rails to provide for the convenient inspection of trucks. Each bay is divided at its midpoint between the inspection and storage ends of the building by a row of Kinnear rolling steel doors, thus separating the fire risks The front and sides of the building are laid with pressed brick and cement mortar.

All foundations for the end and side walls were made of concrete strengthened with American Steel & Wire reinforce-



Utah Light & Railway—Trolley Wire Layout for Double-Track Grand Union Crossing with 92-ft. Roadway

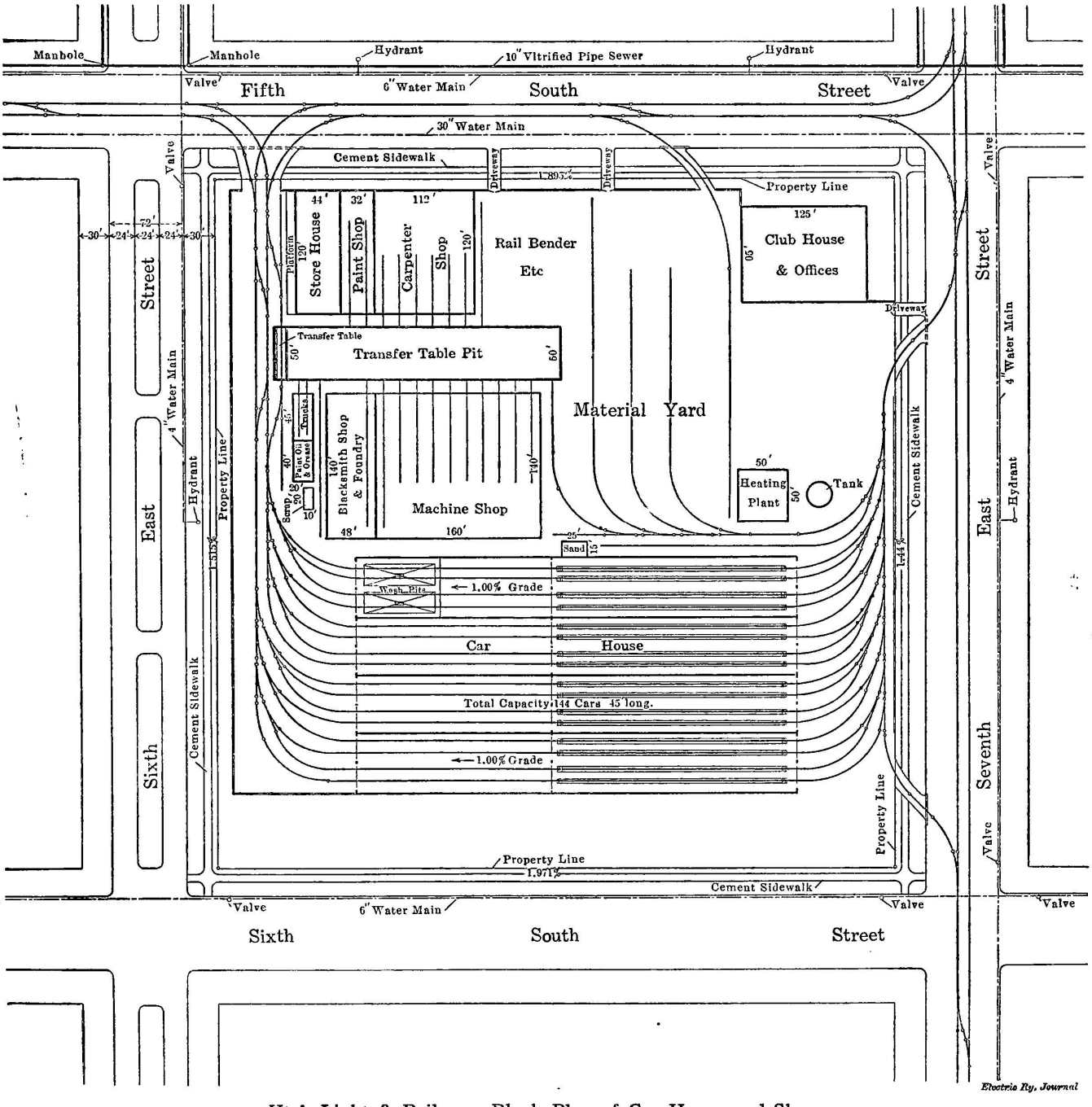


Cast-Iron Base for Tubular Trolley Pole

ment, and the concrete work throughout the structure was laid against galvanized iron forms and therefore presents a smooth surface. The walls are surmounted by concrete copings and pilasters to support the structural steel roof trusses.

The front of the building, which is designed in "Mission" style, is a series of reinforced concrete arches supported by brick piers and structural steel posts enclosed in concrete, protected on the outside by cast-iron boxes. Each of the arches spans two tracks and supports the brick end wall. These arches are made up of two 18-in. 55-lb. I-beams 28 ft. long, from which a curved steel plate ribbed with angles is supported by 5-8-in. hook bolts. The entire structural steel work of the arches is enclosed in a body of concrete 21 in. thick and 34 in. deep at the crown. In the end wall of each bay over the pier supporting the pair of arches is the monogram of the railway company. These monograms are 6 ft. x 6 ft. in size, and were cast of concrete and set in the 13-in brick wall. The opening under each arch is fitted with a Kinnear rolling steel door equipped for operation by an electric motor.

The roof of this car house has 83,600 sq. ft. of waterproofed surface and 204 skylights, each 16 ft. x 8 ft. in size. The skylights are filled with wire glass 1-4 in. thick fitted in galvanized iron frames. The roof, which is supported by structural steel trusses spanning each four-track bay, is a concrete slab 3 in. thick reinforced with 6-in. Kahn mesh. The surface of the roof is water-proofed with four-ply Carey-magnesia roofing. This roof construction cost 25 cents per sq. ft. and the skylight construction 61 cents per sq. ft. The inside of the roof and the end walls of the car house are cal-



Utah Light & Railway—Block Plan of Car House and Shops

cimined cream color down to the height of 6 ft. above the floor. The wainscot is painted black.

