# INDIVIDUAL INVENTORY FORM

# NHDHR INVENTORY # LIN0009

**Name, Location, Ownership**

Historic name Flying Yankee (Boston and Maine Railroad No. 6000)
Street and number 94-98 Railroad Street
City or town Lincoln
County Grafton
Current owner New Hampshire Department of Transportation (NHDOT)

**Function or Use**

Current use(s) Transportation (Rail-related)

Historic use(s) Transportation (Rail-related)

**Architectural Information**

Style Other
Architect/builder Edward G. Budd Manufacturing Co.
Source Budd Blueprint (Jan. 21, 1935)
Construction date 1934-35
Source Budd Blueprint (Jan. 21, 1935)
Alterations, with dates engine block/crankshaft replaced (1947); disassembly and refurbishment activities (c.1997-2016)
Moved? no ☐ yes ☒ date: 1958, 1993, 1997, 2005

**Exterior Features**

Foundation N/A
Cladding steel (stainless)
Roof material steel (stainless)
Chimney material N/A
Type of roof other
Chimney location N/A
Number of stories N/A
Entry location N/A
Windows fixed
Replacement? no ☒ yes ☐ date:

**Site Features**

Setting City/town neighborhood
Outbuildings none


Photo #1 Direction: SE
Date 7/20/2023 (HRI Neg. #23056 D1 050)

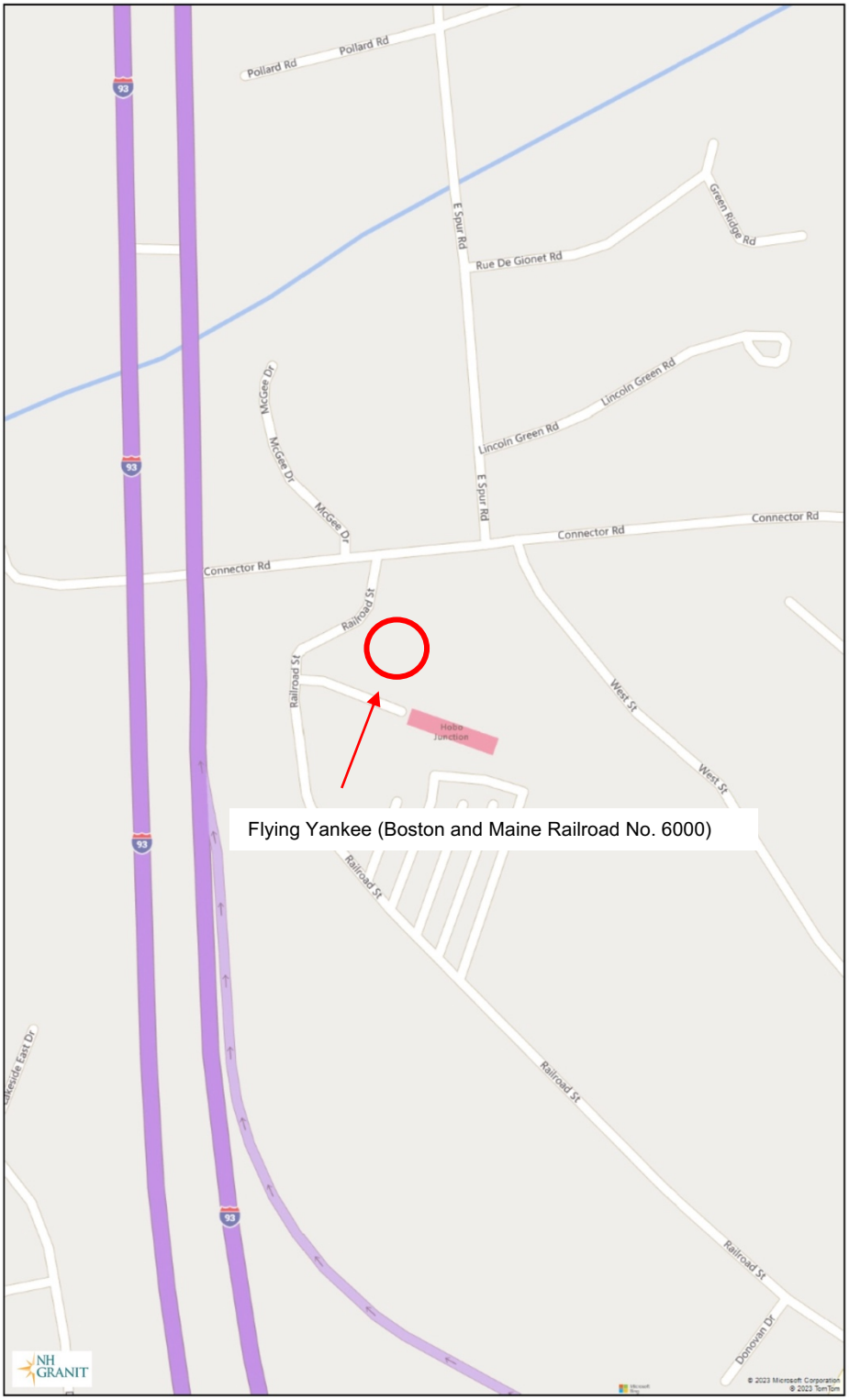
Landscape features other (rail yard)
Tax Map 112-019
Acreage 7.36
State Plane Feet (NAD83) X:980796.481055
Y: 561618.338823

**Form prepared by**

Name Patrick Harshbarger
Organization Hunter Research, Inc.
Date of Survey August 2023

