The Myth & The Reality of the Super-Interurban
The Coaches of the Chicago, South Shore and South Bend Railroad

"For the great enemy of truth is very often not the lie--deliberate, contrived and dishonest--but the myth--persistent, persuasive, and unrealistic. Too often we hold fast to the cliches of our forebears. We subject all facts to a prefabricated set of interpretations. We enjoy the comfort of opinion without the discomfort of thought."

– John F. Kennedy, Yale Univ. Commencement, 11 June 1962

The stuff of myth, a train of new South Shore Line cars posed at Wagner, Indiana, August 1926. This brief has been drafted as a point of discussion regarding the context in which these cars were designed, built, and operated, while comparing and contrasting the vintage South Shore Line cars with their interurban and steam railroad contemporaries. (Photographer credit: E.C. Calvert, Photographer, Michigan City, Indiana).

Myth: The Chicago, South Shore and South Bend Railroad (South Shore Line) cars were built to steam railroad standards.

Reality: The vintage South Shore Line cars are typical interurban cars in nearly all respects and have nearly no attributes in common with any type of contemporary steam railroad equipment.

Brief Answer

The state-of-the-art for steam railroad passenger cars built in the late 1920s was an entirely steel car. The state-of-the-art for interurban equipment of the same period was a wooden car inside of a steel shell. Because the South Shore Line cars were steel in structure only, and wood where nonstructural parts of steam railroad cars were formed from steel and concrete, the South Shore Line cars were built to the state-of-the-art of interurban equipment, not to the state-of-the-art for passenger equipment on the steam railroads.

Discussion

The question regarding how to categorize the vintage South Shore Line cars has arisen often. The myth regarding the nature of the vintage South Shore Line cars arises from two seminal works that include the history of the South Shore Line cars. The first described the South Shore Line equipment as "beyond the interurban style of equipment,"[1] a second stated that "except for their shorter length, the new cars were built to dimensions and standards identical to those for steam railroad equipment,"[2] and a third author claimed that four deluxe cars "were virtually identical to steam road equipment."[3] None of these statements are correct. Unfortunately, the myth of the vintage South Shore Line cars as being something greater than interurban cars has been perpetuated by the several authors who have followed in their coverage of the South Shore Line's history.

A comparison of the vintage South Shore Line cars with typical interurban cars is a challenge in and of itself. Because the interurban era was short, interurban car builders were often trying to engineer equipment solutions to anticipated rising and then declining ridership and the near constant rising costs of operation. Because interurban car architecture went through near constant change from the pioneering era that began in 1889 until the last interurban cars were delivered soon after the end World War II, there was no standardization of interurban cars across the industry. Therefore, there is no typical interurban car.

[1] George W. Hilton & John F. Due, The Electric interurban Railways in America 78 (1960).
[2] William Middleton, Traction Classics: The Great Wood and Steel Cars 215 (1983).
[3] Norman Carlson, Chicago South Shore & South Bend Railroad: How the Medal Was Won 68 (1985).

A Review of the Trends in Interurban Carbuilding Shows Why There is No Typical Interurban Passenger Car

Pioneer Sandusky, Milan and Norwalk (SM&N) car #9 at Norwalk, Ohio, 1893. Although lettered for the Sandusky Milan and Huron, the corporate name had changed after the cars were lettered, but before they were delivered. These small cars were typical of the pioneer interurbans. The dimensions of SM&N car #9 are similar to the early streetcar pictured below.

Chicago Surface Lines car #1210 at Racine and Fullerton, circa 1930. The architecture of this car was typical of small streetcars built at the end of the 19th and the beginning of the 20th centuries. These cars are distinguishable from interurbans of the same era by their wide loading platforms, single compartments, and deck roofs with a free-standing clerestory.

The typical interurban car of the pioneer era was the size of an urban streetcar – about 35 to 40 feet long – and about as fast – typically built for a design speed of 25 miles per hour.[4] Where the interurban cars were differentiated from streetcars was that the interurban cars were divided into compartments.

Because interurban service was frequent, low density, and provided between cities (therefore, the term interurban), the interurbans needed to pack the amenities of a three car local steam railroad train into a single car – a main passenger compartment, a separate space for smokers, and another for baggage. Steam railroads often provided a car for each of these needs or on branch-line and Jim Crow trains, perhaps a combination baggage-smoking car.[5]

[4] Hilton & Due, *supra* note 1, at 70.

[5] John H. White, Jr., The American Railroad Passenger Car 462 (1978).

The typical roof design of the interurbans included a clerestory with ventilating windows and end hoods where the clerestory blended down into the lower roof sections. This design was directly inspired by the steam railroad coaches of the day and was referred to as the "railroad roof."[6]

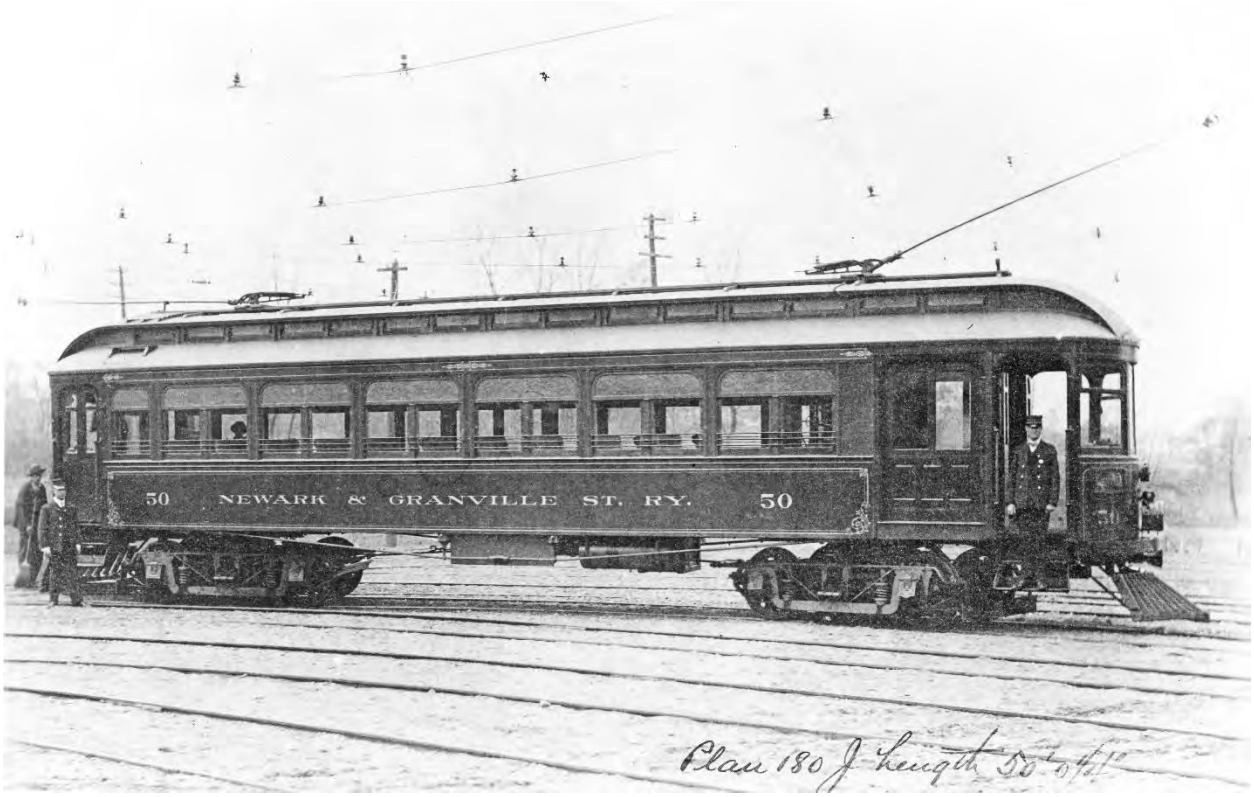
By 1901, the technology of the wooden interurban cars began to evolve. The cars became larger and heavier than streetcars and speeds had increased to 50 miles per hour. The architecture of the cars above the floor was influenced by steam railroad practice, but the cars were narrower with rounded ends to allow the cars to make streetcar clearances while running in cities on streetcar trackage.

Toledo and Western Railway (T&W) car #30 at Sylvania, Ohio. Built in 1901 for the opening of the railway, this car had evolved aesthetically and technologically from the cars of the 19th Century.

During the year 1903, carbuilders began delivering larger cars beginning with an order from the Newark & Granville Street Railway (N&G) for one combination coach-baggage car. N&G car #50 was built with a body of 50' 0¼" in

[6] *Id.* at 71.

length.[7] If there was ever such a thing as a standard dimension in the realm of the Ohio and Indiana interurban network, it was the consistent 50' length of the carbodies after 1903.[8]



Newark & Granville Street Railway car #50 at the Jewett Car Co. plant in Newark, Ohio, 1903. The technology to build longer cars was not unknown; carbodies of typical steam railroad equipment of the era built for mainline service were most often 72' in length, this fully 22' longer than that used for the typical interurban car.[9]

The standard length of the carbody translated into an overall standard car length of 61'6" regardless whether the car had one vestibule (combination coach-baggage cars) or two (for coaches). There were roads in the Indiana and Ohio network that did not support enough traffic to justify longer cars. The Toledo and Western never ordered passenger cars longer than 40', and the Kokomo, Marion and Western used 45' cars throughout its life even after it was acquired by the Insull Group as part of the Northern Indiana Power Company.[10]

---

[7] Lawrence A. Brough & James H. Graebner, From Small Town to Down Town: A History of the Jewett Car Company, 1893-1919 111 (2004).
[8] *Id.* at 73.
[9] The Master Car Builders' Association, The Car Builders' Dictionary 172-75 (1909).
[10] Hilton & Due, supra note 1, at 73.

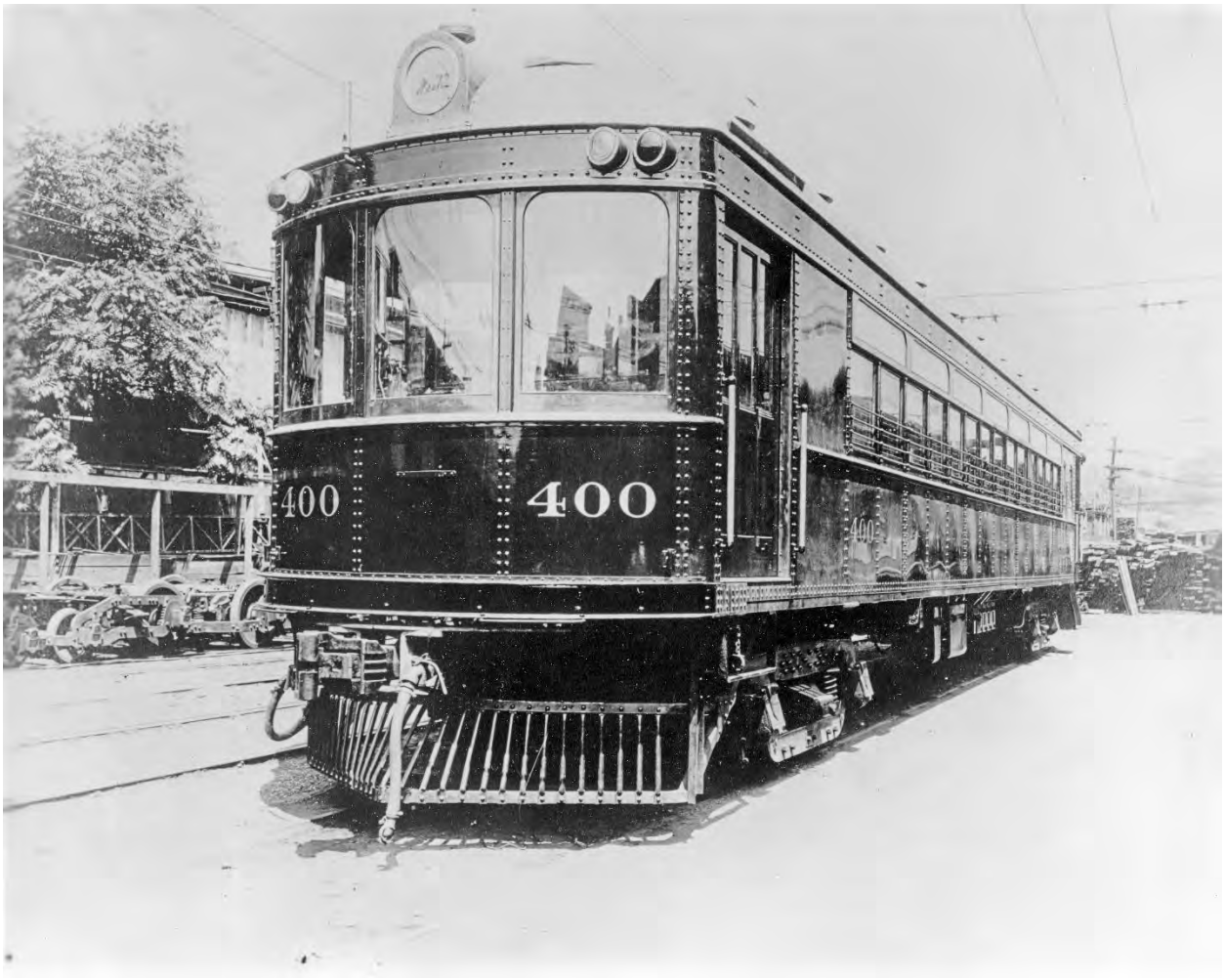
The most common interurban car was the combination coach-baggage car, but interurbans that operated cars in trains often also bought two-compartment coaches with a smoking section and a main compartment. Parlor-buffet and parlor-dining cars were also operated by two Indiana interurbans; one also operated sleeping cars in train with its combination coach-baggage cars. More on typical interurban operations in Indiana will follow in a separate narrative.

The divided interior of Chicago, South Bend and Northern Indiana Railway (CSB&NI) combination coach-baggage car #305. The photographer is standing at the back of the main compartment shooting toward the front of the car through the smoking compartment with the baggage room in the background. Per the standard, car #305 is 61'6" in length overall.[11]

Nearly identical cars were built for the Terre Haute, Indianapolis & Eastern as well as the Ohio Electric Railway because the two syndicates who owned the three roads were affiliated with carbuilder Cincinnati Car Company.

[11] Electric Railways of Indiana III: Bulletin 104 II-23 (1960).

In 1913, at the time that the conversion to steel car construction on the steam railroads was virtually complete, the first steel interurban cars were built for the Union Traction Company of Indiana to the pattern set for the construction of wood cars a dozen years earlier.



Union Traction car #400, Cincinnati Car Company, 1913. This first order for steel interurban cars approximated the architecture and dimensions of the wooden cars that preceded them including a length of 61'1". Fanlights of colored art glass still topped the movable sash. Three compartments segregated the interior into a main compartment, smoking section, and baggage room; this configuration is consistent with the early interurbans of a generation before.

Because the Pullman Company nearly monopolized steam railroad passenger car construction, the design of steam railroad cars was relatively static in the period 1912 through 1933. Interurban equipment was built by many builders independent of the Pullman Company and underwent near-constant experimentation throughout the same timeframe. At the start of World War I, J.G. Brill Company subsidiaries

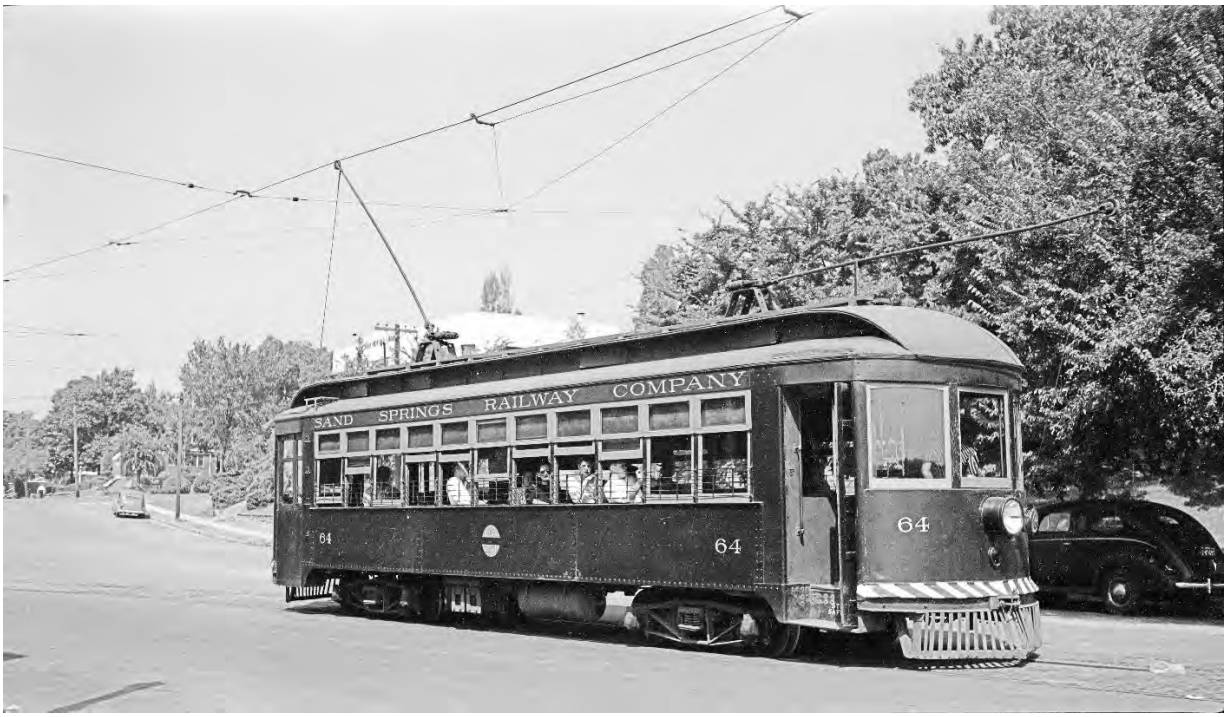
American Car Company and G.C. Kuhlman Car Company began offering center-entrance cars without end vestibules and without continuous side sills.[12] [13]

Center-entrance car of the East St. Louis & Suburban, Alton, Illinois, 9 September 1934. This was one of four identical cars built in the company shops in 1924. The Alton, Granite & St. Louis bought five nearly identical cars in 1917 from American Car Company.

Several companies bought center entrance cars for street railway, suburban, and interurban service including The Milwaukee Electric Railway and Light Company, Lehigh Valley Transit, and the Alton, Granite & St. Louis (AG&StL).[14] The former two companies disliked them and rebuilt them as conventional end-vestibule cars. AG&StL was sold to the Illinois Traction System (ITS) in 1928; ITS successor Illinois Terminal Railroad ran their center entrance cars until 1953.