Over each track current is fed to the cars through a trolley trough made of 4-in. 5 1-2-lb. channel irons with the edges turned down. These channel irons are put up in lengths of 31 ft. 9 in. and are held together with cast-iron clips. They are electrically bonded and are insulated from the steel roof structure with wood. By the use of the channel irons it is practically safe to run cars in either direction within the car

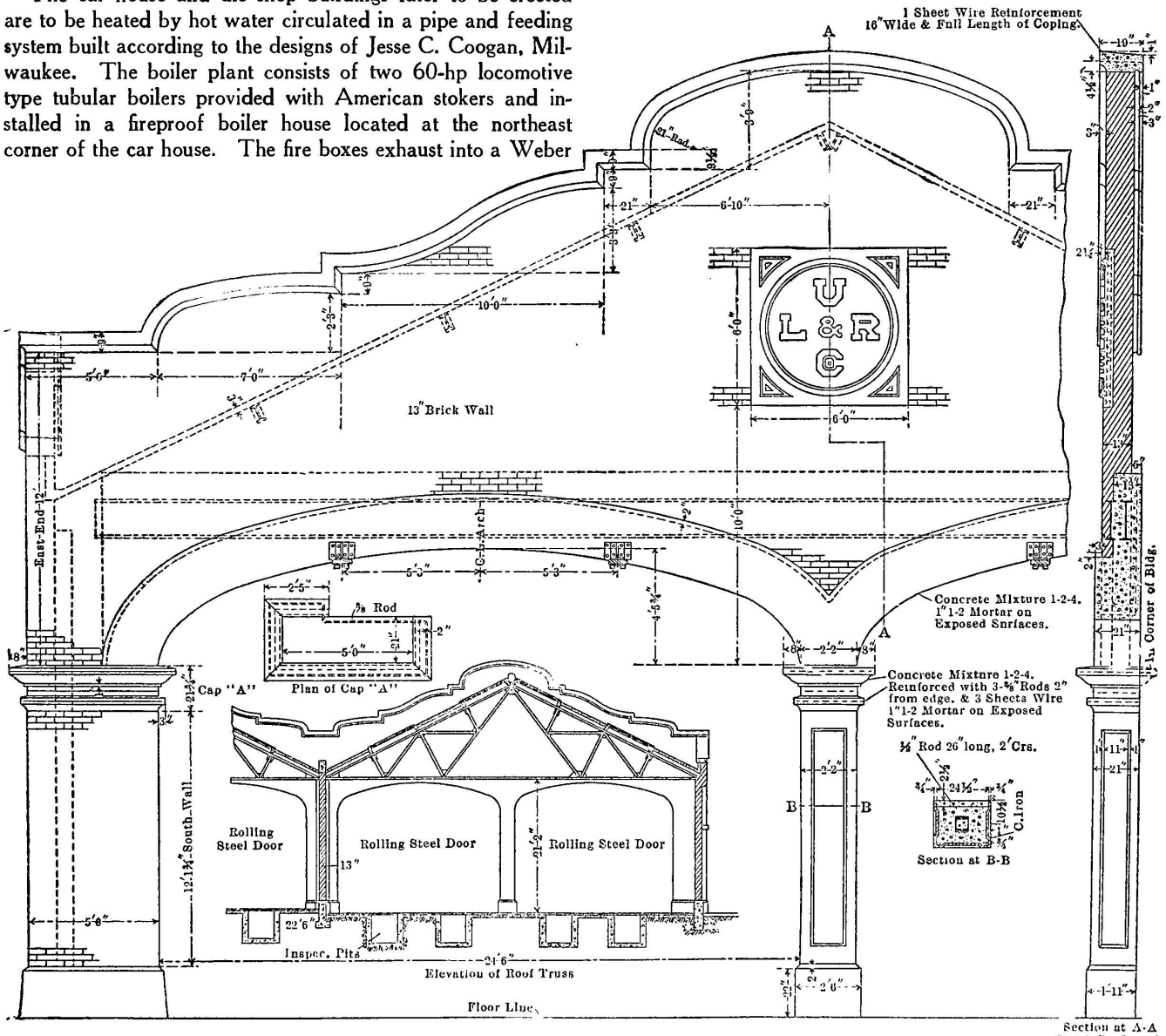
house without turning the poles, which hardly would be possible otherwise on account of the close proximity of the aisle sprinklers.

The entire interior of the car house is protected from fire with an installation of dry-pipe sprinklers made by the International Sprinkler Company. The valves controlling the admission of water are so equipped that they can be opened from several points throughout the car house by pressing electric contact buttons. Sprinkler lines are installed under the roof directly over each track, and there are also six lines of aisle sprinklers in each four-track bay with the sprinkler heads so located that the water will strike the top sash of a car window. A reserve supply of water is held in a 50,000-gal. tank erected by the American Bridge Company. The top of this tank is 97 ft. above the car house tracks.

The car house and the shop buildings later to be erected are to be heated by hot water circulated in a pipe and feeding system built according to the designs of Jesse C. Coogan, Milwaukee. The boiler plant consists of two 60-hp locomotive type tubular boilers provided with American stokers and installed in a fireproof boiler house located at the northeast corner of the car house. The fire boxes exhaust into a Weber reinforced concrete stack 100 ft. high. A thermostatic regulator controls the dampers on the boilers so that the temperature of the circulating water may be regulated automatically. This arrangement permits the circulation of water at 100 deg. in very mild weather, and also permits the raising of the temperature of the circulating water to 300 deg. in cold weather. Inasmuch as this possible variation in the temperature of the circulating water can be controlled continuously and the amount of coal burned also cut down in direct proportion to the rise in outdoor temperature, a considerable economy is said to result over the use of live steam, which would require sufficient fire at all times to keep the piping under pressure and afford circulation. It is expected that it will be possible to heat the entire plant in all except the most severe weather with the use of only one of the 60-hp boilers.

The front half of the car house, which is occupied by 16 pits, each 210 ft. long, is heated by a continuous coil of two pipes on each side of each pit. These coils are fastened to the concrete side walls with hangers which permit expansion movement. Series of coils are supplied with water from flow and return mains enclosed in a concrete trench, which extends from the boiler house across the full width of the building. The rear section of the car house, which will be used for storage, has a similar installation of supply mains and each of the four divisions in this end of the building is to be warmed by series of radiation coils, each 200 ft. long, supported on the side and division walls.