**Location Map:**

**94-98 Railroad Street, Lincoln,**



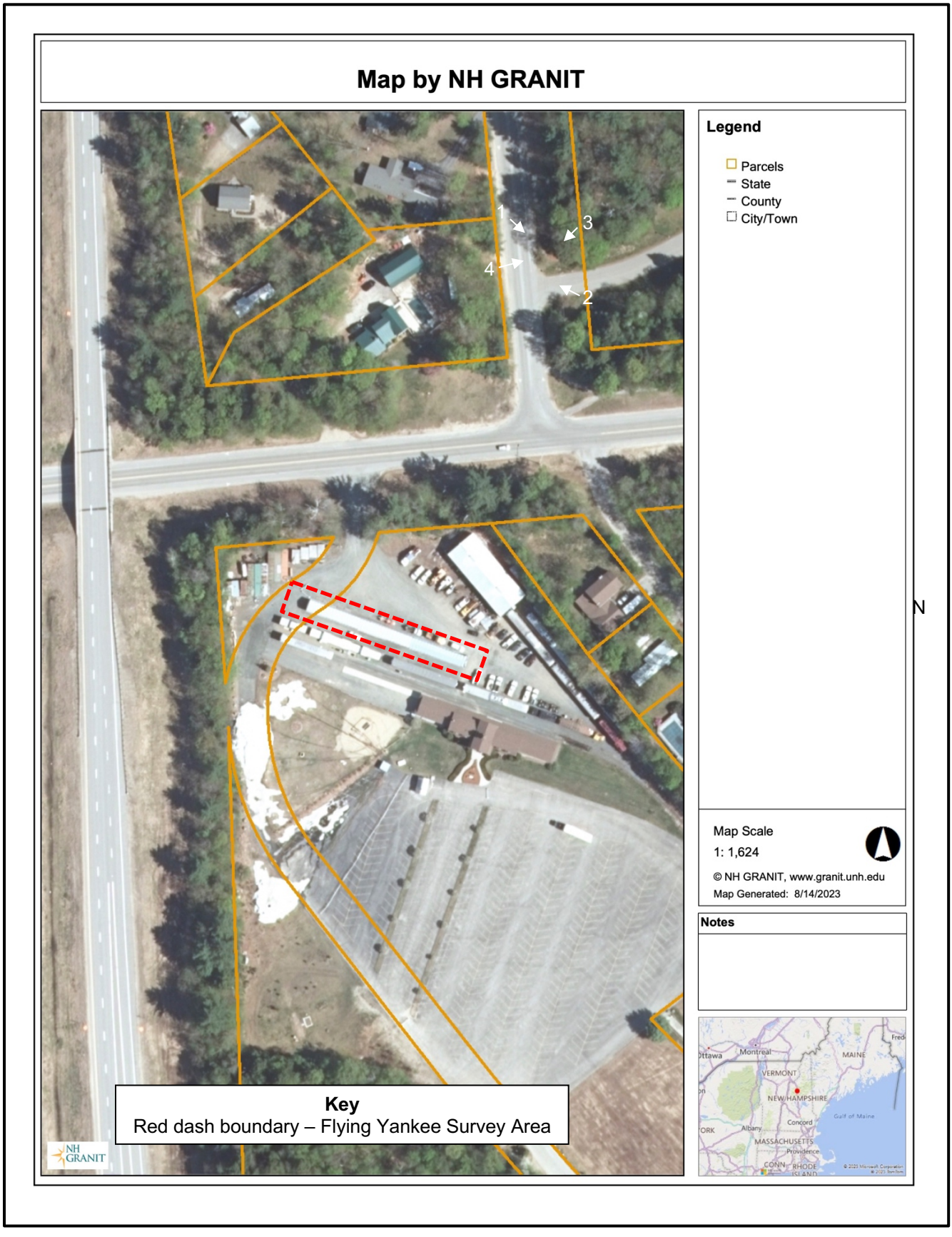

**Legend**

Map Scale
1: 3,247


Map Generated: 8/14/2023

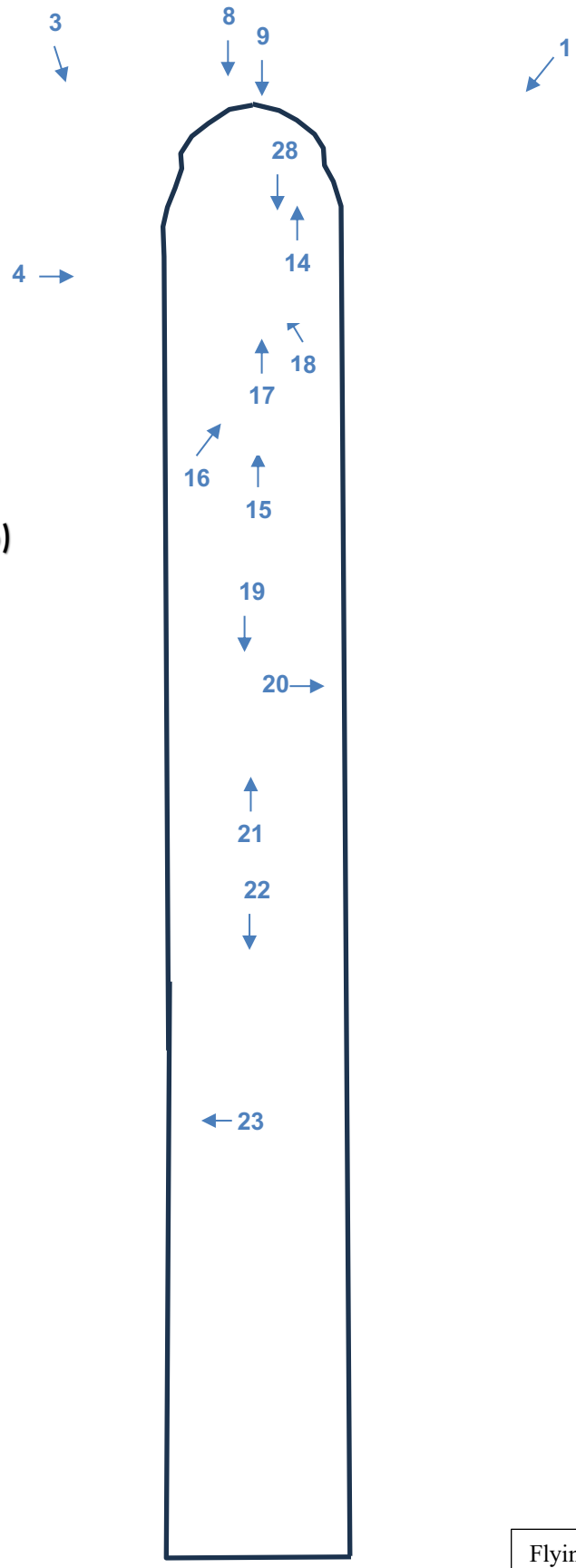
**Notes**

**Property Map and Exterior Photo Key:**



**Plan and Photo Key – CAR A**

Scale: 1" = 9' (approximately)




# CAR A

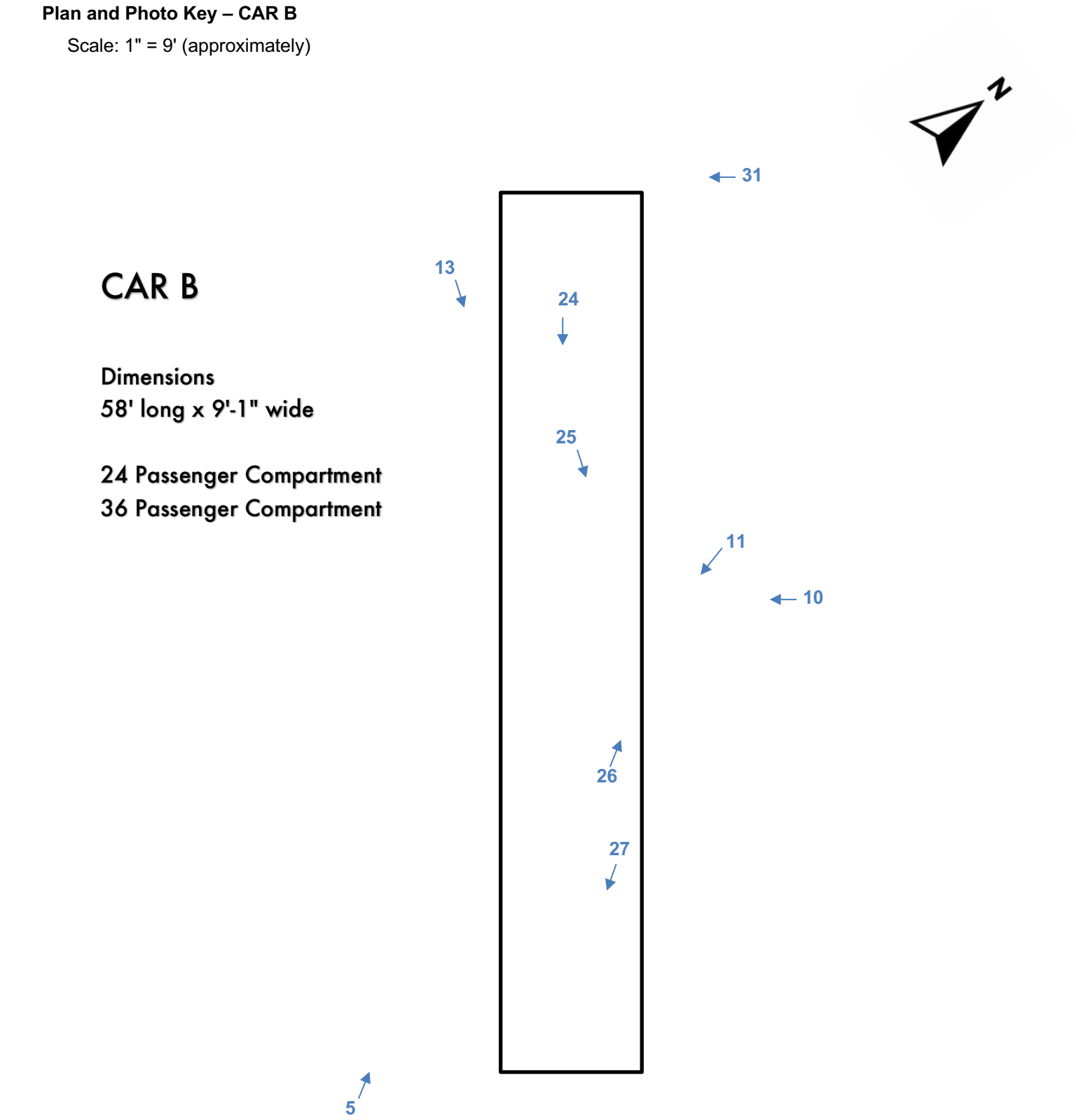
**Dimensions**
**74'-9" long x 9'-1" wide**

**Operator Compartment (Cab)**
**Engine Compartment**
**Baggage Compartment**
**Buffet**
**28 Passenger Compartment**

Flying Yankees is composed of three cars, lettered A, B and C from the head to the tail of the train.

**Plan and Photo Key – CAR B**

Scale: 1" = 9' (approximately)




Flying Yankees is composed of three cars, lettered A, B and C from the head to the tail of the train.

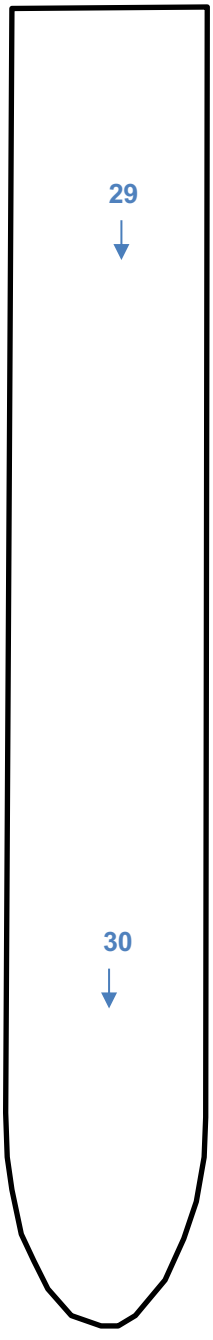
**Plan and Photo Key – CAR C**

Scale: 1" = 9' (approximately)


## CAR C

**Dimensions**
64'-3½" long x 9'-1" wide

32 Passenger Compartment
12 Passenger Lounge Compartment




Flying Yankees is composed of three cars, lettered A, B and C from the head to the tail of the train.

**Historical Background and Role in the Town or City's Development:**

*Overview* – The Flying Yankee is a diesel-electric powered, streamlined, stainless-steel body, articulated, three-car train that operated on the Boston and Maine Railroad and Maine Central Railroad systems in New England from 1935 to 1957. The Edward G. Budd Manufacturing Company of Philadelphia designed and fabricated the train, which has a distinctive appearance and mode of operation that was envisioned at the time as revolutionizing passenger travel. As compared against prevailing steam locomotive operations of the 1930s, the Flying Yankee's innovative diesel-electric power plant offered smooth, high-speed operations and rapid acceleration and deacceleration, and a pioneering, welded, stainless-steel frame and paneling that was strong and lightweight for efficiency. The streamlined design of the train's rounded nose and tail, and its gleaming, fluted, stainless-steel skin with its strong emphasis on horizontal lines and curves, evoked a forward-looking vision of the rapidly increasing pace of travel in the mid-20th century. For a brief and exciting time, the Flying Yankee embodied the concept of modernism and advanced design as applied to transportation technology.

