



One of the New Southern Belle Aluminum Streamliners

K. C. S.-L. & A. Streamliner "Southern Belle"

Eleven new aluminum-alloy railroad cars and two Pullmans are used in three four-car Diesel-driven trains

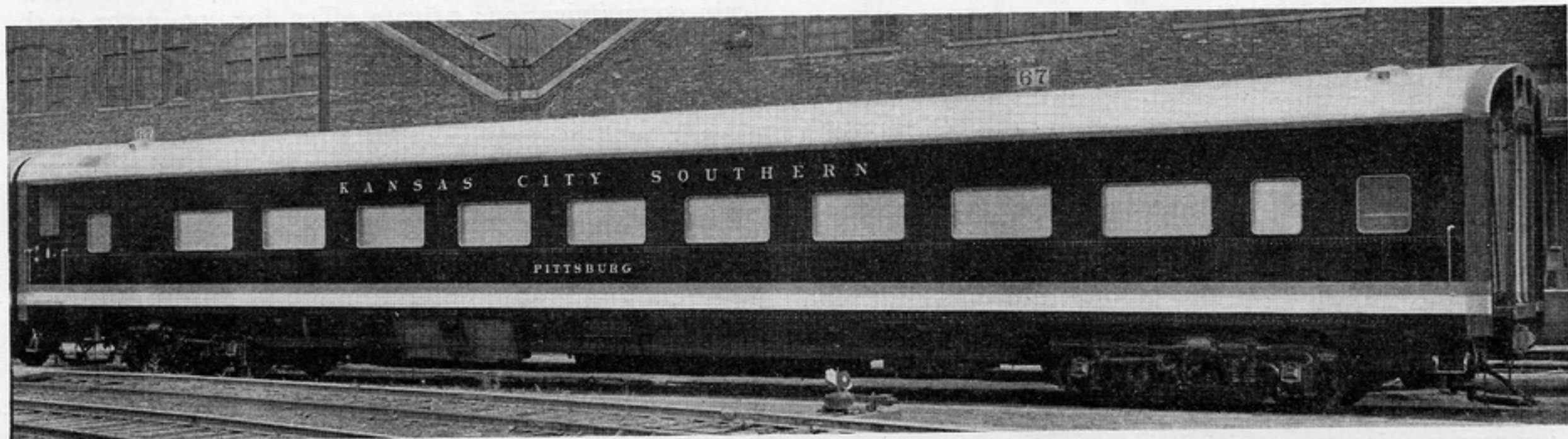
THE new four-car passenger streamliner Southern Belle of the Kansas City Southern-Louisiana & Arkansas Lines was placed in operation between Kansas City, Mo., and New Orleans, La., on September 1. The schedule calls for 25 stops in the 868-mile run between terminals, the overall running time being 21½ hr. and the average speed slightly over 40 miles an hour.

To maintain daily schedules in each direction, three Southern Belle trains are required. Each train consists of a Diesel-electric locomotive, a mail-baggage car, a chair car, a Pullman sleeper, and an observation-parlor-diner car. The single-unit 2,000-hp. locomotives were furnished by the Electro-Motive Corporation. The cars for each train were designed and built by the Pullman-Standard Car Manufacturing Company, strong alumi-

num alloy being used as the principal structural material to secure a high strength-weight ratio. Individual car dimensions, weights and seating capacities are given in one of the tables.

Streamline Design

Both the exterior and interior of the Southern Belle were designed by Pullman-Standard stylists in close cooperation with Harvey Couch, chairman of the board of the K. C. S.-L. & A. The exterior design presents the latest refinements in structural streamlining, accented by the use of a striking and unusual color scheme. The front end of the Diesel-electric locomotive uses vivid red and yellow for visibility, in contrast to the dark



Individual Cars Are Featured by Straight and Smooth Car Sides, Wide Windows and Brilliant Color Treatment



Furnishings and Decorative Treatment in the Observation Room

green background. The red and yellow are carried in sweeping curves, giving an impression of speed and power, and adding materially to the streamline effect.

The cars have aluminum-colored roofs, with the car bodies in dark green, and carry at the girder sheet a wide yellow stripe with a wide vivid red stripe placed just above. These striping colors are carried in uninterrupted lines from the locomotive, giving the effect of continuity to the train, and by this use of color making

Principal Dimensions and Weights of "Southern Belle" Aluminum-Alloy Cars

	Mail— Baggage	Chair Car	Observation— Parlor— Diner
Length over buffers, ft.....	84½	84½	84½
Width over side posts, ft.....	10	10	10
Roof height above rails, ft.....	13½	13½	13½
Truck centers, ft.....	59½	59½	59½
Truck wheel base, ft.....	9	9	9
Journal size (roller bearings), in....	5½ by 10 (all cars)		
Seating capacity	74	41
Weights, lb.:			
Body light weight	58,900	66,750	67,750
Truck weight (2)	37,300	38,000	38,000
Total light weight	96,200	104,750	105,750
Water, ice, provisions, etc.....	2,000	2,000	6,500
Weight ready for service	98,200	106,750	112,250

a striking and complete unit of the train in its entirety. The aluminum of the roof is separated from the dark green of the car body by a narrow red stripe, and the exterior lettering on the train is in imitation gold color.

