

# Historic Context Report for Transit Rail System Development

Nationwide, with localized contexts for the Boston, Chicago, New Orleans, New York, Philadelphia, San Francisco, and Washington, D.C. metropolitan areas



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# I. Introduction

## I.1 Objectives

The purpose of this report is to identify a broad national overview of rail transit development based upon a literature search that was used to develop localized historic contexts of rail transit systems development in the following metropolitan areas: Boston, Chicago, New Orleans, New York, Philadelphia, San Francisco, and Washington, D.C. This national context will be used by the Federal Transit Administration (FTA) in support of an exemption of railroad rights-of-way used for transit as required by Section 11504 of Fixing America's Surface Transportation Act (FAST Act). The exemption would relieve federal agencies from review of the effect of undertakings on railroad rights-of-way under the Section 106 requirements of the National Historic Preservation Act (54 U.S.C. 306108) with exclusions for the nation's most historically significant resources. The FTA intends to use this report to provide historic context that will help identify the range and types of rail transit system infrastructure that may be considered historically significant to inform the process for identifying exclusions from the exemption, with such properties remaining subject to review under Section 106.

This report is not intended to be an identification-level study, but rather is intended to inform a broader historic context. Many of the resources described herein are no longer extant or only remnants have survived. Moreover, the use of the term "historic" to describe certain elements of transit properties is not used in a technical sense as that term may be used in regulations that implement Section 106 requirements or Section 4(f) requirements. FTA headquarters offices, in consultation with other U.S. DOT modal administrations, appropriate agencies, and stakeholders, will develop the process and criteria to be used to identify properties to be excluded from the exemption. The public will also be given an opportunity to provide input on the proposed excluded properties.

## I.2 Methodology

Volpe, the National Transportation Systems Center of the U.S. Department of Transportation, is assisting FTA in the preparation of this report. Volpe conducted an expansive literature review of secondary literary sources that are readily available and previously published. In addition, information available on the internet about transit in the United States was accessed. The report provides a narrative history of types and technological advancement of transit, and identifies broad patterns of development of transit systems at a national level, as well as localized contexts of the seven metropolitan systems under study.

## **I.3 Organization of the Report**

The report is organized first by presenting a national context that chronologically steps through advancements in technology for moving rail passengers, including animal traction, cable, steam power, electric power, heavy rail, and light rail. The report then includes more in-depth research on each of the systems for the metropolitan areas of Boston, Chicago, New Orleans, New York, Philadelphia, San Francisco, and Washington, D.C. The selection of these major metropolitan areas was based on their known early contribution to transit; their selection in no way diminishes the concept that other cities may have resources in their systems that retain historic significance.

Finally, the report concludes with commonalities of property types, period of significance, and integrity that may prove useful as templates for developing the guidance and criteria for identifying the historically significant resources that would be excluded from the exemption.

## 2. National Context

### 2.1 Introduction

The United States, through the end of the seventeenth century, was a country whose cities were largely located along waterways. The few inland, intercity roads were unpaved, rutted, and difficult to traverse. For ease of use, commerce traveled mainly on water via canal barges, river boats, and ocean going ships. By the eighteenth century, American cities pushed inland along natural waterways, and the need to transport goods overland to these new villages, towns, and cities drove advances in transportation technology. In the 1810s and 1820s, American inventors began experimenting with various railway designs in which a “road” made of one or more rails could be built over almost any terrain to allow the operation of steam or animal traction vehicles to move heavy loads. Along with the development of freight -carrying “railroads” came more specialized passenger-carrying vehicles and, ultimately, passenger-only transit lines that carried little to no freight at all.

### 2.2 Early Period (Nineteenth Century through early Twentieth Century)



Figure 2-1.  
B&O Carrollton Viaduct in 1829

In order to connect eastern port cities with new western outposts, the Baltimore & Ohio Rail Road Company (commonly known as the B&O), was the first to utilize rail technology in the United States, initially using rolling stock purchased from England (Figure 2-1). The B&O was the first common carrier railroad, and it enabled busy Baltimore merchants to send and receive goods from inland outposts with its service beginning in 1828.<sup>1</sup>

The B&O continued to innovate with the completion of the first locomotive constructed in the United States (the *Tom Thumb*) and opened the United States’ first railway station, Mount Clare, in



Figure 2-2.  
B&O Ad 1835

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<sup>1</sup> Wikipedia contributors, “The Baltimore and Ohio Railroad,” (accessed July 19, 2016), available: [https://en.wikipedia.org/wiki/Baltimore\\_and\\_Ohio\\_Railroad](https://en.wikipedia.org/wiki/Baltimore_and_Ohio_Railroad); a common carrier in common law countries is a person or company that transports goods or people for any person or company and that is responsible for any possible loss of the goods during transport. A common carrier offers its services to the general public under license or authority provided by a regulatory body.

1829. In that same year, the B&O began earning passenger revenues, ran a timetable (Figure 2-2), and the line was extended to reach the Ohio River by 1852.<sup>2</sup>

## 2.2.1 First Telegraph Line

The B&O Railroad enabled another experimental project; a \$30,000, 38-mile telegraph line. Built along the railroad's right-of-way in 1843, Congress promised free use of the line for the B&O in exchange for its placement. Upon completion, communication between Washington D.C. and Baltimore became easier than ever before. The telegraph line was first put into use on May 24, 1844, where Samuel F. B. Morse uttered, "What hath God wrought?" to the Capitol Building from the B&O's Mount Clare train station.<sup>3</sup>