The Boston and Maine and Maine Central Railroads retired the Flying Yankee in 1957 after 22 years of active operation mostly on routes between Boston and points throughout the northeastern United States including Bangor, Maine; Littleton, New Hampshire; and Troy, New York. Depending on the route the Flying Yankee would take on different names, for instance, being referred to as the Cheshire on its route to Littleton or the Minuteman crossing Massachusetts to Troy, but it was always best known as the Flying Yankee.[1] The Flying Yankee was in near continuous service the entire time except during daily routine maintenance, periodic major maintenance about once every six months, one recovery from an accident in 1944 and a major engine overhaul in 1947. It logged over 2.7 million miles. In 1958, the Boston and Maine Railroad transferred the Flying Yankee to the Edaville heritage railroad and amusement park in South Carver, Massachusetts, where it remained a static display until 1993. Bob Morrell, the owner of the Storyland amusement park in Glen, New Hampshire, acquired the train in 1990 and moved it to Glen in 1993. He formed a non-profit Flying Yankee Restoration Group (FYRG) to raise funds to return the train to operating condition. The train was eventually transferred to the repair shops of the Claremont and Concord Railroad in Claremont, New Hampshire for a relatively intense period of disassembly and repair activity from 1997 to 2003; however, technical delays and FYRG's mounting organizational and financial difficulties eventually led to a stoppage of work. With NHDOT assistance, the train was moved to the Hobo Railyard in Lincoln, New Hampshire in 2005 where it remains today. Over the past 18 years, work has been sporadic and mostly related to weatherproofing and preventive maintenance.[2]

*I. National Context: The Zephyr Train Technology and Design, 1933-1939*

The Flying Yankee is a railroad train property type best described as a "zephyr." The zephyr's defining characteristics are a diesel-electric power plant, articulated cars forming a single operating unit known as a trainset, unified stainless-steel streamlined exterior and Art Moderne-influenced interior design. The origins of this property type are found within the technical expertise and product lines of major American manufacturers: the Edward G. Budd Manufacturing Company of Philadelphia, and the Winton Engine and Electro-Motive divisions of General Motors in Cleveland. Over 100 other American manufacturers provided component parts and materials from iron and steel to cork, rubber and mohair (see attachment at end of form). The Chicago, Burlington and Quincy Railroad Company (CB&Q) provided the leadership and vision for the original zephyr and owned all but one of the ten zephyrs built between 1933 and 1939. That one is the Flying Yankee (Figure 1).


*Figure 1. The Flying Yankee, a widely used original builder's photograph of 1935. Source: General Electric, circa 1936.*

Edward G. Budd (b.1870-d.1946) was a practical machinist and businessman. After having worked as an employee and manager at several types of metal-working factories, he established a company in his own name in 1912 and began making the first all-metal automobile car bodies in the United States. His company started small by pressing out steel automobile panels for Nash cars. Quickly the all-steel bodies proved their worth over traditional wooden car bodies. Budd

[1] David White, The Flying Yankee and the Cheshire and Fitchburg Lines, manuscript, n.d.
[2] Rick Nowell, Flying Yankee Timeline [Excel Spreadsheet], January 2023.

became a supplier to Dodge in 1914 and acquired Ford as a customer around 1920. By 1925, Budd company sales had reached over $24 million with $2 million in profits (about $34 million in 2023 currency).[3]

Budd began thinking about expanding his business into stainless-steel railroad car and airplane bodies in the early 1930s. By his own account, he became interested following a trip to Germany in 1930 where he visited the Krupp steelworks in Essen. There, he learned about a recently developed alloy of stainless steel that was rust resistant and suitable for stamping and welding, in other words an exceptionally strong, elastic, lightweight, corrosion-resistant material.[4] By 1933, the Budd company's newly established Stainless Steel Department had developed an innovative proprietary technique they called "shot welding." This welding process clamped two pieces of stainless steel together and then applied an electric current through them for a very precisely controlled time and temperature. The specialized welding technology joined the pieces together without damaging the anti-corrosion, high-strength properties of the stainless steel. Shot welding was marketed as the "Budd System of Light-Weight Construction."[5]

Budd figured that a stainless-steel railroad car weighed about a third of a typical steel car, had higher strength, and could be used to build trains that moved significantly faster per unit of power applied to weight. In 1933, Budd found a willing partner for an all stainless-steel train in the CB&Q. It operated a rail network in the Midwest that stretched from Chicago to the Gulf of Mexico, north to Wyoming and as far east as Kentucky and west as Colorado. Between 1924 and 1933, the CB&Q, like many American railroads, had watched in dismay as passenger travel declined. During that time, the CB&Q lost 11 million annual passenger rides, about 60% of its ridership, largely a result of the Great Depression and the competitive inroad of automobiles. Executives at the CB&Q decided a new approach was needed and began looking for options. Leading this effort was Ralph Budd [coincidently no relation to Edward G.], who became the CB&Q's president in 1932 and was a champion of its high-speed, light-weight, passenger train initiative. The effort eventually led the CB&Q to the Edward G. Budd Company.[6]

The CB&Q was sufficiently impressed with Budd's innovative stainless-steel car bodies to enter into an agreement to purchase a lightweight train in 1933. CB&Q wanted to take the concept train a step farther by combining it with an internal-combustion diesel engine. Steam power had been the dominant motive technology in railroading since the 1830s. "Supersize" coal-consuming locomotives were the American standard during the early decades of the 20th century, being extremely powerful and heavy. While there was much to praise about steam technology, its downsides were well known including high maintenance costs and long repair times, frequent stops for refueling and rewatering, and miles of track needed to accelerate to top speeds and decelerate when coming to a stop. These factors increased costs and lengthened schedules. The CB&Q was aware from its own economic studies that gasoline-fueled automobiles were the main cause of passengers leaving the railways for the highways, especially on trips of moderate lengths between major cities. They thought it appropriate that their train also use an internal-combustion engine.

CB&Q and Budd approached the Winton Engine and Electro-Motive divisions of General Motors, both divisions based in Cleveland, as the final missing pieces in the partnership. Winton had been producing stationary diesel engines for marine and industrial uses since 1912. Winton manufactured the first practical two-stroke diesel engines for railroad use in the mid-1920s working with the Electro-Motive Company, which assembled the power plant and control systems, and General Electric, which supplied the electrical equipment. This diesel-electric power system combined two powerful technologies; the diesel engine spun an electric generator, which in turn supplied current to motors that in turn applied the power to wheels. The early diesel-electric prototypes of the mid-1920s were proof of concept but they were small and mostly relegated to small, low-powered, self-propelled cars and switchers. In 1930, Winton and Electro-Motive were acquired by General Motors Corporation (GM) and with an influx of new financial resources began to work through the technological obstacles to improving power-to-weight ratios that would make dieselization practical for a wider range of heavier-duty rail applications. Together, Budd and GM designed a 600 horsepower, eight-cylinder, Winton engine specifically for the CB&Q's zephyr project. It was the first major project of the new GM venture and soon proved that lightweight, high-speed, diesel-electric powered trains could have a practical, revenue-generating application on American railroads. This would set GM on the course of building larger, more powerful diesel-electric locomotives including zephyrs and more conventional locomotives. Over the course of the next 25 years, from roughly 1934 to 1959, nearly all major American railroads entirely abandoned steam for diesel-electric power (Figure 2).

[3] Suzanna Barucco, Budd, Edward G. Manufacturing Company, National Register of Historic Places Nomination Form, 2006.
[4] The particular alloy is 18-8 stainless steel (18 percent chromium and 8 percent nickel).
[5] Edward G. Budd, *Reprint of a Lecture by Edward G. Budd, President, Edward G Budd Manufacturing Co., Philadelphia, Pa.* (Boston, Massachusetts: Harvard Graduate School of Business Administration), March 6, 1934; Edward G. Budd Manufacturing Company, Budd System of Light-Weight Construction (Philadelphia, Pennsylvania: 1936).
[6] Budd (1934); R. Eskergian, "The Design of Light-Weight Trains," *Proceedings of the American Society of Mechanical Engineers* (1934): 1.

A further factor in reducing the zephyr's weight and increasing its speed was articulation of the cars. Articulation meant that adjacent cars shared the same trucks, i.e., wheel bodies, axles and wheels. This had the impact of semi-permanently attaching the car into a single unit. The earliest zephyrs were three-car trainsets but they also were made in four-car trainsets and several of the last zephyrs combined multiple sets to make-up seven or twelve-car trains. A disadvantage was the cars of each trainset could not be easily separated, while adding or reducing the number of cars was usually impractical under normal everyday operations; however, fewer trucks meant less weight, higher speeds and less vibration and noise as compared to traditional operations of trains composed of single cars with two trucks each.

