

Chapter 3: The Christening of the Mark Twain Zephyr

Portions Written by Dave Lotz and Kandace & Robert Tabern

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FOREWORD

In January 2020, we were approached by Greg Vreeland, owner of the Wisconsin Great Northern Railroad, advising us that he and his wife were planning to purchase the *Mark Twain Zephyr*. We had seen the train set several times over the years as a lifeless stainless steel carcass at Gateway Rail Services, outside of St. Louis. We were in awe that a tourist railroad 600 miles away in the Northwoods of Wisconsin was going to breathe life into the engine and cars for the first time in nearly 60 years. But, if anyone was going to do it, it would be Greg and his amazing team of carpenters and renovators at the Wisconsin Great Northern Railroad.

Our role in the whole process was to spend a full year finding as much information and history about the *Mark Twain Zephyr* as we could. We learned, almost right off the bat, this would not be as easy as first thought. Most books and articles written about the Burlington *Zephyrs* seem to focus heavily on the *Pioneer Zephyr*, while giving three or four pages of information, at best, about the *Mark Twain Zephyr*. There was also a lot of incorrect information that has been floating around on websites and other sources about the train.

The results of our work is the three volume book series, which you are about to experience. **Volume One** (released Spring 2021) gives an overview of the Burlington shovel nose *Zephyrs*, the design and building of the *Mark Twain Zephyr*, and its dedication on October 25, 1935. **Volume Two** (will be released in Spring 2021) gives a chronological history of the train in both Burlington ownership and private ownership. **Volume Three** (will be released in Spring 2022) shows the step-by-step rebuilding process that occurred at the Wisconsin Great Northern Railroad during the course of late 2020 and 2021.

We hope you enjoy this series as much as we did writing it. One of the things we strived for was to not only tell the story of the *Mark Twain Zephyr* itself, but the people who had a deep connection to the train over the years... the human side of the story behind the machine. We hope this is represented and you enjoy that aspect of our writing, too.

- Kandace & Robert Tabern, Principal Authors
Mark Twain Zephyr: History, Restoration & Rebirth

CHAPTER I

An Overview of the Burlington's Shovel Nose Zephyrs



BUILDING THE FIRST ZEPHYR 9900

The Chicago, Burlington & Quincy Railroad (CB&Q), popularly known as the Burlington Route, suggests images of big-time railroading with the largest fleet of streamliners in the United States: the Burlington *Zephyrs*.

The *Zephyr* idea originated in 1932 when Burlington President Ralph Budd noticed declining passenger revenue on his railroad because of the Great Depression and the ascendance of automobiles and airplanes. He realized that something unique was needed to lure passengers back to train travel.



Ralph Budd (pictured above), served as President of the CB&Q (Chicago, Burlington and Quincy Railroad) from 1932-49. – Chicago, Burlington and Quincy Railroad

Ralph Budd learned that the E.G. Budd Company (no relation to each other despite the name) in Philadelphia was building lightweight passenger cars that were self-propelled and built of a new material called stainless steel. He noted that the company was not one of America's four train builders, America Car & Foundry, the Pullman Company, Brill, or Bethlehem Steel.

On June 17, 1933, Ralph Budd came to Philadelphia to discuss the contract. He told Edward Budd (no relation) that he wanted a three-car train equipped with a Winton diesel engine, and no rubber tires. The interior design would be left entirely to the E.G. Budd Company. The contract was promptly signed and plans were laid. The lead designer was to be Albert Dean, who would modify and refine the design of the rubber-tired car. He took many ideas from aircraft design to enhance the streamlining, although trains had never been streamlined. Albert Dean completely enclosed the underside of the car to reduce drag. He tested his design with a model in a wind tunnel at the Massachusetts Institute of Technology. Tests later determined that the amount of wind resistance brought about by Dean's streamlining had reduced drag by 47 percent at a speed of 95 miles per hour.



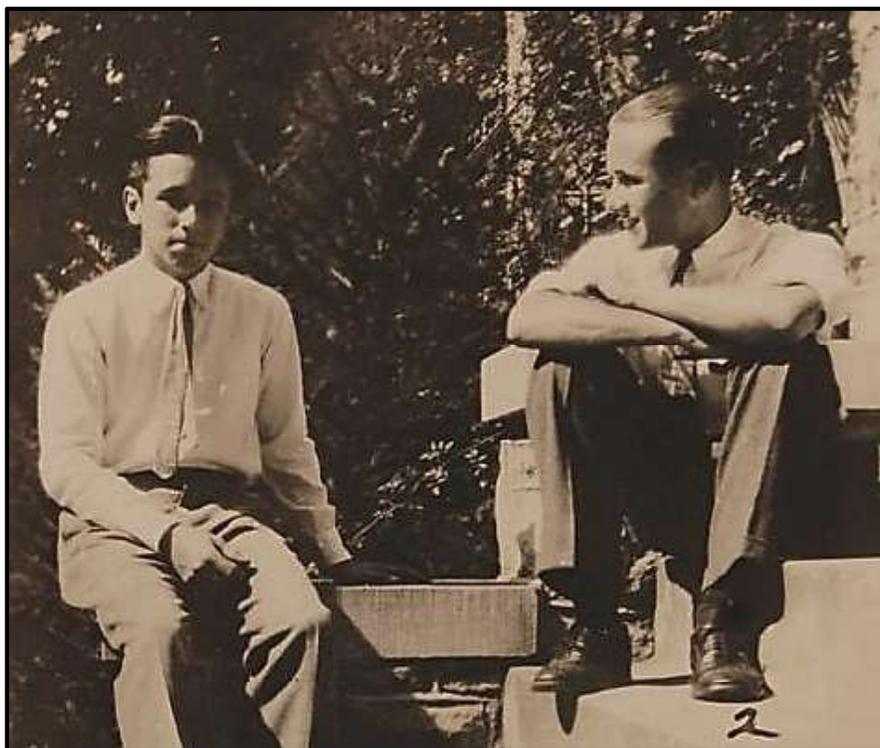
Albert Dean shows off the original wind tunnel model (lower level of photograph) for the Burlington *Zephyrs* to the three then-owners of the *Mark Twain Zephyr* during a video interview at his home in Philadelphia, circa 1992. Dean actually had to rescue the *Zephyr* wind tunnel from a trash dumpster at Budd. –