In the boiler house a Coogan turbine pump driven by a 3-hp motor circulates the hot water through the entire piping system. It is said that the load on this motor will be 1 1-2 hp for the entire plant. The small pump and its driving motor are the only mechanical devices, except stokers, used in the heating plant.



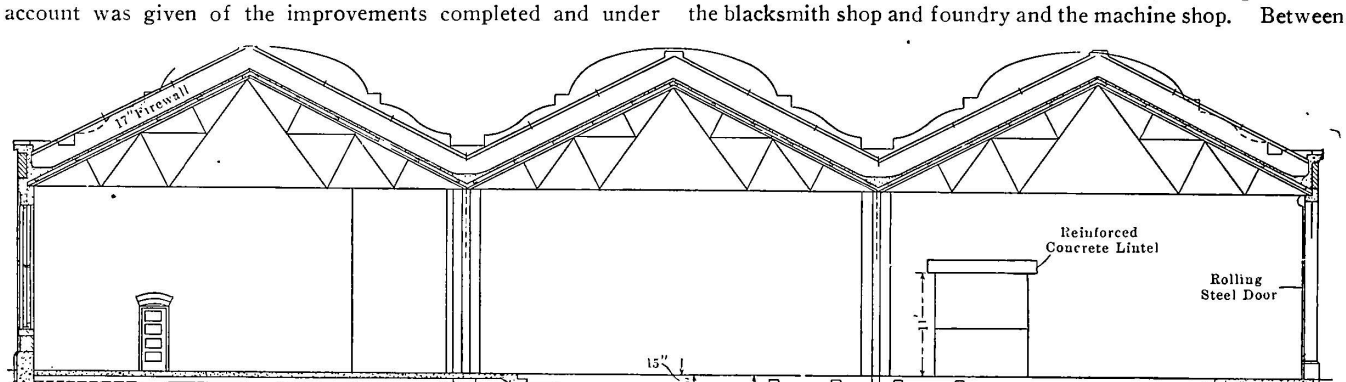
Utah Light & Railway—Detail Design of End Wall Arches and Elevation of Roof Trusses of Car House

NEW SHOPS OF UTAH LIGHT & RAILWAY COMPANY

Since the control of the Utah Light & Railway Company passed to the Harriman interests about four years ago, some extensive construction and rehabilitation work has been carried on in connection with the company's railway property as well as its light and power departments. In the convention issue of the ELECTRIC RAILWAY JOURNAL for Oct. 2, 1909, an extensive account was given of the improvements completed and under way at that time. The company's new car house under construction was then described, and this article has for its object some further reference to the car house and an account of the shops now being erected.

The site on which the car house and shop buildings stand consists of an entire city block located between Fifth South and Sixth South Streets and Sixth East and Seventh East Streets, a little over a mile southeast from the commercial center of the city. The block is 680 ft. square and has a general slope of 1 per cent toward the west, thus providing excellent drainage. The new car house, 430 ft. long x 229 ft. wide, is placed on the south half of the property, and, as previously described, is connected at both ends by tracks leading to the railway lines on Fifth South and Seventh East Streets. The architectural treatment is of the California Spanish Mission type, presenting a very pleasing appearance for so utilitarian a building.

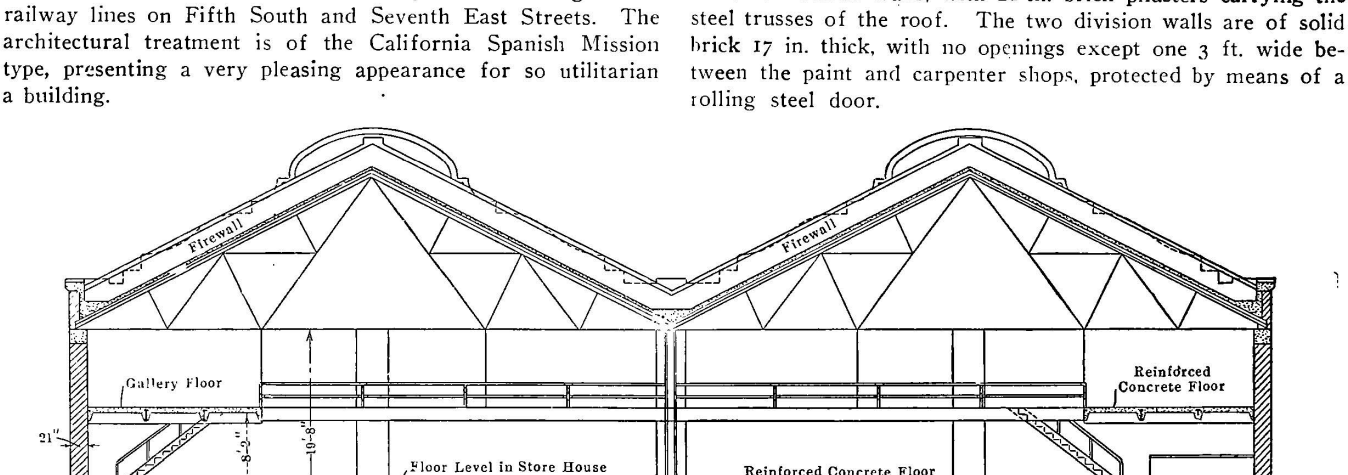
The new shops that are now nearing completion are located on the northwest quarter of the block, track connections being furnished by means of the ladder tracks leading from the west end of the car house to Fifth South Street, while the ladder on the east side of the grounds is connected by a spur leading to the east end of the transfer table pit. There are two principal shop buildings, the northerly one containing the storehouse, paint shop and carpenter shop. The southerly building contains the blacksmith shop and foundry and the machine shop. Between the two buildings is the transfer table pit, 50 ft. wide and 288 ft. in length, extending beyond the buildings at either end. The table operates on four 40-lb. rails, placed 18 in. below the yard trackage on 12-in. concrete walls spaced 16 ft. 1 in. center to center. A 6-in. gravel fill covers the entire pit.