The interior design of the passenger cars creates an impression of extreme simplicity, coupled with efficiency and good taste in selecting materials and decorations.

Special features of the car equipment include Pullman electro-mechanical air conditioning; large wash rooms and luggage compartment at each end of the chair car, allowing a more advantageous spacing of seats; a day room and secretary's room in the observation-lounge-diner car for convenience of passengers and crew; a settee on one side of the aisle and seats with table on the other in the front part of the chair car for convenience and comfort of passengers; photo-murals in the observation-lounge-diner car and chair cars showing scenes along the route; master radio with speakers in all parts of the train, each speaker equipped with variable volume control; telephone connection for use with regular Bell system during stops along the line; large clock in observation-lounge-diner cars and chair cars; telephone connection between all cars and the locomotive for inter-train communication; private office for conductor at the front of each chair car equipped with desk, cabinet for papers, telephone for communication with engineman and other cars; wash room, including shower bath, for crew in mail-baggage car.

Observation-Lounge-Diner

The observation-lounge-dining car is divided into six main sections, from front to rear: two day rooms, 10 ft. 7 in.; lunch room, 7 ft.; kitchen, 11 ft. 4 in.; dining room, 12½ ft., seating 16; parlor, 17½ ft., seating 17; and observation room, 11½ ft., seating 8.

The observation end is semi-oval with large glass windows to permit wide-angle vision. It contains a built-in circular sofa and four chairs. The chairs have satin-

finish tubular aluminum frames; two are upholstered in jade green seat covering, while the other two and the sofa have contrasting coral fabric upholstery. A circular table, with a top of tan linen-finish Formica with coral inlaid lines, in front of the sofa, permits the easy serving of refreshments in this section of the car. Above the curved door at the rear of the observation room is a radio speaker with volume control. The section is separated from the rest of the car by a full-height partition and sliding door.

The color scheme in the observation section is green. The floor covering through the entire car consists of a heavy raisin-color, two-tone leaf design carpet, laid over a thick rubber floor pad. The baseboard is dark green, with the walls of a medium green, and the ceiling of an even lighter green. A coral-color band is applied on the ceiling at the lighting fixtures, while the molding and trim in this section are of satin-finish aluminum.

A low partition separating the lounge section from the dining section of the car imparts to these sections a feeling of greater length than would otherwise be obtained. This same feeling is accentuated in the color scheme. The baseboards are dark blue, while the walls are medium blue, and the ceilings a lighter shade of blue. The moldings are of satin-finish aluminum, as are the indirect lighting trough and all exposed metal trim. Photo-murals are on all full-length partitions.

The lounge compartment contains soft, roomy chairs and sofas, and a writing desk, mail box, magazine table, and other conveniences. Like the chairs in the observation room, the chairs and sofas have satin-finish tubular aluminum frames; two of the sofas are upholstered in Tacoma blue plush, while a third sofa and one chair have a rich coral textured material for covering.

Set apart from the lounge section by a low partition are two fixed tables with linen-finish Formica tops, and each seating four passengers in fixed cross double seats, upholstered in a Tacoma blue fabric. These seats are designed for the use of parlor-car passengers as well as to accommodate any overflow from the dining section.

The dining section is designed to serve all meals on route. Four fixed tables, each accommodating four passengers, form this section. The chairs are tubular aluminum, with rubber backs and coral-colored fabric seats. The tops of the tables in the dining section are similar to those of the fixed tables in the parlor section.

Ahead of the dining section is the kitchen, with all modern equipment for the preparation of refreshments and food for the diner and lunch-room sections. Opening immediately on the kitchen is a lunch counter for the accommodation of coach passengers, where inexpensive meals are served.

In front of the lunch room are two day rooms, one equipped with studio couch, locker, folding washstand, and table luggage rack; and the other with a secretary's desk, chair, locker, washstand, wardrobe, and luggage rack. In the secretary's room is the master radio set that serves all the cars. A loud speaker with variable volume control is in the other day room. A folding partition separates the two rooms.

At the front end of the car is a washroom, and across the aisle from it is a large luggage compartment and clothes lockers.