The interurban network was overbuilt from the start, and as a result the interurban cars on many roads were oversized as well. Seeking relief from the high variable cost of operating large cars with two-man crews with the concomitant high maintenance costs of both cars and track, Cincinnati Car Company began offering lightweight cars in 1918. Only five years after the first heavyweight steel cars were built for the Union Traction Company, the design of interurban cars began to diverge down two distinct paths.

[12] Middleton, *supra* note 2, at 183-87.
[13] Hilton & Due, *supra* note 1, at 424.
[14] Joseph M. Canfield, TM: The Milwaukee Electric Railway & Light Company 462 (1972).



The first lightweight cars were built in 1918 for the Cincinnati, Lawrenceburg and Aurora, an interurban serving thinly settled territory along the Ohio River in Ohio and Indiana. With a length of 40'6" overall and a free-running speed of 35 miles per hour, this car design was not novel, but rather was a reversion toward the standards of the pioneering interurban cars of 25 years earlier. These cars finished out their service lives on the Sand Springs Railway in Oklahoma in 1948.

After World War I, four trends beset the interurban industry: 1) there was an inflationary spiral that diminished the value of capital, 2) there was competition from the newly formed bus industry which was often unregulated, 3) the automobile was cutting down on joyriding on the interurbans, an important source of traffic, and 4) there was a lag in improvements in productivity when compared with manufacturing.[15]

The development of a standardized lightweight car by the Cincinnati Car Company in 1921 lowered the fixed first cost of new vehicles. These lightweight cars were most often operated by a single person acting as both motorman and conductor, therefore lowering variable labor costs as well. W.J. Clardy of Westinghouse Electric & Manufacturing reported that interurbans operating lightweight cars saved 49% on maintenance costs, 50% on power costs, and 46% on labor costs.[16] Because of its impact on both fixed and variable costs, this so-called curved-side lightweight car was a novel design.

[15] Hilton & Due, supra note 1, at 211, 227-28, 230.
[16] W.J. Clardy, Light-Weight Interurban Cars, 65 Elec. Ry. J. 152, 153 (1925).

Curved-Side lightweight car on the Toledo & Indiana. Similar cars were purchased for street railways as these small cars were well suited to both city and interurban service.

Lightweight curved-side cars were nearly exclusively used on lines with declining traffic and deteriorating track typical of much of the interurban network in the mid-1920s. This car operated on the Conestoga Traction Company near Ephrata, Pennsylvania.

Stark Electric curved-side lightweight car #42, 16 July 1939. Lightweight coaches were divided into main and smoking compartments in the same manner as heavyweight cars. The toilet is on the right side of the image ahead of the partition. Car #42 was built in 1926, was 46' 3" long, and could seat 52. This large crowd had turned out for the last run of the Canton to Salem, Ohio, interurban. (Photographer credit: Dimit Brothers Photographers, Alliance, Ohio).

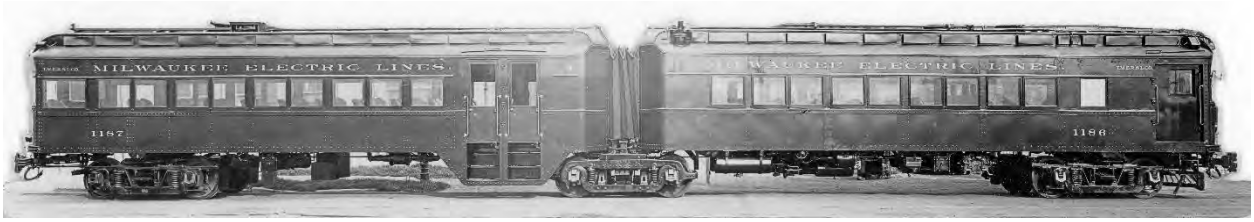
Acceptance of lightweight cars by the interurbans was not universal and there was no geographic pattern as to ownership.[17] However, interurbans that stuck with heavyweight steel cars were incentivized to make their cars more productive. Because union work rules were most often based on the number of cars a conductor or collector was allowed to work, employee productivity could be improved by increasing the number of seats in a single car.[18]

Two interurbans turned to articulated three-truck cars to nearly double the number of passengers served by one employee. The Milwaukee Electric Railway

[17] Hilton & Due, *supra* note 1, at 81.

[18] Agreement Made and Entered Into and Between Chicago, South Shore and South Bend Railroad and the Order of Railway Conductors and Brotherhood of Railway Trainmen, art. 3(7), Mar. 12, 1930.

and Light Company built their own cars in the company shops, eight from older car shells bought used and two from new materials. The Washington, Baltimore and Annapolis bought new articulated cars from the J.G. Brill Company in 1927.[19]



The Milwaukee Electric Railway and Light Company built eight of these three-truck articulated cars in 1929. The bodies were originally conventional heavyweight steel cars from the Indianapolis and Cincinnati Traction Company that had only six years of service running from Indianapolis to Connersville and Greensburg. A single steam railroad type diaphragm sits atop the turntable above the center truck allowing continuous passage between both halves of the car.

In Indiana, the operation of heavyweight steel cars dominated nearly until the last remnant of the interurban network was swept away in 1941.[20] [21] The last heavyweight steel cars constructed for Union Traction were built in 1925 to the pattern of the steel cars of 1913. Ordered by the receiver for the bankrupt interurban, employee productivity was improved only slightly over the earlier cars. At 64' 2" long, the designers were able to seat four more passengers in a car that was only 3' 1" longer than the previous models.

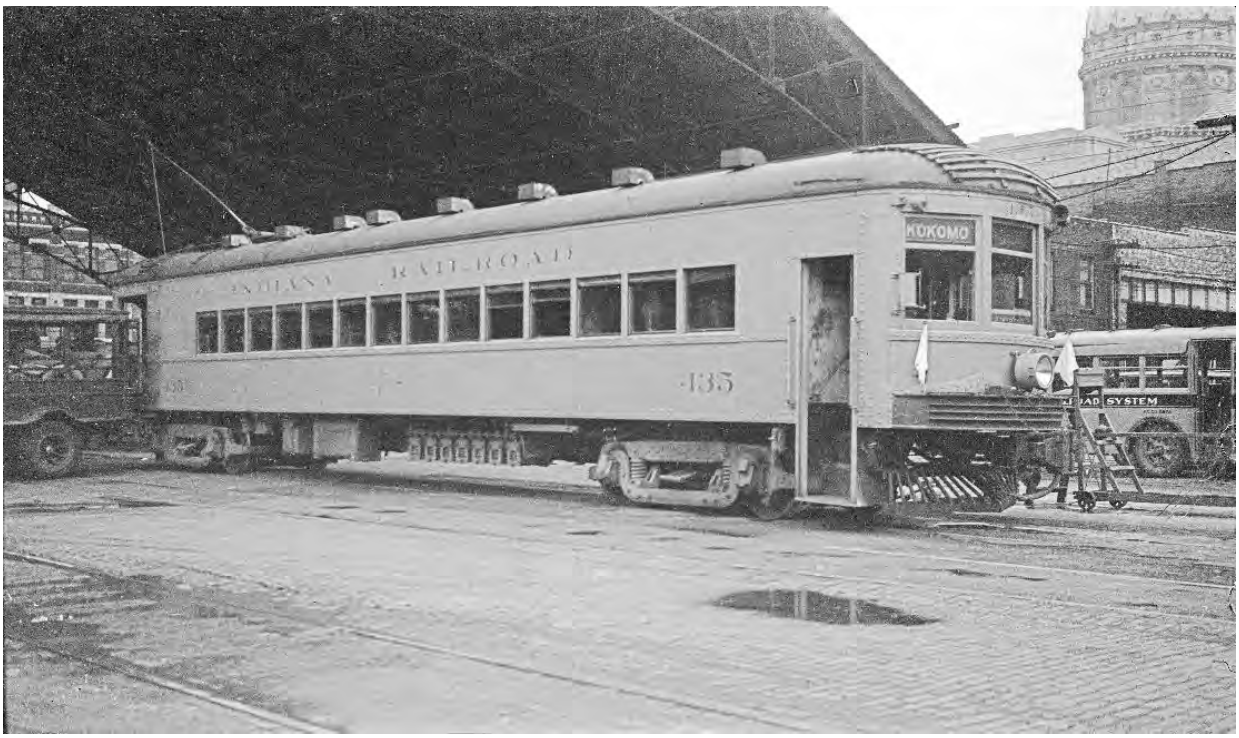
[19] Canfield, *supra* note 13, at 487-89.
[20] Hilton & Due, *supra* note 1, at 81.
[21] *Id.* at 284.

Union Traction heavyweight interurban cars at Anderson, Indiana, 1925. This fleet of cars was bought by Arthur Brady, the receiver for Union Traction. Typical of so-called receivers' cars the interiors were all steel with painted wood-graining to make the cars more appealing.

Lightweight cars would have been a better choice than higher-capacity heavyweight cars as traffic levels continued their inexorable decline and Union Traction was sold in bankruptcy to the Insull Group in 1930.[22] The Insull Group continued to operate the steel heavyweight cars as a supplement to new lightweight Highspeed cars. The solution to the productivity problem was to move the operating controls from the original front of the car to the rear where the steps were and run the heavyweights without a conductor. Called "one-man cars," they reduced labor costs above the rail by 50%.[23]

[22] Hilton & Due, *supra* note 1, at 281, 285

[23] George K. Bradley, Indiana Railroad: The Magic interurban 108-10 (1991).



Indiana Railroad car #435 at Indianapolis, September 1938. The baggage compartment is now at the rear, and what were the rear steps are now at the front. Boarding passengers were now greeted by the motorman rather than the conductor, as there was no conductor.

The South Shore Line was confronted with the same productivity issues that other interurbans faced and designed new cars for delivery in 1930. These cars would have been 72'8" long and seated 63 passengers. Two separate Pullman-type smoking sections are specified on the drawing.[24] The order was likely scuttled by the deepening economic depression. But the low productivity of the South Shore Line cars persisted. The 60' coaches built in 1926 seated only 56 passengers. The 61' coaches built in 1927 and 1929 were even less productive, seating only 48 passengers.

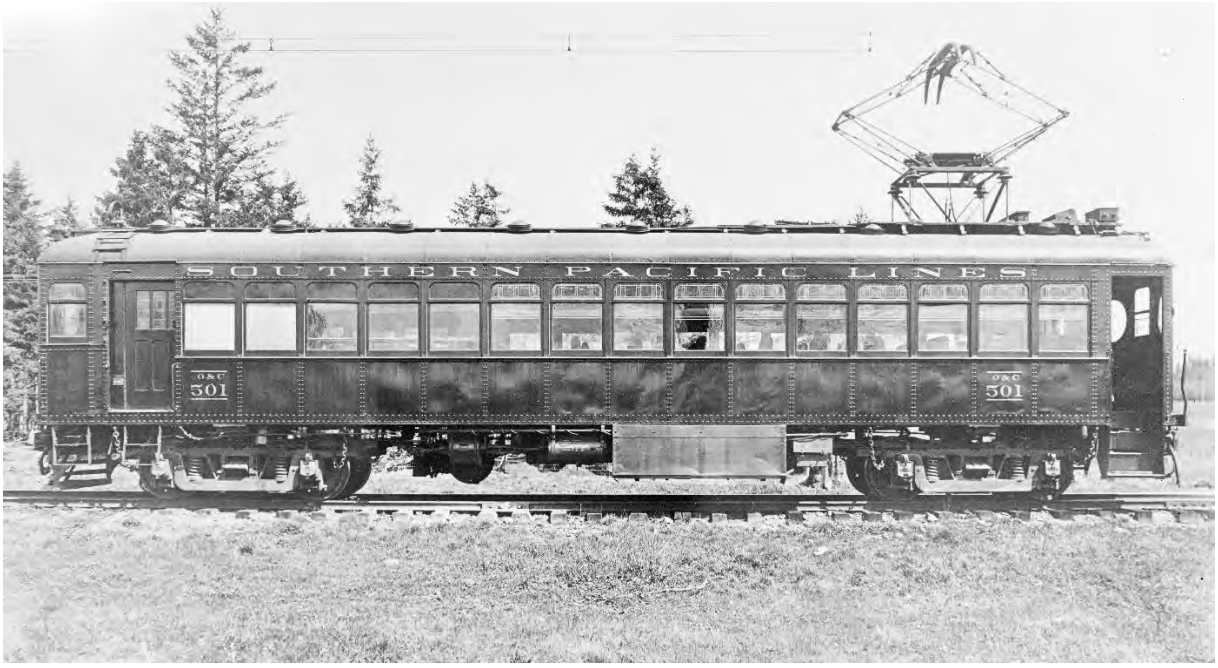
A decade later, the South Shore Line began preparing to lengthen its original cars by 17½' to increase seating capacity in each coach to 80 with a concomitant increase in employee productivity. The first car was completed in July 1941; 35 more cars were completed by 1951. Interiors were modernized at the same time with seating, baggage racks, and lighting typical of steam railroad coaches built in the same period. Of the 36 cars lengthened, 18 were rebuilt after the war with air-conditioning. The lengthened cars took on the aesthetics of their steam railroad contemporaries.

[24] Chicago, South Shore and South Bend Railroad, General Plan and Elevation for 1930 Steel Motor Cars, Drawing No. SS-558, Aug. 1, 1930.

The Comparison of the South Shore Line Interurban Cars with Steam Railroad Equipment is Complicated Only by the Variety of Steam Railroad Operations

A comparison of the South Shore Line cars with steam railroad equipment should be easy as steam railroad steel car engineering and architecture was relatively static from about 1912 until 1933.[25] However, because none of the authors were specific about what category of steam railroad equipment they were referring to, a comparison must include the three most prevalent: 1) locomotive-hauled equipment, 2) electrified self-propelled cars for suburban service, and 3) cars built for interurbans owned by the steam railroads.

Taking this list in reverse order, the last category is small as only the Southern Pacific Railroad (SP) operated electric interurban services that were prosperous enough to justify the purchase of heavyweight metal cars late in the interurban era. The SP electrified operations were along the west coast in California and Oregon.



Southern Pacific Lines interurban combination coach baggage car for operation in Oregon, circa 1914. When the Oregon operations were abandoned in October 1929, these cars joined a large fleet of nearly identical cars on SP's Pacific Electric (PE). The last new cars built to this design were delivered to PE in 1928.

The second category consists of electrified suburban services that were prevalent along the east coast in Connecticut, New York, New Jersey, Delaware,

[25] White, *supra* note 5, at 157.

and Pennsylvania, as well as at Chicago in Illinois. The SP also operated electrified suburban services in California on the Marin Peninsula and in the East Bay.

The New York, New Haven & Hartford line from New Canaan to Stamford was the first North American steam railroad electrification of a branch line for suburban service, completed in 1901. Electric suburban trains reached New York City on 24 July 1907. This train was bound for Stamford at Woodway, Connecticut, 11 November 1937.

The Delaware, Lackawanna and Western (DL&W) electrified its suburban services in New Jersey in 1930. This car design was a decade old at the time these cars were constructed.

The DL&W car interiors were austere and dated. Cars interiors of this general design first appeared in 1908 on the Long Island Railroad. (Photographer credit for two images: William B. Barry for the Delaware, Lackawanna and Western Railroad).

The first cars of the general design of the DL&W equipment were built by Pullman for the Illinois Central suburban service in 1921 for operation from Chicago to the South Side and South Suburbs. The first of these cars were initially hauled by steam locomotives while planning for the electrification was underway. Chicago, Illinois, July 1926.

The East Bay suburban services of the Southern Pacific (SP) were electrified in 1911 with a fleet that reached 174 cars after subsequent orders of identical cars were received as late as 1924. These motorized coaches seated 116. Oakland, California, 1940.

A modified version of the SP East Bay cars was built in 1929 for the suburban services in Marin County operated by SP subsidiary Northwestern Pacific (NWP). The NWP cars offered more leg room and could seat only 103 passengers but included nifty amenities such as heat that were originally lacking on the East Bay cars. Ross, Marin County, California, 1940. (Photographer credit for two images: Victor Vinzent DuBrutz).

The largest fleet of electric commuter cars in the United States were the 1,428 MP-54 cars of the Pennsylvania Railroad and its subsidiary companies, Long Island Railroad and Pennsylvania-Reading Seashore Lines. Construction of cars of this design spanned 30 years – from 1908 through 1937. The last MP54s had yet to be delivered when this photo was taken at Elizabeth, New Jersey, 29 March 1936.

Long Island Railroad MP-54 coach, 1946. The culture of commuting in America does look different in 2021. Men no longer dominate the scene, hats are rarely a fedora, and the ubiquitous newspapers have been replaced with Smartphones and I-Pads.

The first category is the largest as the so-called steam railroad heavyweight era was at its zenith at the time that the South Shore Line cars were designed in 1925. Heavyweight cars were used by the steam railroads in locomotive-hauled service across the country in part because robust equipment was needed to withstand the longitudinal buffing forces that locomotive-hauled trains endured.

Long-distance locomotive-hauled trains were a hotel on wheels. This train of the Chicago, Milwaukee and St. Paul Railway included a railway post office, baggage car, two coaches, a tourist sleeper, a dining car, and the sleeping cars Cascade and Ingomar. The parlor-observation car at the rear featured a ladies' tea room, a men's club room, smoking and writing rooms, a library, bath, barber shop, and a tailor just in case your formal dinner wear did not fit quite right.

This train left Chicago behind steam locomotives, but electric power took the train across western Montana and into Avery, Idaho. A steam locomotive took the train through the night into Washington where electric power was again swapped for steam at Othello for the ride into Tacoma. Humpback Creek, Washington, 12 November 1920. (Photographer credit: Asahel Curtis Photo Company).

Standard sleeping car on the Chicago, Milwaukee and St. Paul Railway, 3 April 1925. The dimensions of steam railroad cars made them the most commodious terrestrial vehicles on earth. (Photographer credit: Asahel Curtis Photo Company).

Streamlined lightweight cars and trains were introduced on the interurbans after all the South Shore Line cars entered service; this novel equipment was introduced on four interurbans, one each in Indiana, Ohio, Pennsylvania, and New York during the period between 1930 and 1932. But streamlined lightweight equipment did not find favor with the steam railroads until 1934.

Cincinnati & Lake Erie (C&LE) Red Devil *lightweight car at Dayton, July 1930. The* Red Devils *were capable of 97 miles per hour under ideal conditions. The airplane was a biplane of the slowest sort. It was not much of a contest, but the race helped sell seats for a time. The unraveling of the C&LE began in 1937 when it abandoned its Lima to Toledo line; the rest of the system was wiped out on 31 May 1939 with the exception of a three-mile segment between Dayton and Southern Hills that lasted until 28 September 1941. (Photographer credit: Mayfield Photo Service, Dayton, Ohio).*

The Insull Group bought similar but slower cars for its Indiana Railroad with similar results. The last short segment of the Indiana network was wiped away twenty days before the last short segment of the C&LE was abandoned.