Salt Lake Shops—Transverse Section—Machine Shop and Blacksmith Shop

CARPENTER SHOP

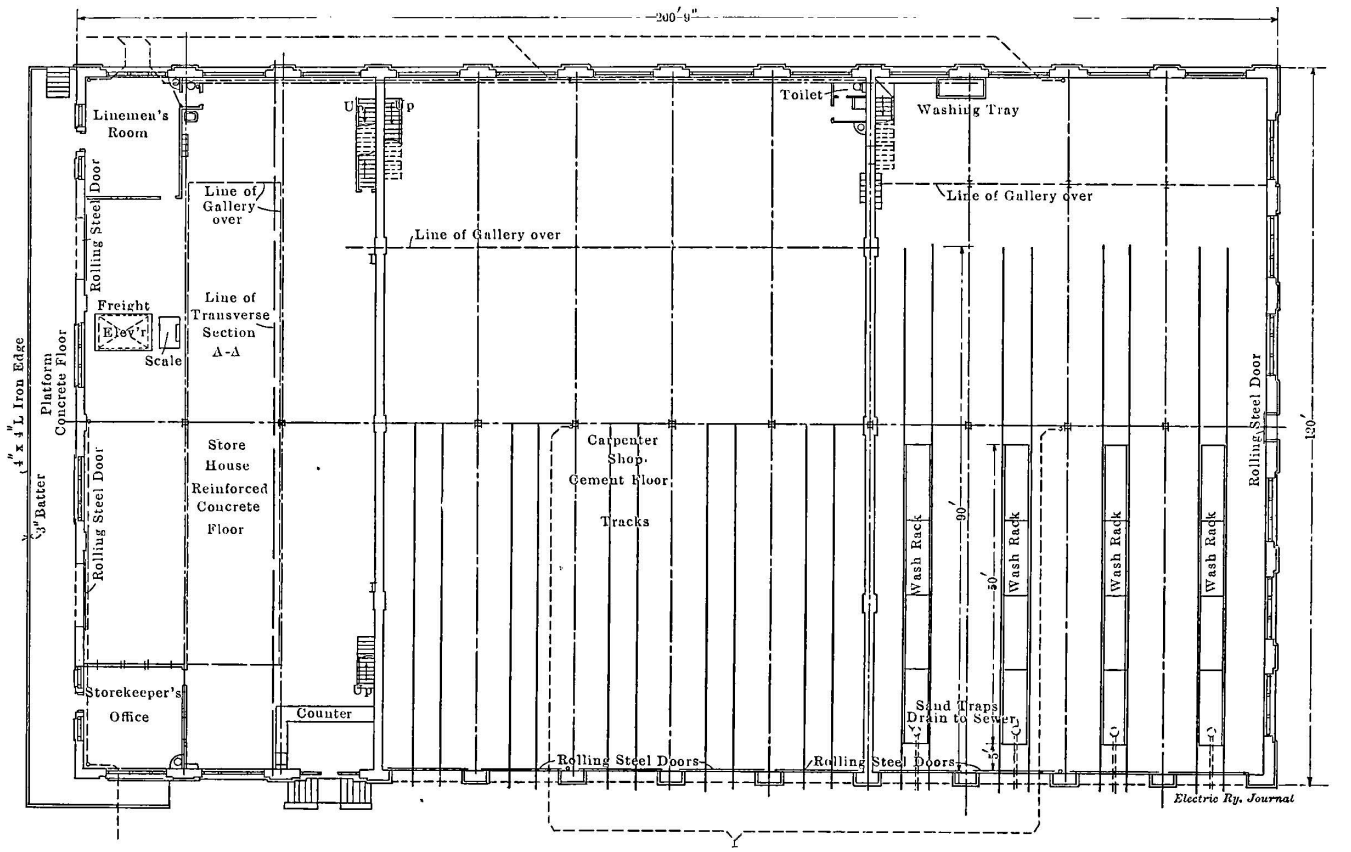
The carpenter shop building is 200 ft. 9 in. long x 120 ft. wide. The storehouse occupies 51 ft. 3 in. of the west end of the building, the paint shop 67 ft. 7½ in. of the east end and the carpenter shop the central portion, 81 ft. 10½ in., the length of each shop being the width of the building, 120 ft. The construction consists of 17-in. brick walls resting on 27-in. concrete foundation walls, with 21-in. brick pilasters carrying the steel trusses of the roof. The two division walls are of solid brick 17 in. thick, with no openings except one 3 ft. wide between the paint and carpenter shops, protected by means of a rolling steel door.