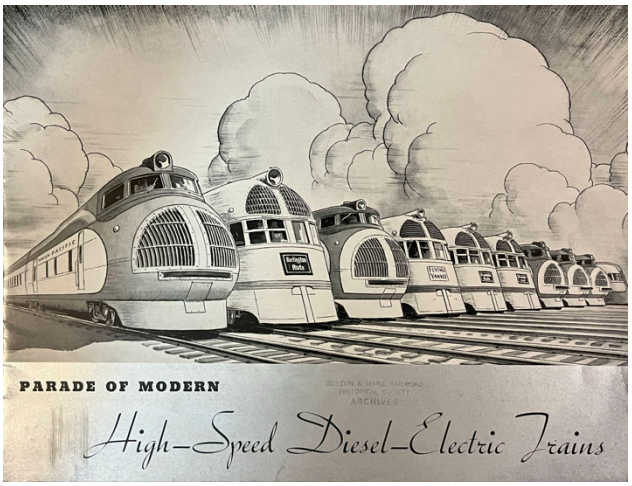



*Figure 2: Streamlined diesel-electric power units from 1934 to 1936. Flying Yankee, fourth from left. Source: General Electric circa 1936.*

Ralph Budd, the CB&Q president, took the public perception of his railroad's new project as seriously as the technology. To be successful, the train needed to attract riders away from competitors and have as much modern appeal as automobiles. He reportedly came up with the "zephyr" name, choosing a word that began with "z" because it was the last letter of the alphabet and he wanted CB&Q's investment in the new technology to be the "last word" in modern passenger service. That zephyr meant a gentle wind was also appealing for a train that was supposed to glide along at high speeds.

To make the train's appearance suitably aesthetic and distinctive, the Budd company turned to its in-house designer Walter Dean and his brother, Albert Gardner Dean, a little known aeronautical engineer. They fashioned the pressed stainless-steel skin forming the nose, sides, roof and tail. A model of the train was even sent to the Massachusetts Institute of Technology to be tested in a wind tunnel for aerodynamic qualities that would enhance speed and smoothness of the ride. Those tests indicated that at a speed of 95 miles per hour, the zephyr had a resistance of about 47 percent that of a conventional three-coach steam train.[7] The Deans teamed with two Philadelphia architects, Paul Philippe Cret and John Harbeson, who were credited with coming up with the pattern of horizontal fluting seen on the side panels of the zephyr trains. Cret and Harbeson's main focus though was the interior design, developing details for seating and lighting and interior finishes of the passenger compartments. Working with an Art Moderne-influenced aesthetic, Cret and Harbeson emphasized balance, proportion and repetition of curved and ovular patterns. They gave each of the ten zephyr trains produced by Budd its own interior identity with distinctive paint schemes and upholstery patterns and colors.[8]

The first zephyr, a three-car unit christened the Burlington Zephyr and renamed the Pioneer Zephyr after the CB&Q placed orders for additional zephyrs, undertook its first test runs in early 1934 (Figure 3).[9] In April, it left Philadelphia and began a promotional tour across the Northeast and Midwest, stopping in 46 cities. The train made its first regularly scheduled run from Chicago to Denver on May 24, 1934, averaging 77 mph and reaching top speeds of 112 mph. It was shown at the Century of Progress Fair on Chicago's Lake Michigan, and then sent over the CB&Q rail system for a grand tour. During 1934, the Pioneer Zephyr visited 31 states, 222 cities and was viewed by more than two million people. The positive publicity was all that the CB&Q and the train's manufacturers could have wanted. The American Flyer model-toy company introduced a zephyr in 1934, one of the most popular model trains ever, and other major American manufacturers picked up on the zephyr theme. Even the Ford Motor Company introduced a Lincoln-Zephyr car in 1936 and Northwest Airlines promoted its


*Figure 3. The Pioneer Zephyr. Source: Edward G. Budd Manufacturing Company 1936.*

[7] Edward G. Budd Manufacturing Company, Railway Division, *Boston and Maine-Maine Central, The New Flying Yankee* (Philadelphia, Pennsylvania: 1935) [Reprinted from *Railway Age* (February 9, 1935)].
[8] The Paul Phillippe Cret Collection at the University of Pennsylvania Archives contains 27 drawings and sketches for zephyr interiors. Unfortunately, these do not include the Flying Yankee.
[9] The first zephyr will be consistently referred to as the Pioneer Zephyr for the rest of this report, although that name did not come into use until around 1936.

aircraft fleet as "sky zephyrs." While the Budd Company would build only ten zephyr trainsets between 1933 and 1939, the technology and design of combining dieselization, articulated light-weight stainless-steel frame car bodies, streamlined exteriors and stylish interiors influenced American locomotive and railroad passenger car design for decades to come.

*II. Regional Context: The Flying Yankee and Railroading in New England, 1935-present*

*A. Building the Flying Yankee, 1934-35*

In June 1934, well before the CB&Q could order its second zephyr, the Boston and Maine Railroad and Maine Central Railroad placed an order with the Budd company for a three-car trainset that was dubbed the Flying Yankee or in railroad fashion Boston and Maine Railroad #6000 (the new four-digit 6000 series denoting diesel-electric power). However, the two northern New England railroads were experiencing hard economic times, the Maine Central in particular. In 1933, the latter had cut its losses by entering into a joint management agreement with the Boston and Maine Railroad. Even then, the railroads purchased the Flying Yankee with a $225,000 loan from the New Deal's Public Works Administration, having only $55,000 available for the down payment.[10]

From the outset, the Flying Yankee was closely patterned after the original Pioneer Zephyr, although adaptations were made to the specific requirements of the Boston and Maine and Maine Central Railroads. The Pioneer Zephyr, for instance, accommodated 72 passengers in its original three-car set (a fourth car was added to the Pioneer Zephyr in 1938 to bring seating up to 112 passengers). The Flying Yankee had 132 seats in its three-car set. For the extra seats, the Flying Yankee sacrificed a dinette and two restrooms found in the Pioneer Zephyr, as well as more commodious seating. The Flying Yankee's Winton diesel engine and electric motor propulsion system, however, were the same as the Pioneer Zephyr's, as was most of the exterior design. The Budd company, once again working with architects Paul Philippe Cret and John Harbeson, came up with a blue-green and maroon interior color scheme that was unique to the Flying Yankee.

Edward G. Budd Manufacturing Company blueprints and order records on file at the Boston and Maine Railroad Historical Society library document the Flying Yankee's original plan and layout (Figure 4).

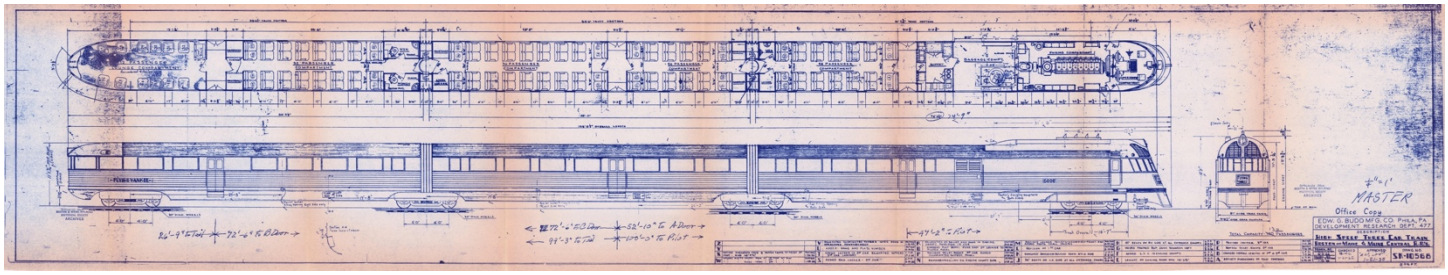


*Figure 4. Edw. G. Budd Mfg. Co., High Speed Three Car Train, Boston and Maine & Maine Central R.R.'s, Blueprint, January 21, 1935. See Figures 21-23 for details of car plans from this blueprint.*

This, along with photography, written descriptions and comprehensive operational instructions for the crew, provide ample evidence for the train's appearance and character after it left the factory in early 1935. A few of the specifications, as itemized by Budd, were as follows:[11]

- Dimensions – 199'-2" long, 9'-1" wide, 12'-5" tall
- Weight – 213,600 lbs. when fully supplied with fuel and water
- Power Plant – Winton 600-hp., two-cycle, diesel engine, rated at 700 rpm. (Figure 5).

[10] R. Stuart Wallace and Lisa B. Mausolf, New Hampshire Railroads: Historic Context Statement (April 2002): 52.
[11] Edward G. Budd Manufacturing Company (1935).

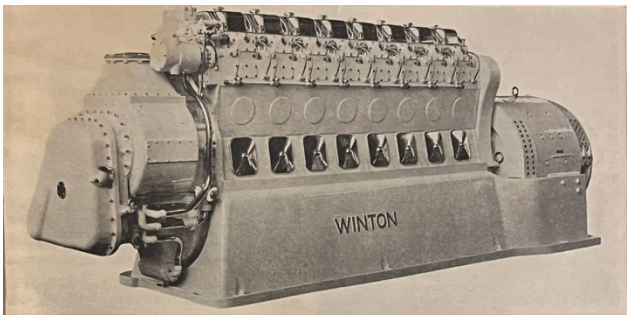



*Figure 5. The Flying Yankee's Original Winton 600-Hp., Two-Cycle Diesel Engine. Source; Edward G. Budd Manufacturing Company 1935.*

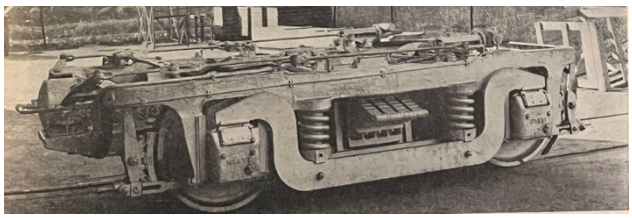


*Figure 6. The Flying Yankee's Original Power Truck. Source: Edward G. Budd Manufacturing Company 1935.*