Cincinnati & Lake Erie Red Devil car #124. This single car constituted an entire train. The coach section is up front; parlor car customers were seated at the rear. (Photographer credit: Mayfield Photo Service, Dayton, Ohio).

In 1931, the University of Michigan conducted wind tunnel tests to cut the air resistance of these Philadelphia & Western Bullet *cars.*[26] *The maximum speed of the* Bullets *was 80 miles per hour. This train is seen here at Villanova, 28 April 1936. Five similar, but smaller cars were built for the Fonda, Johnstown & Gloversville in New York State. Because the* Red Devil *and* Bullet *cars combined the attributes of lightweight equipment with high-speed capabilities, they were a novel departure from the patterns of interurban car construction that persisted throughout the 1910s and 1920s.*

Aerodynamic experiments on interurban equipment were not new; a car named Louisiana *was outfitted for aerodynamic testing on the Union Traction mainline between Carmel and Noblesville in 1904.*

Because lightweight streamlined cars were introduced after the timeframe in which the South Shore Line cars were constructed, they are not part of this discussion beyond these illustrations.

[26] *Philadelphia & Western Starts High-Speed Service*, Ry. Age, 872 (1931).

The Comparisons

For clarity, this comparison of the vintage South Shore Line cars to their contemporaries considers six areas of car construction and embellishment:

1) Car framing,
2) Car construction,
3) Car coupling and draft hardware,
4) Interior appointments,
5) Trucks, and
6) Dimensions and Weight.

That the South Shore Line cars were typical interurban cars in their engineering standards was not unknown in the railroad engineering field. In 1975, the South Shore Line contracted with the engineering firm of Louis T. Klauder and Associates of Philadelphia for a structural analysis of their passenger car fleet. John R. Vollmar found that the South Shore Line carbodies were of a design typical of interurban cars of the 1920s and that the carbodies rode on Baldwin trucks typical of the design used under interurban cars.[27] [28] Mr. Vollmar noted that the original design of the cars was not in contemplation of long passenger trains commingled with heavy freight train operations.

Car Framing:

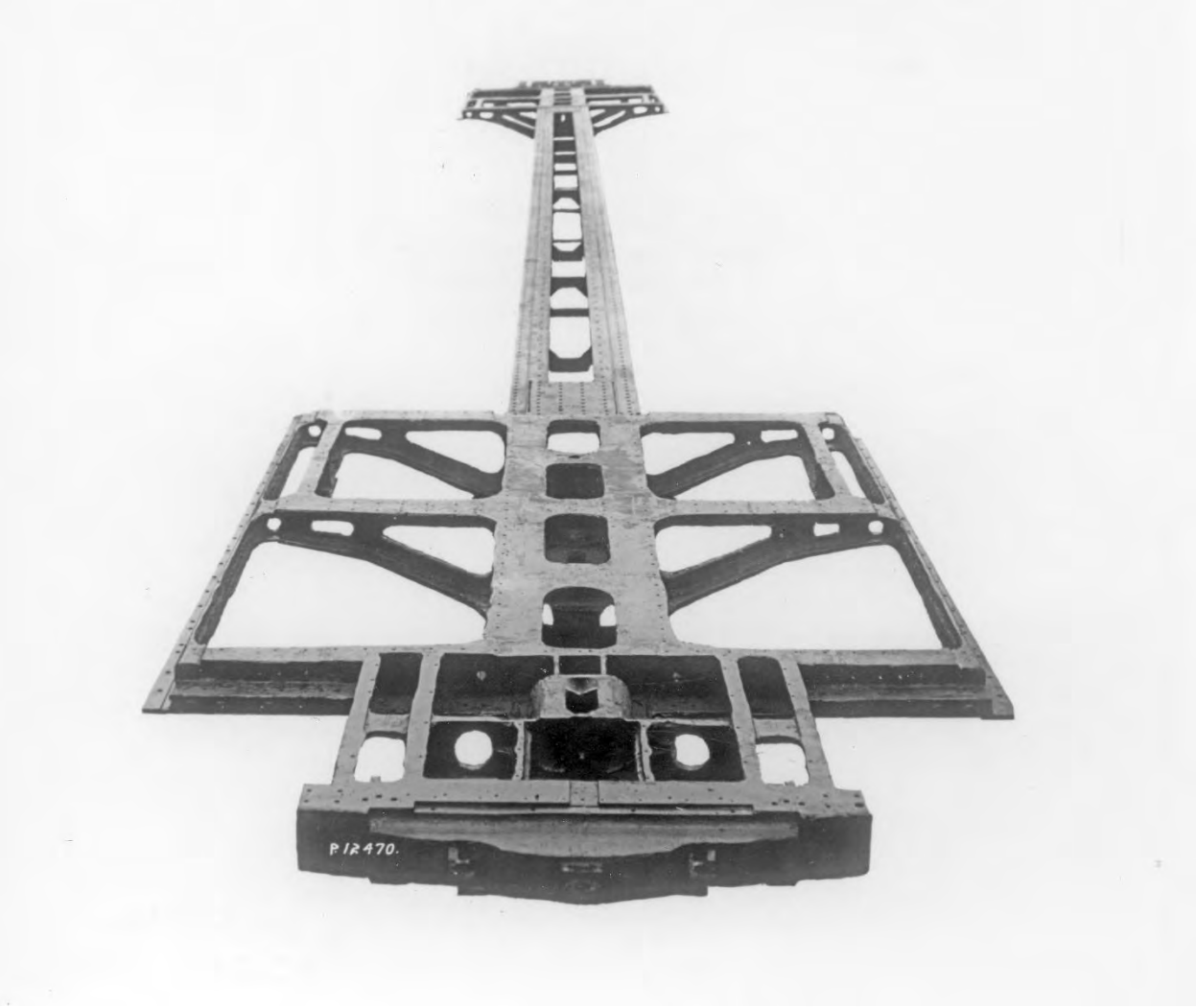
Locomotive-hauled steam railroad trains placed great stress on passenger cars by the longitudinal pulling and pushing effects of the locomotive. Further, under what has been codified at 49 CFR § 238.203, passenger cars must meet collision standards that were not applied to the interurbans.[29] There were four distinct designs for steel steam railroad passenger cars that met these requirements: 1) fishbelly, 2) box girder, 3) floor and side-panel, and 4) the Stillwell side-truss.[30] Fishbelly framing was the most common scheme on the steam railroads in the 1920s; it made up nearly all Pullman steam railroad car construction.

In the fishbelly framing scheme, the car sides and roof rested on a bridge structure formed by two trapezoidal steel plates. Cast steel bolsters were used for the connection to the trucks. Cast steel cross bearers spanned the width of the car.

---

[27] J.R. Vollmar, Chicago South Shore and South Bend Railroad: Structural Evaluation of Commuter Equipment 6 (1976).
[28] *Id*. at 12.
[29] 49 CFR § 229.141(a)(1) is applied to "MU Locomotives" – a term used to describe diesel locomotives and self-propelled cars that operate in suburban and interurban service; lower collision standards apply to trains with a total train weight of less than 600,000 lbs.
[30] White, *supra* note 5, at 145-48.

The sides and roof did not measurably add to the structural strength of the car. Fishbelly framing had little to offer as it was heavy, typically 13 to 15 tons or as much as 20 percent of a car's total weight. Further, the size of the trapezoidal plates complicated the arrangement of brake rigging, and car maintenance.[31]



Fishbelly underframe of a heavyweight Pullman car. The cast steel bolsters were cast with the end platforms; the trapezoidal plates (center) were riveted to the castings. The interurban cars operated in Oregon and California by steam railroad Southern Pacific used a similar cast bolster and end platform, but the castings were riveted to plates of uniform dimensions rather than trapezoidal plates.[32]

[31] *Id.* at 146.

[32] Middleton, *supra* note 2, at 153.

Car side being lowered onto an underframe. Because the sides of the car were non-structural, they were lowered onto the trapezoidal structure and then riveted in place.

Next, the roof was lowered and riveted to the side structure. Pullman, Illinois, circa 1922.

A plan similar to fishbelly framing was used for a series of coaches built by the Pennsylvania Railroad (PRR) beginning in 1908 and continuing until 1929, its P-70 class. Here, the structural underframe plates were of uniform size the length of the car, this called box girder framing. Although it resolved the brake rigging and maintenance issues, box-girder framed passenger cars were deemed a failure in an engineering analysis that showed that the cars sagged. But the PRR stuck with the design in subsequent car construction.[33] Neither the fishbelly nor the box girder scheme was found to have been used in the construction of interurban equipment.

An improvement over floor and side-panel framing was the Stillwell side-truss. Here, the entire carbody, including the roof, was an active part of the load-carrying structure. The benefit of this arrangement was a lightweight carbody. The bulk of the approximately 900 cars constructed with the Stillwell side-truss were used in New York City's subways and by the Erie Railroad in suburban service.[34] The London & Port Stanley, a Canadian interurban, used a modified Stillwell side-truss for its steel interurban cars, the only interurban to do so.

London & Port Stanley interurban car #8. The diagonal rivets above the bolsters and at the center of the car attach the side sheathing to the pressed-steel side-panel inner truss – a key feature of the Stillwell design. The active structure of the car continues up through the windows and across the steel roof with its ogee curves. The floor frame is only a secondary support. (Photographer credit: Wilbourne B. Cox).

[33] White, *supra* note 5, at 146.
[34] *Id.* at 147.

As interurban cars were most often run as single units or in short trains of self-propelled cars with or without trailers, the pulling and pushing effects of a locomotive were not a consideration in interurban car design. During the first half of the steel car era on the interurbans, carbuilders reached back to the standard design of the wood car era with floor and side-panel framing. Not commonly used on the steam railroads, American Car & Foundry (ACF) did build a few hundred cars of this pattern, many of them sold to the Chicago, Rock Island and Pacific.[35]

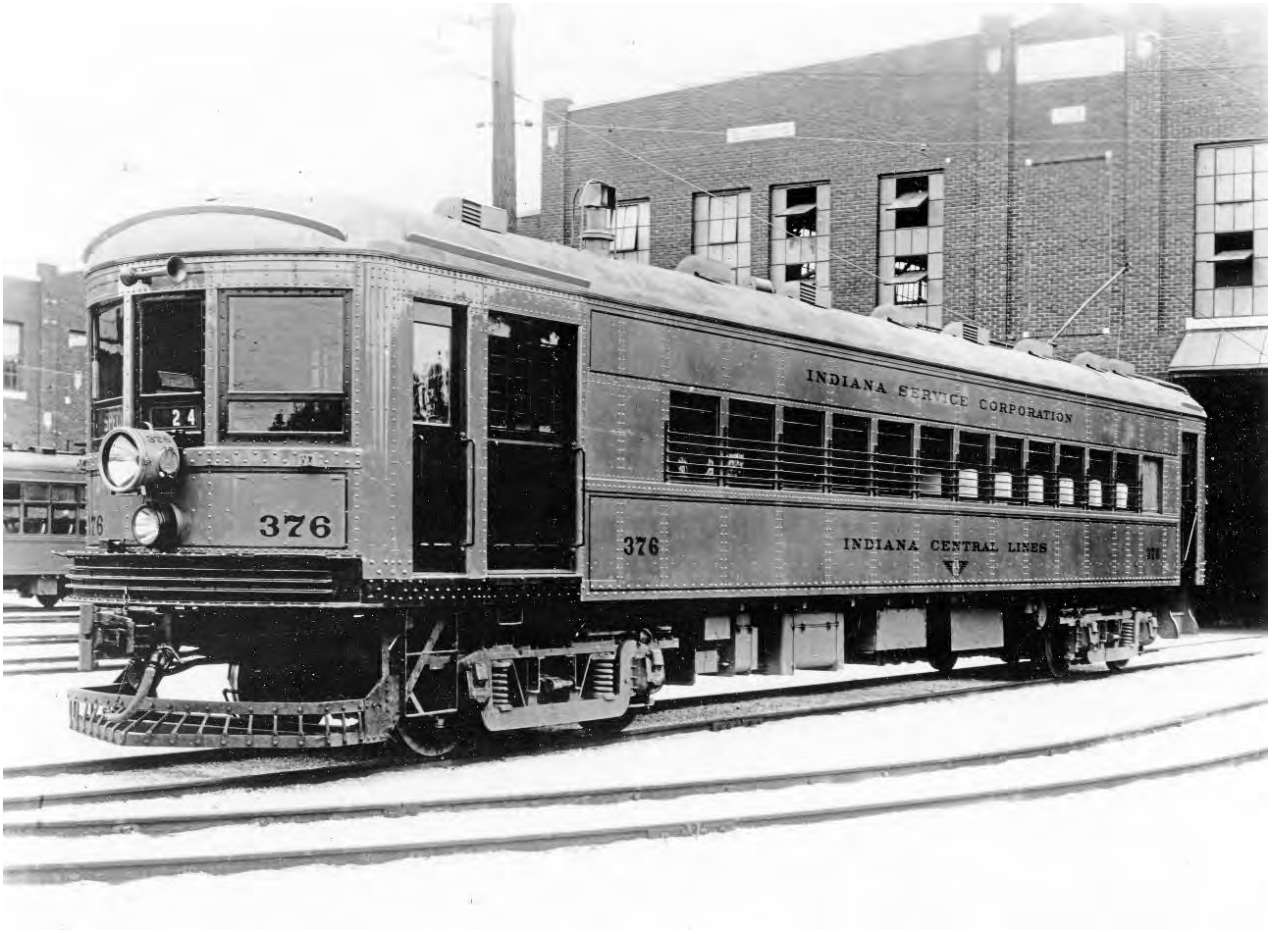
With floor and side-panel framing, the structural portion of the car sides was that below the windows. The structure above the water table (railroad term for windowsill) added little to the active load-carrying structure of the car. Early steel interurban cars used floor and side-panel framing, but the shallow side girder structure was prone to bending resulting in loose rivets or buckled side sheathing.[36] Visually, floor and side-panel framed interurban cars such as those of the Chicago, North Shore and Milwaukee Railroad were distinguished from later interurban cars by the use of T-shaped side posts only 1½" wide in the longitudinal direction, and a letterboard only 7½" tall over frosted or patterned glass upper-sash windows.[37]

Chicago, North Shore and Milwaukee Railroad (CNS&M) car #170 at Highwood, Illinois, 1920. Floor and side-panel framing gives this car a light and airy interior, but a weak structure. Cars delivered to CNS&M in 1928 and 1930 used heavier truss-side framing.

[35] White, *supra* note 5, at 147.
[36] Middleton, *supra* note 2, at 133.
[37] Chicago North Shore & Milwaukee, General Plan & Elevation: Steel Diners, Sheet No. CRS-647, Dec. 10, 1925.

Because of the difficulties with floor and side-panel framing and a desire for a simplified and more modern car architecture without upper sash windows, carbuilders developed a framing scheme unique to the interurbans – truss-side design. This design was a compromise between the floor and side-panel framing and the Stillwell design as the entire height of the car side and the floor were active structural members, but the roof was not.

Truss-side design was visually distinguished from the other framing methods by having wide U-channel side posts, and a tall letter board where the upper sash windows had been. Thin 13-gauge (3/32") steel was used for side-sheathing. Although the side sheathing with the truss-side design was 25% thinner than that found on steam railroad cars, this arrangement was sufficiently rigid to avoid loose rivets or buckled side sheathing.



Indiana Service Corp. (ISC) combination coach-baggage car #376, shown at Fort Wayne, Indiana. Car #376 was built by the St. Louis Car Company in1926. Car #376 is typical of truss-side cars built in the period 1925 through the 1930 for service in Indiana with wide window posts and a tall letterboard creating an active structure the height of the car side.

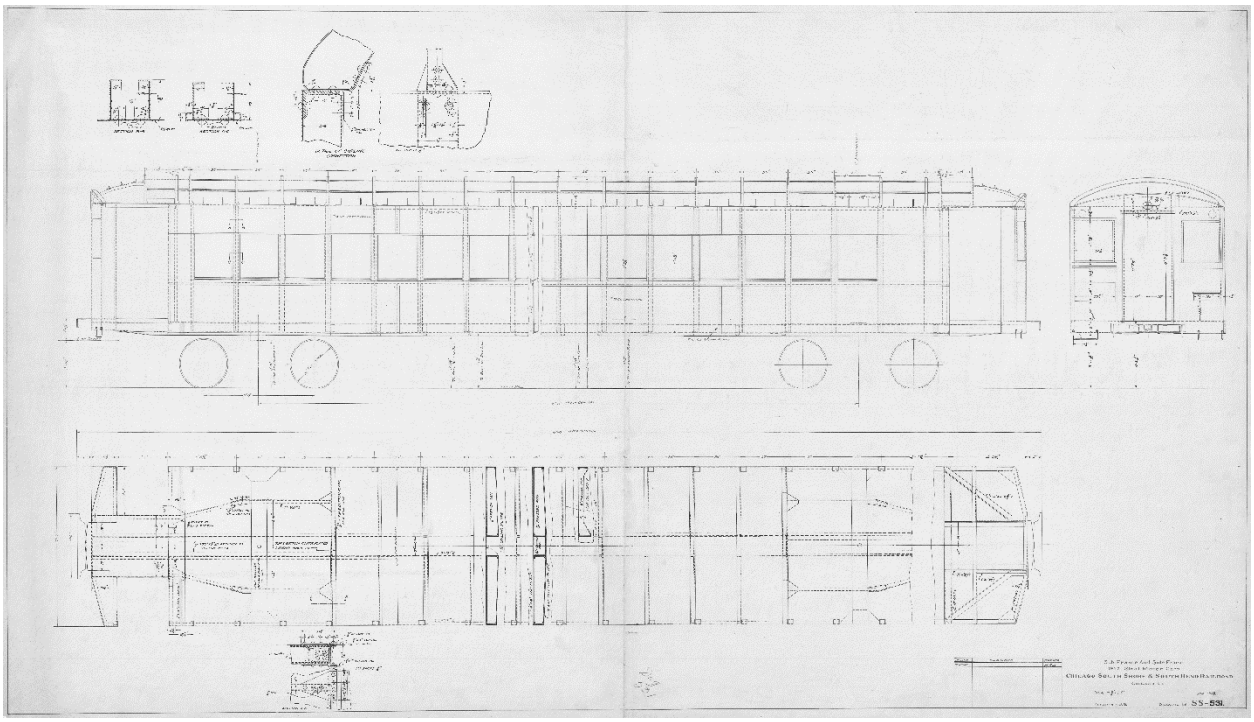
Union Traction car #431, completed framing, St. Louis Car Company, November 1925. This view toward the front of the car shows the pressed-steel floor frame members, U-channel window posts extending from the bottom of the side sills to the top sill, and the pressed steel carlines used to support the wood roof. Typical of a truss-side framed car, nearly all the structural strength is in the floor and sides. (Image Courtesy of the John W. Barriger III National Railroad Library).

