

## THE SOUTHERN ROADS AND THE TERRITORY THEY SERVE.

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The United States owes to its railroads a great debt for the past development and union of its separated sections. Previous to 1850 the great West was as effectually separated from the East by topographic and geographical conditions as the North and the South were in 1865 by political conditions. The railroads reclaimed the West no less than the South.

The development of through railway traffic in the South was very much slower than in the country farther north. This was due partly to the fact that there was no large city on the eastern seacoast south of Baltimore, partly to the fact that the streams in the great interior basin generally flowed south, affording routes for getting produce to the seacoast unhindered by ice throughout the year, and partly to the fact that the streams draining the great interior basin had acquired such volume by the time they reached the southern part of the United States as to make their bridging very expensive by east and west railways.

Even to-day there are only two bridges spanning the Mississippi south of Saint Louis and none south of Memphis. The bridging of the streams in southern Alabama and Mississippi which was necessary before through lines could be operated between New Orleans and Atlanta, Louisville, Cincinnati and New York was a task calling for the best efforts of the engineers of the country, a task which could not be said to have been satisfactorily accomplished before about 1872.

During the civil war and for many a long year afterward railway development was very nearly at a standstill in the South. In 1860 30 per cent of the railway mileage of the country was in the southern states. In 1870 only 23 per cent of the railway mileage of the country was in the South. From 1860 to 1870 railway mileage increased 91 per cent in the rest of the country and only 35 per cent in the southern states. By the time that railway expansion began again the economies to be gained by consolidating separate lines into continuous systems had been pretty well demonstrated by the lines farther north.

The Illinois Central was the first exterior road to push its lines into the South. This road, extending from Chicago and the upper Mississippi to the mouth of the Ohio at Cairo, had been of great service to the northern armies in the transportation of its troops. Paralleling the Mississippi it had found that it could compete successfully with the river even for heavy traffic. In 1872 steps were taken to interchange traffic across the Ohio at Cairo with two roads which together extended from New Orleans to Jackson, Tenn., and on December 24, 1873, through traffic was opened all the way from Chicago, the metropolis of the West, to New Orleans, the metropolis of the South.

From the date of this peaceful invasion of southern territory by a northern road two changes were to be made in conditions which had hitherto materially affected the relations of the South with the rest of the country. One of these changes was to be regretted, perhaps, while the other was most propitious. The immense steamboat traffic on the Ohio and on the Mississippi, of which the South was justly proud, was to be curtailed in the same manner as had been the traffic on the Erie Canal; and there was to come a happy end to the narrow local prejudices which had so long surrounded so many southern communities.

About the same time the Louisville & Nashville, a rival system, began to extend its lines from the Ohio River through the South. It reached down to the Tennessee River in Alabama by acquiring the Nashville & Decatur

in 1872, and in the same year to the Alabama River at Montgomery by completing and controlling the South & North Alabama, which line was later to develop the wonderful coal and iron fields in the Birmingham district. It reached tidewater at Mobile in 1880 by acquiring the Mobile & Montgomery, and then in the same year joined the Illinois Central at New Orleans by absorbing the New Orleans & Mobile. By 1880 through lines of railway traffic and travel had been well established from New Orleans to Chicago via Memphis and Cairo; from New Orleans to the East via Birmingham, Cincinnati and Pittsburg by both the Louisville & Nashville and the Queen & Crescent Route over the famous Cincinnati Southern; by the Shenandoah Valley route via Montgomery, Atlanta, Chattanooga and the Blue Ridge mountains, and via the Piedmont Air Line through Montgomery, Atlanta, Charlotte, Greensboro, Danville and Washington.