Venetian blinds with aluminum slats, painted a light tan, are applied to all windows in the observation as well as the parlor and dining sections. The day rooms have curtains of Pantasote. The three observation cars serv-

In the Parlor Section of One of the Observation Cars





Interior of One of the Chair Cars

ing the Southern Belle are named "Kansas City," "Shreveport," and "New Orleans."

Chair-Car Design

Many details designed to increase the comfort and convenience of the passengers have been incorporated in the chair cars which are named "Pittsburg," "Joplin," "Texarkana," "Alexandria," and "Baton Rouge." The seating capacity of each chair car is 74, 56 in the 48-ft. white compartment and 18 in the 17-ft. colored compartment.

Each end of the car has a large washroom for men and one for women. At the front of the car, just back of the washroom, is a private office for the train conductor, equipped with desk, pigeon holes for papers, telephone for inter-train communication, and folding seat.

Just behind the partition separating the white and colored compartments are a table and two seats on one side of the aisle, and a semi-oval settee on the other.

The seats, upholstered in blue fabric, are of the twin revolving type with adjustable backs, each seat being equipped with a foot rest. The seat cushions are of rubber, the back of spring construction. There is an individual ash tray on the back of each seat.

Pantasote window curtains, with blue and tan horizontal stripes, are used in the chair cars. Individual reading lights for each seat, with dim blue night lights, lend a further note of individuality.

There are wide luggage racks in natural aluminum finish running the length of the car to provide ample storage space for passengers' luggage. In addition, there is a luggage compartment at the end of the coach.

A bulletin board in the chair car is placed where passengers can easily read the news items and notices that will be placed there. There is also a mail box for the convenience of the passengers; the train crew will see that all mail placed in it receives the earliest possible attention.

Electrically operated water coolers in each end of the car furnish a supply of cold water at all times.

In the partition at the rear of the chair car is a loud speaker connected with the master radio and equipped with volume control. A large clock is placed in the partition at the front of the car, in such a position that it may be seen from any seat. The inclusion of a clock is an innovation in train service in the territory of the Southern Belle.

In the wall beside each seat is a rack into which a portable linoleum-topped table can be fixed. The tables will be stored in a compartment at the rear of the car and set up as requested by the passengers.

The base color of the chair car on the inside is brown. The wainscoting and upper frieze panels are yellow, while the bulkhead panels at pier-panel height and the piers are blue. The ceiling is a light yellow. The interior of the vestibules is painted light blue. Both the vestibules and car proper have a dark blue marbled linoleum floor covering.

Mail-Baggage Cars

The mail-baggage car is designed especially for the maximum comfort and convenience of trainmen and includes, among other outstanding features, a shower in the washroom; a bell in the mail room operated by the engineman in the cab to notify mail clerks of the approach of stations; a folding desk in the baggage room, with telephone connection to the locomotive and other cars for inter-train communication.

The baggage-express compartment in the front half of the car is 38 ft. 4 in. long. A partition with a low creep door separates it from the 30-ft. mail compartment, which is equipped with Railway Mail Service racks, compartments, etc., for working mail while the train is enroute. At the front of the mail compartment, on one side, are a steam cooker and a water cooler, while across the aisle is a wardrobe. Large glass windows, reinforced with built-in screen wire, give ample light, and large ventilators on the roof supply plenty of fresh air.

A 9-ft. 9 $\frac{3}{4}$ -in. section at the rear of the car is designed to supply comfortable sleeping and toilet accommodations for the crew.

Pullman Sleeper

One sleeping car is operated in the southbound train from Shreveport to New Orleans, and another sleeper in the northbound train from New Orleans to Shreveport. The sleeping cars, "Sulphur Springs" and "Siloam Springs," are of the ten-section, three-double-bedroom floor plan.

The interiors of the Pullman cars are characterized by simplicity of line and coolness of color. The open portions of the cars have a light blue-gray ceiling, walls of a medium blue, and wainscoting in a deep hue of bluish gray. The upholstery of the section seats carries out this color plan, the material being horizontally striped blue. Contrast is found in the carpeting which features a sienna-colored leaf pattern.

The women's lavatory follows generally the color treatment in the sections. The walls and upholstery are in blue, and the flooring is marbled rubber tile. The men's room has identical tile flooring. The walls are painted a neutral tan, and the upholstery is of light brown leather.

The two vestibules in general blend with the interior. Blue is the predominant color, the ceiling having a light shade, the walls a medium, and the end doors a dark blue. Door handles and other metal parts are finished

in satin-finished chromium plate. Rubber tiling like that used in the lavatories makes a colorful floor covering.