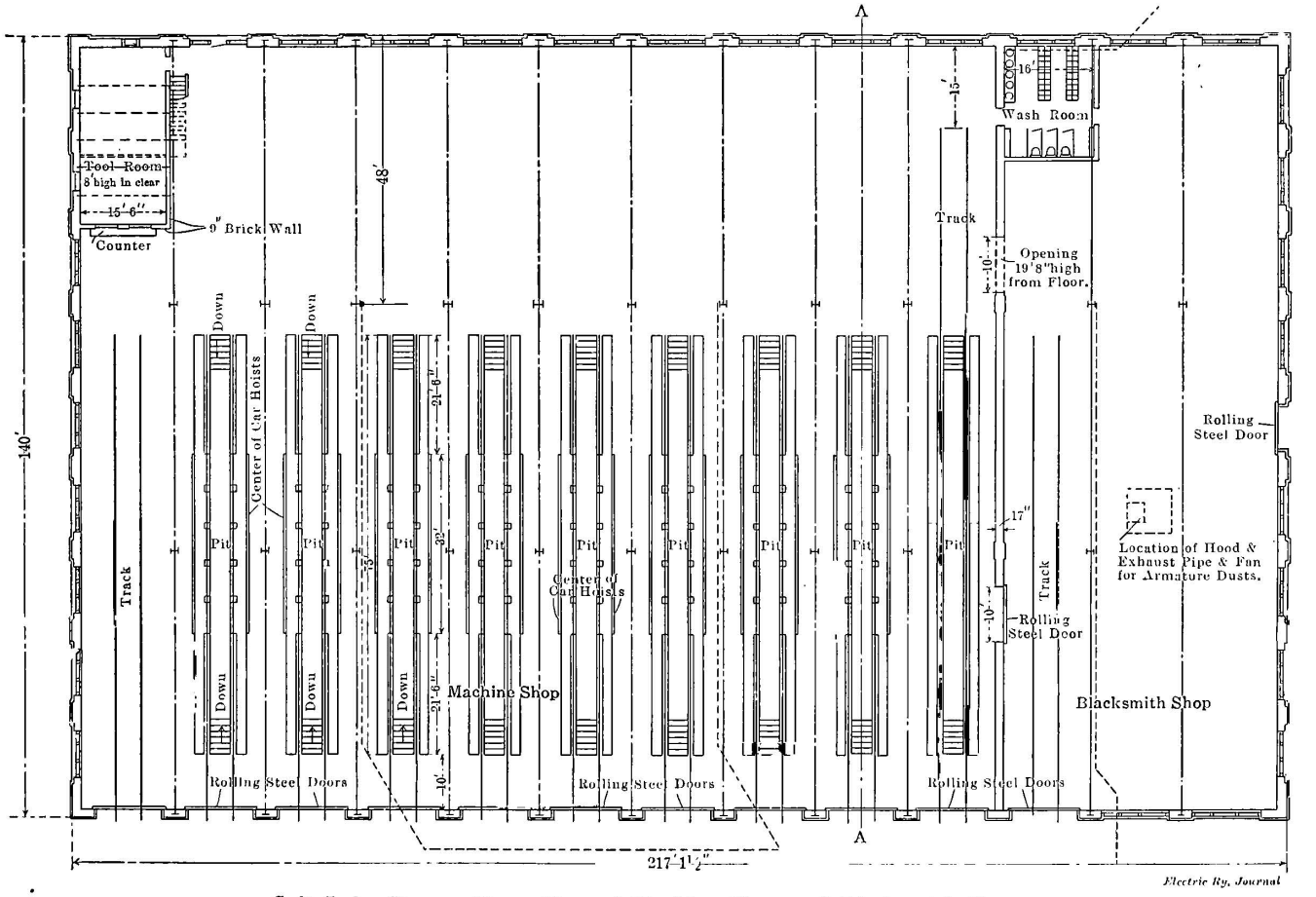
Salt Lake Shops—Transverse Section—Carpenter Shop, Paint Shop and Storehouse

A feature of this car house is the elaborate system of fire protection installed. For general protection purposes four sprinkler mains are run under the roof in each of the four bays, one directly over each track. There are also six lines of aisle sprinklers in each four-track bay, all supplied from a 50,000-gal. tank. The tracks at the west end of the car house are on grade, so that the cars can be run out by gravity if necessary. A low insurance rate has been obtained.

The storehouse has a gallery 16 ft. wide extending around all four sides, having a central court 15 ft. 11 in. high in the clear between floor and bottom of the roof trusses. In the southwest corner of the main floor, under the gallery, is partitioned off the storekeeper's office, 16 ft. square. In the northwest corner is the lineman's room, 16 ft. x 20 ft. The partition in each case is of metal lath with cement plaster. A basement 9 ft. 6 in. high under the floor shop is provided under the

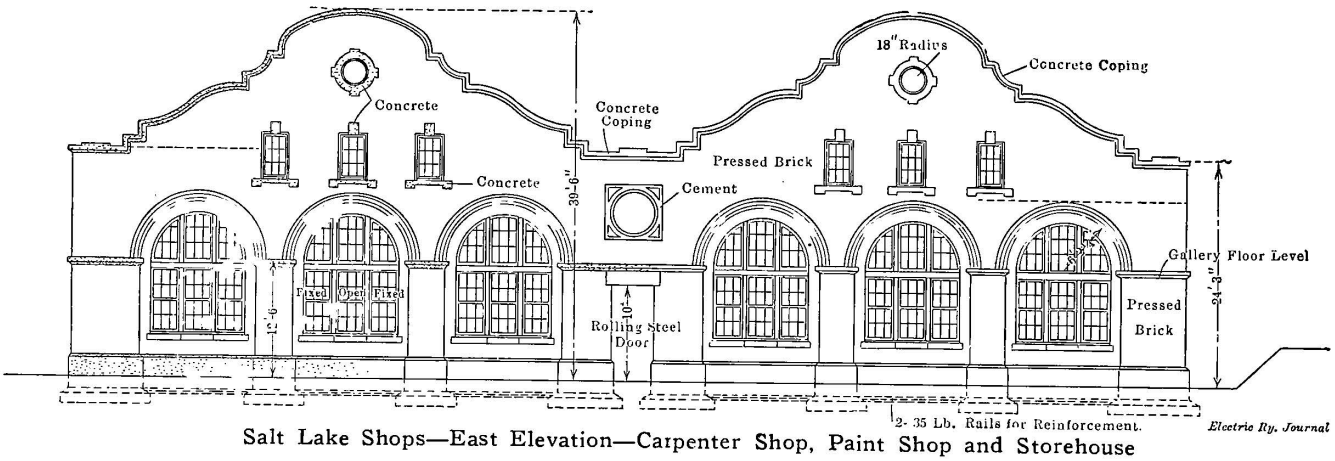


Salt Lake Shops—Main Floor Plan of Carpenter Shop, Paint Shop and Storehouse



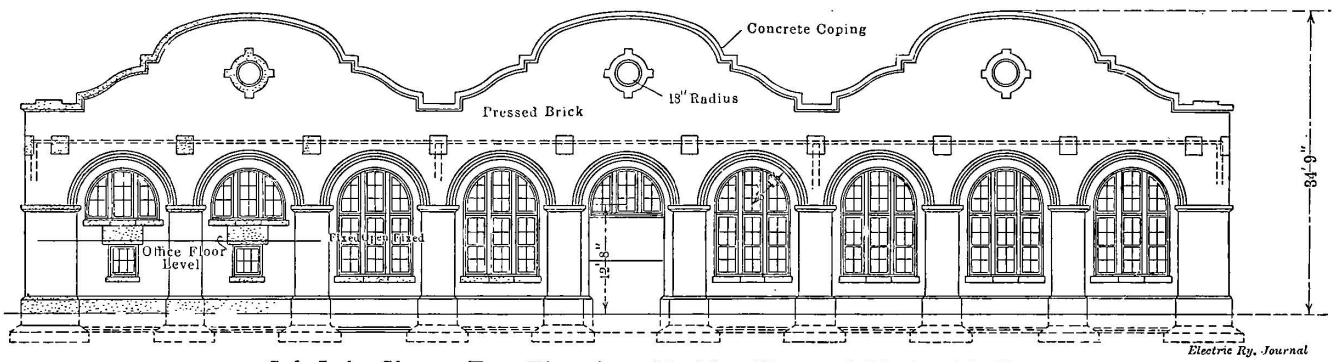
Salt Lake Shops—Floor Plan of Machine Shop and Blacksmith Shop