Even in the South it is a long step both in time and in progress from the conditions of 1880 to those of 1905. Southern territory lies east of the Mississippi and south of the Ohio and Potomac. The principal systems which connect this territory with the gulf, the seaboard or the trunk line territory to the north and northeast, in one of which directions most of the traffic goes, are given below:

1. The Chesapeake & Ohio.
2. The Norfolk & Western.
3. The Southern Railway and its controlled lines: The Mobile & Ohio, the Cincinnati New Orleans & Texas Pacific and the Alabama Great Southern.
4. The Atlantic Coast Line.
5. The Seaboard Air Line.
6. The Louisville & Nashville, with its controlled line, the Nashville Chattanooga & St. Louis.
7. The Georgia Railroad, controlled jointly by the Atlantic Coast Line and the Louisville & Nashville.
8. The Central of Georgia.
9. The Illinois Central, with its controlled line, the Yazoo & Mississippi Valley.

The Mississippi River is a natural barrier to east and west traffic south of Memphis, and except for considerable traffic crossing at Memphis it has been such south of Saint Louis. Traffic between the great southwestern territory and the more densely populated districts of the central west and of the northeastern part of the United States naturally tends either to move along northeast and southwest lines through Memphis or Saint Louis or to seek salt water routes through Galveston or New Orleans. Partly through the influence of Saint Louis as the distributing point for the south central and southwestern territory and partly through the effect on traffic of the lower river most of such traffic has heretofore crossed at Saint Louis. Heretofore only one large system, the Frisco, operated its road across and beyond the Mississippi River south of Saint Louis, though this condition will probably not continue now that the great bridge over the Mississippi at Thebes, Ill., is completed. This bridge is located a short distance above the mouth of the Ohio. The Frisco system reaches down from Memphis southeast to the iron and coal regions of Birmingham. However, the Queen & Crescent Route operates a line of light traffic across the Mississippi at Vicksburg by means of car ferries, and cars are ferried over the river to meet connections at a few points. Both the Texas & Pacific and the Southern Pacific make their eastern connections at New Orleans by ferries.

The first two systems named above are frequently classed with the trunk lines, particularly the Chesapeake & Ohio. Both of these roads connect the Ohio Valley with the Atlantic seaboard. One of these roads has the most favorable gradients in crossing the Blue Ridge and Alleghany Mountains of any road from the Mohawk Valley in New York to central Alabama. The Erie Railroad has grades of 60 feet to the mile against eastbound trains; the Delaware Lackawanna & Western, 75; the Lehigh Valley, 62; the Baltimore & Ohio, 74, and the Pennsylvania, 62 feet. The Norfolk & Western has grades against east-

bound trains of 106 feet to the mile for a short distance, but the Chesapeake & Ohio has only 50 feet at present. This will ultimately be reduced to 30 feet. The eastern terminals of the two roads are in Virginia at the southern end of the Chesapeake Bay, at which point both roads have extensive docks for coaling ocean vessels. The mileage of the Chesapeake & Ohio increased from 1897 to 1905 15.1 per cent and its gross earnings 93.5 per cent. The mileage of the Norfolk & Western increased 16.8 per cent and its gross earnings 129 per cent in the same time. In 1905 the gross earnings of the former were \$12,350 per mile, and of the latter \$13,390.

The two lines above, though located in southern territory, do not engage in distinctive southern traffic except in so far as their traffic in coal and hardwood lumber may be so considered. The main lines of all the larger southern systems, with a single exception, which handle distinctive southern traffic, run north and south, or northeast and southwest, parallel to the seacoast and the Appalachian chain of mountains.

The exception referred to is the Central of Georgia. This system, like the Norfolk & Western and the Chesapeake & Ohio, operates on distinctive east and west lines. The road heads at Savannah and extends westward, with its lines lying almost entirely in Georgia and Alabama. The system comprises nearly 1,900 miles, 1,300 of which are in the former state. Its principal western termini are Chattanooga, Birmingham and Montgomery. It is one of the oldest systems in the South and is making rapid progress. Its gross earnings are small as yet, amounting in 1905 to about \$5,400 per mile. But while its mileage has increased less than 23 per cent from 1897 to 1905, its earnings have increased 92 per cent in the same time.