Lighting

The chair cars have individually controlled lights placed on the lower side of the basket racks, one light to each seat. In addition to this, and for general illumination, center lights are used at the ceiling and, by a unique lens system, are so designed to focus the light on the aisle only. These lights are glareless to the passengers,

The general type of underframe consists of two main center sills of 12-in. aluminum-alloy channels, reinforced with 5/8-in. aluminum-alloy bottom plate. These center sills extend from bolster to bolster. The bolsters and end construction are welded alloy steel. Floor stringers, false floor and main floor consist of aluminum alloys. The main floor is Pullman arch construction, with Fiberglas insulation, lightweight composition flooring. Linoleum is applied in the chair cars and carpet in the observation-parlor-diner. All threshold plates in all cars are made of cast aluminum, with special anti-skid surface.

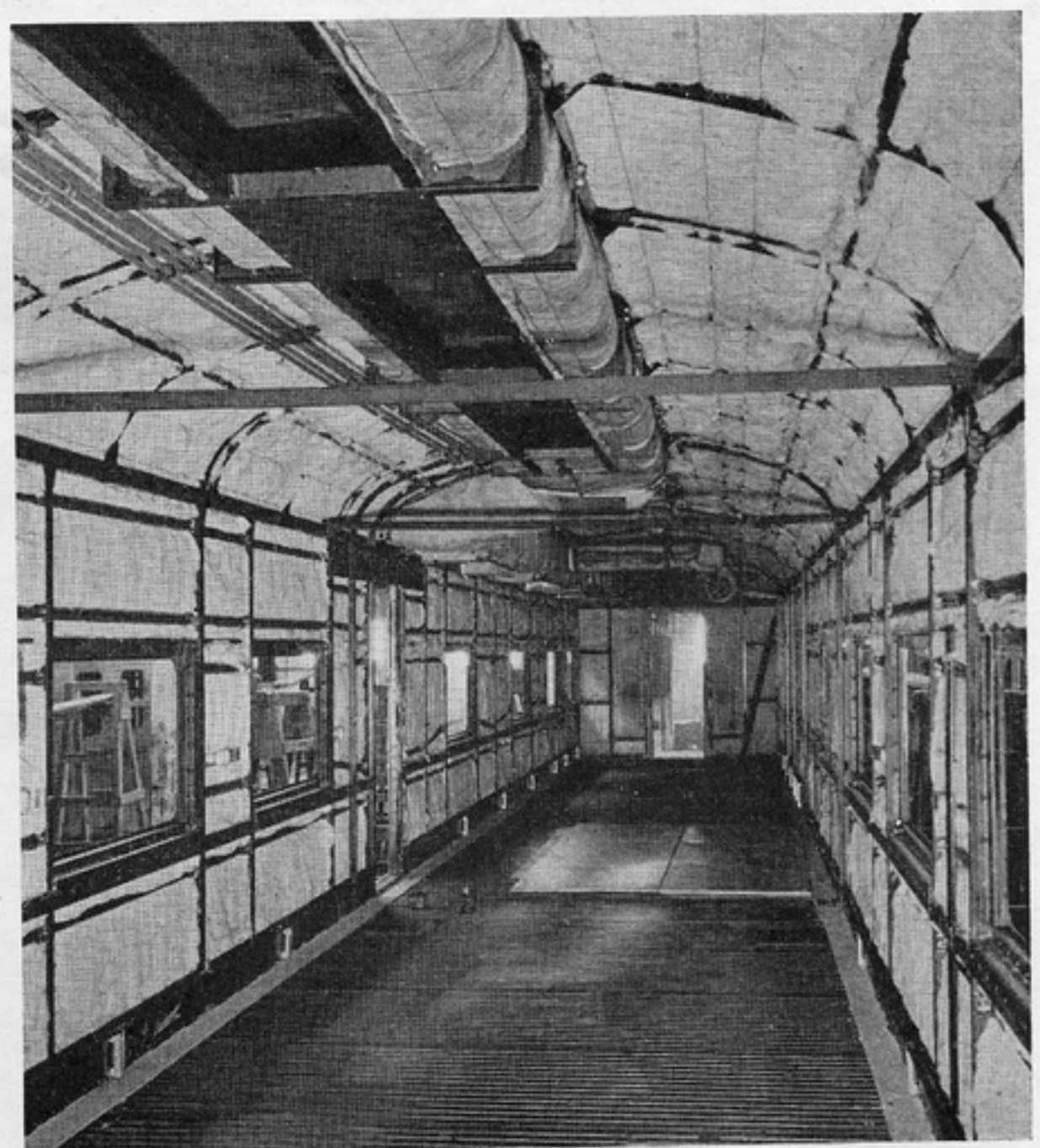
The side framing is of the self-supporting type, riveted-girder design, of aluminum-alloy sheets and shapes, with skirts below the side sills separately applied. The vestibule construction for the wide and dummy-type vestibules also is made of aluminum alloys. The turtle-back type of roof is continuous from end to end of the cars, without hoods, except the rear end of the observation-parlor-diner cars, which have a sloping hood to conform to the streamline shape of the train.