- Main Generator, auxiliary generator and two traction motors – General Electric
- Air Compressor – Gardner-Denver, 75 cu.-ft.-min., located at rear of diesel engine.
- Diesel Engine Bed – arc-welded structural steel plate supplied by the Lukens Steel Company
- Articulation – cast-steel connections, welded into the car frames
- Trucks – Four, conventional outside bearing type, 54,100 lbs., front power truck with 36"-diameter wheels and other trucks with 30"-diameter wheels (Figure 6).
- Brakes – New York Air Brake Company electro-pneumatic
- Car Frames – 18-8 thin-gauge stainless steel truss frames using the Budd shotweld system of fabrication (Figure 7)

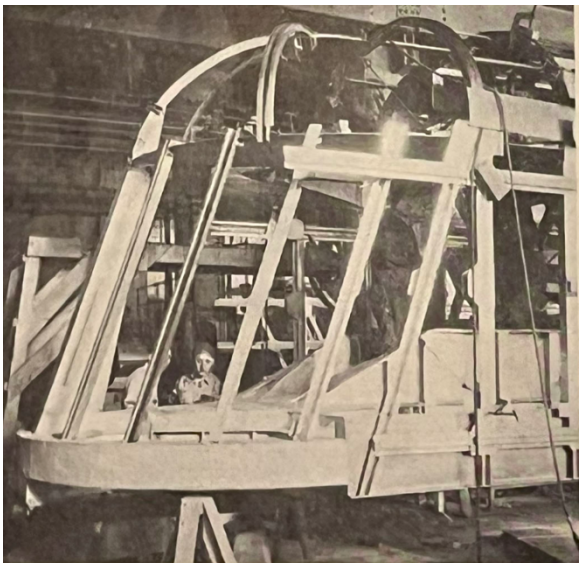


*Figure 7. The stainless-steel frame of the front end of the Flying Yankee (Car A) under construction. Source: Edward G. Budd Manufacturing Company 1935.*

*Figure 8. Flying Yankee passenger compartment. Source; Edward G. Budd Manufacturing Company 1935.*

- Car Decks – corrugated sheets of stainless steel welded to longitudinal stringers, ten to a car
- Walls and Ceilings – lined with Masonite and painted green and ivory
- Seating – 132 seats, upholstered in mulberry-taupe or green mohair, cushioned with light-weight tubular aluminum frames and removable anodized aluminum trays for food service (Figures 8-9)
- Carpeting – meadow green color under the seats and sand color in the aisles
- Floors – cork tile cemented to the corrugated steel underflooring; linoleum tile in the buffet, lavatories and luggage lockers
- Window Drapes – lemon gold
- Buffet – with service at the counter or at the seats, efficiently arranged for grill service, ice cream and hot or cold drinks (Figure 10)

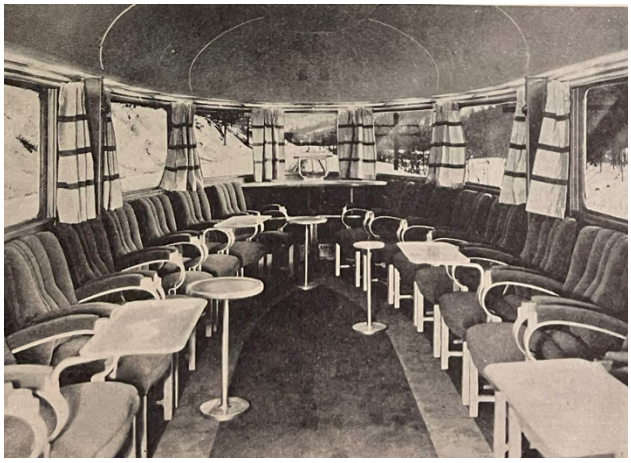


*Figure 9. The Flying Yankee's passenger lounge at the rear of Car C. Source; Edward G. Budd Manufacturing Company 1935.*

*Figure 10. Flying Yankee's Buffet compartment. Source: Edward G. Budd Manufacturing Company 1935.*

- Exterior Doors – swing type, double doors
- Windows – double glazed and hermetically sealed, shatterproof glass, supplied by the Pittsburgh Plate Glass Company (the windows were sealed to work with the air conditioning, a relatively new feature in trains, which needed to be explained to passengers who were used to opening train windows for ventilation)[12]
- Heating – steam heating with an oil-fired boiler located in baggage room
- Air Conditioning – Frigidaire mechanical equipment
- Front Headlight – 14", 250-watt
- Rear Light – 9", 40-watt

*B. Flying Yankee's Operational Years on the Boston and Maine Railroad/Maine Central Railroad, 1935-1957*


*Figure 11. The new technology meets the old as the Flying Yankee stands in Boston's North Station, January 1935. Source: L. Peter Cornwall photo, Boston and Maine Historical Society.*

The Flying Yankee turned out to be one of the bright spots in New England railroading during the dismal years of the mid- to late 1930s. Even as ridership plunged generally and the region's railroads began abandoning trackage and cutting back on services, the Flying Yankee was celebrated as the first streamlined, high-speed train on any American railroad east of the Appalachian Mountains. The train left Philadelphia on its own power and arrived in western Massachusetts on February 9, 1935, and then went to Boston where it was met with a large and eager crowd (Figure 11). It then went on a two-month grand tour of northern New England. Audiences turned out in medium and small-sized towns to visit the train, much as they had turned out in the Midwest for the Pioneer Zephyr. The reaction in Concord, New Hampshire, caught the spirit of the event with *The Concord Monitor and New Hampshire Patriot* newspaper reporting, "In a few hours nearly 13,000 people walked through the train in Concord … and since Saturday more than 100,000 New Englanders have seen her interior as well as the exterior." The paper's editor further observed that "everybody seemed to know the train was coming, and waited for it" and concluded that "we have never seen anything quite like the fascination this train has for people."[13] On April 4, 1935, the Flying Yankee made its first regularly scheduled 740-mile roundtrip run between Boston and Bangor, covering each direction in about six hours at an average speed of about 60 miles per hour, stops included.

[12] Boston and Maine Railroad, The Flying Yankee Comes to New England [brochure], 1935, on file, Boston and Maine Historical Society Library, Lowell, Massachusetts.
[13] "The People Turn Out," *The Concord Monitor and New Hampshire Patriot* (February 14, 1935).

Fascination with the sleek streamlined design and speed of the Flying Yankee thrilled travelers and those who stood by stations and tracks to watch it whiz by. In 1936, *Popular Mechanics* reported that "Speed has an added thrill for passengers on the "Flying Yankee" …. They can sit in the solarium of the rear car and watch the speedometer, installed to tell them exactly how fast this speed train is traveling. The dial reads up to 120 miles per an hour. It is illuminated at night, and there is a clock in its face" (Figure 12). The Boston and Maine Railroad's President, Edward S. French, announced the arrival of the Flying Yankee with the thought that its "purpose is to maintain for northern New England a passenger service line with the best, fastest and safest forms of modern transportation."[14] Somewhat more creative was the Boston and Maine Railroad's advertising department's brochure announcing that "The New Flying Yankee" was "like giving wings to your favorite easy chair at home." The Budd company went national with its advertising, which included a full-page in *Fortune Magazine* with the headline of "Making History in New England." A beautiful illustration of the Flying Yankee under a New England sky (complete with airplane) pictured it crossing a bridge within a picturesque blending of a coastal and mountain landscape (Figure 13). The advertising and promotions all had one thing in common, sleek photographs and illustration of the streamlined train, often pointing toward the viewer and in perspective to emphasize its speed.

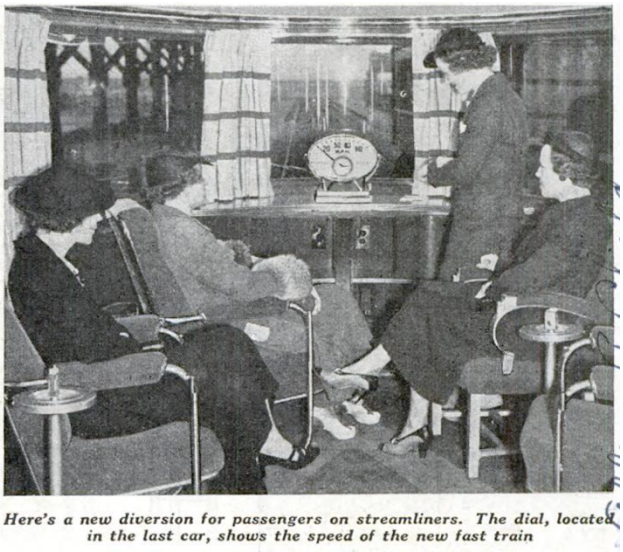



*Figure 12. Flying Yankee's passenger lounge (Car C). Source: Popular Mechanics 1936.*