South Shore Line combination coach-baggage car #107, at South Bend, Indiana. Car #107 was built by the Pullman Car & Manufacturing Company in 1926. Car #107 is typical of truss-side cars built in the period 1925 through the 1930 for service in Indiana with wide window posts and a tall letterboard creating an active structure the height of the car side.

Car #107 operated from South Bend to Chicago under the corporate umbrella of the Midland United Company of the Insull Group. Different clearance standards and terminal arrangements dictated slightly different dimensions from ISC car #376 above. As car #376 was built to the Indiana-Ohio standard length of 61'6", it is 1½' longer than car #107. Car #376 is also 4¾" shorter in height, and 12" narrower in width than the South Shore Line car. Operating details differ as well: the ISC car is single-ended because its terminals had loop tracks for turning single-ended cars; the South Shore Line cars are double-ended as the Chicago terminal tracks were stub-ended and the cars could not be turned there.

Typical of interurban steel cars built in the latter half of the 1920s, the South Shore Line cars use truss-side design. Here, the side posts are U-channels 3⅞" wide; the letterboard is 1' 9¾" tall (eliminating the non-structural area where upper-sash windows had been on early steel interurban cars); the overall height of the active structure is 7' 9$^{11}/_{16}$"; and the car is sheathed in 13-gauge steel.[38]

[38] Chicago South Shore & South Bend Railroad, Sub-Frame and Side Frame 1927 Steel Motor Cars, Drawing No. SS-531, Jan. 1928.



Framing drawing of the South Shore Line coaches built by Pullman in 1927. The use of pressed steel shapes throughout the carbody including the floor framing was typical of cars built with truss-side design. The bolsters and end platforms were built-up from steel shapes rather than using castings as had been found in typical locomotive-hauled steam railroad cars and the interurban electric cars of the Southern Pacific.

The efficacy of truss-side design was borne out by the experience of the South Shore Line: in Mr. Vollmar's 1975 inspection of the vintage South Shore Line cars he detected no loose rivets on any of the 54 cars after nearly a half-century of hard high-speed service.[39] Despite the South Shore Line's good experience, truss-side construction was not found on any steam railroad passenger cars.[40]

Because the vintage South Shore Line cars used the truss-side framing method, the South Shore Line vintage cars were engineered to the framing standards typical of interurban cars of the 1920s, therefore the South Shore Line cars are not framed to the standards of steam railroad equipment built for locomotive-hauled or electric self-propelled service.

[39] Vollmar, supra note 27, at 14.

[40] Traction Classics: The Interurbans, the Great Wood and Steel Cars, Middleton, at 133.

Car Construction:

Steam railroad car construction in the era of the heavyweight steel car was driven in part by the hazards inherent in their service – steam railroad train operation risked mixing live steam boilers with paying customers. The hazard of fire was particularly acute once steam railroads began tunneling.

A rational fear of fire in tunnel operations arose after an electrical fire ignited on board a Paris Metro train in 1903 in which the wooden cars were completely consumed and 84 people perished. A fire in a subway of the Interborough Rapid Transit in New York City on 29 March 1905 graphically showed the dangers of operating wooden cars in tunnels and the benefit to safety of using steel cars. After a seven-car train overran the end of track, a fire broke out completely destroying the five wooden cars in the train; the two steel cars suffered only minor damage to their structures. Fortunately, the train was not in service and no passengers or crew perished.[41]

The Railroad Gazette took note of the subway fires and editorialized in support of a conversion to steel cars.[42] Railroading is a very conservative field, and a complete conversion from wood to steel carbuilding was an enormous undertaking given that the carbuilders themselves had a vested interest in the continuation of wood car construction given their investment in woodworking equipment. But the risk of fire was too great as tunneling became prevalent in urban areas and mountain country. The conversion to steel carbuilding for the steam railroads was relatively quick and completed by 1912, a year before the first order for steel interurban cars.

As the steam railroads developed their first experimental steel passenger cars, there was a tendency to dismiss the need to produce absolutely fire-proof cars. Wood roofs and interiors prevailed. As the production of all-steel cars was perfected and widely adopted, wood was entirely eliminated from the steam railroad passenger car with the exception of small items such as seat armrests. The Carbuilders' Cyclopedia of 1925 summed up the transformation:

> The substitution of steel for wood has meant the replacement of wood trim and cabinet work by sheet steel doors, windows, and interior finish. Plainness, neatness, and sanitary considerations are now given first consideration….[43]

Once the interurbans began to purchase steel cars in 1913, the electric cars did not follow the general trend toward all-steel car construction with the exception

[41] *Another Accident in the New York Subway*, 55 The R.R. Gazette, April 7, 1905, at 329-30.
[42] *Wooden Cars in the Subway*, 55 The R.R. Gazette, April 7, 1905, at 318-19.
[43] The Master Car Builders' Ass'n, Car Builders' Cyclopedia of American Practice 431 (1925).

of inexpensive "receiver's cars" bought for roads that were either too poor for embellishments or under court order to skimp on the amenities. The typical "steel" interurban car was distinguished from steel steam railroad cars by using wood for 1) roof-sheathing, 2) interior lining, and 3) flooring. The South Shore Line interurban cars were steel-structured cars, but the use of wood was extensive in their construction. What follows is a top-down analysis:

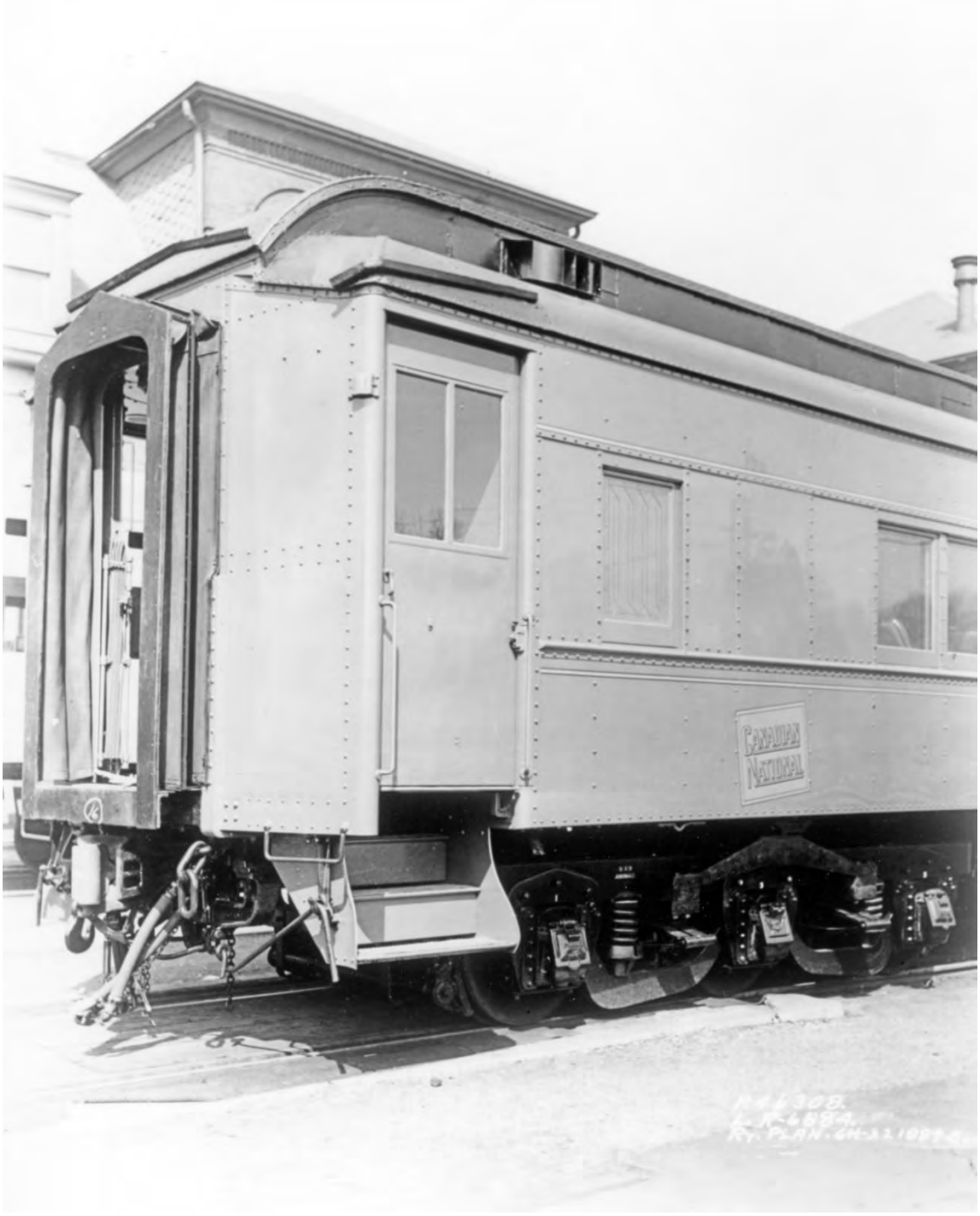
Roof sheathing:

Steel had replaced wood generally in the construction of steam railroad car roofs, but the South Shore Line cars used wood for the decking and intermediate carlines. Tongue-and-groove wood decking was attached to wood carlines that rested on top of the side structure. Every third wood carline was attached to a steel carline. Wood tack molding was attached to the top of the steel car sides as a place to drive the tacks that held the canvas that covered the wood decking.

Steel roofs prevailed across all classes of steam railroad equipment including the interurban and suburban cars of the Southern Pacific. Pacific Electric car #1108, 31 August 1941. (Photographer credit: Victor Vinzent DuBrutz).

Although some steam railroads used wood roofs in the steel car era for locomotive-hauled cars, none of the electric self-propelled suburban cars or interurban cars of the steam railroads used wood roofs. But the interurbans used

wood roofs almost exclusively throughout the steel car era including on the lightweight streamlined cars that were built at the end of the interurban era.[44]



Canadian National coach at Pullman, 1942. Early steel clerestory roofs were prone to leaking and a few roads reverted to canvas-covered wood roofs. Pullman developed a cap joint seen above where the vestibule corner post meets the roof. Some steam railroads used steel arch roofs which were far simpler to build and maintain than the clerestory. (Photographer credit: Pullman Car & Manufacturing Co.).

[44] Author's observation from reviewing photographs in private collections.

Interior lining:

Car interiors on the steam railroads were typically steel with aluminum trim often painted with a wood graining technique to give the appearance of the earlier wood cars. But on the interurban roads, there were divergent applications of wood in car interiors often driven by the relative prosperity of the company. Typical interurban cars were lined with mahogany veneer but cherry was also seen. Oak has a tendency to crack, but parlor-observation cars for the Waterloo, Cedar Falls and Northern used quarter-sawn oak throughout.[45]

Interurbans in receivership but needing to replace elderly wooden cars would often have to forgo niceties such as wood interiors. Cheap "receiver's cars" bought while the interurbans were in receivership or in cost-cutting mode used steel or a composite such as Agasote or Haskelite, and then finished the interiors with the same wood-graining technique as the steam railroads. The Chicago & Milwaukee Electric Brills of 1915, the Chicago, Aurora & Elgin Pullmans of 1922, and the Union Traction (Indiana) St. Louis cars of 1925 are good examples of receiver's cars and all had interiors lined with steel or a composite. Using steel, aluminum or composite materials for interior lining was especially common at the end of the interurban era.

All classes of the South Shore Line cars were lined with decorative wood: the coaches and parlor-observation cars were lined with mahogany, the parlor-observation-buffet cars were lined with walnut, and the dining cars were lined with painted poplar.

The Insull Group could well afford cars with mahogany or walnut interiors and applied them to cars built for the Interstate Public Service Company and the Columbus, Delaware and Marion of Ohio between 1924 and 1926. All these cars had mahogany walls and mahogany beamed ceilings.

The Insull Group had a 50% share in the ownership of the Illinois Traction System (ITS); North American Company owned the remaining shares. ITS bought a fleet of 17 lightweight cars in 1925 from St. Louis Car Company for its Illinois Valley division that had mahogany interiors. But not all the Insull Group car purchases specified wood interiors. The seven cars built in 1926 for the Indiana Service Corporation had interiors sheathed with a combination of steel and aluminum; mahogany was only used for the trim and doors.

[45] Editorial Correspondence, *Waterloo Cedar Falls & Northern Railway*, 11 Elec. Traction, 271, 277 (1915).

Floors:

Typical steam railroad practice in the steel car era was to pour a concrete floor product called Flexolith over steel lath.[46] The Southern Pacific PE and Oregon Electric cars also had Flexolith poured floors.[47] The exceptions to this practice were found on the Northern Pacific and on the railroads of Canada where a wood floor was easier to keep warm in cold weather. The interurbans uniformly used wood flooring as this resulted in a lighter car – critical to keeping electricity costs low.

The South Shore Line followed typical interurban practice in constructing all of their steel cars with a floor system built up from two layers of long-leaf yellow pine over a 1/16" steel sub-floor. A survey of the car orders in the Electric Railway Journal and Electric Traction magazines covering the period of interurban steel car construction turned up no exceptions to the rule that interurban cars were built exclusively with wood floor systems.

Because the builders of the South Shore Line cars made liberal use of wood in their construction, the South Shore Line cars were constructed to the standards of typical steel interurban cars of the 1920s, and therefore not the construction standards of the steam railroads for any class of equipment either locomotive-hauled or electric self-propelled.

Car Coupling and Draft Hardware:

This section describes the car hardware used to couple cars into a train, and that hardware which absorbs the longitudinal forces of coupled cars in a train.

The couplings between South Shore Line cars are Ohio Brass Form 23 couplers. These couplers attach to the carbody by means of a ball-and-socket arrangement at the rear end of the coupler and travel side-to-side near the front of the coupler by means of a radius bar in typical interurban fashion. This ball-and-socket and radius bar arrangement are required to negotiate tight-radius curves often found in interurban street trackage. This arrangement is not known on any steam locomotive-hauled railroad trains or electric suburban trains. The SP PE and Oregon interurbans encountered street running in both operations and equipped their interurban cars operated in those states with similar radius bar equipment.

[46] White, supra note 5, at 153.

[47] Fred F. Small, *New All-Steel Passenger Cars for the Pacific Electric Railway*, 46 Elec. Ry. J., 489, 489 (1915).

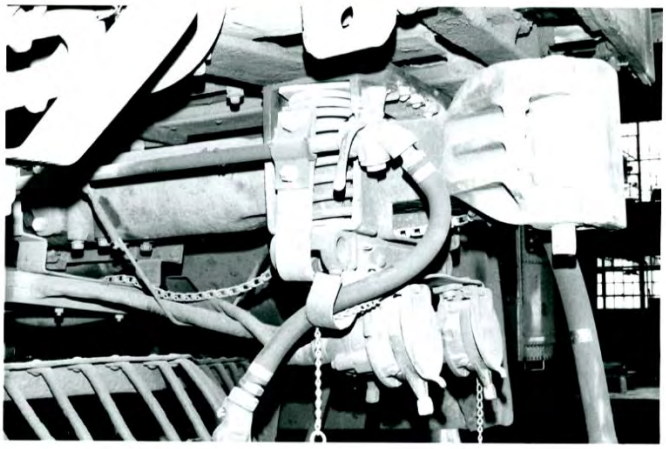


Fig. 38

Coupler and radial carrier.

Fig. 39

Draft attachment ball anchor bolted to draft sill.

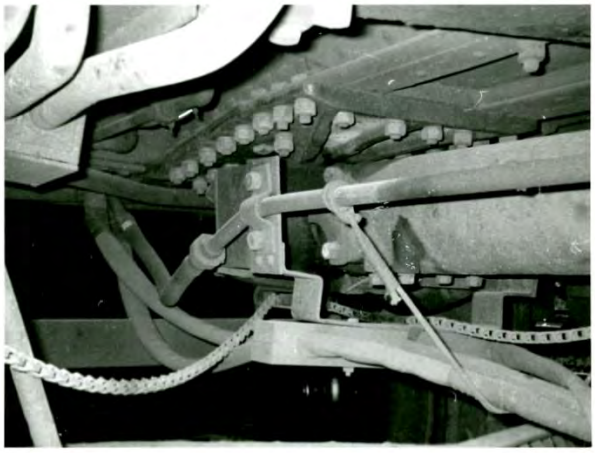
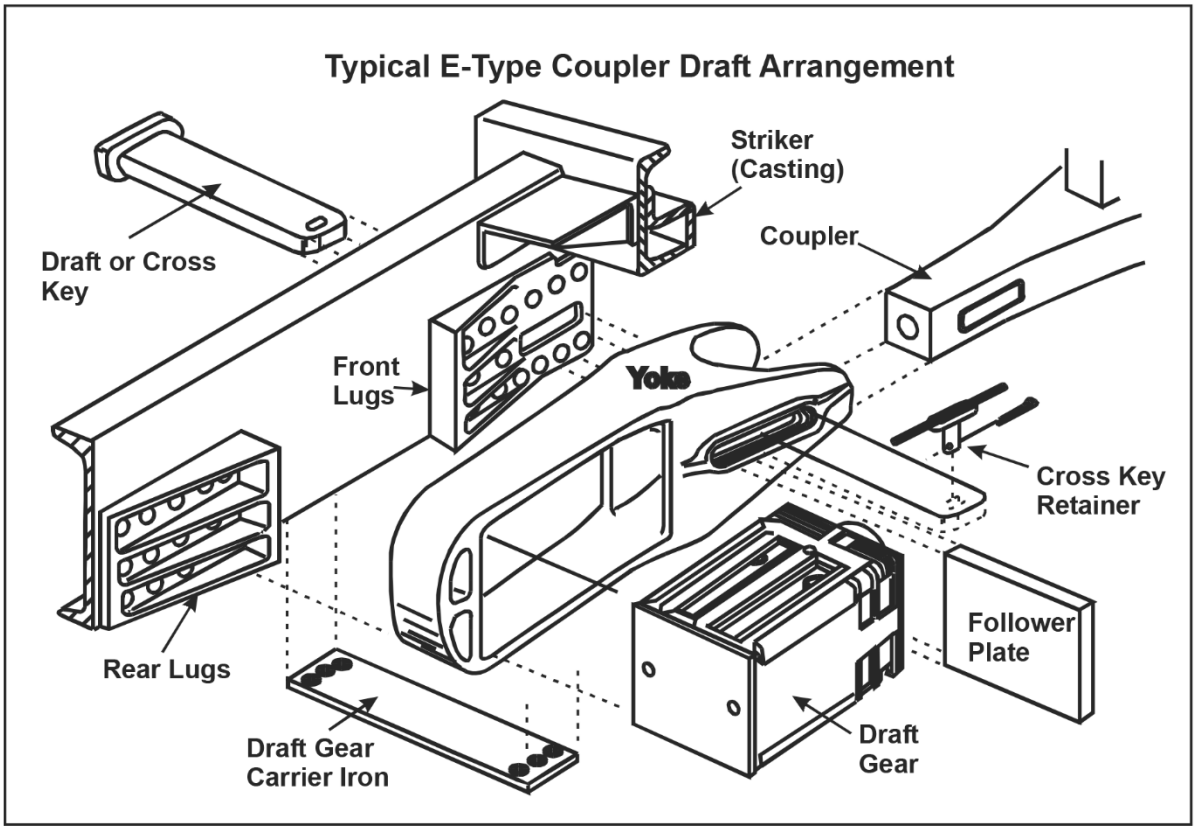


Fig. 40

Ball draft attachment.