The cars are completely insulated with Fiberglas insulation, held in place with aluminum bands. All safety appliances have been provided to meet Interstate Commerce Commission requirements for these types of cars.

The draft gear, buffing device, and drawbars are of the A. A. R. tight-lock type, with integral yoke, designed to absorb lost motion and provide easy starting and stopping characteristics without jerk or jar. The vestibule side doors, of the Pullman pivoted-type, operating in conjunction with trap doors, are arranged to close up and hide the steps when the doors are shut. All steps have aluminum cast surfaces with non-skid feature. Cars are provided with complete rubber closures at the vestibules so as to give the smooth, continuous side effect desired for streamlining. Diaphragm faces are covered with carpet for sound deadening, and all contacting surfaces are insulated to prevent noise.

All interior finish, partitions, bulkheads, sliding or swinging doors, have been insulated or equipped with

How Insulating Materials Are Applied to the Car Interior



Schedule of "Southern Belle", Effective September 1, 1940

Southbound No. 1			Northbound No. 2	
Lv. 10:00 a. m.		Kansas City, Mo.	Ar. 7:20 p. m.	
Lv. 12:13 p. m.		Pittsburg, Kan.	Lv. 5:07 p. m.	
Lv. 12:48 p. m.		Jopkin, Mo.	Lv. 4:33 p. m.	
Lv. 1:18 p. m.		Neosho, Mo.	Lv. 4:02 p. m.	
Lv. 2:28 p. m.		Siloam Springs, Ark.	Lv. 2:49 p. m.	
Lv. 2:38 p. m.		Watts, Okla.	Lv. 2:38 p. m.	
Lv. 3:47 p. m.		Sallisaw, Okla.	Lv. 1:35 p. m.	
Lv. 4:13 p. m.		Spiro, Okla.	Lv. 1:11 p. m.	
Lv. 4:39 p. m.		Howe, Okla.	Lv. 12:40 p. m.	
Lv. 4:47 p. m.		Heavener, Okla.	Lv. 12:31 p. m.	
Lv. 5:45 p. m.		Mena, Ark.	Lv. 11:38 a. m.	
Lv. 6:45 p. m.		DeQueen, Ark.	Lv. 10:28 a. m.	
f Lv. 7:45 p. m.		Ashdown, Ark.	f Lv. 9:42 a. m.	
Lv. 8:25 p. m.		Texarkana, Ark.	Lv. 9:15 a. m.	
f Lv. 9:07 p. m.		Rodessa, La.	f Lv. 8:22 a. m.	
f Lv. 9:17 p. m.		Vivian, La.	f Lv. 8:13 a. m.	
Ar. 10:05 p. m.		Shreveport, La.	Lv. 7:30 a. m.	
Lv. 11:00 p. m.		Shreveport, La.	Ar. 6:50 a. m.	
Lv. 12:22 a. m.		Coushatta, La.	Lv. 5:30 a. m.	
Lv. 12:58 a. m.		Clarence, La.	Lv. 4:55 a. m.	
Lv. 1:42 a. m.		Colfax, La.	Lv. 4:05 a. m.	
Lv. 2:30 a. m.		Alexandria, La.	Lv. 3:25 a. m.	
Lv. 3:16 a. m.		Mansura, La.	Lv. 2:40 a. m.	
Lv. 6:00 a. m.		Baton Rouge, La.	Lv. 12:01 a. m.	
Lv. —		Gonzales, La.	Lv. 11:36 p. m.	
Lv. 7:22 a. m.		Carrollton Ave., La.	Lv. 10:38 p. m.	
Ar. 7:30 a. m.		New Orleans, La.	Lv. 10:30 p. m.	

even though the passengers may be in reclining positions. Blue night lights are also provided to give further distinction to the lighting system.

The same general type of controlled-lens lighting is used in the vestibules, passageways, lunch room and day rooms, and in the observation room. In the lunch room and observation room these lensed ceiling units are arranged in a pattern to follow the room contour of the observation end and the lunch counter contour in the lunch room, and are further accented by satin-finish snap moldings placed on either side, with a distinctive color band in the central portion.

The dining room and lunch room, in addition to the lensed center lighting, have continuous side lighting running from bulkhead to bulkhead, placed just over the windows on either side of the room. This gives a very decorative effect because the light is directed up to the ceiling and down to the dining tables and lounge furniture through translucent plastics. To add further to the appearance, strips of the same plastic material are inserted in the front of the fixture, thus creating luminous lines running the length of the unit.