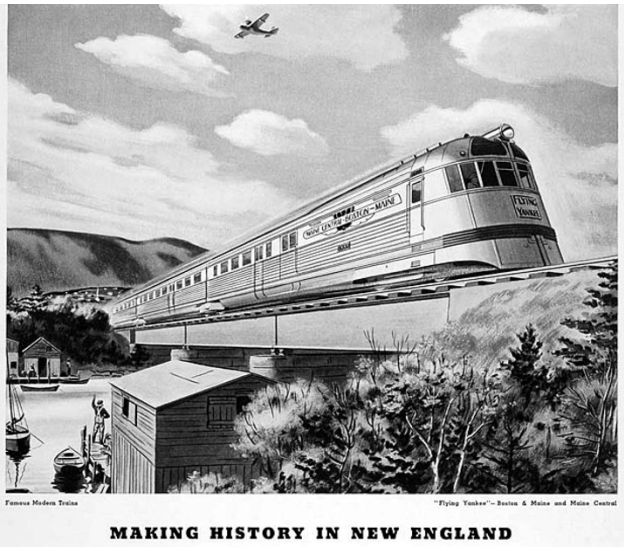



*Figure 13. Budd Company Ad from Fortune Magazine. 1936.*

The Flying Yankee's early performance was equally impressive. After a year of operation, the Boston and Maine Railroad reported a 48% increase in ticket sales on the Boston-Bangor route, amounting to the Flying Yankee carrying 94,500 passengers and grossing $266,800. During the Boston and Maine Railroad's fiscal operating year of 1937-38, the expense of operating the Flying Yankee was only about 25% of the revenue it earned per mile, delighting the railroad's accountants and stockholders. All in all, the train performed remarkably well, although as with any new design there were technical issues. Early experiences showed that the train ran rougher than expected and the rear car sometimes would whip at higher speeds. These issues were relatively quickly solved by replacement of springs and weight redistribution. Other complaints included faulty electrical wiring, brake issues and problems with ventilation that trapped cold or hot air in some parts of the cars. When the Flying Yankee broke down on the road or became stuck in deep snow, as happened sometimes, the process of calling up a steam locomotive to rescue it was unusually burdensome since the Flying Yankee's front and rear drawbars and couplers were kept in the baggage compartment and had to be manhandled into place.[15]

The Boston and Maine Railroad carefully maintained the Flying Yankee as recorded in the original maintenance orders now on file with the Boston and Maine Railroad Historical Society library in Lowell, Massachusetts. The schedule generally allowed for one-day a week when the train was taken out of service for routine maintenance and nonemergency repairs. The Flying Yankee was taken out of service for several weeks each year and given an overhaul in the Boston and

[14] Edward G. Budd Manufacturing Company, "Forward" to *The New Flying Yankee* (1935).
[15] Carl Byron, "The Streamlined Flying Yankee," *Trains Classic Magazine* (1999): 61-62.

*Figure 14. Flying Yankee in the Boston and Maine Railroad repair shops following derailment in January 1945. Source: Boston and Maine Railroad, Maintenance Records.*

Maine Railroad shops in Concord, New Hampshire.[16] The only serious accident to involve the Flying Yankee occurred on January 19, 1945 in the railyard at North Walpole, New Hampshire. Ice derailed the train and it careened off the track and hit a section house. Fortunately, no one was seriously hurt. The nose of Car A was crumpled and the frame bent, taking the train offline for several months while repairs were made (Figure 14).[17]

In April 1947, the Flying Yankee went into the Concord shops for a major overhaul. It was originally intended to disassemble and rebuild its original Winton diesel engine of 1934 but when this proved too worn out for practical repairs, a decision was made to swap it out for the block and crankshaft from a switcher, the Boston and Maine #1103, which had entered service in 1936.[18] This was one of the few alterations of any potential historical consequence made to the train during its operating period.

*C. Preservation and Repair Activities, 1957-present*

In May 1957, the Flying Yankee was retired from active service making a final run between Boston and Troy, New York as the Minuteman. A month later it was donated to Nelson Blount for display at his Edaville heritage railroad and amusement park in South Carver, Massachusetts. Over the next 36 years, little was done to maintain or weatherproof the train (Figure 15). A report from 1999 stated "glass cracked, steel rusted, and the interior upholstery and carpeting moldered away. Mice made homes in the wall insulation, and ceiling paint crazed or fell away in sheets."[19] In 1993, Robert Morrell, owner and operator of his family's Storyland amusement park in Glen, New Hampshire, acquired the train, disassembled and trucked it from South Carver to Glen (Figure 16). The truck convoy that brought the train north was a news event in itself.[20] He established a non-profit to refurbish the Flying Yankee's cars and return them to operation. In 1996, the Flying Yankee Restoration Group (FYRG) and the State of New Hampshire entered into an agreement whereby title to the train was turned over to the state in consideration for assistance with a public-private fundraising partnership and, ultimately, rights to operate on state-owned trackage.[21]

*Figure 15. The Flying Yankee at Edaville. Circa 1960s. Source: Postcard.*


*Figure 16. The Flying Yankee at Glen, New Hampshire, December 1996. Source: Ron LeBlond photo, Boston and Maine Railroad Historical Society.*

[16] Boston and Maine Railroad, Streamline Motor Car #6000, Maintenance Reports, 1935-1957, on file, Boston and Maine Railroad Historical Society, Lowell, Massachusetts; Chuck Crouse, "The Zephyr's Eastern Sister, B&M 6000: A New Era in New England Railroading," *Boston and Maine Railroad Historical Society Bulletin* (June 1985): 9-13.
[17] Boston and Maine Railroad, Subject: Streamline 6000 – Derailment, January 31, 1945 [memorandum], on file, Boston and Maine Railroad Historical Society, Lowell, Massachusetts; Byron (1999): 62-63.
[18] Boston and Maine Railroad, Streamline Motor Car #6000, Maintenance Reports, 1947, on file, Boston and Maine Railroad Historical Society, Lowell, Massachusetts.
[19] Byron (1999): 63.
[20] "Flying Yankee Headed to N.H.," *Foster's Daily Democrat* (October 16, 1993).
[21] Byron (1999): 94.

The Flying Yankee was moved from Glen to the Concord & Claremont Railroad in Claremont in 1997 to begin repair activities (Figure 17). In 1998, Robert Morrell passed away but his family continued to back the project. Between 1997 and 2003, the necessary repairs needed to bring the train back into operation began, which essentially meant stripping the car bodies, removing the trucks and all internal fixtures, controls and powerplant. Welders made structural repairs to the frames and bodies. The Winton diesel engine installed in 1947 was removed and rebuilt, and the motors and generators rewound. The FYRG refurbished the interior with new insulation and Masonite panel linings, installed new glass in the windows and reupholstered the seats, among a long list of activities.[22] By 2000, the Flying Yankee was being slowly reassembled just as technical, organizational and financial difficulties began to plague the effort. One newspaper report noted that the project budget had more than doubled to $2.7 million with only about half the total raised.[23] In 2001, the FYRG completed interior refurbishment of Car B. The Car B "roll out" drew an audience of 500 visitors with the refurbished upholstery of the mohair seats drawing many compliments.[24] Meanwhile Car A remained entirely stripped down in the small Claremont and Concord Railroad shops, and Car C, also stripped, stood outside on a siding (Figure 18). While there was visible progress, work had largely reached a standstill by 2003 with the project budget publicly reported now at $4 million with about $2.5 million spent.[25] The next year, FYRG and the State of New Hampshire determined that it was time to end the relationship with the Concord & Claremont Railroad shops.


*Figure 17. A convoy of trucks prepares to move the disarticulated Flying Yankee from Glen to Claremont, 1997. Source: C. M Harrington, photo, Boston and Maine Historical Society.*

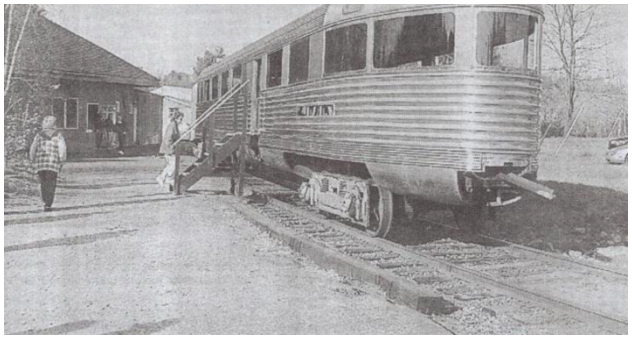


*Figure 18. Flying Yankee's Car C at Claremont, stripped out and awaiting refurbishment. Source: Manchester Union Leader 2001.*

In August 2005, the State of New Hampshire moved the Flying Yankee from Claremont to the Hobo Railyard in Lincoln, New Hampshire. The train's unassembled parts were placed in containers and stored at a separate NHDOT location at Twin Mountain. Over the next several years, the FYRG fundraised and initiated several projects, the largest of which was a contract to refurbish the trucks. In 2010, a plan was initiated to weatherproof the cars and make roof repairs, a project that was completed when a tent that had been covering the train was removed in 2017. After several years of inactivity, volunteers and railroad enthusiasts formed a new Flying Yankee Association board in April 2021. This revitalized organization is currently working toward a plan for reactivating the preservation project.