Illustrations from the Louis T. Klauder structural evaluation of the South Shore Line interurban cars showing the arrangement of coupling equipment. (Photographer credit for three images: John R. Vollmar).

Draft gear is used on railroad equipment to absorb the longitudinal forces of train operation. The Ohio Brass Form 23 coupler contains the car's draft gear in the coupler; steam railroad cars have their draft gear behind the coupler in the center sill of the car to restrict its movement. The draft gear is tied to the coupler with a yoke and cross key retainer.



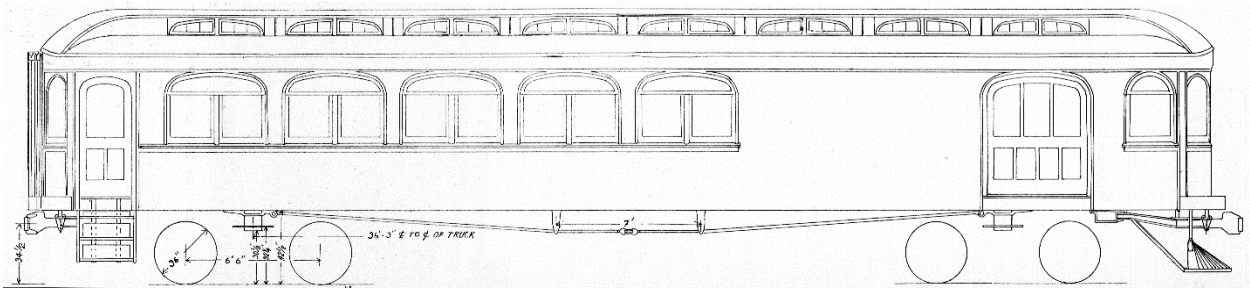
Exploded view showing typical coupler and draft arrangements for steam railroad equipment. This arrangement differs from the South Shore Line and all other interurban car coupler and draft gear arrangements as it is a rigid system mounted between the center sills of the car; interurban couplers and draft gear are hung from the center sills and swivel.

Diaphragms fitted to railroad car ends create an enclosed passage between cars. The diaphragm buffing device also absorbs some of the longitudinal pushing and pulling effects of coupled cars. The South Shore Line cars are fitted with diaphragms and diaphragm buffing devices identical to those used on contemporary steam railroad equipment, but this was not unique among the interurbans.

The Cedar Rapids and Iowa City (CRANDIC) had steam railroad diaphragms on a combination coach-baggage coach-trailer train of 1909,[48] and the Oregon

[48] *Cars for Cedar Rapids & Iowa City Railway*, 5 Electric Traction Weekly, 646 (1909) (photographs of the cars in Niles Car & Manufacturing Company advertisements show the diaphragms).

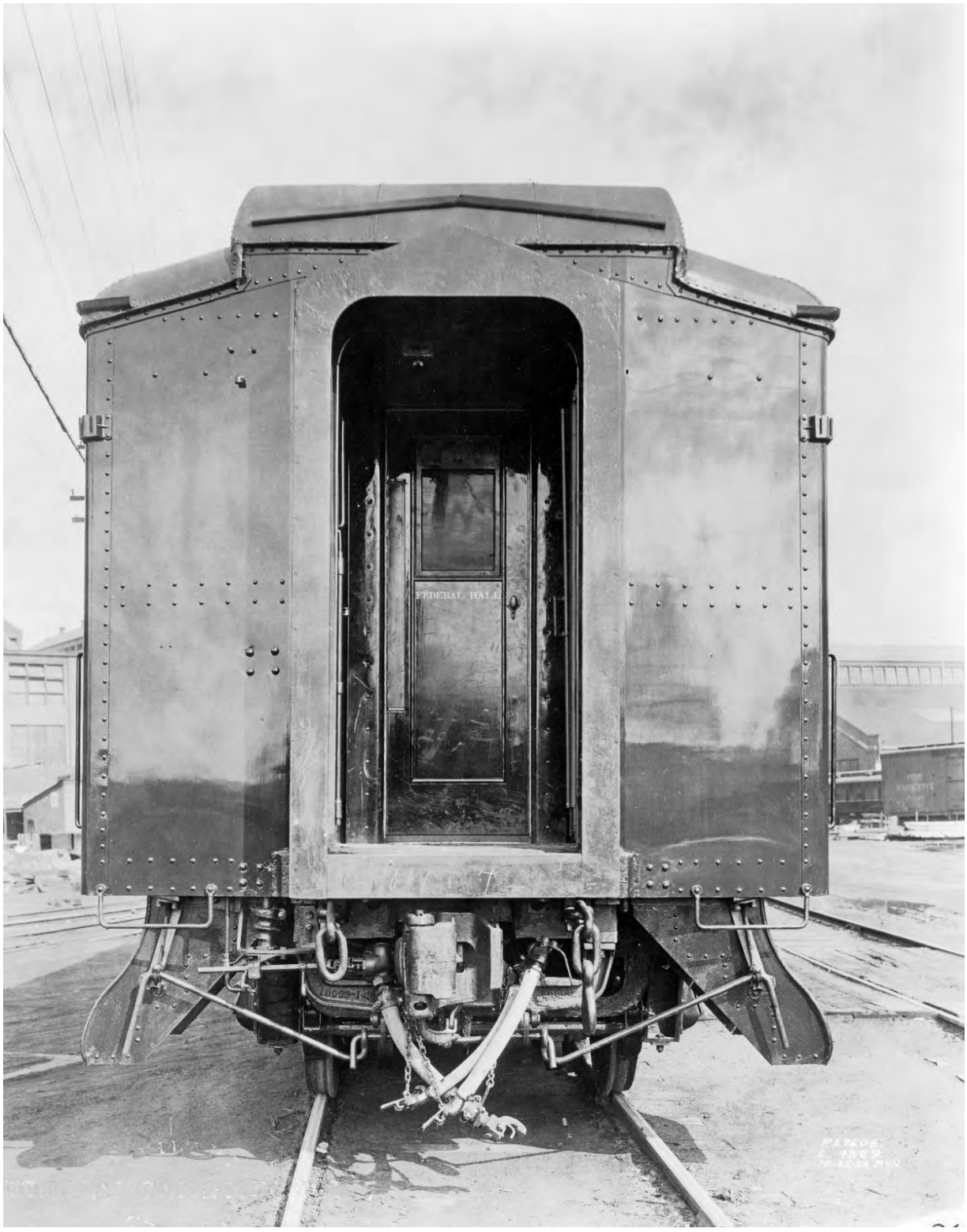
Electric trains had the same arrangement on its deluxe parlor-buffet trains built in 1910.[49]



Oregon Electric combination coach-baggage car with diaphragm and buffing device at the rear. The parlor-observation cars used in train service with the combination coach-baggage car had a matching diaphragm and buffing device at the front. Source: Electric Traction Weekly; vol. 6, p. 1028 (1910).

These early attempts at a covered passageway between cars during the wood car era were not repeated on the interurbans in the heavyweight steel car era except on the South Shore Line. If all the data collected for this article were shown on a Venn Diagram, this is the only place where the South Shore Line cars and their steam railroad contemporaries would overlap.

[49] *New Car for Oregon Electric Railway*, 6 Electric Traction Weekly, 1027, 1028 (1910).



Pullman observation car Federal Hall at Pullman, 22 October 1924. The Waugh diaphragm at the end of Federal Hall is identical to those installed on the South Shore Line coaches and deluxe cars. (Photographer credit: John P. Van Vorst for Pullman Car & Manufacturing Co.)

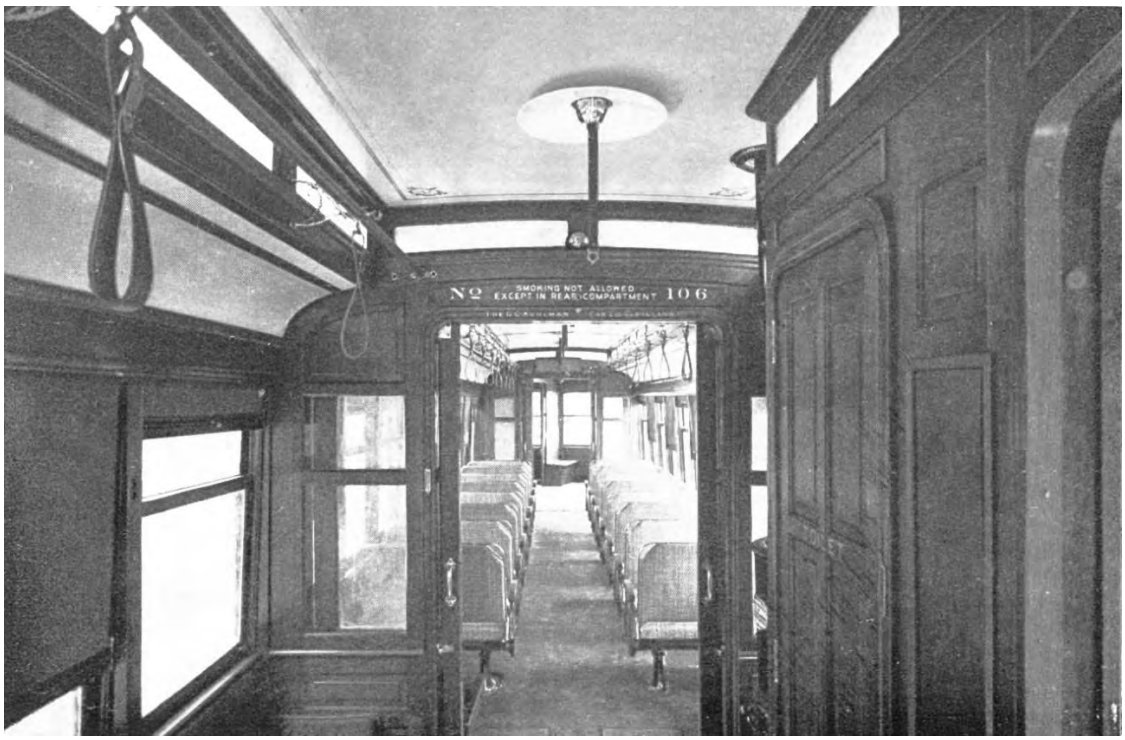
South Shore Line car #27, Standard Steel Car Company, Hammond, Indiana, 1929. The diaphragms and buffers were manufactured by the Waugh Draft Gear Company of Chicago. A standard Adams & Westlake diaphragm curtain meant to keep fingers away from the steel plates while the train is in motion is mounted to the right (non-cab) body collision post. (Photographer credit: Standard Steel Car Company).

Because the vintage South Shore Line cars used couplers and draft gear typical of interurban cars of the 1920s, they were not built with car couplers and draft gear in a manner like the steam railroads. However, the diaphragm and its buffing device is identical to steam railroad passenger car equipment. Therefore, this hybrid system taken as a whole, was not consistent with steam railroad equipment of any class or typical interurban equipment practice in the steel car era.

Interior Appointments:

Because the interurbans were in decline in the late 1920s, the South Shore Line cars have a high level of interior appointments not generally seen on the interurbans of the period in which they were built. Steam railroad coach equipment was generally austere after the coming of steel car construction. Because of the slim-to-none profitability of suburban commuter service, self-propelled electric suburban cars were exceptionally austere. What the South Shore Line coaches had that their steam railroad contemporaries lacked included modern rotating bucket seats upholstered in German mohair, mahogany paneling and trim throughout, as well as brass lamps and other brass decorative fixtures.

While in decline, many interurbans restyled the interiors of their ancient wooden cars with modern appointments hoping to recapture traffic lost to the bus and the private automobile. Correctly, the interurbans concluded that their competition was on the parallel paved highway and not on the parallel steam railroad. Restyled cars took their cues from the former, not the latter, and matched the comfort of contemporary buses and automobiles. Wooden cars twenty years old were hauled into the company shops and refitted with the newest automotive-type bucket seats, decorative lighting, and occasionally an arch roof. The steam railroads stuck with what was familiar: walkover seats and the dated clerestory.



Wisconsin Traction, Light, Heat and Power (WTLH&P) car #106, G.C. Kuhlman Car Co., Cleveland, O., 1909. This car was part of an order for 21 identical cars, six for service in Appleton and fifteen for service in Milwaukee. (Photographer credit: J.G. Brill Co.).

The Milwaukee Electric Railway & Light Co. (TMER&L) rebuilt car #1138, Milwaukee, Wisconsin, 1924. The history of the rebuilt cars of TMER&L is complex, but illustrative. TMER&L reorganized its traction properties including its separate operation at Appleton in 1923. All the WTLH&P and TMER&L cars were rebuilt in 1924 to this general pattern. Leather upholstered bucket seats replaced rattan walkovers and decorative light fixtures replaced bare bulbs, but the clerestory roof section remained.[50] [51] [52]

[50] Brill City & Interurban Cars, 29, 67 (1910).
[51] Badger Traction, Cent. Elec. Railfans' Ass'n., 38-9 (1969).
[52] Canfield, *supra* note 14, at 497.

The Chicago, Lake Shore and South Bend Railway (South Shore Lines) coach trailer car #108 at the G.C. Kuhlman Car Co., Cleveland, O., 1908.[53] *The South Shore Lines cars were a cut above the ordinary at the start: typical interurban cars of the era used bare bulb light fixtures and walkover seats without extra padding at both the bottom and top of the back. The extra padding gave better back and neck support than the seats normally provided by street railways or some steam railroads.*

[53] Brill City & Interurban Cars, *supra* note 50, at 28, 65.

South Shore Line coach trailer car #224, Michigan City, Indiana, 1927. The South Shore Line originally contemplated operating a mixed fleet of wooden and new steel cars. Rebuilt from South Shore Lines car #106, South Shore Line car #224 was one of only two wooden cars to operate with the steel cars, far short of what was expected. Originally, ten coach trailers and eighteen motor cars were to have been rebuilt.[54] (Photographer Credit: E.C. Calvert, Photographer, Michigan City, Indiana).

On 1 January 1928, the South Shore Line suffered a fatal wreck at Parsons in Chicago in which two steel cars were severely damaged; car #10 burned. It is likely that the Parsons wreck gave the South Shore Line good reason to abandon operating the mixed fleet. The rebuilding of wooden cars ceased and additional steel cars were ordered for delivery in November 1928, but the delivery was delayed until February 1929. The two rebuilt coach trailers were removed from passenger service the following month.[55]

[54] Chicago, South Shore and South Bend Railroad, Specifications for Rebuilding Cars 1 to 15, 75, 76, 77, and 101 to 110, Jan. 15, 1926.

[55] Chicago, South Shore and South Bend Railroad, Authorization for Expenditure 491, Mar. 21, 1929; R.O. 8015, Mar. 2, 1929.

Indiana Union Traction car #428, combination coach-baggage car interior, view toward the front, St. Louis Car Company, November 1925. After the interurban carbuilders adopted steel for construction, the interior layout of the cars remained unchanged: there were still separate compartments for the general public, smokers, and baggage. This car was equipped to operate as a single unit, in multiple with other combination coach-baggage cars, or with a parlor-observation-buffet car on the Indianapolis-Fort Wayne runs. (Image Courtesy of the John W. Barriger III National Railroad Library).

The South Shore Line steel cars were designed over the course of three years beginning in 1925, this at a time when the state-of-the-art for comfort in interurban cars was shifting. The first group of South Shore Line cars were a mix of old and new: decorative ceiling fixtures brightly illuminated rows of walkover seats.

As the first South Shore Line cars arrived from Pullman in the Summer of 1926, company vice-president Samuel Insull, Jr. was disappointed in the look of the new cars. Insull, Jr. had asked the engineering department to develop a car to the standards of the steam railroads of the day. But Insull, Jr. felt that the new South Shore Line cars were "nothing but overgrown 'L' cars."[56] As the car deliveries

[56] Interviews with Samuel Insull, Jr., 1978.

continued over the next three years, there were several updates to the car's interior design, some obvious, others subtle, but most of the updates were intended to keep up with the public's changing tastes.

Charles H. Jones, the South Shore Line's general manager, understood that travelers who used the steam railroads had come to expect the same amenities on the South Shore Line. However, by 1927, the updates to the South Shore Line railcars were also designed to compete directly with automobile travel:

> Car equipment comes under the closest scrutiny of the traveling public…. Our railcar standards have been raised and are now based on the luxurious finish and comfort of the modern sedan automobile.[57]

Male steam railroad travelers had come to expect the privacy of the men's smoking room. The first South Shore Line car order included six coaches that had what South Shore Line promotional material called a "Pullman-type" smoking compartment. The aisle at the smoking compartment was at the side of the car rather than down the center. Women did not have to pass through the smoking compartment to exit the car but could walk around it instead. Genuine leather upholstery was used in the Pullman-type smoking compartments.

All automobile passengers had come to expect the comfort of bucket seats and they were included in South Shore Line coaches delivered in 1927 and 1929. In March 1931, the bucket seats from the two retired wood trailers were installed in the main compartments of combination coach-baggage cars 100-105 "to provide greater comfort for passengers … between Chicago and South Bend." [58]

What follows is a visual tour of the evolution in South Shore Line car interior design contrasted with their steam railroad contemporaries.

[57] C.H. Jones, *Heavy Interurban Meets the Urge of Automobile Competition*, 70 Elec. Ry. J. 496, 497 (1927).
[58] Chicago, South Shore and South Bend Railroad, Authorization for Expenditure 655, Mar. 12, 1931.

The short and happy evolution of the South Shore Line passenger car fleet: the first coaches were delivered in 1926. The smoking compartment was beyond the door at the center of the image. The seats in the main compartment were upholstered in green patterned "cut, no-cut" German mohair; the seats in the smoking compartment were imitation leather. Car #3 at Pullman, 13 July 1926. (Photographer credit: John P. Van Vorst for Pullman Car & Manufacturing Company).

Combination coach-baggage car #106, at Pullman, 25 June 1926. This view is from the back of the main compartment looking toward the front of the car. Beyond the first partition is the smoking compartment, and past the second is the baggage room. This arrangement is identical to that of CSB&NI combination coach-baggage car #305, supra.