Dan Krupske Collection

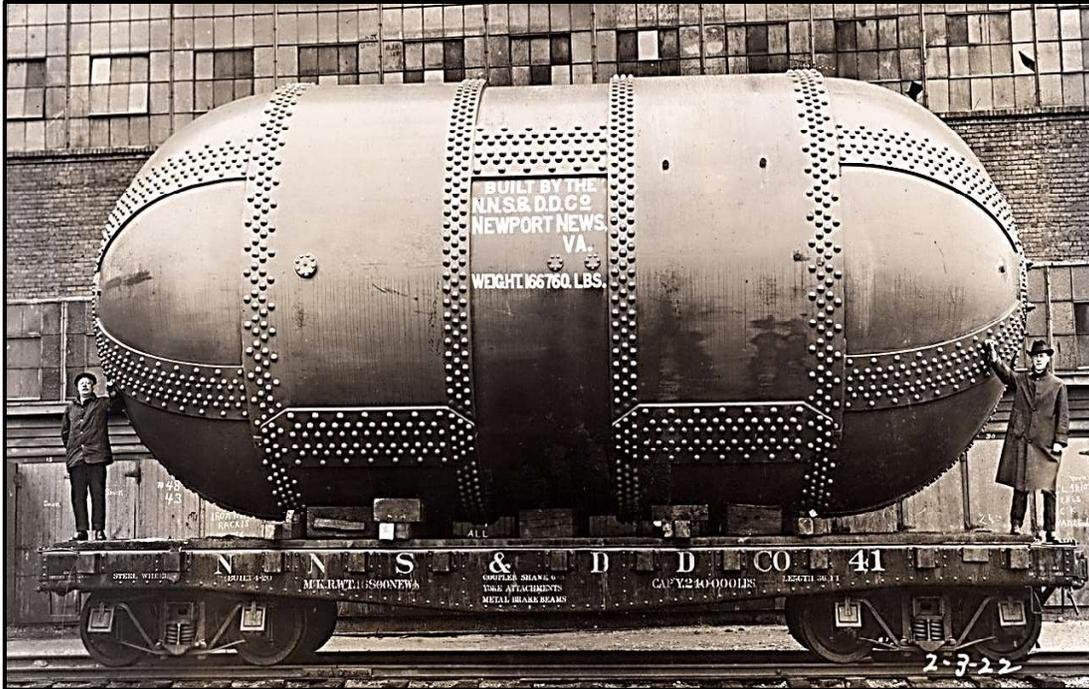
The front of the train was designed by an architect by the name of John Harbeson, who made it sloped down like a shovel for reduced wind resistance. The front had no handles or other objects protruding, not even rivets, only smooth shot welds.



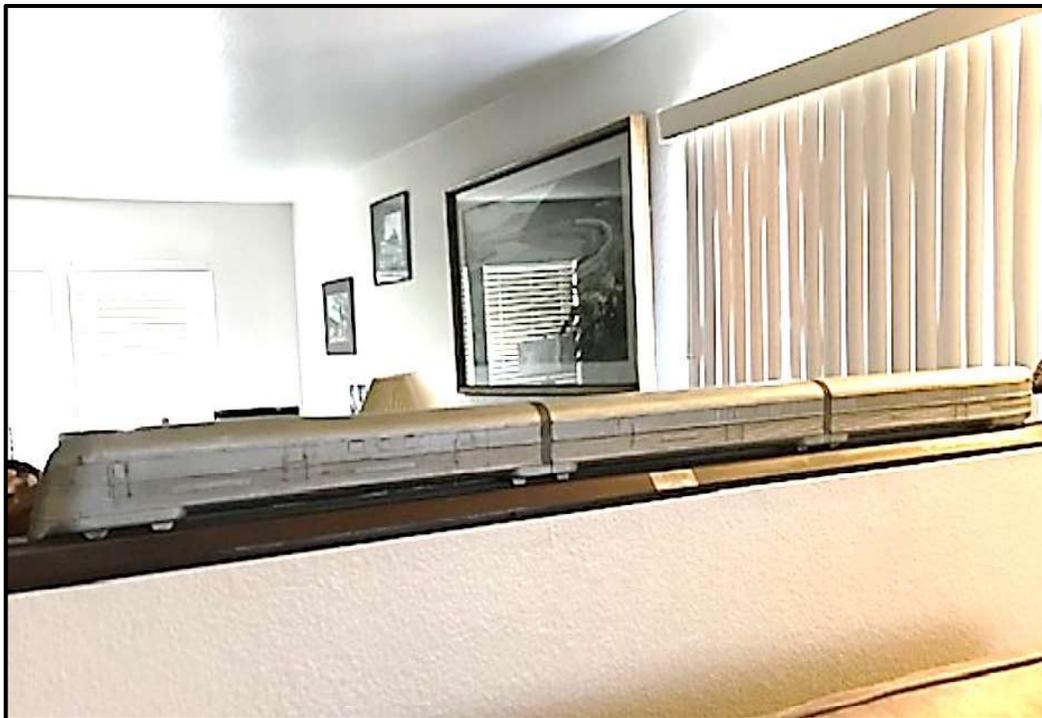
Lead designer of the Zephyrs, Albert G. Dean (right), and his wife, Effie W. Dean, (left) circa the late 1930s. They are pictured sitting on the front steps of their home at 219 N. Wynnewood Avenue in Narberth, PA. – *Dean Family Archives*



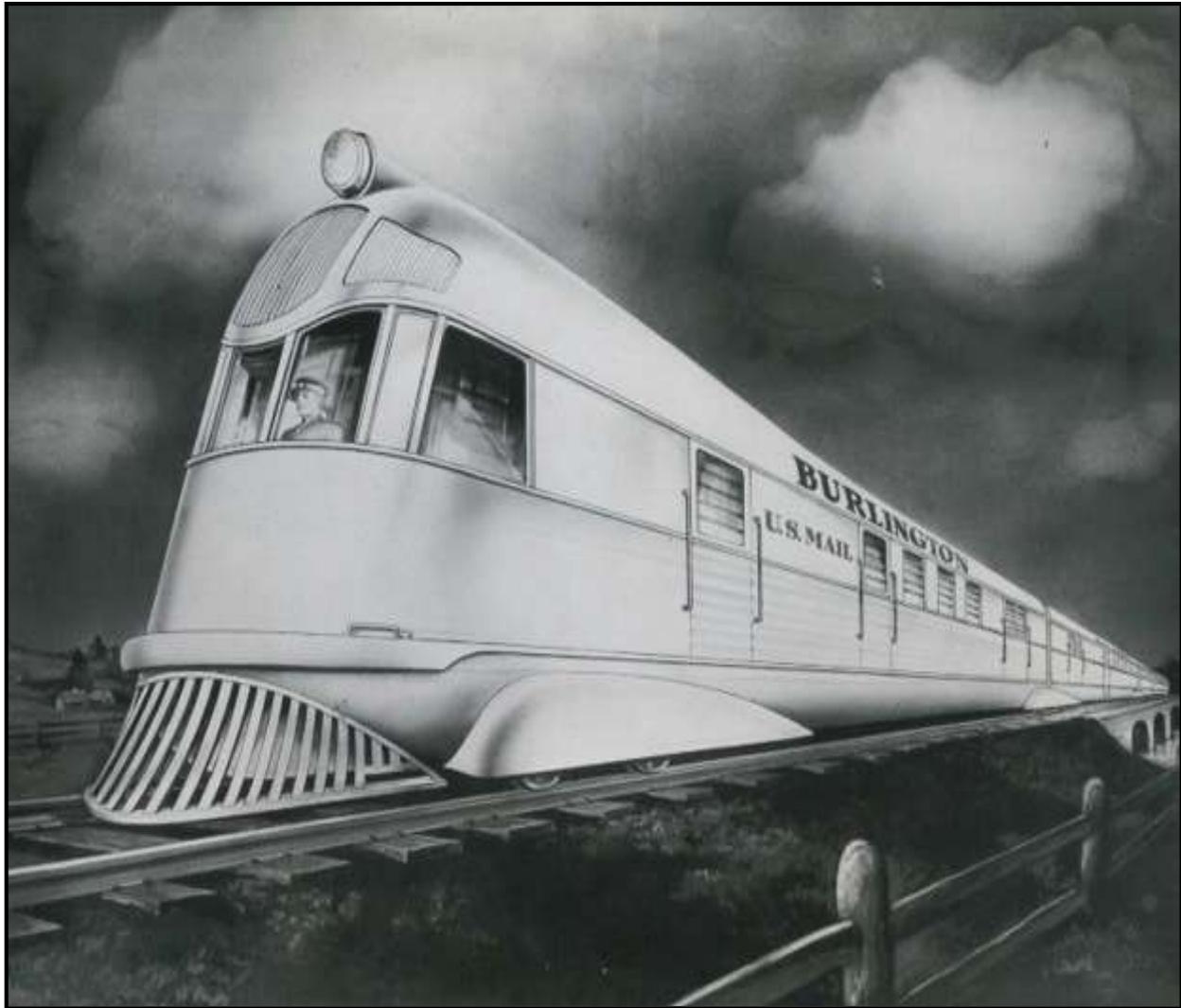
Albert G. Dean (right), and his brother, Walter B. Dean, (left) circa the late 1930s. Walter was responsible for designing the undercarriage of the Zephyrs. – *Dean Family Archives*