**Applicable NHDHR Historic Contexts** (please list names from Appendix C)**:**

*Transportation*
*704. The Railroads in New Hampshire, 1842-1960*
*902. Engineering in New Hampshire, 1623-present*

**Architectural Description and Comparative Evaluation:**

The Flying Yankee is a self-propelled, diesel-electric, high-speed train composed of three articulated cars referred to throughout this report and historically by the Boston and Maine Railroad as Cars A, B and C from head of train to rear (Photographs 1-7). At present, the train is stored outdoors at the Hobo Railroad's railyard in Lincoln. The train car bodies are standing on blocks without the four "trucks," i.e., wheels, axles and frames on which the cars would have rolled and

[22] Byron (1999): 94.
[23] Kate Feld, "Of Train Half Finished," *Arctic Valley News* (November 17, 2001).
[24] John Reading, "Mass Bay RRE Inspects the Flying Yankee" (November 18, 2001); Stephen Seitz, "All Aboard, Classic Flying Yankee Restoration Is Well Under Way at Claremont," *Manchester Union Leader* (November 18, 2001): B8.
[25] "More Contributions Received for Flying Yankee Restoration," *Conway Daily Sun* (September 1, 2004).

been propelled. The truck locations from front to back are found under the front of Car A, between Cars A and B, between Cars B and C and under the rear of Car C. The Flying Yankee from head to rear measures just over 199'-2" long and has an out-to-out width of 9'-1". The train's height is approximately 12'-3¾" as measured at the headlight to the ground at the front of Car A and 11'-5½" as measured at the rear light at the rear of Car C, per plans that included the trucks.[26] The cars are of unequal lengths with Car A measuring 74'-9" long, Car B measuring 58' long and Car C measuring 64'-3½" long (all out-to-out measures of the car bodies). The train is articulated between Cars A and B and between Cars B and C; however, the cars are currently disconnected and set a foot or two further apart than they would be in operation. The articulation is achieved by joints formed by center pins and drum-like castings tied into the car body frames (Photograph 31). These joints create a semi-permanent attachment between the cars while allowing the train to bend traveling through curves. At present, the cars remain attached through non-original gangways, i.e., walk-through passages between the cars (Photograph 5, right of view).

*Exterior* – The Flying Yankee's streamlined exterior covering or "skin" is visually distinctive and one of its most obvious defining features. The skin is composed of stainless-steel panels riveted to a stainless-steel frame. The streamlined look is achieved through a design of smoothly curved and surfaced front and rear ends at the head of Car A and tail of Car C (Photographs 4 and 7). The cars' side panels are pressed into fluting or concave grooves (Photograph 11). The fluting creates a series of continuous horizontal lines drawing the eye up and down the length of the train. The visual interest of the horizontal streamlining is accentuated by varying the depth and spacing of the fluting. The widest grooves are reserved for the panels located under the ribbon windows of the passenger compartments while narrow grooves are used for the domed roof above the windows and an inward curving apron that covers the car underbodies (Photograph 13). This apron is essential for the streamlined visual effect as it gives the train a tubular appearance. It also hides the various mechanical and operating systems located within the underbody area, such as fuel and water tanks, motors and compressors, which if exposed would detract from the train's streamlining.

The Flying Yankee's streamlined design extends to the placement and pattern of its windows. The windows form a continuous horizontal ribbon, occasionally alternating with smooth stainless-steel panels, around the entire train. The operator's compartment at the head of Car A is defined by a ribbon of eight windows in a curved 180-degree plan. The windows are battered, or slanting rearward, to fit seamlessly into the curvature and angle of the nose. The outside-most window on the engineer's righthand side of the train slides open while the other windows are fixed. Behind the operator's compartment in line with the windows are smooth stainless steel panels that are stenciled and painted with the names of the "Boston and Maine Railroad" and "Maine Central Railroad" and a decorative wing-like pattern (Photograph 4). The "Flying Yankee" nameplate also appears on the sides of Car C. A nameplate that would have historically been placed on the nose is not present. The windows of the passenger compartments of Cars A, B and C are fixed, rectangular and approximately 41" wide by 30" deep at the passenger seating areas. The windows at the ends of the cars are smaller, fixed, squarer and approximately 26" wide by 30" deep at the lavatories and lockers (Photograph 5). All windows have curved corners and are set within riveted, stainless-steel frames. The rear of Car C, referred to as the passenger lounge compartment, has a ribbon of windows set in an ovaloid plan to offer passengers a 180-degree panoramic view (Photograph 7).

Passenger and crew access to the train is provided by 3'-6"-wide, stainless-steel double doors located near the mid-section of both sides of each car (Photograph 10). The doors swing inwards with a footplate and exterior handle bars to assist with stepping into and out of the car. In addition, Car A has 5'-4"-wide, stainless-steel sliding doors to each side of the baggage compartment and 23"-wide, stainless-steel single doors to each side of the operator's compartment. Each door has an upper glaze and the lower portion of the door is continuous with the horizontal fluting of the exterior skin.

In keeping with the streamlined design of the Flying Yankee, exterior details such as lights and vents are rounded and often smooth surfaced. For instance, Car A's front end is capped by a circular, engine headlight extending forward between two curved louvered vents that serve as air intakes just above the operator's compartment windows (Photograph 8). A "cowcatcher" has a distinctive circular swoop to its lower edge with its forwardmost point defined by a nose with a pyramidal cap (Photograph 9). The rear light atop the tail of Car C is also circular and set within a stainless-steel housing that blends with the curvature of the car (Photograph 13).

The following interior description proceeds from front to back of the train describing each compartment. For the purposes of this description the head of Car A is the front and the tail of Car C is the rear.

[26] Edw. G. Budd Mfg. Co., Development Research Dept. 477, Description of High Speed Three Car Train, Boston and Maine & Main Central R.R.'s, Drawing No. SK-10568, January 21, 1935, on file at the Boston and Maine Railroad Historical Society Library, Lowell, Massachusetts.

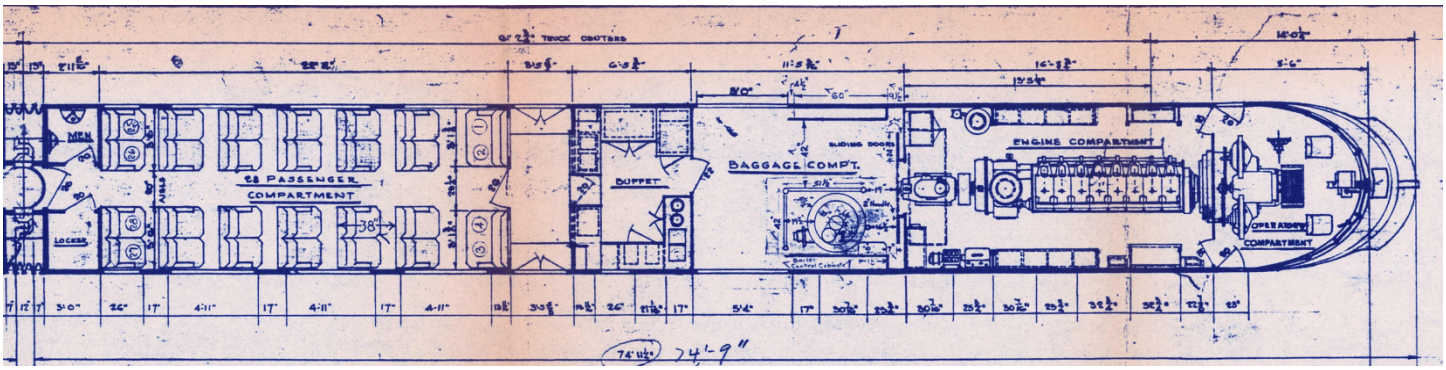



*Figure 19. Edw. G. Budd Mfg. Co. Detail of Car A, original interior plan from blueprint, January 21, 1935.*

*Interior Car A* – Car A consists, from front to rear, of an operator compartment, engine compartment, baggage compartment, buffet and 28-seat passenger compartment (Figure 19). The interior of Car A is approximately 8'-8" wide as measured side-to-side between the interior walls at floor level. Each compartment is separated from the adjacent compartment by a stainless-steel frame and by a paneled bulkhead.

*Operator Compartment* – The operator compartment at the head of the train is an approximately 8'-6" (front-to-back) space fit into the nose of Car A. The cab is designed for two forward-facing seats, although both chairs have been removed. The right-hand seat was for the engineer and the left-hand seat for the second operator, potentially a fireman or engineer-in-training, who would have typically assisted the engineer in train movements and monitoring the engines. The right-hand side (as facing the front) is the engineer's seat with control stands consisting of the brake valve and throttle (Photograph 14). The interior walls are finished with smooth, stainless-steel panels and the floor is non-original anti-slip textured steel plate. The cab is an extremely tight space because its central area is occupied by the main electric generator, an auxiliary generator and two cooling fans within a stainless-steel, floor-to-ceiling, box-shaped housing. This equipment is located between the two operators' seating areas.

*Engine Compartment* – The engine compartment is a 16'-9" (front-to-back) space located behind the operator compartment. It has stainless-steel panel ceiling and walls, and a steel plate deck. Currently visible in this engine compartment is the heavy, welded, steel-plate bed for mounting the diesel engine (Photograph 15-16); however, the diesel engine block has been removed and is currently in storage. The engine bed is an exceptional piece of industrial art with curved lines and ovular cutouts, the latter a weight-saving measure to remove steel from the web of the bed where the metal is not necessary to support the weight of the engine block. The circular, main electric generator remains in place and is mounted directly in front of the engine bed within the bulkhead separating the operator and engine compartments (Photograph 17). A wire-mesh grille above the main electric generator reveals the blades of two cooling fans (Photograph 18). Stainless-steel shelving units are placed along both sides of the compartment. Visible in the ceiling of the engine compartment are the diesel engine's eight exhaust vent pipes, one vent for each of the eight in-line pistons.

*Baggage Compartment* – The baggage compartment is an 11'-5" (front-to-back) space located behind the engine compartment (Photograph 19). It has stainless-steel panel ceiling and walls and a corrugated stainless-steel deck. The function of this space to onload and offload baggage is defined by the 5'-wide, sliding doors to either side of the train (Photograph 20).

*Buffet* – The buffet is a 6'-6" (front-to-back) space located behind the baggage compartment (Photograph 21). It has stainless-steel panel ceiling and walls, and a corrugated stainless-steel deck. The bulkhead to the rear of the buffet has an arched opening for counter service in an aisle that serves as the mid-car vestibule for passenger exit and entry. Kitchen appliances, fixtures and counters have been completely removed.