Because the South Shore Line had no means of turning cars at the Chicago terminal, the seats are reversible by grabbing ahold of the handles at the edge of the seat backs and "walking" them over to face the opposite direction. (Photographer credit: John P. Van Vorst for Pullman Car & Manufacturing Company).

South Shore Line car #21 at Pullman, 16 August 1927. The South Shore Line was slow to adopt bucket seats in light of the trend already underway in the interurban industry. The bucket seats sat on a turntable mechanism. Depressing a foot pedal just below the seat cushion allowed the bucket seats to be turned to face forward. Non-motorized coach trailers were similar but had a single unisex restroom; the motor cars had separate restrooms for men and women. (Photographer credit: John P. Van Vorst for Pullman Car & Manufacturing Company).

South Shore Line car #27 at Standard Steel Car Company, Hammond, Indiana, circa February 1929. This was the final form of the South Shore Line coaches. The improvements in the car interiors between the final two car orders were insignificant: the aisle partition between the main and smoking compartments was eliminated, patterned linoleum graced the floor, and seating manufacturer Hale & Kilburn had increased the arch of the seat backs for a refined appearance. Other minor changes from the earlier cars included a different style of center lamp. (Photographer credit: Standard Steel Car Company).

Baltimore and Ohio Railroad car #5315, at Pullman 30 September 1927. Contemporary steam railroad car design was stagnant throughout the 1920s. The walkover seats in this view are of an older design that lacked the back and "head roll" neck support of those in the wooden South Shore Lines coaches of a generation before. The design of steam railroad day coaches was a full decade behind the design standards of the interurbans.[59] *But the steam railroads ignored the impact of the automobile at their own peril. (Photographer credit: John P. Van Vorst for Pullman Car & Manufacturing Company).*

[59] White, p 377

Illinois Central electric self-propelled suburban commuter car, Pullman, 7 March 1929. In its austerity, gone from the Baltimore and Ohio railroad day coach above are decorative ceiling stripes, overhead center lamps, fans, baggage racks, arm rests, and mohair upholstery. Instead, there is an assumption that the majority of passengers on crowded rush period trains will not get a seat on their journey home. This car seated 84 but was expected to accommodate 109 standees. Just inside the vestibule doors, there are porcelain-coated straps for standees to hold on to while the train lurched from station to station. (Photographer credit: John P. Van Vorst for Pullman Car & Manufacturing Company).

South Shore Line car #33 at Indianapolis, in 2004, over 4 million miles and 75 years after it entered service in February 1929. (Photographer credit: John P. Hankey).

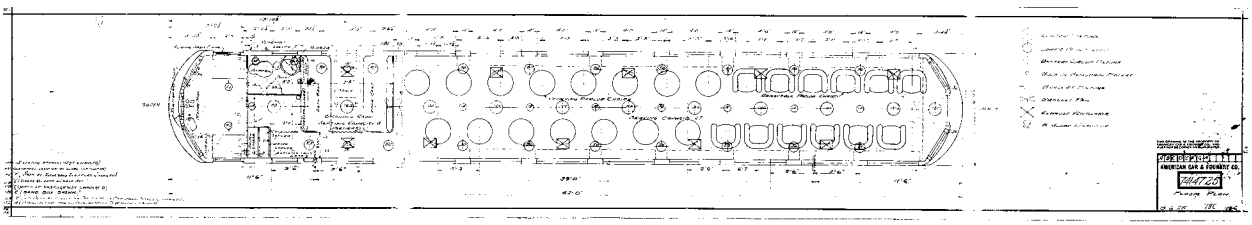
An argument has been made that the Pullman-type smoking compartments gave the South Shore Line cars the feel of a ride aboard steam railroad equipment as they were not frequently seen on interurban cars. These bench seat compartments were most often found on sleeping, café-parlor, and parlor-observation cars on the steam railroads, and integrated with the men's saloon (archaic railroad term for toilet).

Pullman-type smoking compartments were not found on steam railroad coaches in significant numbers. Although the Chicago, Milwaukee and St. Paul did purchase some coaches arranged with so-called Pullman-type smoking compartments from American Car & Foundry (AC&F) in 1912,[60] the steam railroads were otherwise nearly universal in providing a smoking car for those coach passengers inclined to smoke, not a separate smoking compartment.

These so-called Pullman-type smoking compartments with bench seats, but not integrated with a restroom, were a feature on several interurban cars of the Insull Group. The Interstate Public Service (Indiana) coach trailers with observation platforms were rebuilt with Pullman-type smoking compartments in

[60] Chicago, Milwaukee & St. Paul , Floor Plan Passenger Cars 4266-4285, Drawing No. 14967A, Aug. 26, 1912.

1921, again by AC&F;[61] the North Shore Line had Pullman-type smoking compartments on their parlor-observation cars built by Cincinnati Car Company as early as 1923;[62] the parlor cars built in 1926 by the St. Louis Car Company for the Indiana Service Corporation had Pullman-type smoking compartments;[63] and the parlor-observation cars built by AC&F for the Columbus Delaware and Marion had so-called Pullman-type smoking compartments as well.[64]



Columbus, Delaware & Marion parlor-observation car floor plan, 6 August 1925. The arrangement of the Insull-type smoking compartment is consistent with those on the cars of the interurbans of the Insull Group including the Interstate Public Service Company, North Shore Line, Indiana Service Corporation, and South Shore Line. All the Insull-type smoking compartments were located at the front of their cars on the right.

The Insull Group promotional materials stated that their smoking compartments were similar to those in steam railroad Pullmans,[65] a misstatement as these seem to be better associated with carbuilder AC&F. The crews on the South Shore Line called them box smokers. This is an opportunity to either adopt the name given to them by the crew members who worked the cars or call them something else, perhaps Insull-type smokers as their adoption was almost entirely confined to several Insull Group interurbans.

Because so-called Pullman-type smoking compartments are a novel feature of Insull Group interurban cars and not generally found on the steam railroads or other interurbans, therefore they are not a standard of the steam railroads or any other railroads.

[61] Jerry Marlette, Interstate: A History of Interstate Public Service Rail Operations 133 (1990).
[62] Chicago North Shore & Milwaukee Railroad, General Plan and Elevation 1922 Steel Trailer Observation Parlor Cars, Sheet No. CRS-620, June 1922.
[63] George K. Bradley, Fort Wayne & Wabash Valley Trolleys, 275 (1983).
[64] American Car & Foundry Co., 7414725, Floor Plan CD&M 500-501, Aug. 6, 1925.
[65] Carlson, supra note 3, at 88.

Insull-type smoking compartment in South Shore Line car #33. After smoking was prohibited on the South Shore Line in 1970s, these semi-private compartments became a passenger favorite. The usual office procedure in Chicago's Loop was to send a person to the trains waiting for boarding at Randolph Street Station before quitting time so that they could "hold" a box smoker for the rest of the staff for the shared ride home. (Photographer credit: John P. Hankey).

Trucks:

Vollmar noted in his structural evaluation of the South Shore Line cars that the trucks "are of the old Baldwin interurban design consisting of a number of forgings and several cast details … most of the elements are connected with fit bolts."[66] Similar fabricated trucks from Baldwin and others dominated the rosters of interurban companies throughout North America. Baldwin designed its interurban trucks as a fabricated truck built up from steel shapes using an equalized arch bar frame with the bolster mounted on swing-links. Fabricated passenger car trucks are generally contrary to steam railroad practice; none of the fabricated trucks in steam railroad service used an equalized arch bar truck frame.

The steam railroads began the conversion from wood-beam to cast trucks following the successful use of cast trucks on Chicago's Lake Street Elevated Railroad.[67] Here, the electric 'L' advanced the technology nearly a decade before the steam railroads: the Lake Street Elevated had begun using cast iron trucks in 1896 and cast steel trucks two years later. The conversion to cast steel trucks on the steam railroads was slow. The first steam railroad car with cast steel trucks was a single baggage car for the New York Central equipped with them in 1904. It took to two years to put cast steel trucks under another sixteen more baggage cars.[68]

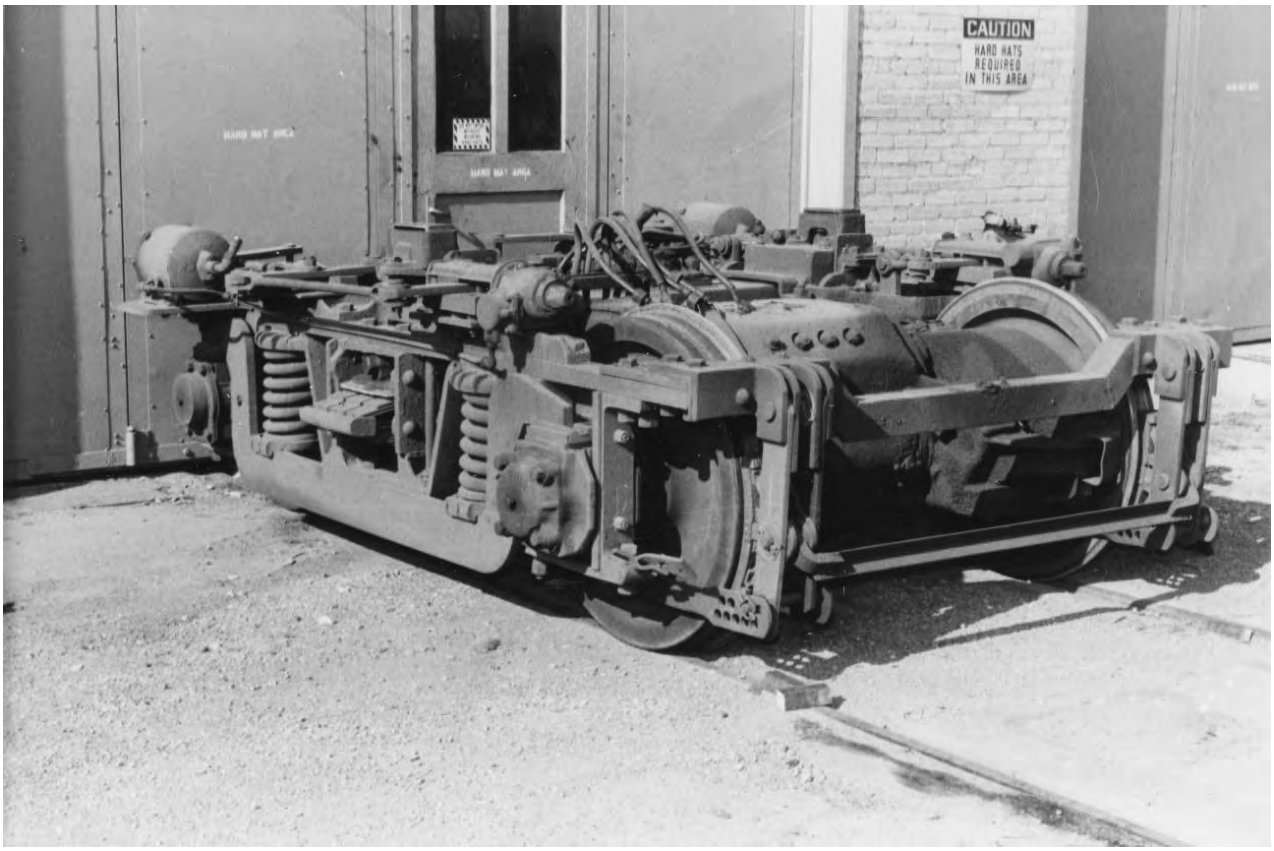
When steel trucks were universally adopted by the steam railroads, fabricated trucks of the type used by the interurbans were nearly universally absent. The Pennsylvania Railroad billed itself as the "standard railroad of the world." But its early all steel trucks were the fabricated exception to the cast trucks rule. Even these Pennsylvania Railroad trucks were oddities that the railroad itself discarded in less than a decade; there were no interurban railroads – or other railroads – that adopted the Pennsylvania Railroad truck design.[69]

The interurban and suburban operations of the SP were the other exception to the cast trucks rule. Other than ten cars outfitted in a 1911 experiment on the Alameda electrification,[70] the cars of the PE and Alameda electrification rode on Baldwin or similar fabricated trucks. When SP bought its last group of electric cars for the suburban NWP operation in Marin County, SP finally opted for cast trucks.[71]

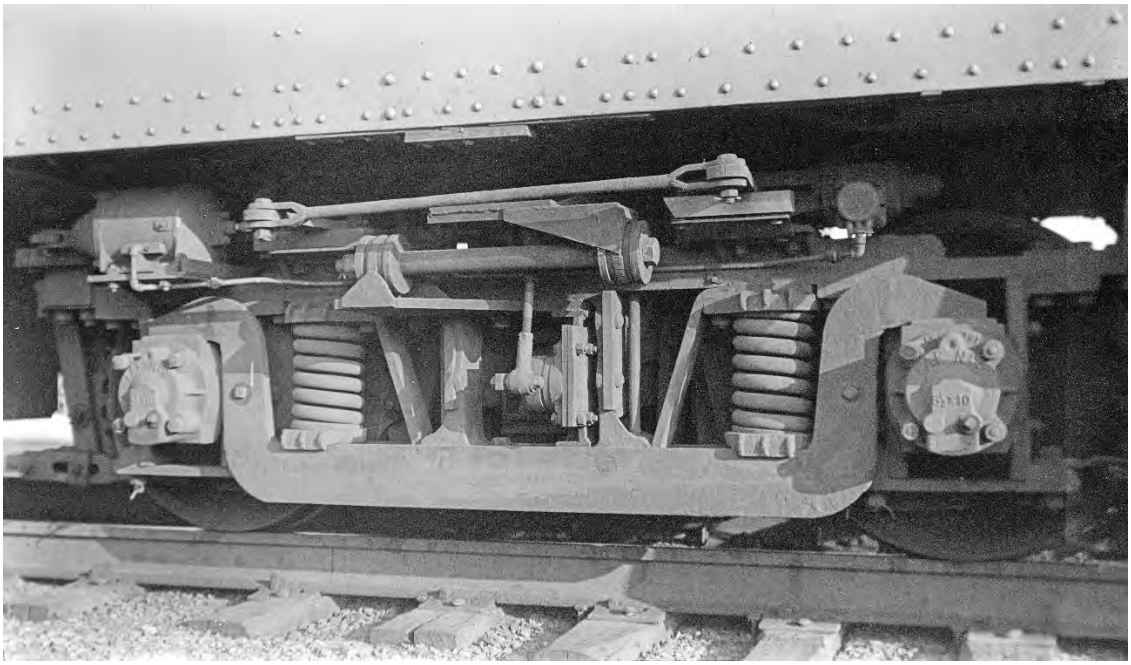
The trucks of the South Shore Line cars are Baldwin Locomotive Works class 84-40 – an 84" wheelbase truck with a 40,000 lb. capacity at the center bearing intended to carry the 80,000 lb. carbodies as built. When the South Shore Line

[66] Vollmar, *supra* note 27, at 12.
[67] White, *supra* note 5, at 505.
[68] *Id.* at 505-06.
[69] *Id.* at 506-07.
[70] Cast-Steel Motor Trucks for the Southern Pacific Company, 37 Elec. Ry. J. 470 (1910).
[71] Middleton, *supra* note 2, at 154, 237-8

began lengthening its cars in 1941, the truck center bearing capacity of the 36 lengthened cars was increased to 120,000 lbs. to carry the weight of the additional 17½'. The modified trucks of the lengthened cars are identified as class 84-60.



South Shore Line Baldwin-built complete motor truck from a lengthened car, Michigan City, Indiana, 1975. Of the 36 lengthened cars, 35 of them were modified with truck mounted brake cylinders as shown here. (Photographer credit: John R. Vollmar).



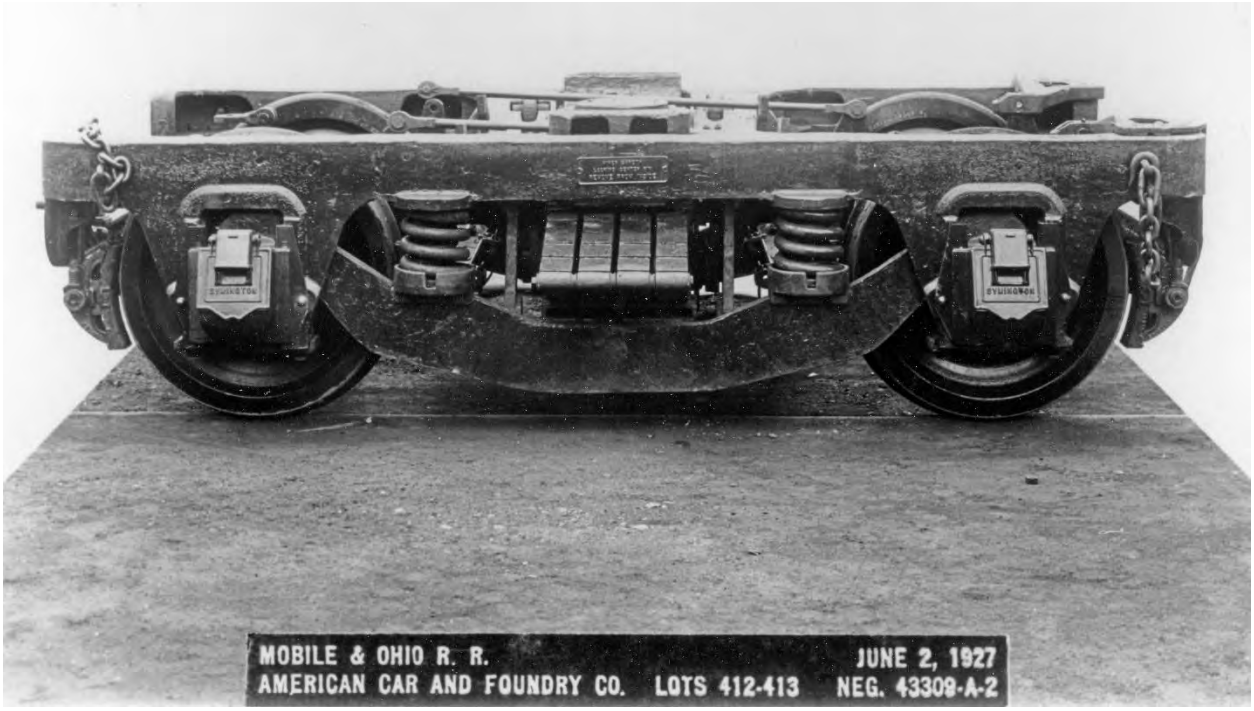
The trucks under car #107 were modified with horizontal stabilizers; the trucks under car #11 (shown here) were further modified with a shock absorber system eliminating the elliptic springs that carry the bolster.