Wind tunnels were still a relatively new concept at the time of the Zephyrs. Above is a February 1922 photograph of the world's first density wind tunnel that allowed accurate testing with small-scale models. – NASA Archives; Langley Research Center

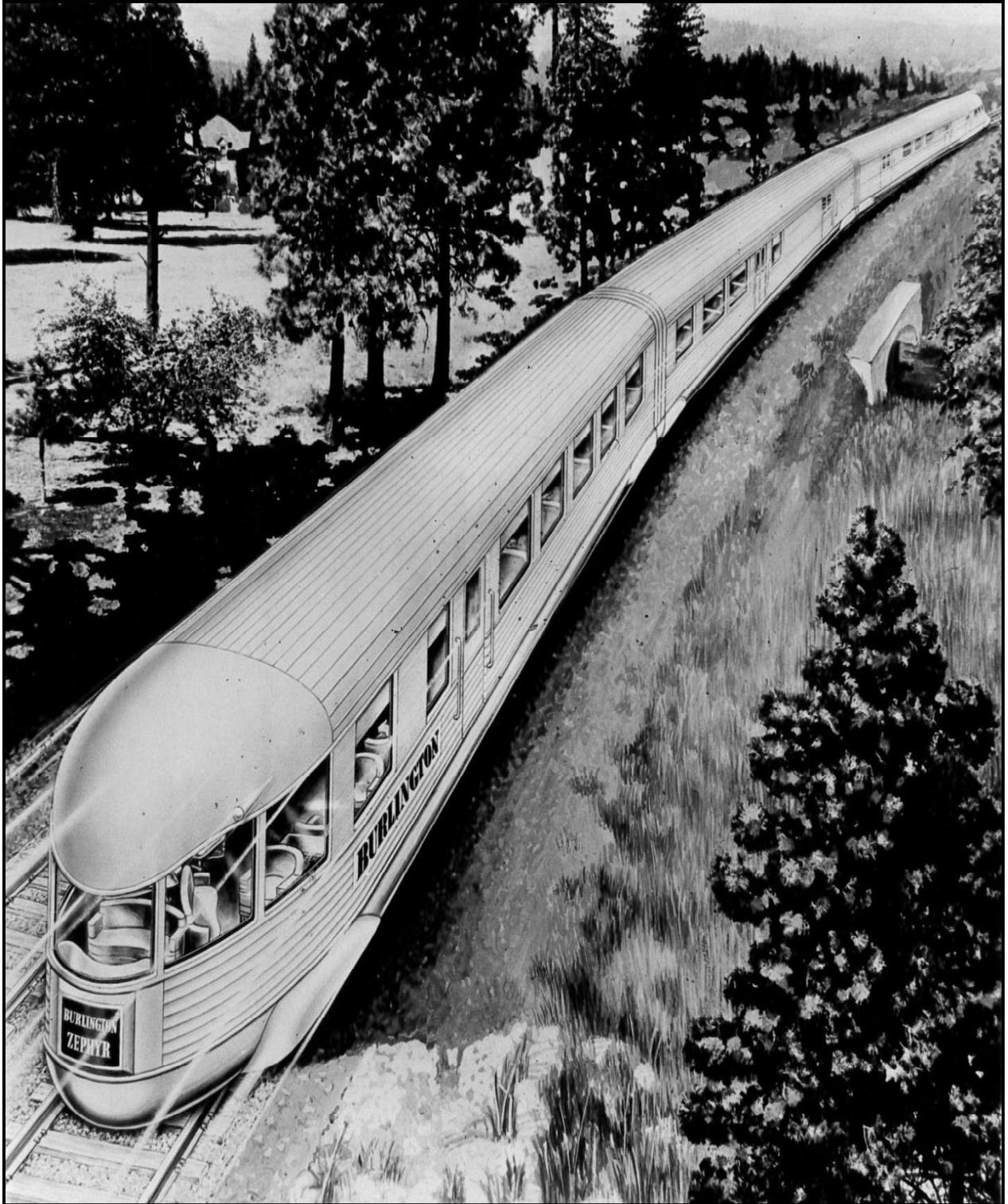


The original wind tunnel model of the *Pioneer Zephyr*, as seen in December 2020. It is about five feet in length and one-and-a-half feet wide. - Dean Family Archives

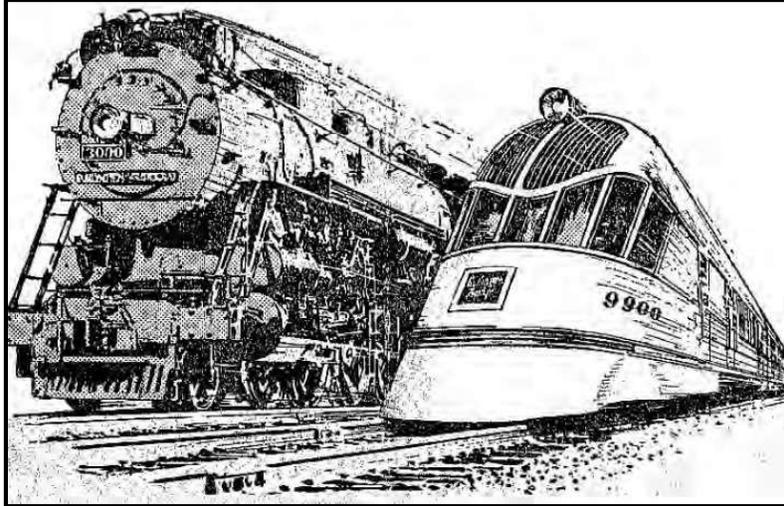


The above image is a rare July 25, 1933 concept photograph of the completed engineer's model of the Burlington's two-mile-a-minute stainless steel train, *The Zephyr*. A typed note on the rear of the photograph mentions that "the train will actually be run by electricity... generated in the motor through a 600-horse power diesel eight in-line motor". - Acme Photograph / Greg Vreeland Collection