Construction Details

The 11 railroad-owned cars, consisting of 3 mail-and-baggage cars, 5 chair cars and 3 observation-parlor-diner cars, embody the same general structural design and are made of fabricated aluminum alloys, except for the draft sills, bolsters, end sills, and cross ties, draft lugs and diaphragm post reinforcements, which are of alloy steel. The shell weight of one of the coaches, as determined by track scales, was only 20,113 lb. The car structure is designed to comply with the present requirements of the Association of American Railroads for new passenger cars, including resistance to minimum static end load of 800,000 lb. applied on the center line of draft. The cars are of riveted construction, all exposed rivets being aluminum with mushroom-type heads.

anti-squeak tapes to eliminate interior noise. Parcel racks, lighting fixtures and decorative molding are aluminum natural finish.

Trucks

Four-wheel trucks are used on all cars. The trucks are the single drop-equalizer, swing-motion type, with alloy-cast-steel frames of which the pedestals are cast integral. Both equalizer and bolster springs are helical coil design of alloy steel. Vertical motion is controlled by shock absorbers, and truck bolsters are restrained

Partial List of Materials and Equipment on the New "Southern Belle" Aluminum Alloy Cars

Aluminum-alloy sheets and shapes....	Aluminum Co. of America, Pittsburgh, Pa.
Truck castings and pedestal liners....	General Steel Castings Corporation, Granite City, Ill.
Roller-bearing wheel unit; Simplex clasp brakes	American Steel Foundries, Chicago
36-in. steel wheels	Edgewater Steel Co., Pittsburgh, Pa.
Side bearings	Standard Equipment Company, Chicago
Pivoted steps, trap doors, exhaust ventilators, hoppers, journal boxes and electro-mechanical air-conditioning system	Pullman-Standard Car Mfg. Co., Chicago
Tight-lock couplers	National Malleable & Steel Castings Company, Cleveland, Ohio
Combined draft gear and buffer	Waugh Equipment Company, New York
Heating equipment, air-conditioning controls	Vapor Car Heating Company, Chicago
Car axle gear drive	Supergear Drive Corporation, Chicago
Air brakes	Westinghouse Air Brake Co., Wilmerding, Pa.
Telephones	Automatic Electric Company, Chicago
Lighting fixtures	Luminator Company, Chicago
Car batteries	Safety Car Heating & Lighting Co., New Haven, Conn.
Coach seats (4 cars)	Electric Storage Battery Company, Philadelphia, Pa.
Coach seats (1 car), magazine table and writing desk	Heywood-Wakefield Co., Gardner, Mass.
Observation car seats and chairs	Karpen Bros., Chicago
Coach-seat upholstery	General Fireproofing Co., Youngstown, Ohio
Observation-car seating covering	L. C. Chase & Co., New York
Fiberglas car insulation	Collins & Aikman Corporation, New York
Stonefelt air-duct insulation	Gustin-Bacon Mfg. Co., Kansas City, Mo.
Self-tapping screws	Johns-Manville Sales Corp., New York
	Parker-Kalon Corporation, New York

Defect-car holders	Railway Devices Company, St. Louis, Mo.
Composition floor covering	Tuco Products Corporation, New York
Presdwood inside finish	Masonite Corporation, Chicago
Outer diaphragms between cars	United States Rubber Company, New York
Window cappings	Caf-O-Lite Company, Muskegon, Mich.
Curtain material	Pantasote Company, Inc., New York
Plymetl partitions and doors	Haskelite Mfg. Corp., Chicago
Baggage-car window sash, basket racks and washstands	Adams & Westlake Co., Elkhart, Ind.
Coach and observation-car sash	Hunter Sash Company, Inc., Flushing, N. Y.
Mail room hoppers	The Duner Company, Chicago
Water coolers, radio and public address equipment	General Electric Company, Schenectady, N. Y.
Push-pull end door locks	Dayton Mfg. Company, Dayton, Ohio
Carpet	Bigelow-Sanford Carpet Company, New York
Linoleum floor covering	Armstrong Cork Company, Lancaster, Pa.
Marbleized counter top	Midgely & Borrowdale, Chicago
Venetian blinds	H. B. Dodge Company, Chicago
Window glass	Libbey-Owens-Ford Glass Company, Toledo, Ohio
Paint	Pittsburgh Plate Glass Company, Milwaukee, Wis.