entire storehouse. All floors are of concrete and steel frame construction. Along the entire west side of the storehouse is an 8-ft. platform with concrete floor 3 ft. 9 in. above grade and level with the storehouse main floor. A track alongside the platform and also a wagon roadway permit ready unloading of supplies, while a runway to grade 5 ft. wide at the southwest corner of the building permits trucking of heavy stores from the storehouse. Entrance from the platform is afforded by two rolling steel doors 6 ft. 11 in. high and 10 ft. 6 in. wide.



Salt Lake Shops—East Elevation—Carpenter Shop, Paint Shop and Storehouse

The carpenter and paint shops are each provided with tracks connecting at the south end with the transfer pit. The five tracks of the carpenter shop are carried only to the center of the shop, the remaining half of the room with a 28-ft. gallery over the northern end being left for woodworking machines, workbenches, etc. The four paint shop tracks are carried back 90 ft., each track having a wash rack grating installed in four removable sections 12 ft. 6 in. long. At the south end of each track is an 18-in. sand trap with drain to sewer. Across the northern end of the paint shop extends an 18-ft. gallery. Each track opening is 12 ft. 4½ in. wide x 19 ft. high and is protected by a Kinnear steel rolling door. Both carpenter and paint shops have concrete floors, their elevation being at grade or 3 ft. 9 in. below that of the storehouse.

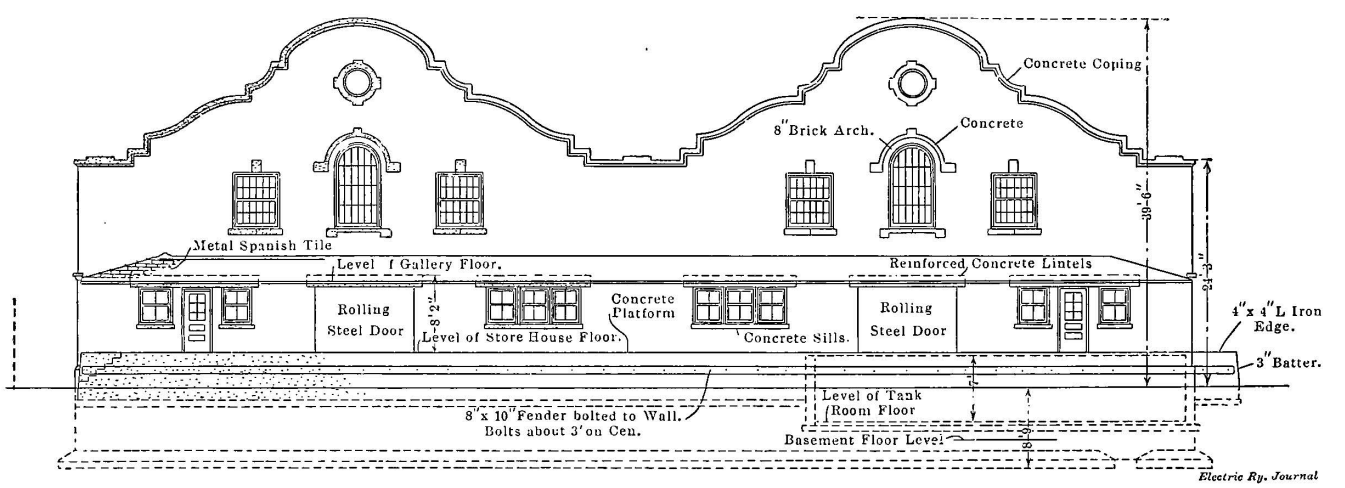


Salt Lake Shops—East Elevation—Machine Shop and Blacksmith Shop

An awning covered with metal Spanish tile covers the entire platform. As a protection from teams and trucking, the platform has a 4-in. x 4-in. angle-iron edge, and on the face of the platform wall, 22 in. above grade, is bolted an 8-in. x 10-in. fender. A freight elevator with platform 6 ft. x 8 ft. 6 in. serves the storehouse from basement to gallery. At the southeast corner of the storehouse are a counter and employees' entrance for dispensing stores and supplies.

MACHINE AND BLACKSMITH SHOP

The machine and blacksmith shop building is 217 ft. 1½ in. long x 140 ft. wide. The western end, 51 ft. 3 in. x 140 ft., is given up to the blacksmith shop and foundry and has one