Walter Dean, who was Albert Dean's older brother, was in charge of designing the undercarriage of the cars. This included the heavy steel trucks, which consisted of the wheel and axle assemblies that supported the entire weight of the car. At the time, most cars would have been conventional heavyweights with three axle, six-wheel trucks. Walter Dean's idea, on the other hand, was to save weight by having the truck at each end of the center car share the load of the cars before and after. This also permitted the train to be built with four trucks instead of six, for a weight saving of several tons. This created what is called an "articulated train," which permits the cars to turn on roller bearing pivots as the train rounds a curve. Two couplings were also eliminated.

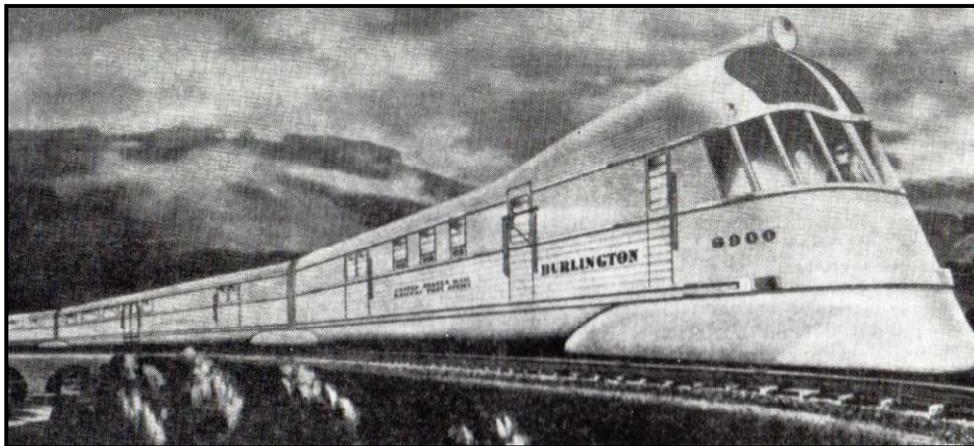


The above image is a rare September 28, 1933 sketch of the *Zephyr*. A typed note on the rear of the sketch mentions that "...the 120 mile-an-hour train is being built for the Burlington Railroad. This image appears from the rear end, with the solarium observation car in the foreground. Every pane of glass in the train is shatter-proof."
– *Acme Photograph / Greg Vreeland Collection*



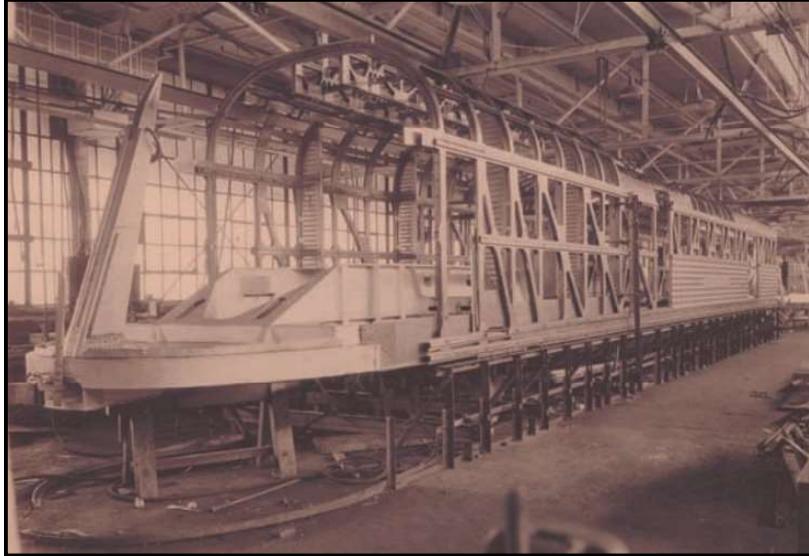
This sketch shows the new Burlington Zephyr #9900 positioned next to a steam engine. It was released to various newspapers across the country by CB&Q on January 28, 1934. – Chicago, Burlington and Quincy Railroad

The three-car train would be 196 feet long and weigh 104 tons, or about the weight of a single Pullman coach. It would be powered by a newly developed Winton 8-201A 660 hp, two-cycle engine, which would drive an electric generator. The generator current would be fed to electric traction motors in the train's front truck, and would provide power for lighting, heating, and air conditioning. The unpainted sides of the train would be fluted stainless steel sheet to increase rigidity and enhance appearance. It would be fast – maybe one hundred miles an hour – and would quite often be called “The Silver Streak.”



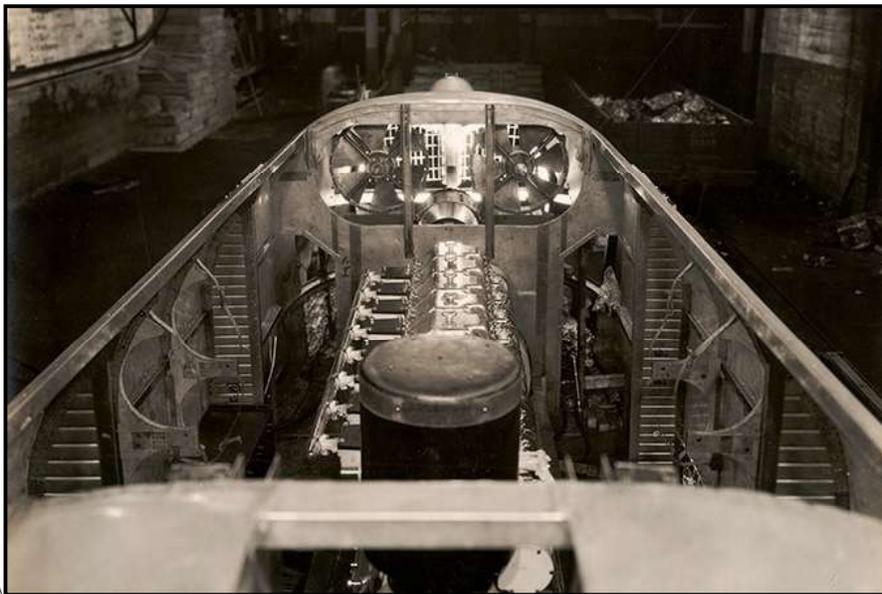
Another early rendering for the first Burlington Zephyr. – Chicago, Burlington and Quincy Railroad / Hol Wagner Collection

The train represented the largest application by far of stainless steel in any structure; 23 tons of Allegheny Metal stainless steel were used in its construction.