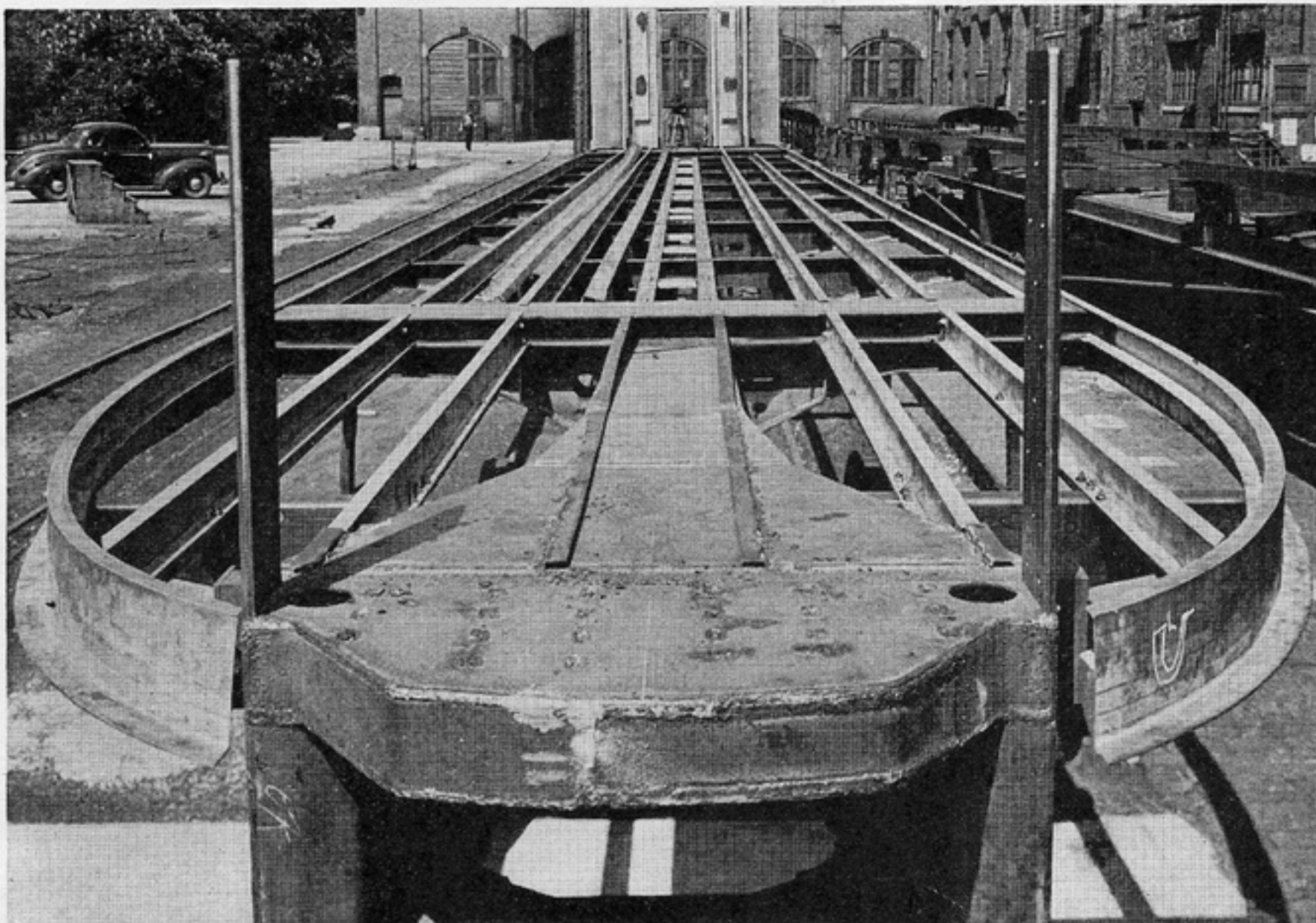
longitudinally by the rubber-cushioned bolster anchor rods. Lateral sway is controlled by the stabilizer arrangement which replaces the conventional spring plank. A. S. F. roller-bearing wheel units are installed using SKF roller bearings. Clasp brakes are of the Simplex Unit-Cylinder type.

Sound-deadening materials are used at bolster springs, truck center plates and body side bearings to isolate truck noises completely from the car body. Sound-deadening materials are also used at moving parts of coupler and face-plate mechanism.

Locomotives

The Diesel-electric locomotives, with a rating of 2,000 hp. each, are capable of a top speed of 117 miles an hour, but are designed in general to cover fast schedules with low rather than the high maximum speeds. This performance is made possible by the ability of the locomotives to accelerate and decelerate quickly, maintain speed on grades, take curves fast with safety because of their low center of gravity, and because frequent changes of

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An Observation-Car Underframe in Process of Construction

so designed that it could be moved along to keep pace with the dismantling work. It was 13 ft. long, measured parallel with the center line of the bridge, and embodied a support at each end by means of which it was hung from the top flanges of the two plate girders of the old bridge.