The names of the Seaboard Air Line and of the Atlantic Coast Line indicate the section of the country they occupy, which for the most part is the coast plain between the mountains and the Atlantic, though each of them has lines reaching westward to Montgomery, Ala. The two systems operate nearly 7,000 miles of road. Richmond, Va., is the northern terminus of each of them and they both extend southward as far as Tampa, Fla. Together they reach all of the more important cities in their territory, both on the coast and on the coast plain. The territory occupied by these roads is one of the oldest sections of the United States. When compared to the development being made in other parts of the South and of the United States, it must be apparent that the eastern coastal plain south of Richmond is pretty much at a standstill.

Lumber, fertilizers and agricultural products make up the bulk of the tonnage of these lines. The soil of the district is generally inferior and easily exhausted. Lumber is becoming scarce, though it now furnishes about 40 per cent of the tonnage of the coast line roads. Formerly a large per cent of the cotton raised in the South was grown in the territory served by these lines, but cotton so quickly exhausts the soil of the district that a fair yield cannot be maintained except by continual use of fertilizers. So this district cannot now compete in the production of this staple with the interior lands along the streams in Alabama, Mississippi and Louisiana and the Texas prairies. A good deal of the cotton grown on the interior lands is exported through the south Atlantic ports, and yet in the cotton season closing at the end of August of the present year only 1,927,000 bales were exported through the south Atlantic ports, while 5,242,000 were exported through the gulf ports.

With 72 per cent of the mileage of the Seaboard Air Line, the cotton tonnage of the Central of Georgia is 20 per cent in excess of that of the coast road. These roads

also serve the district that formerly produced nearly all the rice grown in the United States, but the seat of this industry also has moved westward. In 1900 Texas and Louisiana produced 60 per cent of the rice crop of the country, but in 1904 these states produced about 90 per cent of the crop. Very little mining is done in the district. Mine products make up only from 12 to 16 per cent of the tonnage on the Seaboard Air Line, while these products make up 18 to 19 per cent of the tonnage of the Central of Georgia, 41 per cent of the Southern's, and 71 per cent of the Norfolk & Western's.

These roads have, however, a valuable source of traffic that is rapidly increasing in the fruit and vegetables, game and fish, that the district produces for the eastern markets. This high grade traffic, coupled with their small proportion of low grade commodities, enables these roads to collect almost as high rates as the New England roads, the receipts per ton mile usually averaging between 1.1 and 1.3 cents.

In 1902 the Atlantic Coast Line secured control of the Louisville & Nashville, a system of much greater mileage than itself, a system serving a territory for which the outlook is very much better than its own, and a system whose gross earnings in the year 1902 were more than quadruple its own. The Atlantic Coast Line and the Louisville & Nashville connect at Montgomery and at a point in Northwest Florida. Through the Georgia Railroad, which they control, the two systems also connect at Atlanta.

President Hadley, writing in 1885 concerning the southern railroads, said:

In the states south of the Potomac and east of the Ohio (Mississippi) the western form of railroad geography is reversed. Instead of railroads radiating from the central markets toward the points of production, the points of production are in the center and the markets lie all around the edge of the district—on the seaboard, the gulf, the Mississippi or the Ohio. There is an inward radiation instead of an outward one.\*

This description was true enough at the time it was penned, but since the year 1898 there has been in process a great change in the characteristics of southern traffic. Cotton, the chief product shipped from the section, still goes out of the district to the North, East and South, but much more of it is manufactured at home than formerly, and very little of it is carried on the river. In 1905 the entire South raised 13.6 million bales of cotton. Of this crop about 16 per cent was manufactured at southern mills. The Tennessee coal goes south and southeast even to the seaboard from the Jellico district. The Alabama coal goes south to Pensacola, Mobile and even to New Orleans, where it is used largely for domestic purposes. Practically all coal used at New Orleans for bunkering steamers, however, is brought down the Mississippi from the Pittsburg district. The Louisville & Nashville Railroad exports about 250,000 tons of Alabama coal per annum from Pensacola for use on Mexican railroads. Alabama iron goes all through the South and literally radiates from Birmingham in every direction, but more than half of it goes to markets north of the Ohio and the Potomac; but, more important than all of these, there is now an increasing stream of traffic between the North and Northeast and the South.