*28-Passenger Compartment* –The Car A passenger compartment is a 25'-6" (front-to-back) space located to the rear of the mid-car entry and existing vestibule and buffet (Photograph 22). The side walls and ceiling of this compartment are covered in a Masonite board and the floor is carpeted. Seating has been removed. The space is being used for storage and displays have historic photographs. Ceiling lighting fixtures are concealed behind two, curved, opaque "coves" that run the length of the compartment. Steam-heat radiators are located along the floor at the sides of the compartment. These radiators have stainless-steel covers with an attractive, repeating ovular cutout for ventilation (Photograph 23). At the rear of the compartment are two small rooms, one originally serving as a storage locker and

the other as a restroom. None of the original fixtures or furnishing remain in these spaces, and the locker has been converted into a space with modern electrical components for train communications, safety and climate control.

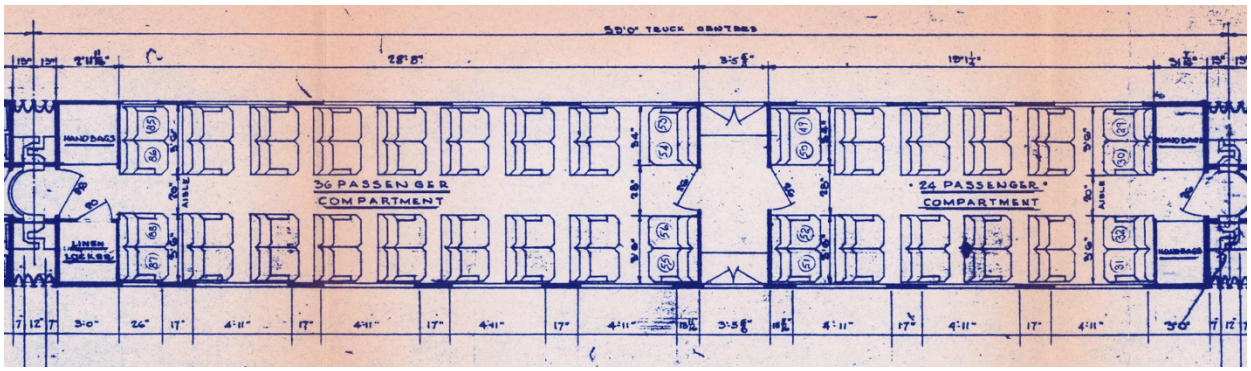



*Figure 20. Edw. G. Budd Mfg. Co. Detail of Car B, original interior plan from blueprint, January 21, 1935.*

*Interior Car B* – Car B consists of two passenger compartments that have been restored to an original appearance (Figure 20).[27] The front 24-seat passenger compartment is a 21'-9" (front-to-back) space and the back 32-seat passenger compartment is a 31'-8" (front-to-back) space (Photograph 24). The two compartments are separated by a mid-car vestibule for passenger exit and entry. Storage lockers are located at both ends of the car, two lockers at each end for a total of four lockers. Car B's interior details have been restored to an original mid-1930s streamlined aesthetic with an emphasis on horizontal lines, curved edges and period color schemes. Ceiling lighting fixtures are concealed behind two, curved, opaque "coves" running the horizontal length of the ceiling down the center of the two passenger compartments (Photographs 26). Original, open, tubular, aluminum overhead "parcel" racks with curved brackets also run the length of the car above the windows and seating (Photograph 27). The car's interior ceiling and walls consist of restored Masonite panels, with the ceiling painted an ivory color and the sidewalls a deep blue-green. The blue-green side walls are relieved by two polished, stainless-steel moldings that run the length of the compartment, one molding above the windows and the other at the window sills. Car B is completely furnished with restored passenger seating. Seats are arranged in rows of four seats, two on each side of the center aisle (Photograph 25). These seats have original, curved, tubular, aluminum frames and restored plush front and back cushions upholstered with a mulberry-colored fabric. Restored arm rests have rounded leather cushions. Radiators with polished, stainless-steel covers and ovular vents, similar to those in Car A are located along both sides of Car B (Photograph 23). The floor is covered in a restored low-pile carpet that is a light shade of green. Small stylistic details such as original, oval, brass doorknobs with vertical scoring are evident in Car B and other locations throughout the train (Photograph 27).

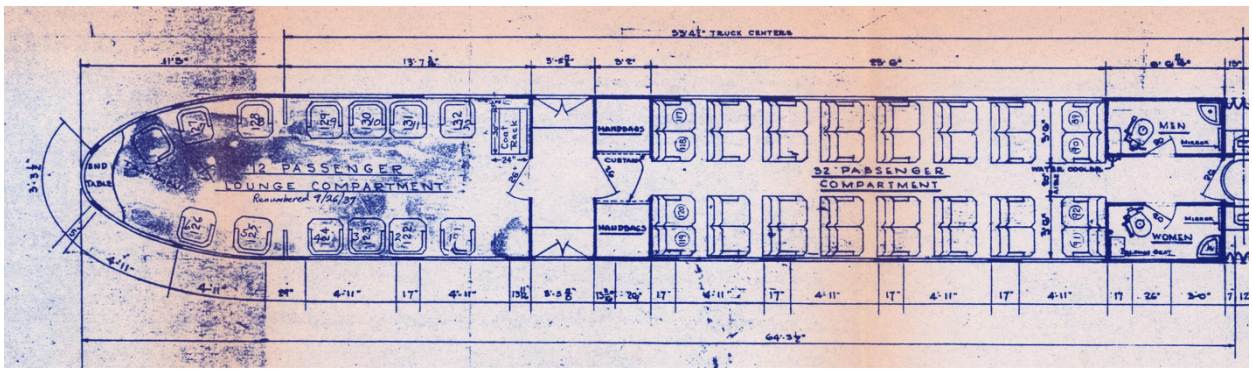



*Figure 21. Edw. G. Budd Mfg. Co. Detail of Car C, original interior plan from blueprint, January 21, 1935.*

*Interior, Car C* – Car C has been stripped down to its welded, stainless-steel frame and corrugated deck with all interior furnishings removed. This reveals the car-body structure employing stainless-steel channels welded to form trusses for the sidewalls below the windows and ribs that support the arched roof (Photographs 29-30). The removal of the interior wall and ceiling coverings also provides a clear view of the backside of Car C's stainless-steel skin covering. Although the interior furnishings and finishings have been removed from Car C, the frames for the bulkheads between the front

[27] Restored is used here per the definitions in the Secretary of Interior's Standards for the Treatment of Historic Properties. Restored means accurately depicting the form, features, and character of the interior features as they appeared at a particular period of time, i.e., 1935-57. This level of accuracy was achieved to the best of the evaluator's knowledge based on physical evaluation and review of documentation.

passenger compartment and the rear passenger lounge compartment remain visible and provide evidence for the original car layout, which included two restrooms at the front of the car and a passenger vestibule for exit and entry at mid-car (Figure 21).

*Materials in Storage* – At present, five shipping containers at the NHDOT Twin Mountain maintenance facility contain a wide range of mechanical equipment, fixtures and furnishings that have been removed from the Flying Yankee. An inventory of these materials was provided to the preparers of this form but in-person inspection of the containers was not part of the evaluation. The container inventory indicates that the Winton engine that was placed in Car A in 1947 was preserved. Also in storage is a new replica engine that was ordered from Winton with the intent of returning the Flying Yankee into service. Other major items in storage are the trucks; fuel and water reservoirs; restored car seats; and door knobs and other interior trim.[28]


*Figure 22. Pioneer Zephyr on Display at the Chicago Museum of Industry and Science. 2021. Source: CMIS.*

*Comparative Evaluation* – Comparative evaluations of the Flying Yankee begin with its sister zephyr trains, a total of ten that were built by the Edward G. Budd Manufacturing Company between 1934 and 1939. The Flying Yankee is the only one of the ten to have operated outside of the Chicago, Burlington & Quincy Railroad (CB&Q) system in the Midwest. As of 2023, the following three zephyrs are the intact surviving examples to compare with the Flying Yankee:

1. The Pioneer Zephyr (CB&Q #9000) was the first of the ten zephyrs and the prototype for the Flying Yankee (Figure 22). This three-car train, later expanded to four cars, entered service in November 1934 and retired in 1960 upon donation to the Chicago Museum of Industry and Science. The Pioneer Zephyr was displayed outdoors at the museum until 1994 after which it was cosmetically refurbished and moved indoors. The Chicago Museum of Industry and Science renovated the train and its exhibit to make it more interactive, reopening it in 2021 with restored interior finishes and fabrics (Figure 23). The Pioneer Zephyr was named a National Historic Mechanical Engineering Landmark by the American Society of Mechanical Engineers in 1980.[29]

*Figure 23. Pioneer Zephyr, refurbished interior of the rear lounge compartment. 2021. Source: CMIS.*

[28] Flying Yankee Association, Flying Yankee Restoration Project, Container Inventory Detail [Excel Spreadsheet], October 2005.
[29] The American Society of Mechanical Engineers, National Historic Mechanical Engineering Landmark, Pioneer Zephyr, 1934, Chicago, Burlington & Quincy Railroad, November 18, 1980, Museum of Science and Industry, Chicago, Illinois; Chicago Museum of Science and Industry, Museum of Science and Industry Reopens Pioneer Zephyr Train after Sweeping Renovations to Historic "Silver Streak [Press Release], (March 4, 2021).