In each of these supports an 8-in. by 16-in. timber was placed transversely across the tops of the girders, this timber being of sufficient length to overhang the latter members at each end. Inserted through each end of the transverse members were two 1 $\frac{3}{4}$ -in. steel rods, each of which was threaded at both ends. The rods in each of the transverse beams were provided with take-up nuts at their upper ends and served as hangers for an 18-in. wide-flange beam placed transversely under the girders in the plane of the timber beam. The lower ends of the hanger rods extended through both the upper and lower flanges of the wide-flange beams and were provided with hexagonal nuts, there being three nuts to each rod, one above and two below the lower flange of the beam. The nuts were placed in the rods on the top sides of the lower flanges to prevent the rods from slipping down and fouling the wires. To provide a working platform, 2-in. planks were laid between the lower flanges of the two wide-flange beams.

To supplement the hanger bolts, a $\frac{7}{8}$ -in. steel cable, fitted with turnbuckles, was looped around each overhanging end of the 8-in. by 16-in. transverse timbers and the corresponding wide-flange beam. Also the supporting structure for the platform was stiffened by three 1-in. steel rods, enclosed in 3-in. pipe sleeves, extending between the transverse timber beams, and by 1-in. rods extending between the wide-flange beams. In addition, sway bracing was provided in the form of two 4-in. by 4-in. by $\frac{1}{2}$ -in. angles placed diagonally between the hanger rods on each side of the platform. To facilitate the work of shifting the platform, a skid board was placed on the top flange of each of the plate girders.

The movable platform was assembled between the pier and the abutment at the north end of the bridge, and was moved out over the tracks, being shifted forward by successive steps as the work of demolishing the deck proceeded toward the south end of the structure. As a means of stabilizing the platform while the demolition work was under way, wooden shims were driven between the lower flanges of the plate girders and the top flange of the 18-in. beam at each corner of the structure. In removing the old deck, all the floor beams were cut out except one near each end, these being left in place to hold the girders in position while they, in turn, were being dismantled.

Removing the Old Girders

Another interesting aspect of this project was the manner in which the old plate girders were dismantled. Here again it was necessary to safeguard the catenary wires, and to this end a special procedure was devised for dismantling those portions of the girders that were situated directly over the tracks. In this work holes were burned in the webs of the girders at about 8-ft. intervals and needle beams, consisting of 8-in. by 16-in. timbers, were inserted in these holes. To provide support for the blocking that was provided under the ends of the needle beams, a steel beam, spanning between the new concrete piers, was placed on each side of the girder.

With the girders supported in the manner described above, it was possible to dismantle them piecemeal by cutting them into relatively small sections with oxy-acetylene torches, the sections being loaded into trucks by a crawler-mounted crane operating from the completed portion of the new bridge. The upper portion of

each girder was removed first, the horizontal cut being made on a line slightly above the mid-point in the height of the girder. Above this line the member was cut into sections about 16-ft. long, but when the lower portions were removed they were cut into 8-ft. sections. Before the cutting of each section was commenced, the crane hook was attached to that particular section and the line tightened. After the old girders had been removed the remaining portion of the new bridge was constructed.

As mentioned previously, the new bridge at Tonnele avenue was designed by the railroad, under the general direction of G. A. Phillips, chief engineer, and under the direct supervision of J. L. Vogel, engineer of structures, and Meyer Hirschthal, concrete engineer. It was constructed under the supervision of the New Jersey State Highway department, of which Morris Goodkind is bridge engineer. J. P. Burns, Dumont, N. J., was the contractor on the project. E. Knudson was the engineer in charge of the work for the contractor.

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locomotives are not necessary nor are frequent stops made for fuel and water. The locomotives have high initial tractive force which promotes fast and smooth train starting.

Provisions for the comfort of the engine crew include deeply upholstered, adjustable seats, the one on the engineman's side being so that the control levers are readily accessible. Special acoustical treatment insulates the cab from engine-room and outside noises, making it possible for the engineman and fireman to converse without appreciably raising their voices—another feature contributing to safety because of the greater ease in exchanging signal observations.

A Vapor-Clarkson automatic oil-burning boiler in the rear of the locomotive supplies steam heat for both the locomotive and passenger cars. Each locomotive carries 1,100 gal. of train-heating boiler water and 1,200 gal. of fuel. With a full supply of fuel, boiler water and sand, the total weight of each locomotive is slightly less than 300,000 lb. It is 71 ft. long, 14 ft. above the rail and about 10 ft. wide.

* * *



Here Is a Strange Station Combination. The Yonkers (N. Y.) Terminal of the New York Central's Putnam Division Is Located at the Third Story of the City's Leading Bank