Three large systems have developed and now control the streams of north and south traffic—the Southern, the Louisville & Nashville and the Illinois Central. The first controls a line from eastern Tennessee to Cincinnati, which line connects the system with trunk line territory at Cincinnati, whose earnings have increased, without any increase in mileage, 114 per cent from 1897 to 1905, or from \$10,200 per mile to \$20,790 per mile. To understand what these figures mean it is necessary to note that no railway system west of Chicago has per mile earnings greater than \$13,000, though the main line earnings of several systems would probably exceed this figure considerably. Even the

\*Hadley's Railroad Transportation. Putnam, N. Y., p. 87.

earnings of the Lake Shore & Michigan Southern in 1904 were only a little in excess of \$24,000 per mile. The Southern and the Louisville & Nashville, finding the stream of north and south traffic to Chicago so great, found it to their interest some years ago to purchase jointly the control of the Monon, from Louisville to Chicago. But the leading southern road in developing north and south traffic through the South is the Illinois Central, which road is busily engaged in completing a second track all the way from New Orleans to Chicago.

Of these three systems the Southern is greatest in mileage and in area of territory, but weakest in average volume of traffic. The Southern owns and controls nearly 10,000 miles of railway. The system and its controlled lines may be said to head at Washington. It reaches tide-water at Norfolk, Charleston, Savannah, Brunswick and Mobile. It reaches the Mississippi at Greenville, Memphis, Cairo and Saint Louis; the Ohio at Cairo, Evansville; Louisville and Cincinnati, and Lake Michigan at Chicago. But a large proportion of its mileage lies on the mountain plateau, where the soil is thin and unproductive and where steep grades and sharp curves make railway operation expensive. The mountain country, however, furnishes yellow pine and some hardwood lumber, as well as coal and iron. The management of the road is enterprising and is striving to develop its territory, but the gross earnings of the system proper were only \$6,700 per mile in 1905. Still, it should be noted that the ratio of improvement in the last nine years has been greater on the Southern road than on the other southern systems.

The Louisville & Nashville has been from the beginning the strongest system in the interior South. While the Illinois Central has done most to develop traffic through the South, this road has done most to develop traffic in the South. It does not cross over and occupy the coastal plain except with a controlled road from Atlanta to Augusta. Its distinctive territory is the central South between the 84th and the 88th meridian and from the Ohio to the gulf. If a meridian is drawn through Birmingham from Lake Michigan to the gulf the line will not be at any point more than 70 miles from main line traffic controlled by this company. This traffic heads on the Ohio at Paducah, Owensboro, Cincinnati and Maysville and crosses this stream at Henderson and Louisville. It reaches tide-water at Pensacola, Mobile and New Orleans, and it reaches the Mississippi at Saint Louis, Hickman, Memphis and New Orleans.

For a quarter of a century the management of this road has possessed unbounded confidence in the future of the territory served by it. But while the development has been somewhat slower than in many other parts of the country it has been none the less sure. Its greatest success has been in the development of the coal and iron district of Alabama centering at Birmingham. Alabama ranks fifth in coal production in the United States and third in the production of iron ore. In 1903 there were mined in this state 12 million tons of coal and there were produced 1,560,000 tons of pig iron. In the beginning the Louisville & Nashville did not have as advantageous a location for the development of these mining industries as a rival system had which had less confidence in the mining possibilities. But the road started a quarter of a century ago to build the lines to reach and serve the mines and furnaces, and it is now supreme in a district which makes pig iron cheaper than any other part of the United States. In 11 years pig iron production in Alabama has increased 63 per cent, and steel of superior grade is now made at Birmingham. There is every reason to believe that Birmingham will soon stand in the same relation to the whole

South and Southwest that Pittsburg does to the North and central West. And the Louisville & Nashville already stands in the same relation to Birmingham that the Pennsylvania Railroad does to Pittsburg.