In part because of their higher first cost, cast steel trucks for interurban cars did not see widespread use. Commonwealth Steel of Granite City, Illinois, was the primary manufacturer of cast trucks for the steam railroads and the interurbans, but only a few steel heavyweight interurban cars were built to ride on cast steel trucks.[72] The exceptions included five center entrance cars built for the Alton, Grafton & St. Louis in 1917 and nineteen of twenty cars built by Pullman for the Chicago, Aurora and Elgin (Sunset Lines) in 1923. The one odd car in the builder's lot rode on Baldwin trucks, while the remaining nineteen Sunset Lines cars rode on Commonwealth trucks.[73] Illinois Terminal used cast trucks under its unpowered coach trailers and parlor-buffet cars.

The use of cast steel trucks under interurban cars was most prevalent after the construction of heavyweight interurban cars had ended. The Indiana Railroad high-speed lightweight cars of 1931, the North Shore Line Electroliners of 1941, the Sunset Lines's St. Louis-built cars of 1945, and the Illinois Terminal streamliners of 1948-9 all used cast steel trucks. The South Shore Line parlor-observation-buffet and dining cars delivered in 1927 also rode on cast steel trucks; these deluxe cars are the only South Shore Line cars that rode on them. The parlor-observation-buffet, parlor-observation, and dining cars are covered in a separate narrative.

[72] White, *supra* note 5, at 509.

[73] Cent. Elec. Railfans' Ass'n., The Great Third Rail III-18 (1961).

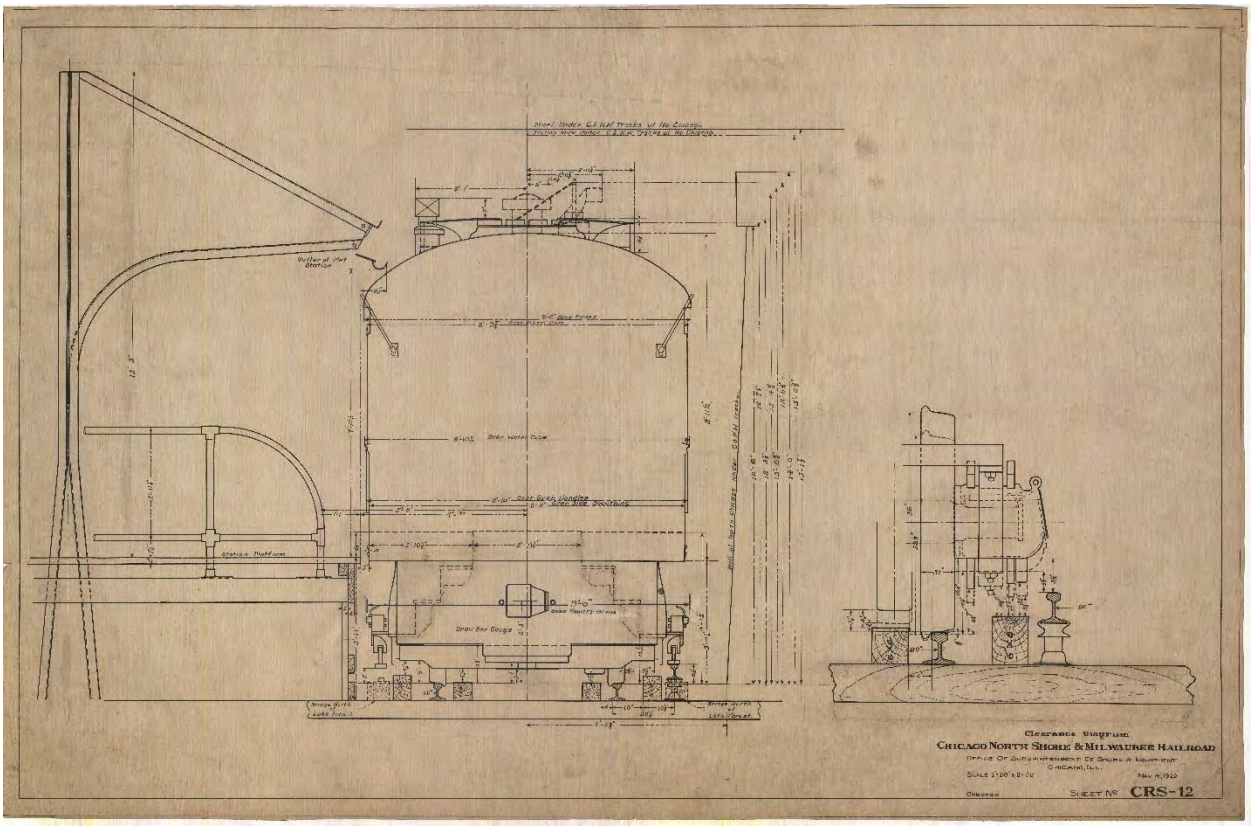


Typical cast steel steam railroad truck. The pedestals that hold the axle journal boxes on this truck are integral with the truck frame completely obviating the need to assemble any components of these trucks with fit bolts. Alternate versions of these trucks had the pedestals bolted on.

Because the South Shore Line cars used trucks typical of interurban cars of the 1920s, therefore, their trucks were not to the standard for steam railroad locomotive-hauled trains.

Dimensions and Weight:

The dimensions of interurban cars were most often dictated by the clearance restrictions of the elevated and street railways over which the interurbans operated in large cities and small towns.[74]



Clearance diagram for the North Shore Line, 4 May 1922. Restricting the dimensions of North Shore Line cars were the gutters of 'L' platforms on the West Side of Chicago; high-level platforms in Milwaukee, as well as in Chicago and its suburbs; the overhead steel work, trolley wire, and abutments at the Chicago and North Western Railway overhead crossing at North Chicago; and bridge clearances at Lake Forest. These forced dimensions directly affected car design.

There are three dimensions to consider:

1) Width,
2) Height,
3) And length.

[74] The dimensions of interurban and other electric railroad equipment quoted in this section were compiled from the extensive data published in the Street Railway Journal, Electric Railway Journal, and Electric Traction Weekly from 1885 and 1934. Several specific articles that discuss equipment dimensions are cited below.

Width:

The width of interurban cars was most often bedeviled by the "devil strip," the narrow space between two tracks of a double-track street railroad. As interurbans most often operated over street railroads that they did not control to enter cities and towns, tight clearances controlled car width. The typical width of the devil strip was 4', but in Ohio, 3½' was also seen.[75]

The built environment outside the rails impacted widths as well. In Chicago, the Insull Group interurbans that entered the city from the north and west came in over the 'L' which was also owned by the Insull Group. Chicago 'L' trains used high-level platforms with canopies and third rail power pickup; all the dimensions of North Shore Line and Sunset Lines car were constrained by these factors.

The tight radius curves of urban rails at street corners not only constrained the width of the cars, but the taper and curvature of the end vestibules as well. On the Chicago 'L', the minimum radius was 90', and on street railways the radius was usually 35' to 40'. All these factors combined so that interurban car width was most often between 8' and 9' capped off with gracefully rounded ends.

[75] Hilton & Due, *supra* note 1, at 51

Chicago's 'L' created a myriad of problems for the design of the interurban cars that traveled to the Loop. None solved the problems more eloquently than the North Shore Line Electroliners built by the St. Louis Car Company in 1941.

The problem of platform width was defeated by using the curved side developed for light weight cars of a generation before, this giving the Electroliners a 6" advantage over the 8' 8" standard width North Shore Line car. The articulation used by TMER&L and the WB&A in the late 1920s allowed the 155' 4" Electroliners to negotiate the 90' radius curves. Streamlining developed for the interurbans at the beginning of the Great Depression was further refined allowing for a free-running speed of 86 mph once the Electroliners left the confines of Chicago's 'L' on the way to Milwaukee. The train was internally connected by diaphragms allowing coach passengers uninterrupted passage to drinks and an Electroburger in the Tavern Lounge car.

This Electroliner is heading west at Lake and Wabash having just left the station stop at Randolph and Wabash, the transfer point from the South Shore Line terminal a half block away at Randolph and Michigan. This image was taken on 14 January 1963, just six days before the North Shore Line was abandoned.

Steam railroad passenger cars were most often approximately 10' in width. Because a narrow car led to undersized seats and small aisles, narrow interurban cars were not often a deliberate choice. When the opportunity was presented, wider cars were preferable. Those interurbans that were built with clearances to accommodate steam railroad freight cars throughout their length could also accommodate steam railroad-width passenger cars.

Examples of interurbans with steam railroad-width passenger cars include the Piedmont & Northern of the Carolinas; the Illinois Traction System; the Fort Dodge, Des Moines & Southern and the Waterloo, Cedar Falls & Northern in Iowa; and the Oakland, Antioch & Eastern of California. All these roads operated as freight haulers and all had passenger cars between 9' 7¼" and 10' 7" in width.[76] The Michigan United Railway expected to compete for freight traffic and operated passenger cars 9' 6¼" wide.[77] Therefore, those interurbans that were built with adequate clearances were more likely to operate cars that were approximately the width of standard steam railroad cars.

Exceptions included the Jamestown, Westfield and Northwestern Railroad (JW&NW), an electrified steam railroad which ordered its steel interurban cars in 1914, early in the steel car era. The JW&NW cars were only 8' 9¼" wide.[78] Much of the PE was also built to haul freight for parent SP, but PE interurban cars were 9' 4" in width. At least a portion of PE could accommodate wider cars; the cars operated by the SP in suburban service in the Bay Area were 10' 5 7/8" in width and moved to the PE after the Bay Area operations were abandoned before the start of World War II.[79]

Here, the South Shore Line cars were 9' 9¼" in width, constrained only by the high-level passenger platforms of the Illinois Central electrified suburban operations that the South Shore Line used to enter the central business district of Chicago from the South Side. From the start, what has become the South Shore Line was conceived as an electrified short-line freight hauler and passenger carrier by its original promotors.

Three brothers originally from Massachusetts, James, Frank, and Austin Seagrave, promoted the Toledo and Western, the Toledo and Chicago, as well as South Shore Line predecessor Chicago and Indiana Air Line Railroad as divisions in a passenger and freight link between the Toledo and Chicago.[80] The entire route

---

[76] *Waterloo, Cedar Falls & Northern Railway*, *supra* note 45, at 277 (the widest cars found were four combination coach-baggage cars for the Waterloo, Cedar Falls & Northern).
[77] *All-Steel Cars for the Michigan Railway*, 43 Elec. Ry. J. 1087, 1087 (1914).
[78] *Electrification of the Jamestown, Westfield & Northwestern Railroad*, 45 Elec. Ry. J. 1110, 1111 (1915).
[79] *Southern Pacific Electrification at Oakland: Rolling Stock and Repair Shops,* 37 Elec. Ry. J. 1048, 1049 (1910).
[80] *From Toledo to Chicago*, 21 St. Ry. J. 132 (1903).

from Fitch Yard in Toledo to Chicago had to be engineered to accommodate standard railroad freight cars.

Because the South Shore Line was built to accommodate standard steam railroad equipment, therefore the width of the South Shore Line cars would be expected to fall within the normal range found for interurban cars when those roads were engaged in freight hauling and accommodated standard steam railroad freight cars. The South Shore Line car width of 9' 9¼" is within that normal range.

Height:

How an interurban car is designed is complex engineering. Three factors affect the height of the cars. The most important factor that affects the height of interurban cars is the lowest clearance point above the railway's tracks. The location of the smallest dimension between the trolley wire and the top of rail is the lowest clearance point on an interurban.

The second factor that influences interurban car height is whether the cars are operated with a simple trolley pole or a pantagraph. Each has its own peculiarities and there does not seem to be a consensus as to what is the optimal trolley wire height for either; Hilton and Due believed that there was no relationship between wire height and car height.[81] [82] However, there is a minimum operating height for pantagraph operation: 3" above that height which must be maintained to keep the pantagraph from locking itself in the non-operating "down" position.[83] Because there is a minimum pantagraph operating height, therefore a lower trolley wire clearance forces a lower car height.

The third factor that determines the height of interurban cars is whether the cars are lightweight cars operated singly or heavyweight cars that operate in coupled trains. Here, wheel size and coupler height influence overall car height. Lightweight cars rode on small wheels – 24" to 28" was typical – as wheels are the most important place to reduce weight. The reduction of rotating weight reduces energy use and improves acceleration to a greater degree than a corresponding weight reduction of non-rotating equipment. Small wheels contributed to a lower car floor and a lower overall height, the latter generally in the range of 10' 1" to 11' 4" above the rail. The majority of lightweight interurban cars were operated singly and did not need to carry couplers.

Because heavyweight cars were often used in trains of coupled cars, they carried couplers. The American Electric Railway Association (AERA) recommended

[81] Hilton & Due, *supra* note 1, at 78.
[82] *Id.* at 57.
[83] Westinghouse Electric & Mfg. Co., Pantagraph Trolley – Spring Raised – Double Shoe – Type U.S. 142-A-2, Drawing #325545.

couplers configured to mate with those of the steam railroads because of a perceived, but largely unrealized, need to interchange passenger cars from the steam railroads.[84] The standard coupler height for passenger cars was 35" above the rail.[85] The standard height of steam railroad freight car couplers is described as a range of 31½" to 34½" above the rail dependent on whether the car is loaded or empty.[86] [87] The AERA recommended that the interurbans install knuckle couplers on their cars at the 31½" to 34½" height range used for the steam railroad freight cars.

Even though the steam railroad passenger car coupler standard height was 35", interchange of steam railroad passenger cars was mechanically feasible. However, there was actually very little interchange of passenger cars between steam and interurban roads. The Chicago & North Western Railway interchanged sleeping cars with the Waterloo, Cedar Falls & Northern,[88] and the Grand Junction & Grand River Valley Railway in Western Colorado operated steam railroad coaches of its parent Colorado Midland as trailers with motor cars,[89] but the practice was not widespread. The South Shore Line adopted the interurban standard for couplers of 34½" above the rail, and regularly operated cars from the steam railroads and the Pullman Company equipment pool for football specials serving the University of Notre Dame fans, staff, and players. The South Shore Line also borrowed steam railroad dining cars to meet seasonal and other equipment demands without any difficulty.

[84] Am. Elec. Ry. Ass'n., Proceedings 1912, *Couplers for Interurban Cars*, 675-7.
[85] The Master Car Builders' Ass'n., *supra* note 43, at 727.
[86] *Id.*
[87] Ass'n of Am. R.R.s, Interchange Rule 21.
[88] Hilton & Due, *supra* note 1, at 361.
[89] William L. McGuire & Charles Teed, Fruit Belt Route: The Railways of Grand Junction, Colorado 1890-1935 24, 45 (1981).

The University of Notre Dame football squad departing from the South Shore Line station in South Bend, circa 1927. The car at the end of the train is a sleeping car from a steam railroad. Interchange of steam railroad cars on the South Shore Line was common because of the need to move the football squads in sleeping accommodations and the influx of football fans for home games that would otherwise overwhelm the South Shore Line fleet.

For those keeping score, Knute Rockne is in the image toward the right near the baggage door on the combination coach-baggage car.

To achieve the coupler height in the range recommended by the AERA, heavyweight interurban cars typically rode on 34" to 38" wheels. The combination of coupler height and wheel diameter resulted in a range of heights for heavyweight interurban cars from 11' 10" to 13' 9". Steam railroad passenger cars were most often 14' 3" in height over the roof, often limited by the clearance inside tunnels.[90]

A limiting factor of the height of all cars that travel the South Shore Line is the low clearance of 16' 9" at the Pere Marquette (PM) underpass east of Michigan

[90] White, supra note 5, at 194-95 (discussing clearance limitations, or lack thereof on various railroads).

City.[91] Tolerance for trolley wire sag caused by hot weather in summer and snow and ice accumulations in winter also has to be taken into consideration. Apparently, the South Shore Line engineering staff felt that 1' 4¼" was the minimum acceptable clearance between the bottom of the trolley wire at the PM underpass and the top of pantagraphs in their lowest operating position. The height required for the roof equipment including the pantagraphs in their lowest operating position resulted in a height of 13' 1" over the roof as measured from the top of the rail for the South Shore Line cars.

The Pere Marquette Railroad (PM) overhead crossing east Michigan City is the lowest clearance on the South Shore Line at 16' 9". This low clearance was likely a determining factor in engineering the height of the South Shore Line cars. To avoid contact between the trolley wire and the steel PM bridge, insulating blocks are mounted above the primary trolley cable below the bridge to assure the minimum distance needed to avoid arcing.

The South Shore Line shared its Chicago terminal tracks with landlord Illinois Central (IC). The IC suburban line into Chicago had tight overhead clearances at Grand Crossing and under Grant Park in the IC station. The IC

[91] Northern Ind. Commuter Transp. District, Employee Timetable #6, Jan. 1, 2002.

suburban cars were 13' 0 5/16" tall; 11/16" shorter than the South Shore Line cars.[92] Low clearances on the Illinois Central were also likely a factor in determining the height of the South Shore Line cars.

Low overhead clearances and high platforms on the Illinois Central influenced South Shore Line car design. The height of the body of the car had to fit between the mechanical limits of the pantagraphs at their lowest operating position and the floor height dictated by the need for passengers to step seamlessly from the cars to the platforms. Roosevelt Road, Chicago, 24 October 1948.

There were other considerations in the design of the South Shore Line cars forced by the built environment of the Illinois Central. To meet the height of the high-level platforms on the Illinois Central, the rail to top of floor height of the South Shore Line cars is 4' 3".[93] As noted above, the South Shore Line opted to use the standard height for couplers on interurban passenger cars of 34½" resulting in a wheel size of 36". All these height dimensions are well within the range of what was typical for heavyweight steel interurban cars. but not commensurate with those of a typical steam railroad passenger car.

Other interurbans suffered from many of the same constraints even when they operated into the same terminal city, but over different host railroads. The height of interurban cars that operated on Chicago's 'L' with power from the third

[92] Ill. Cent. R.R., Side & End Elevations of Typical M.U. Two Car Unit and Ten Car Train, Drawing H101, June 26, 1928.
[93] *Id.*

rail were limited by the structures that hung over the station platforms and tracks. Obstructions over the tracks may not have been consistent from one 'L' line to the other. The Sunset Lines likely enjoyed a slightly higher clearance on the Metropolitan West Side 'L' than the North Shore Line had on their entrance into Chicago over the former Northwestern 'L'. The tallest steel cars of the Sunset Lines were 9" taller than the cars of the North Shore Line, and an inch taller than the South Shore Line cars as well.[94]

Sunset Lines car #313, Marshfield Avenue, Chicago, 21 August 1953. Interurban cars that operated over Chicago's 'L' were constrained by everything seen and unseen in this view. The pedestrian bridge that served as the photographer's perch limited the height of these cars.

Because the South Shore Line and IC clearance profile is dictated by the lowest objects situated above their rails, the South Shore Line's cars are built to fit those clearance profiles, here a maximum height of 13' 1" from the rails to the top of the roof. Because steam railroad cars have a typical roof height 14" higher than South Shore Line cars, therefore the height of a South Shore Line car is not to the standards of locomotive-hauled trains of the steam railroads.