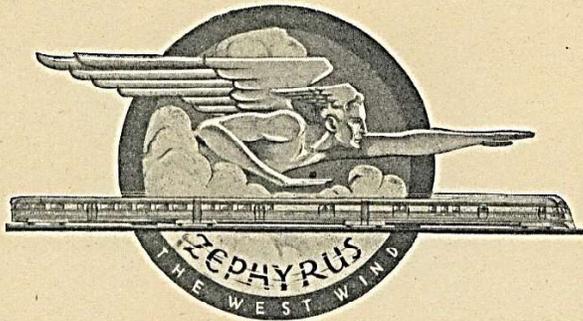
The above image shows the front car of the Burlington *Zephyr* under construction at the Budd Plant in Philadelphia. Note the two stanchions that support the diesel engine at the front. - Budd Company Photograph / Hagley Collection

The stainless steel car body was built primarily with steel as thin as 0.012 inch, formed and shot welded to make hollow square and rectangular subsections that were then joined by shot welding. The hollow sections created the lightest possible structure, although requiring much more assembly time than solid bars and plates. A lighter car body meant that the supporting wheel trucks could also be lighter. The roofs are constructed of corrugated stainless 0.022-inch thick, or about the thickness of a stack of seven sheets of paper.

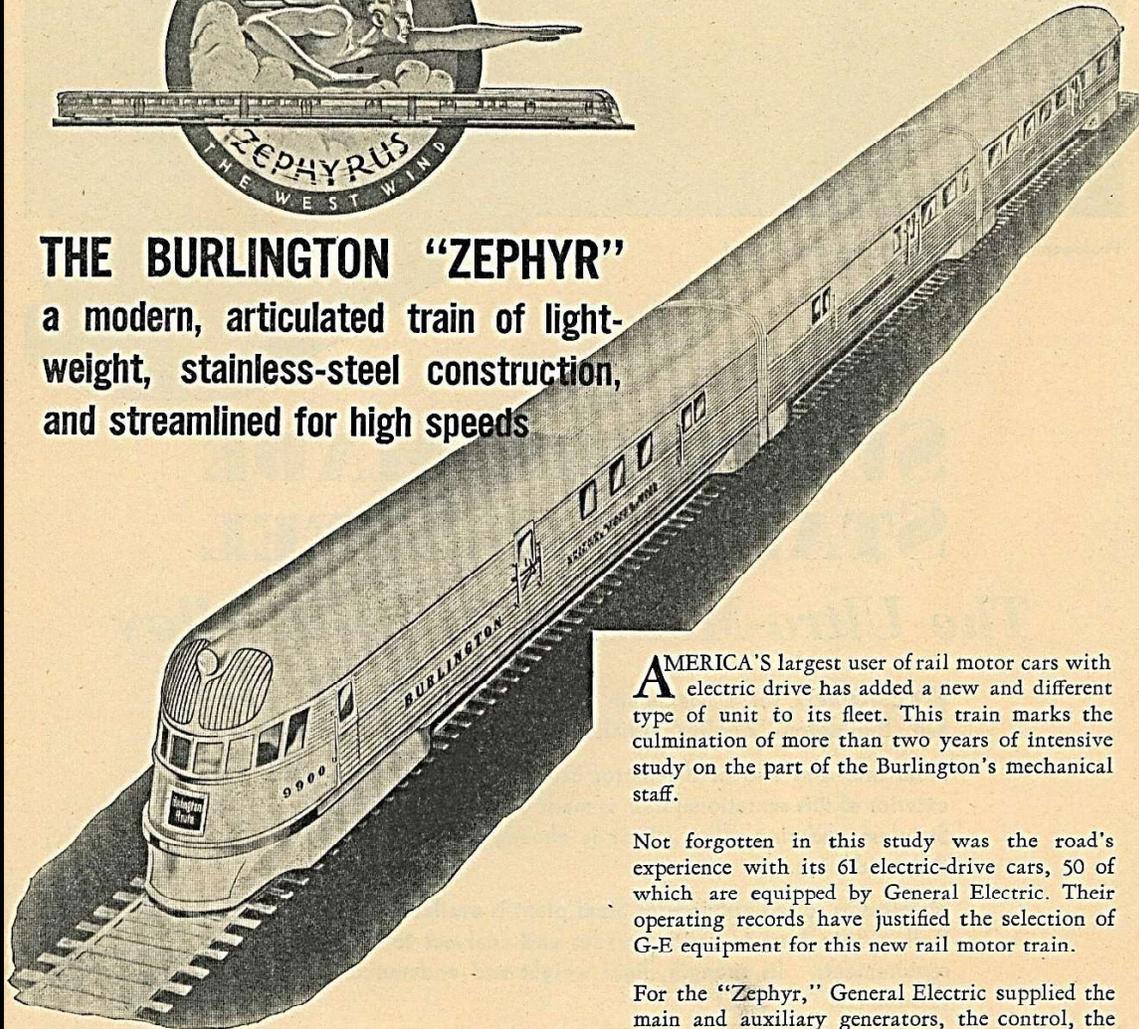


An interior view of a *Zephyr* shovel nose engine - Budd Company Photograph / Hagley Collection

POWERED with GENERAL ELECTRIC DRIVE



THE BURLINGTON "ZEPHYR"
a modern, articulated train of light-weight, stainless-steel construction, and streamlined for high speeds



AMERICA'S largest user of rail motor cars with electric drive has added a new and different type of unit to its fleet. This train marks the culmination of more than two years of intensive study on the part of the Burlington's mechanical staff.

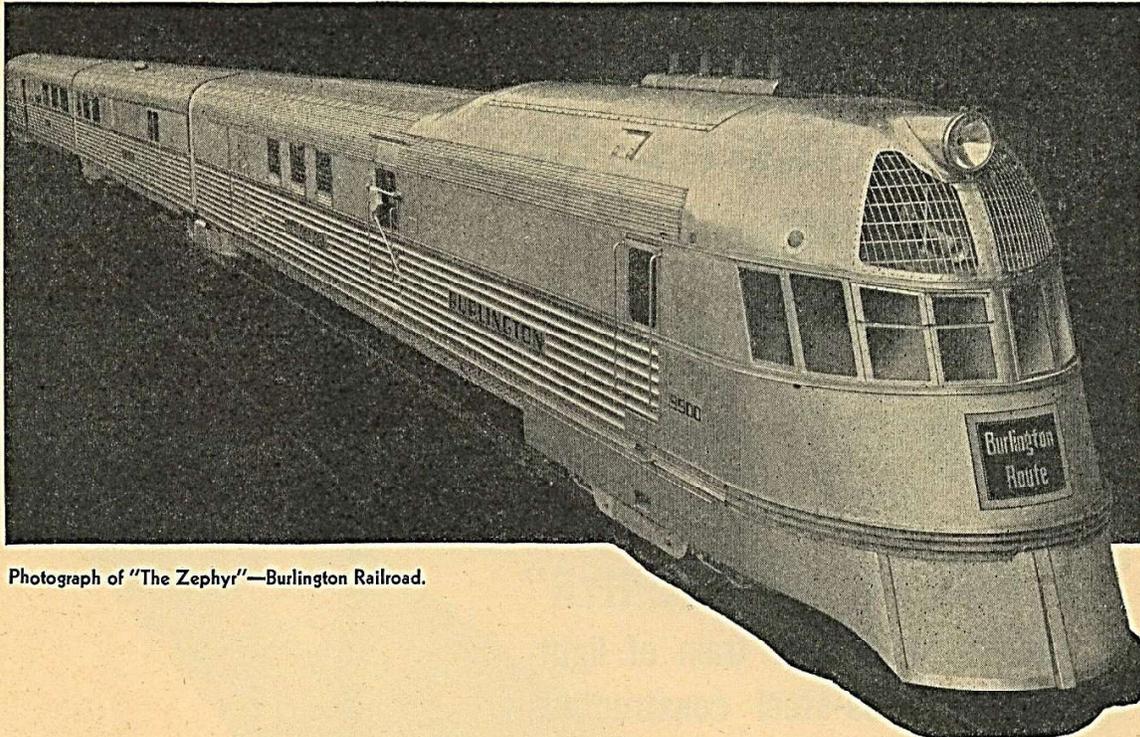
Not forgotten in this study was the road's experience with its 61 electric-drive cars, 50 of which are equipped by General Electric. Their operating records have justified the selection of G-E equipment for this new rail motor train.