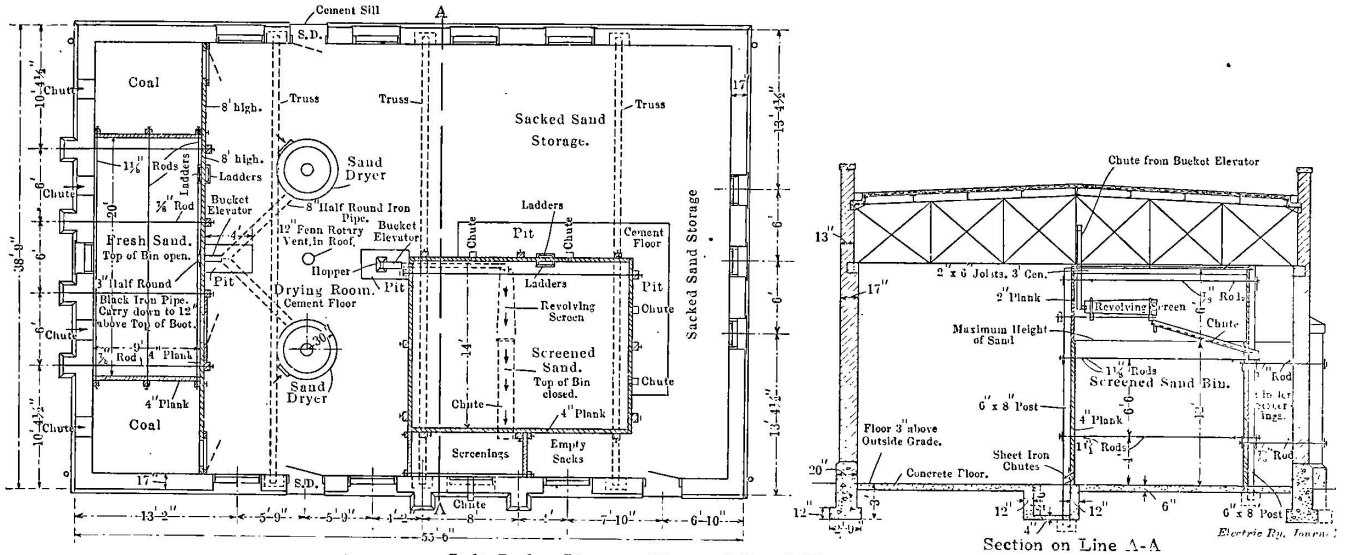


Salt Lake Shops—West Elevation—Carpenter Shop, Paint Shop and Storehouse

The machine shop is a single room 140 ft. x 165 ft. 10½ in. It has 10 tracks for the transfer pit, extending back from the entrance a distance of 85 ft. Dividing this shop from the machine shop is a 17-in. brick fire wall, which has two 10-ft. openings, one being equipped with a rolling steel door.

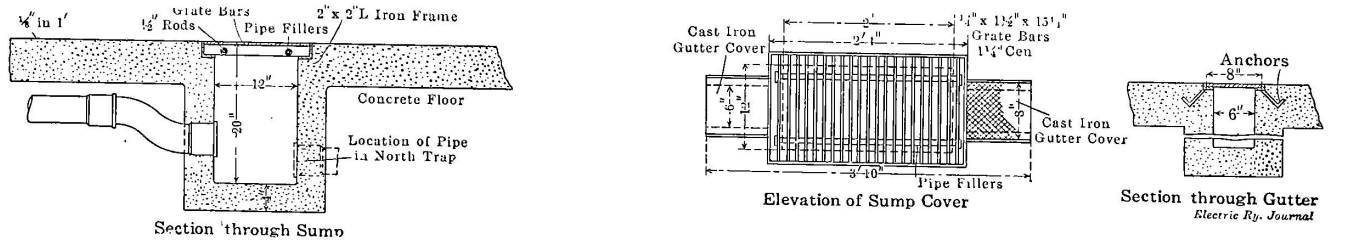
ing back a distance of 85 ft. from the entrances, with the exception of the one on the west end, which runs within 15 ft. of the rear wall. Nine of these tracks are provided with pits 75 ft. in length, eight of which have, midway between their ends, a 32-ft. car hoist. The hoisting members of the latter consist of

In the southeast corner of the machine shop is partitioned off a tool room 32 ft. long x 15 ft. 6 in. wide, an office for the master mechanic being located directly over. The entire southern side of the machine shop will be utilized for machine tools and machining operations.



Salt Lake Shops—Plan of Sand House

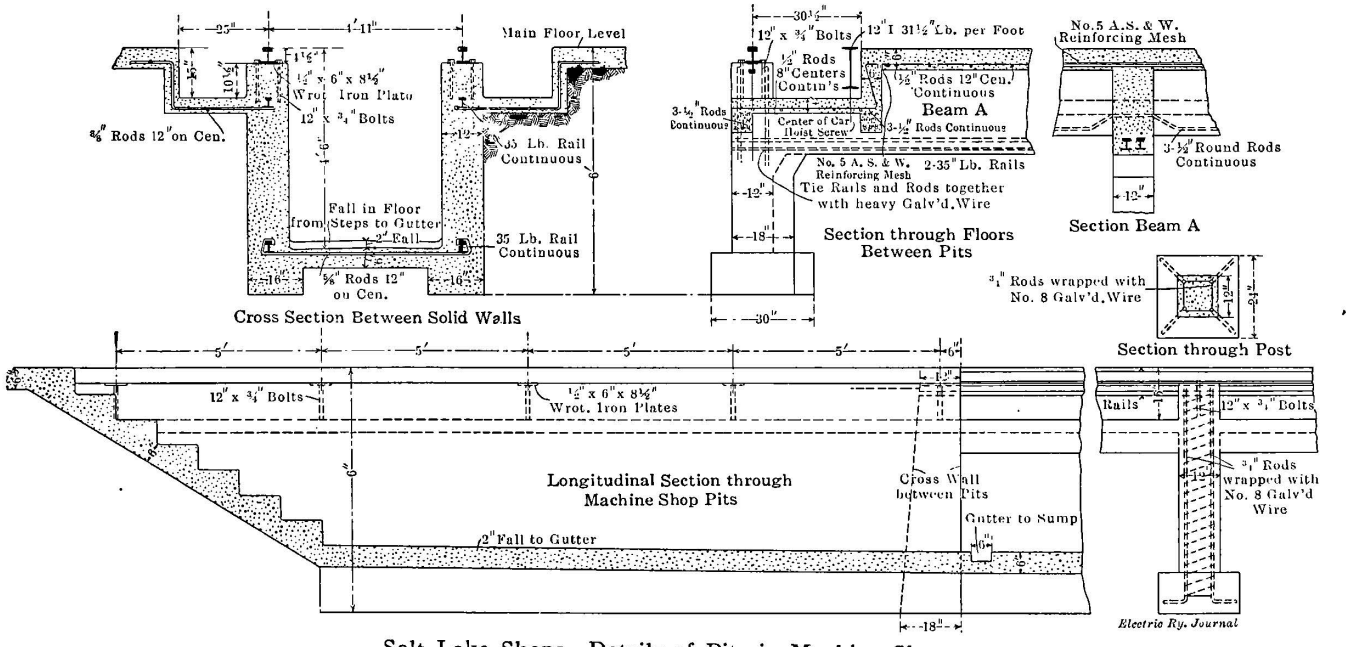
12-in. I-beams, 31½ lb. per foot, spaced 9 ft. 6 in. center to center. For the length of the hoists the space between pits is open, supports for the hoists being provided by 12-in. x 18-in.