Length:

As above, the standard 50' 0¼" length of the body of an interurban car on the Indiana-Ohio network was set with the construction of N&G combination coach-baggage car #50. Interurban cars on the network were nearly uniformly 61' 6" in

[94] The Great Third Rail, *supra* note 73, at III-18.

length overall after that time. There were some exceptions as noted above, but most deviations from these dimensions now seem like rounding errors forced by differences in the engineering of wood versus steel cars. The interurban cars of the Indiana-Ohio network did show some variations, but most were from 60' to 62' in overall length. The South Shore Line cars were not an exception to this rule.

The bodies of the South Shore Line cars varied slightly between the cars of 1926 and those cars of 1927 and 1929. The bodies of the 1926 Pullman built cars were 49' 6 ⅛" in length, and these cars were 60' overall. The bodies of the cars built in 1927 and 1929 were 49' 5⅞" in length and the cars were 61' long overall. The difference in body length between N&G car #50 and the South Shore Line cars was just over 6" and the South Shore Line cars were the shorter of the two. As to the overall length, the South Shore Line cars were within the range one would expect for interurbans in Indiana and Ohio – 60' to 62'.

The steam railroad locomotive-hauled steel coach of the 1920s was most frequently built with a 70' body with a 5' vestibule end platform at each end.[95] The range of overall lengths of coach cars was 70' to 82'. The shorter cars generally rode on four-wheel trucks, and the longer cars rode on six-wheel trucks, and there were some variations as well. By way of example, the Chicago Burlington & Quincy and its subsidiaries Colorado & Southern and Fort Worth & Denver City had twelve-wheel coaches built by Pullman in 1922 that had an overall length of 70' 8½".[96]

Steam railroad electric suburban cars were shorter than their locomotive-hauled counterparts with the industry coalescing around an overall length in the range of 71' to 73'. The D&LW cars were 71', the IC cars were 72' 7½" long, and the SP Bay Area cars were 72' 10½".[97] [98] [99] The Pennsylvania Railroad, acting as the self-proclaimed Standard Railroad of the World, dedicated itself to a very non-standard electric suburban car length of 64' 5¾".

Outside of the Indiana-Ohio network, the longest heavyweight steel interurbans were seven cars 67' 8" in overall length built for the Michigan Railway. The interurban cars that operated over the Chicago 'L' were limited to 56' 10" on the Sunset Lines and 55' 3¼" on the North Shore Line. The Milwaukee Electric Railway & Light Company bought four heavyweight steel cars from the St. Louis Car Company in 1927 that were among the shortest in their class at 54' 2½". There were no impediments to longer cars on the Waterloo, Cedar Falls & Northern in

[95] The Master Car Builders' Ass'n, *supra* note 43, at 431.
[96] F. Hol Wagner, Jr., The Colorado Road: The History, Motive Power, & Equipment of the Colorado and Southern & Fort Worth and Denver City Railways 390 (1970).
[97] *Lackawanna Electrification Plans Completed*, 73 Elec. Ry. J., 769 (1929).
[98] Ill. Cent. R.R., *supra* note 92.
[99] *Southern Pacific*, *supra* note 79, at 1049.

Iowa, but overall car lengths there were 60' 0⅜" – well within the normal range for heavyweight interurban cars.

Because the South Shore Line cars were well within the expected range for the length of heavyweight interurban cars, therefore the length of the South Shore Line cars is not to the standards for any class of steam railroad cars either locomotive-hauled or suburban electric self-propelled.

Weight:

In 1926, Purdue University professors Harding & Ewing wrote in *Electric Railway Engineering* that the important considerations when ordering interurban railcars were 1) the nature of the traffic, 2) length of the road, 3) social conditions, 4) schedule speed, 5) condition of roadbed and structures, 6) convenience of the patrons, 7) nature of the competition if any, and 8) whether the road entered the cities along its route over private rights-of-way or public streets.

> At the present time careful engineers are studying the problems of car selection and design as they never have been studied before and much emphasis is being placed on the economic ratios of weight of car per seat, weight of car per square foot of floor area, and weight of car per foot of car length.[100]

Steam railroad coaches were high-density passenger haulers; on a long-distance passenger train, they were the equivalent of steerage. Passengers who preferred niceties such as legroom or a sense of privacy need look no further than the first-class accommodations in the sleeping and parlor cars.

A typical steam railroad locomotive-hauled coach built in 1925 sat 84 people in a 700 square foot room. The space allocated to each coach passenger was 8.33 square feet. At the typical weight of a coach of 140,000 lbs., that was about 1,667 lbs. per passenger.[101] When the weight is divided by the floor area, that works out to 175 lbs. per square foot.

Because there is no electric propulsion equipment underfloor on steam railroad locomotive-hauled cars, the only fair comparison is with unpowered interurban trailer cars. Here, a South Shore Line trailer car seats 50 in a 483 square foot room allocating 9.7 square feet per passenger or about 15% more space per passenger than on the steam railroad coaches. The total floor area of the South Shore Line coach trailers was 595 square feet and the total weight was 96,200 lbs. Because of the lower density seating, the car weight of the South Shore Line coach

[100] C. Francis Harding, E.E. & Dressel D. Ewing, E.E., M.E., Electric Railway Engineering 290 (1924).
[101] The Master Car Builders' Ass'n, *supra* note 43, at 431.

trailer is 1,940 lbs. per passenger. The car weight is 161 lbs. per square foot of floor area, 8% less than that of a typical steam railroad coach.

For a comparison with electric self-propelled steam railroad suburban coaches and other interurban coaches it is appropriate to make the comparison using South Shore Line motorized cars. The South Shore Line cars built by the Standard Steel Car Company in 1929 weighed 129,600 lbs. and seated 48 passengers for a weight per seated passenger of 2,700 lbs. Because of the low-density seating discussed above, this is a very heavy car *per passenger*. At the other end of the scale were ten lightweight curved-side cars built by the Cincinnati Car Company in 1922 for Kentucky Traction & Terminal – these cars weighed only 570 lbs. per passenger.[102]

Kentucky Traction & Terminal Cincinnati Curved-Side interurban coach at Lexington, 1928. These small cars were among the lightest interurban cars built on the basis of weight per passenger. Per Kentucky Jim Crow statutes, these small cars had separate "colored" seating compartments. (Photographer credit: Lafayette Studio, Lexington; R.J. Lang, proprietor).

[102] Richard Wagner & Birdella Wagner, Curved-Side Cars Built By Cincinnati Car Company 8, 13 (1965).

Because seating density varies between electric car operators, the better comparison between electric self-propelled equipment of any kind is to consider the weight per square foot of floor area. The South Shore Line motorized cars weigh 212 lbs. per square foot. The range of weights per square foot of floor area necessarily vary with the type of car. Lightweight interurban cars built in the period 1925 to 1930 varied from 81.8 to 106.8 lbs. per square foot of floor area.

The distinctions between lightweight and heavyweight interurban cars can be blurred in this area – the low end of what are thought of as heavyweight interurban cars is also 106.8 lbs. per square foot of floor area – this for a fleet of unusual cars operated by the West Penn Railways designed for the rugged Appalachian country east and south of Pittsburgh, Pennsylvania. The weight per square foot of floor area for the West Penn cars is identical to the top end of the lightweight cars in the sample above, a group of cars operated by the Union Pacific Railroad subsidiary Yakima Valley Transit. The top of the scale for heavyweight interurban cars were the Michigan Railway cars described earlier as the longest interurban equipment. The weight of the Michigan Railway cars was 221 lbs. per square foot of floor area, these the second heaviest electric self-propelled cars in American railroading.[103]

[103] *All-Steel Cars for the Michigan Railway*, *supra* note 77, at 1087.

J.G. Brill Company built small standardized "Master Unit" cars for both street railways and interurbans. The weight per square foot of floor area was 106.8 lbs. This car was built for Yakima Valley Transit in 1930. 6th Street, Yakima, Washington, 19 August 1946.

West Penn Railways built their own cars in the company shops at Connellsville. Car #733 was built in 1923, thirteen years after the first cars of this design were delivered by the Cincinnati Car Company. The weight of these cars per square foot of floor area was identical to the Yakima cars pictured above – 106.8 lbs. Connellsville, Pennsylvania, 4 July 1948.

Electric self-propelled suburban cars were well within the range of the weights per square foot of floor area of heavyweight interurban cars – 173.4 to 210.3 lbs. per square feet of floor area with one early exception – the cars built for the New York, New Haven & Hartford (NYNH&H) in 1910 which weighed in at 247.7 lbs. per square foot of floor area.[104] Time and emerging technologies in steel car construction and increased use of aluminum were factors in the lighter weight of cars built in the 1920s. By way of example, the Illinois Central electric suburban had aluminum roof sheathing and interior trim and weighed 180.1 lbs. per square foot of floor area.[105] The lightest electric suburban cars were built for the electrification of the Philadelphia & Reading (Reading) in 1931 weighing 173.4 lbs. per square foot of floor area. The Reading cars were built by Bethlehem Steel and ironically made extensive use of aluminum.[106]

Although built at the same time as the DL&W cars pictured earlier, the Reading cars were a novel departure from the technologies used in steam railroad suburban electric cars elsewhere. The contemporary DL&W cars were largely built of steel and had a weight per square of floor area of 208.5 lbs. – 35 lbs. per square foot of floor area heavier than the Reading cars.

[104] Weight per square foot of floor area was calculated from data compiled from the extensive data published in the Street Railway Journal, Electric Railway Journal, and Electric Traction Weekly from 1885 and 1934. Several specific articles that discuss equipment dimensions are cited below.

[105] *I.C. R.R. Cars for Chicago Electrification Designed for Heavy Service*, 65 Elec. Ry. J., 211, 212 (1925).

[106] William D. Middleton, When the Steam Railroads Electrified 308 (1974).

Although the South Shore Line cars were heavy compared to all but the NYNH&H electric suburban cars, the South Shore Line cars were not significantly heavier than the other cars of the Insull Group. The North Shore Line cars of 1930 were built by Standard Steel Car Company as were the South Shore Line cars of 1929; the North Shore Line cars were 1 lb. lighter per square foot of floor area than the South Shore Line cars at 211 lbs. The Sunset Lines cars of 1927 were built by Cincinnati and weighed 5 lbs. lighter per square foot of floor area than the South Shore Line cars at 207 lbs. The only cars built by the Insull Group for the Indiana-Ohio network that were significantly lighter than the South Shore Line cars were built for the Columbus, Delaware and Marion and the Indiana Service Corporation, both weighing 186 lbs. per square foot of floor area.

The weight of heavyweight interurban and steam railroad electric self-propelled suburban cars generally lies within the same range because their respective design engineers were conscience of the need to cast off weight that was not needed. Lower car weights were necessary to keep power consumption low, and possible because self-propelled cars were subject to lower longitudinal forces when coupled. Aluminum was substituted where possible – the South Shore Line cars of 1929 had aluminum headlining.

Because the South Shore Line cars were within the range of weights per square foot of floor area for interurban and steam railroad electric self-propelled suburban cars, but not for locomotive-hauled steam railroad cars, therefore the South Shore Line cars are not built to the standards of locomotive-hauled equipment.

With these Findings It is Possible to Describe the Common Elements of Interurban Cars

There was a great variety of interurban cars in large measure because there was a great variety of interurban railroads many of whom were in a period of expansion and experimentation, and ultimately contraction and experimentation.[107] There was so much variety that there was never a legal rule as to what constituted an interurban. The U.S. Congress never defined the term.

The U.S. Department of Commerce and Labor did attempt to define the term interurban: electric railways where more than half their mileage was outside of any incorporated town.[108] There was a sub-classification of "fast, long" interurbans that had more than fifteen miles of line, two-thirds or more of its trackage outside of municipalities, and cars that could reach or exceed 20 miles per hour.[109] Peculiar characteristics of the interurbans that distinguished them from the steam railroads were: 1) small units and frequent service; 2) frequent stops; 3) costs of operation and fares that were lower than for steam railways; 4) operation in the streets and towns of cities; and 5) freight traffic generally consisting of light-weight commodities.[110]

But the Census Bureau soon determined that their definition of the term interurban was unworkable and decided to let electrified railroads self-classify.[111] And so they did. Being able to self-classify soon led to agency capture. The self-classified company could simply say that it is an electric interurban railway. In the early 20th Century, whether a railway was an electric interurban or a steam railroad legally mattered.

Under the Transportation Act of 1920, only the steam railroads were subject to the full Interstate Commerce Commission (ICC) regulatory scheme; street, suburban, and interurban electric railways that were not part of the general system of steam railroads were exempt from regulations affecting officers and directors, abandonment, construction, the establishment of rates to yield a fair return, as well as securities and finance.[112] Any electric railroad that wanted to be exempt could lay claim to the title "interurban." At this point, a simple definition of the term "interurban" would have been helpful, but none was forthcoming.

---

[107] White, *supra* note 5, at 193 (noting that throughout industrial history, radical experimentation proliferates both during technological development and while the industry is in decline).
[108] Department of Commerce and Labor, Special Reports of the Census Office: Street and Electric Railways 101 (1902).
[109] *Id.*
[110] *Id.* at 110-12.
[111] Department of Commerce and Labor, Special Reports of the Census Office: Street and Electric Railways 22 (1907).
[112] Transportation Act § 402(22), 456, 478, 488-91, 494-97 (1920).

Throughout the 1920s, the ICC attempted to rectify the resulting regulatory chaos by recommending that all electric railways that hauled freight in interchange be subjected to ICC jurisdiction regardless of whether they were street, suburban, or interurban railways.[113] Because there was no definition of the terms "interurban" or "general system," the language of the Transportation Act was not clear. At the request of any party with standing, the ICC could create an order of determination as to whether any given electric railroad was not an interurban and therefore exercise jurisdiction (*Shanahan v. United States*, 303 US 596, at 601 (1938)).

Because there was no definition of the term interurban, court rulings were inconsistent. In *Shanahan*, the court affirmed the ICC determination that the South Shore Line was not an interurban. But in *United States v. Chicago N. S. & M. R. Co.*, 288 U.S. 1 (1933), on the facts of the case, as well as the prior uniform application of the Transportation Act to the company's activities, the court held that the North Shore Line was an interurban. In part, the North Shore Line decision turned not on whether there was freight, but how much freight. In the later South Shore Line decision, the court simply affirmed the ICC determination without distinguishing the cases.

As the interurban industry withered in the late 1920s, few of the remaining interurbans could have survived without hauling freight and therefore be exempt from ICC jurisdiction. If the ICC recommendations had been codified (they were not), there would have been a bright line rule. Had there been a bright line rule, a finding of fact would have turned only on whether there was a presence or absence of freight. Because the decision was left to the courts as in the South Shore Line and North Shore Line cases, outcomes were a coin toss. The ICC was not interested in the outcome of a coin toss, only whether it could exercise jurisdiction over a particular interurban.

Losing jurisdiction meant that the ICC could not make determinations on extensions (*Piedmont & N. R. Co.*, 286 U.S. 299 (1932)), ratemaking (*Hubbard v. United States*, 266 U.S. 474 (1925); *Omaha & C. B. S. R. Co.*, 230 U.S. 324 (1913)), labor relations (*Shields v. Utah I. C. R. Co.*, 305 U.S. 177 (1938); *Shanahan*, 303 U.S. 596), the issuance of securities (*Chicago N. S. & M. R. Co.,* 288 U.S. 1), and abandonments (*Yonkers v. United States*, 320 US 685 (1944)). The ICC was not in the business of losing jurisdiction.

But this discussion still leaves us without a definition of what an electric interurban railroad is. To understand the elements that combine to make an interurban car, there must first be a definition of the railroad that the car operates on. Given that there was no congressional or Department of Commerce and Labor legal definition of the term interurban, and ICC recommendations made some

[113] United States v. Chicago N. S. & M. R. Co. 288 U.S. 1, 19-20 (1933).

interurbans subject to ICC jurisdiction without defining what an interurban was, three economic historians voluntarily took up the task.

Edward Sagendorph Mason was a Harvard economics professor and dean of what is now the John F. Kennedy School of Government. Mason chronicled the rise and decline of the electric railways in Massachusetts as an economic study for Harvard University. Mason kept his definition of the interurban simple – electric interurbans were in the category of railroad, operated on private right-of-way, and offered high-speed service. Mason found that few electric railroads in Massachusetts fit his definition of the interurban.[114]

The next two men who attempted a definition of the interurban were much more familiar with the American heartland where the interurban was prevalent. George Woodman Hilton was a Chicagoan who taught at the University of California, Los Angeles. John Fitzgerald Due took his Ph.D. at the University of California and taught at the University of Illinois. Hilton and Due collaborated on The Electric Interurban Railways in America, Stanford University Press, 1960. The Hilton & Due definition of the interurban picked up where Mason's definition left off:

- Electric power,
- primary emphasis on passenger service,
- equipment that was heavier and faster than city streetcars, and
- operation on streets in cities but at the sides of highways or on private rights-of-way in rural areas.

This was all in keeping with what Mason observed in Massachusetts – few miles of electric railroad there could meet the Hilton & Due definition of the interurban. The New England trolley was a thing all unto itself. Mason, Hilton, and Due all concluded that the interurban took on its most substantial form outside of New England even as Hilton & Due admitted that a rigorous definition of the term interurban was impossible.[115]

As it is impossible to create a rigorous definition of the term interurban, it is likely impossible to create a rigorous definition of the term interurban car. However, by applying the above findings to the definition given by Hilton & Due it is possible to describe the common elements of interurban cars. They are:

- Electrically powered,
- Have partitions dividing the car into coach and smoking compartments, and most often having a separate baggage compartment as well,

[114] Edward S. Mason, The Street Railway in Massachusetts 11 (1932).
[115] Hilton & Due, *supra* note 1, at 8.

- Heavier and faster than city streetcars, but built to a lighter standard than steam railroad cars,
- Most often have trucks fabricated from steel bar stock and/or pressed steel shapes, as well as forgings,
- Fitted with mechanical equipment that allows the car to negotiate the tight curves found on street trackage or elevated railways in their terminal cities including radial coupling and draft systems if cars are operated in coupled trains, and
- With the coming of steel-structured cars, the continued use of significant amounts of wood in their construction.

It is possible that some other criteria would better refine or add to these elements.

Conclusion

That brings us back to the original question, are the South Shore Line cars interurbans or are they something beyond the interurban style of equipment and built to some other standard.

Because the South Shore Line cars are 1) electrically powered, 2) divided into two or more compartments segregating smokers, as well as baggage and express shipments from the general population of riders, 3) heavier and faster than city streetcars, but built to the lighter standards of interurban cars rather than steam railroad equipment, 4) have trucks fabricated from steel shapes assembled with fit bolts, 5) have radial coupling equipment allowing the cars to negotiate sharp curves, and 6) have a significant amount of wood in their construction, therefore, the South Shore Line cars meet all the above criteria and are traditional interurban cars.