For the "Zephyr," General Electric supplied the main and auxiliary generators, the control, the traction motors, the compressors for air brakes, and the air-conditioning equipment.

255-6

GENERAL  **ELECTRIC**

A General Electric advertisement for the new Burlington Zephyr -
General Electric Archives / Greg Vreeland Collection



Photograph of "The Zephyr"—Burlington Railroad.

SUPERIOR-MADE STAINLESS STEEL

The Ultra-Modern Stainless Alloy

DESIGNED for a maximum speed of 120 miles per hour, the Burlington "Zephyr" is hailed as the new conqueror of time.

From the front end of the motor car to the rear of the solarium, the exterior of this sensational train is made from Stainless Steel — the new Stainless enduring alloy which is already serving Industry in many thousand ways.

Stainless as rolled at Superior Steel plant is available in Hot and Cold Rolled Strip form in various grades and analyses to suit all particular requirements. Its strength, light weight and endurance offer unusual economies.

SUPERIOR STEEL CORPORATION

Pittsburgh, Pa.
Philadelphia, Pa.

Chicago, Ill.
Carnegie, Pa.

Detroit, Mich.
Cincinnati, Ohio

A Superior Steel Corporation advertisement for the new Burlington Zephyr -
Superior Steel Corporation Archives / Greg Vreeland Collection

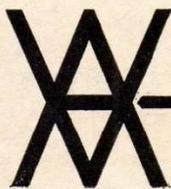
SAFETY

*on the
Burlington
Zephyr*

with
**WESTINGHOUSE
AIR BRAKES**

THE CONTROL of such a train as the Zephyr presents a new braking problem . . . Its energy is much greater than that of the ordinary train of equal weight operating at conventional speeds, consequently the brake must be more powerful. It travels much farther in a unit of time, and therefore the brake must be quickly responsive to the engineer's intent so that retardation will start without delay. It will operate over a wide range of speeds, and the brake must also be flexible enough to permit the making of short smooth stops under all conditions without wheel sliding.

An additional safeguard is provided whereby the train will be brought to a stop by an emergency application should the engineer become incapacitated.



WESTINGHOUSE AIR BRAKE COMPANY

GENERAL OFFICE AND WORKS » WILMERDING, PENNSYLVANIA

**A Westinghouse Air Brake Co. advertisement for the new Burlington Zephyr -
Westinghouse Corporate Archives / Greg Vreeland Collection**