This company is ascendant through the greater portions of Tennessee and Kentucky. Manufacturing is not thriving except in Alabama and Tennessee. Clarksville, on its Memphis line, is the center of a great tobacco producing country. The lines of this road will continue, as they have long been, the main channel for the distribution of the manufactures of the East and central West through central southern territory.

The Illinois Central occupies a unique position among American railroads. In Chicago it is the leading suburban line. From Chicago west to the Missouri River and south to the Ohio River it is a leading granger line, and from Cairo south it is a leading southern line. The great Cairo bridge over the Ohio at its mouth, which was completed in 1889 at a total cost of more than \$3,000,000, was built by one of America's greatest engineers. This bridge forms a fitting link between its northern and its southern lines. The system extends through Iowa to both Sioux City and Omaha and crosses the upper Mississippi at Dubuque. It crosses the north end of Illinois from Dubuque to Chicago and divides the state almost exactly in half by its north and south line from Freeport to Cairo. It also divides the state by a northwest and southeast line from Peoria to the Ohio at Evansville, and again by a northeast and southwest line from Chicago to Saint Louis through Springfield, the state capital. From Fulton on the Kentucky-Tennessee state line some 40 miles south of Cairo it operates a line up the Ohio Valley, touching the river at Paducah and Louisville. At Fulton its main line forks, one going directly through Jackson, Tenn., and central Mississippi, to New Orleans, and the other through Memphis, where it connects with its Yazoo & Mississippi Valley lines, which lead down the river to New Orleans through the most fertile lands in the United States.

The Illinois Central does not publish the classification of its tonnage, but from its report to the railroad commission of Illinois in 1904 some insight into the character of its traffic may be had. In 1904 its Illinois tonnage amounted to 16.75 million tons, which was 14.5 per cent of the total tonnage hauled by all railroads in that state. Some of the items in which the Central's Illinois tonnage exceeded that of any other road are given in the statement below in thousands of tons:

Item.	I. C. Tonnage.	Nearest Competitor's Tonnage.	Name of Nearest Competitor.
Total tonnage.....	16,750	9,200	The Northwestern.
Grain and flour.....	2,314	1,007	The Rock Island.
Fruit and vegetables.....	436	213	The Northwestern.
Hay.....	148	63	The Big Four (N. Y. C.)
Cotton.....	68	41	The I. & I. (N. Y. C.)
Live stock.....	366	240	The Northwestern.
Sugar.....	115	75	The Rock Island.
Wines, liquors and beers.....	83	75	The St. Paul.
Soft coal.....	6,228	4,506	The C. & E. I. (Frisco)
Lumber.....	2,584	698	The M. & O. (Southern)
Merchandise.....	1,155	808	The Northwestern.

The bulk of the fruit and vegetables from the Pacific coast is supposed to reach Chicago over the Rock Island, the St. Paul, the Northwestern and the Santa Fe, and it is interesting to note that the tonnage in Illinois in these two items over the Illinois Central in 1904 was greater than on all four of the roads named.

In the table below are shown some interesting comparisons between the three principal southern roads. The long haul on the Illinois Central, as compared with its competitors, shows the effect of its through traffic and demonstrates the change already referred to in the character of southern traffic. The low rate per ton mile on the Illinois Central is accounted for by the necessity of competing with the

river, and the high rate on the Southern by the local character of a large proportion of its traffic.