Salt Lake Shops—Details of Pits in Machine Shops

ARCHITECTURE

As in the case of the car house, the shop buildings are designed in the California Spanish Mission style. Red pressed brick is used for the exterior with concrete lintels, sills and copings. The roofs are of 3-in. concrete slab covered with magnesia roofing, and are supported on steel trusses, which



Salt Lake Shops—Details of Pits in Machine Shop

the tracks the pits are 21 in. wide x 15 in. deep. The floors of the pits drain to 6-in. gutters, which lead into a sump and sewer. A 6-in. concrete floor covers the entire machine shop.

divide the buildings into longitudinal bays, two in the case of the carpenter shop and three in the machine shop. In each building a clear height under the roof trusses of 19 ft. 8 in. is

provided. Special attention has been given in the case of the shops, as in the car house, to keeping the insurance risk down by providing fire walls, iron stairs, concrete floors and roofs, Kinnear steel rolling doors for all openings, metal lockers for the workmen, etc. The buildings are all heated from a central boiler house by means of a hot-water system built according to designs of Jesse C. Coogan, Milwaukee.

The company's monogram, cast in concrete, 6 ft. x 6 ft. in size, is set in the end walls of the buildings, adding to the general decorative treatment.

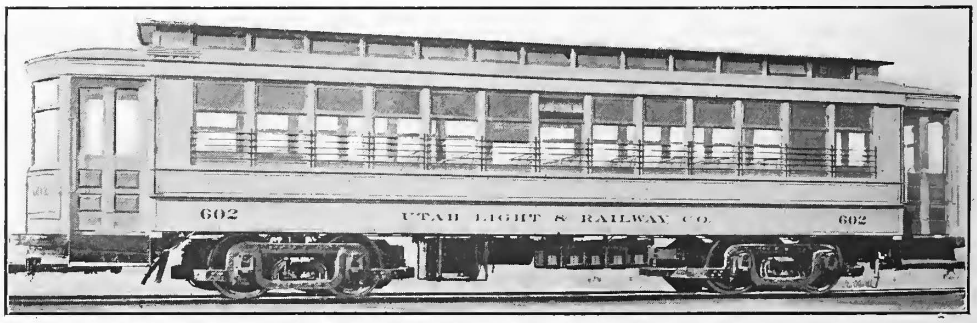
SAND HOUSE

Since the original plans for the car shops were drawn a very important addition has been made, consisting of a sand house, that is now nearing completion. This is located in a building by itself 55 ft. 6 in. long x 38 ft. 9 in. wide, located east of the machine shop and convenient to the car house. Fresh sand will be received at one end of the building in a 9-ft. x 20-ft. bin, from which it will be carried by means of a bucket elevator to two 8-in. half-round iron pipes that discharge into two 5-ft. diameter sand dryers located in the drying room. From the dryers the sand is fed by hand into a hopper and is taken by means of another bucket elevator to a chute which discharges into a revolving screen in the top of a 14-ft. x 18-ft. closed screened sand bin.

The revolving screen discharges the screenings onto a chute, from which they drop into a separate bin whence they can be removed outside the buildings by means of another chute A maximum height of 12 ft. is provided for the screened sand, so that a capacity of over 3000 cu. ft. is thus obtained. Sand is drawn from the bin by means of four chutes and is sacked and stored until needed. The storage for sacked sand will take care of over 6000 cu. ft.

CARS FOR THE UTAH LIGHT & RAILWAY COMPANY, SALT LAKE CITY, UTAH

The St. Louis Car Company has just shipped to the Utah Light & Railway, Salt Lake City, 12 cars of its semi-convertible type, in which both sash enter the roof. These cars are 34 ft. 4½ in. over the corner posts, the length of the platform inside is 4 ft. 6 in. and the length of the car over bumpers is 45 ft. 4½ in. The width over the side posts is 8 ft. 4 in. and the width over all 8 ft. 6 in.



Vestibuled Car for Utah Light & Railway, Salt Lake City, Utah

The side sills consist of long leaf yellow pine plated on the inside with ⅜-in. x 14-in. steel plate for the entire length with yellow pine subsills; the whole is thoroughly bolted together. The center sills are 5-in. x 9¾-lb. steel I-beams, with yellow pine fillers on each side. The end sills are of oak, 5 in. x 10 in., plated on the inside with ½-in. x 9-in. steel plates; the intermediate cross frame and bracing are of yellow pine, angles and flat steel.

The cross framing between the center sills consists of cast-iron blocks with a hole in the center to permit the passage of electric cables and air pipes from end to end of car body. The lower floor is of 13-16-in. tongued and grooved flat yellow pine laid lengthwise, while the top floor is of 13-16-in. tongued and grooved vertical-grained yellow pine laid crosswise under the seats. In the aisles inside on the top floor the floor mats are of removable hard maple laid lengthwise.

The platforms are supported by four knees at each end of car, the larger outside knee being a 7-in. 12¼-lb. steel channel bent in shape and extending from the buffer to the bolster along the side sills. This knee is reinforced with 1-in. x 6-in. steel plate forged to shape and riveted to the inside of the channel. The center knees consist of railroad T-rail which weighs 45 lb. per yard and extends from the buffer to a point 4 ft. ¾ in. back of the bolster.

The panels are of the concave-convex type. The cars have 13 windows per side, two at each end, and double sliding doors in the bulkhead. The interior finish is of cherry. The metal trimmings throughout are of bronze highly polished and lacquered and are of the car builder's standard pattern. The cars are further equipped with four illuminated signs and walk-over seats upholstered in rattan and furnished with a top rail. The signs and seats are also of St. Louis manufacture. Besides the vestibule doors, there are four channel iron folding gates per car.