Assurance
of Complete Satisfaction

**Commonwealth Motor and Trailer Trucks
of Proved Designs**

on

BURLINGTON ZEPHYR

**LIGHT WEIGHT DESIGNS
OF ALLOY STEEL**

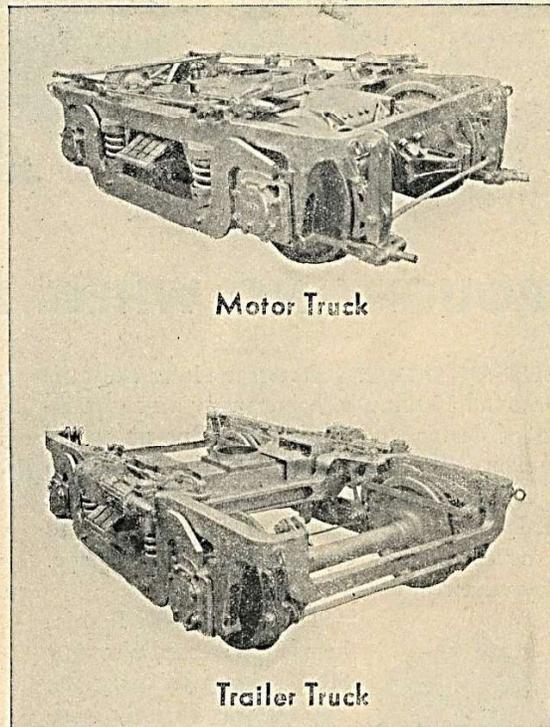
*

**SAFETY AND SPEED
WITH SIMPLICITY AND
SMOOTH RIDING**

*

**RUBBERIZED
AT ALL IMPORTANT
BEARING SURFACES**

*



Motor Truck

Trailer Truck

COMMONWEALTH COMBINED END SILLS AND ARTICULATED
CONNECTIONS OF ALLOY STEEL ALSO FURNISHED FOR THIS TRAIN

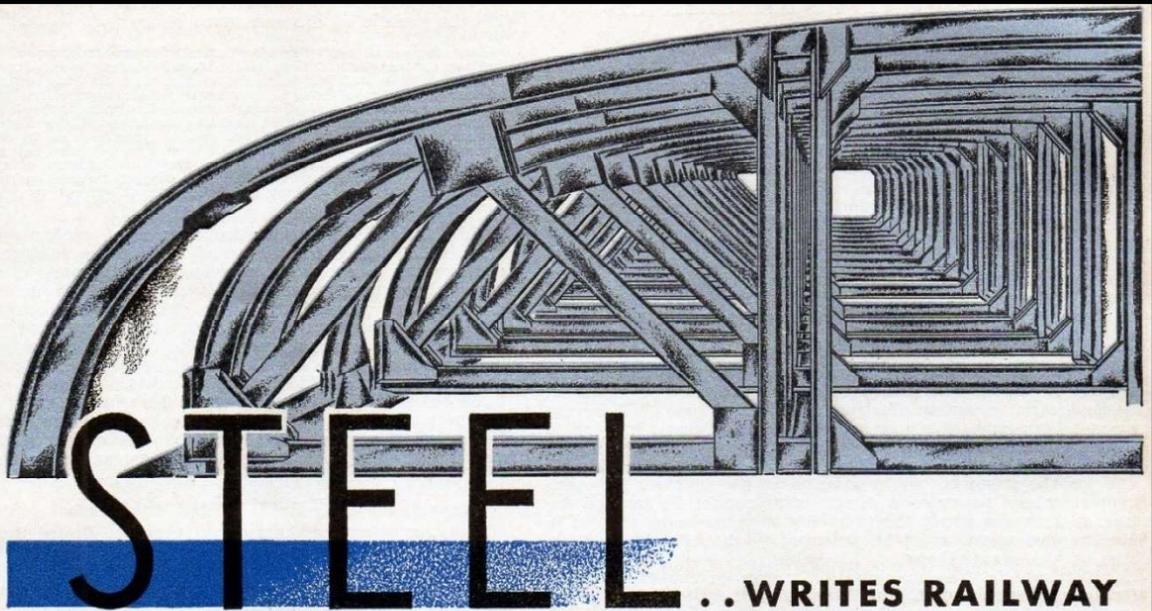
GENERAL STEEL CASTINGS CORPORATION

COMMONWEALTH PRODUCTS

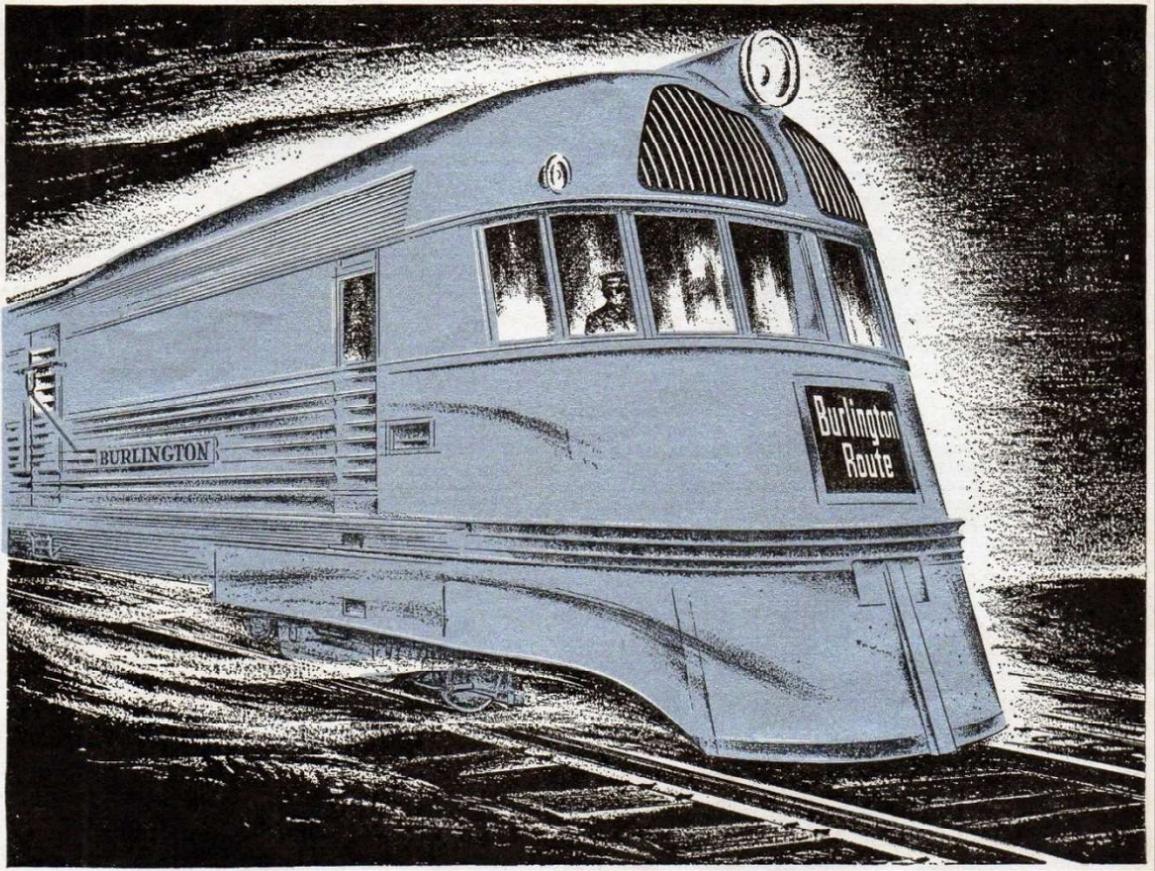
EDDYSTONE, PA.

GRANITE CITY, ILL.

**A General Steel Castings Corp. advertisement for the new Burlington Zephyr -
Commonwealth Products Corporate Archives / Greg Vreeland Collection**



**...WRITES RAILWAY
HISTORY AGAIN IN THE "ZEPHYR"**



**A United States Steel Corporation advertisement for the new Burlington Zephyr -
United States Steel Corporation Archives / Greg Vreeland Collection**



The above image is of a stainless steel card with two shot welds given as souvenirs by the Budd Company, featuring the CB&Q *Pioneer Zephyr*. The Budd company invented the process and used it first to construct the *Pioneer Zephyr*. Later trains, such as the *Mark Twain Zephyr*, were also made from the same stainless steel as the card. – Budd Company Archives / Greg Vreeland Collection

Paul Phillipe Cret, head of the University of Pennsylvania School of Architecture and a noted interior designer, was hired to design the train's interior. He wanted the passenger compartments to reflect a state-of-the-art appearance in keeping with the exterior streamlining. The cars would look stark and unadorned when compared with the Pullman coaches of the day. Fluorescent tubes would supply indirect lighting, and the walls would be pastel colors of pale green, blue, and light brown. The plush separate armchairs would be comfortable and covered with fine but sturdy fabric.

Luxurious carpeting and curtains would be shades of pearl grey. To preserve the clean lines of the interior, baggage racks were not overhead. Instead suitcases were kept in a separate baggage compartment. Each passenger compartment would be individually heated and air conditioned. It would truly be the train of the future.

The entire period of designing, building, and decorating was one of intense excitement, with everyone working to show off their best work possible, as if their job depended on it. The train was completed in only nine and one-half months, two and one-half months ahead of the stated delivery date. The feat was all the more remarkable when it is considered that the equipment for the train had to be procured from one hundred different suppliers.

The cost of the train was around \$260,000, which would be about \$5,207,800 in the year 2021 after adjusting for inflation.

It should be noted that the original *Zephyr* went through many configurations during its service life. When completed on April 7, 1934, it was just a three-car train – #9900 as a power unit; #505 as a baggage/coach car; #570 as a coach/observation car. After a few months, chair car #525 was added to the consist. The train was re-equipped again in 1937 with car #500 (40 chair seats and a buffet/pantry/kitchen), which replaced #525. The train itself was officially given the *Pioneer Zephyr* name on November 11, 1936, however the individual cars were never given a name.