	1897.			1905.		
	South- ern	L. & N.	I. C.	South- ern.	L. & N.	I. C.
Miles operated directly.....	4,806	2,980	3,130	7,195	3,828	4,374
Increase, per cent, in 9 years.....	50	28	40	50	28	40
Gross earnings (millions).....	19.1	20.4	23.1	48.1	38.5	49.5
Increase, per cent, in 9 years.....	152	80	124	152	80	124
Gross tonnage (millions).....	7.9	11.4	9.9	21.0	21.0	23.1
Increase, per cent, in 9 years.....	166	84	134	166	84	134
Freight ton-miles (millions).....	1,324	1,862	2,368	3,365	3,508	5,559
Increase, per cent, in 9 years.....	154	18	147	154	18	147
Earnings per ton-mile (cts.).....	0.94	0.79	0.67	0.94	0.79	0.59
Average tons per train.....	194	289	319	194	289	319
Average tons per car.....	13.8	17.2	17.0	13.8	17.2	17.0
Pr. ct. of loaded cars in train.....	68	87	72	68	87	72
Av. number of cars per train.....	20.5	19.79	26.2	20.5	19.79	26.2
Average distance each ton is hailed (miles).....	160	167	240	160	167	240

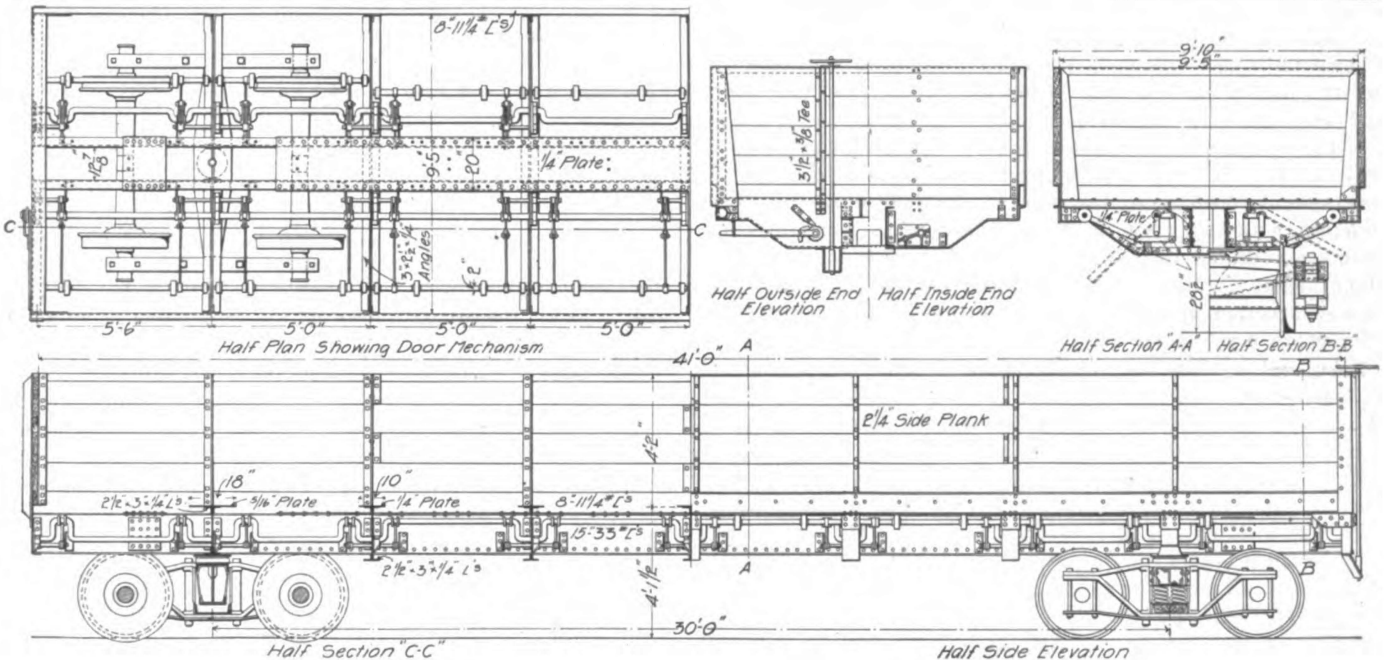
As a measure of the magnitude of the north and south traffic it should be noticed that the gross earnings per mile of the Louisville & Nashville are \$10,066 and of the Illinois Central \$11,320, which per mile earnings exceed those of any system of equal mileage west of Chicago. These per

the showing made by the Southern line is a creditable one. That the mineral tonnage of the Southern should exceed the St. Paul's might be expected, but that it should equal or surpass the great western road in its manufacturing and merchandise tonnage is contrary to the prevailing opinion. For the last two years the tonnage of the Southern road in the building materials, lime, cement and brick has exceeded that of the St. Paul in these commodities by 24 per cent.

THE CAMPBELL DROP BOTTOM GONDOLA.

The western lines appear to prefer flat bottom gondola cars to those with hoppers for coal traffic, because they can be loaded with lumber and other coarse long freight; but it is desirable that they be arranged with drop bottoms so as to discharge the bulk of the load of coal by gravity. The car here illustrated was designed by Mr. Argyle Campbell to meet these conditions, and it is placed on the market by the Enterprise Railway Equipment Company. Old Colony building, Chicago.

This car has been designed to carry 100,000 pounds of coal and to discharge 95 per cent of its load. It is 41



THE CAMPBELL DROP BOTTOM GONDOLA.

mile earnings are exceeded only by the Alton among the western, southwestern and Pacific roads.

The manner in which the leading southern roads are serving and developing their territories may be shown by the comparison of some of the operating statistics for 1905 of the largest southern road with a leading western road. The Chicago Milwaukee & St. Paul is a road of about the same extent as the Southern. It serves a district supposed to be many times more progressive than that of the Southern, and it is well known that the St. Paul has been for years in the very forefront of western railroad activity.

COMPARISON OF THE ST. PAUL'S MILEAGE EARNINGS AND TONNAGE WITH THE SOUTHERN'S.

Item.	C M. & St. P.	Southern	Ratio So. to St. P.
Mileage.....	6,908	7,195	1.04
Gross earnings (thousands).....	\$19,884	\$45,145	0.97
Net earnings (thousands).....	17,590	13,062	0.74
Revenue ton-miles (millions).....	4,081	3,365	0.83
Total tonnage (thousands).....	23,304	20,974	0.90
Tons mineral traffic (thousands).....	6,571	8,607	1.31
Tons agricultural products (thousands).....	5,267	2,499	0.48
Tons animal products (thousands).....	1,620	324	0.20
Tons forest products (thousands).....	3,917	3,511	0.90
Tons manufactures and misc. (thousands).....	5,910	6,032	1.01

In agriculture and the industries dependent upon it the Southern's district is not in the same class with the St. Paul's. In fertility the Appalachian plateau cannot compare with the upper Mississippi Valley. But in other respects

feet long inside by 9 feet 5 inches in width and 4 feet 2 inches in depth. All of the stakes are inside and made of 1/4-inch steel flanged over for proper fastening for the side boards, and extend down and are riveted to the diaphragms of the car, the stake having a width of about 7 inches at the bottom. All the diaphragms and bolsters are continuous crosswise of the car, the diaphragms being made of 2 1/2 by 3 inch angles top and bottom, with plate between forming the diaphragm, which is also fastened to the center sill by angles. The bottom angles of the diaphragm are used as a track for the door mechanism, which will be described later. Over all of the diaphragms and fastened to the top angles are 1/4-inch plates 10 inches wide running crosswise of the car. Also at the body bolsters a 5-16-inch plate 18 inches wide is used, which is securely fastened to the side stakes by means of small steel box sections.

The side sill is an 8-inch channel and is fastened at the various diaphragms and stakes by means of connecting angles. The center sills are the usual 15-inch channel reinforced by 1/4-inch top cover plate and 3 1/2 by 3 1/2 by 3/8 inch bottom angles. The end sill is made of plate and flanged over both top and bottom with reinforcing casting