Above is a photo of *Zephyr* coach #525 on a flatcar at the Budd Company plant in Philadelphia, getting ready for delivery to the CB&Q. The articulated coupling is visible. This is the fourth car of the *Pioneer Zephyr*. The Burlington ordered the additional car because of ridership demand during the time Budd was building the *Mark Twain Zephyr*. – Budd Company Archives



Here is another view of the *Zephyr* coach #525 on a flatcar in Philadelphia. The articulated coupling is visible. Behind it is a second flat car loaded with the single additional truck needed for the addition to #9900. This is the fourth car of the *Pioneer Zephyr*. – Budd Company Archives

UNVEILING THE FIRST ZEPHYR

There was a final inspection. The first car held the diesel engine, an engineer's cab, a 500-gallon fuel tank, a 30-foot railway post office, and a space for baggage. The second car included a larger baggage compartment, a buffet grill, and a 16-foot smoking section for twenty passengers. The third and last car had a 31-foot section with seats for forty persons, and a solarium-lounge at the end of the car with club chairs for twelve. The train had a total of 72 seats, and could carry 25 tons of baggage and express freight.



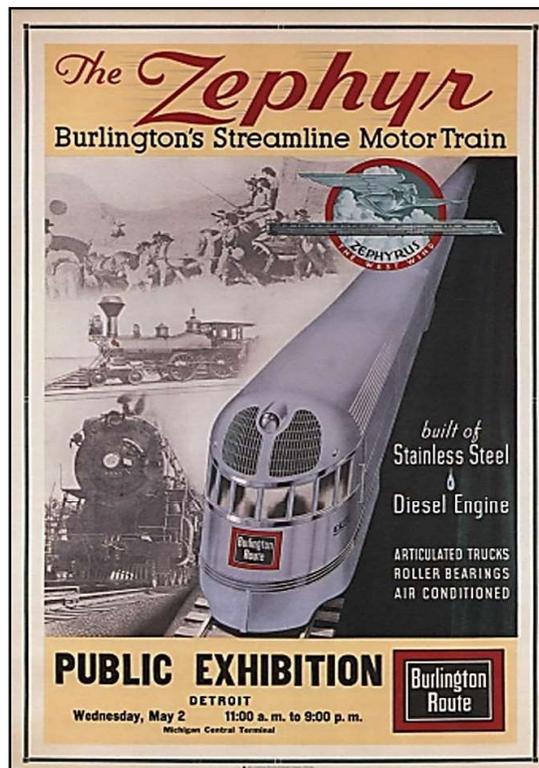
The Burlington *Zephyr* is about to leave the Budd Plant in Philadelphia after its final inspection. – *Budd Company Archives*

Two days after the train was completed, it was taken on a 25-mile test run from Philadelphia to Perkiomen Junction on a line that the Reading Company had cleared and inspected. The train ran perfectly and reached a speed of 104 miles per hour for a brief time.

The formal dedication came on April 18, 1934 at Philadelphia's Broad Street Station directly across from the City Hall. At the appointed time of 10:00 A.M., the ceremony took place amidst a crowd of hundreds. Ralph Budd spoke over national radio saying that "the Burlington *Zephyr* is a symbol of progress." On the following day, 24,000 people lined up to see the train. The Burlington *Zephyr* was then taken on a three-week tour to thirty cities in the East, during which time it was estimated that close to a million people went through the train.



The first Zephyr was officially christened at Broad Street Station, Philadelphia, on April 18, 1934. Among the distinguished guests is Marguerite Cotsworth, a student at Swarthmore College, whose father is passenger traffic manager of the CB&Q. Miss Cotsworth broke a bottle of champagne over the nose of the train. –
Temple University Libraries, Urban Archives, Philadelphia



The Burlington Zephyr toured the country in mid-Spring 1934, including a stop in Detroit, Michigan on May 2nd. –
Chicago, Burlington and Quincy Railroad / Greg Vreeland Collection

Ralph Budd had a plan that would attract the attention of the entire nation. He was aware that the Chicago Century of Progress Exposition would be opening its second season on May 25, 1934, and that one of the major attractions would be the “Wings of a Century Pageant” showing America’s progress in transportation from the Indians to the modern steam locomotive. Budd was going to display his Burlington *Zephyr* in that pageant, which would open on the evening of Saturday, May 26, 1934.

Ralph Budd planned the big event for weeks. He would have the *Zephyr* leave Denver at dawn on May 26th, and race 1,015 miles non-stop to Chicago, pulling in at dusk just in time for a grand entrance at the Exposition.

The *Zephyr* was moved to Denver on Thursday, May 24th, and set on display at the Union Station. Newspapers reported that “a silver train has flashed into the silver state.” Visitors went through the train that day and also on Friday up to the time that the train was sent into the shop for inspection before the mad dash the next day. Celebrities and politicians got wind of the wild trip and clamored for tickets. But tickets were sold already for the 72 regular seats... most going to officials of the Burlington, General Motors, and the Budd Company. An additional thirteen folding chairs were set up for reporters in the baggage compartment.

Ralph Budd had made special preparations for the thousand-mile dash. All of Burlington’s employees along the route had been notified to inspect the entire length of track and to post large signs at those places where the train should slow down for some reason. Railroad employees, police, and army veterans would man every one of the 1,689 grade crossings to be sure that all road traffic would be stopped at the time the train would be passing. All passenger and freight trains would be sidelined. Guards would also be posted at each railroad station to make sure no one was approaching or standing on the track.

Never before had such preparations been taken for a train trip, giving the train the clearest right-of-way, any train would ever have.

On Saturday morning, May 26, the train left the Union Terminal, breaking the timing tape at 6:04 A.M. Mountain Standard Time. In the driver’s compartment were three men who would take their turns at the controls in two-hour shifts. These men were J. F. Weber, Burlington’s superintendent of automotive equipment; J. S. Ford, an assistant master mechanic; and Ernie Kuehn, a Winton engineer. Three Burlington mechanics also rode in the cab. All of them would scan the road ahead to watch out for any problems.



On your mark, get ready, get set – GO! The CB&Q *Pioneer Zephyr* is ready to begin its record-setting run. The drop of the start flag, as seen in the above photograph, took place at 6:04AM Mountain Standard Time in Denver, Colorado. –
Chicago, Burlington and Quincy Railroad / Greg Vreeland Collection

The two Budds were seated side by side in the Solarium lounge waiting for the show to begin. They had a great deal at stake on this “maiden voyage.” The train was now on its way, and the throttle was pushed to ninety miles per hour for much of the trip. She ran at one hundred miles per hour along one nineteen-mile stretch, and reached a top speed of 112.5 miles per hour for three miles. It was a quiet ride, with only the clickety-clack of the rails and the brief clanging of the bells as the train passed the grade crossings. The telephone poles looked like picket fences. Ralph Budd had guessed that the trip might take about fifteen hours, which would be possible if they could average a pretty fast clip of sixty-seven miles per hour.

The Burlington’s crack steam-powered train on the Denver-to-Chicago run, the *Aristocrat*, took almost twenty-six hours to make the trip, and had to stop several times to take on water, coal, and new train crews.