## 2.2.2 Civil War Period

Just before the onset of the Civil War, the B&O possessed over 200 locomotives, more than 100 passenger coaches, thousands of freight cars, and 513 miles of rail. These assets were all located south of the Mason-Dixon Line and the B&O kept itself busy providing support to the Union during the long years of war (Figure 2-3). During the Civil War, 143 skirmishes, battles, and raids involved the B&O line.<sup>4</sup>



Figure 2-3.  
1864 B&O Ad during  
the War

## 2.2.3 Early Forms of “Mass Transit”

Meanwhile, in 1863, the Metropolitan Railway, a steam locomotive powered railway built solely for intercity passenger service, opened in London, England (Figure 2-4). Steam locomotives made a poor choice as motive power in an urban environment due to their excessively dirty, noisy, and thirsty operations. Steam locomotive technology works best when the engine has a chance to get up to running speed and then stay at speed over long distances. For the short distance stop and

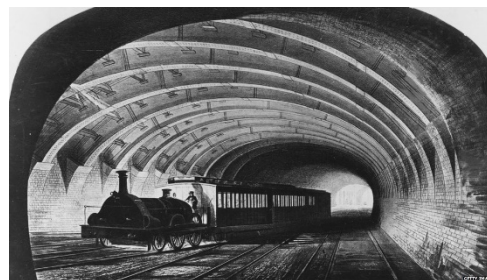


Figure 2-4.  
Metropolitan Railway, London, England c.1863

<sup>2</sup> Wikipedia contributors, "Baltimore and Ohio Rail Road," (accessed July 18, 2016), available: [https://en.m.wikipedia.org/wiki/Baltimore\\_and\\_Ohio\\_Rail\\_Road](https://en.m.wikipedia.org/wiki/Baltimore_and_Ohio_Rail_Road); Classic Streamliners, "Baltimore and Ohio Railroad," (accessed July 18, 2016), available: <http://www.classicstreamliners.com/rr-b-o.html>; Wikipedia Contributors, "Baltimore and Ohio Railroad, Civil War period," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Baltimore\\_and\\_Ohio\\_Railroad#Civil\\_War\\_period](https://en.wikipedia.org/wiki/Baltimore_and_Ohio_Railroad#Civil_War_period).

<sup>3</sup> Eugene Weiser, The Baltimore and Ohio Railroad: A Brief History in Time Series 1, Seaford, DE: Dragonkick Publishing, 2013, 53-54. Accessed via Google Books July 19, 2016.

<sup>4</sup> Wikipedia contributors, "Baltimore and Ohio Rail Road."

start service that would be required of an efficient transit system, another type of motive power would be required.<sup>5</sup>

## 2.2.4 Animal Traction – The Horsecar Era

The first streetcar line in the United States, the New York and Harlem Railroad's Fourth Avenue Line, opened in 1832 and ran along the Bowery and Fourth Avenue in New York City (Figure 2-5). Laying of steel rails made it practical for a driver with one or two horses or mules to move passengers easily along fixed routes in the urban environment of New York City. Animal waste and the associated odors were a drawback, but no different than the byproducts of the many other animals then found in urban centers drawing wagons and carrying individual riders at the time. The introduction of horsecar lines had the effect of spurring new real estate development patterns as the public realized that for the first time they could consider living and working farther apart. With a workforce now able to commute to work, larger industries and office buildings could be built that did not have a residential component. These early fixed route circulators were the first harbingers of suburban development. Ultimately, the ability to live and work in different locations gave rise to the American middle class, an institution intimately connected with the need to commute via transit.



Figure 2-5.  
New York & Harlem Railroad horsecar c.1870

Animal traction was slow but reliable. Most systems utilized a wagon-like system of the animal(s) pulling a wagon on rails. A few systems placed the animal behind the car so the smells and kicked up dust were less likely to waft through the passenger carrying portion of the car.<sup>6</sup> In California's system, one entire route ran uphill from one end to the other. Each trip, the mule pulled the car to the very top of the line and then he was loaded onto a special trailer and

rode with the passengers downhill for the entire return trip.<sup>7</sup>

In 1866, Henry Bergh founded the first chapter of the Society for the Prevention of Cruelty to Animals (SPCA), initially focusing on the mistreatment of draft horses in New York. The early years of the SPCA is recounted in Bergh's obituary from 1888:

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<sup>5</sup>Wikipedia contributors, "Metropolitan Railway," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Metropolitan\\_Railway](https://en.wikipedia.org/wiki/Metropolitan_Railway).

<sup>6</sup> Mount Lowe Preservation Society, Inc., "One Man and a Mule Railway," (accessed May 25, 2016), available: <http://www.mountlowe.org/mount-low-history/the-one-man-and-a-mule-railway/>.

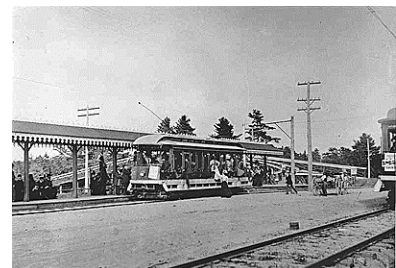
<sup>7</sup> Electric Railway Historical Association of Southern California, "Ontario & San Antonio Heights Line," (accessed May 25, 2016), available: <http://www.erha.org/peeosah.htm>.

*"...there are many people who can recall the first instance when he set its machinery in motion. One blustery Winter's night about 6 o'clock, when the slush in the streets was ankle deep and sleet and hail filled the air, he, with a number of his men, concentrated their forces at what was then Chatham-street, but is now known as Parkrow. Here, as is well known, half a dozen horse car lines meet, and Henry Bergh gave orders to take from the tracks every horse that had an ailment or a sore. The condition of the wretched animals attached to the cars at that time was notoriously bad, and the consequence was that the society's men found plenty of work, which virtually resulted in a blockade of the lines for several hours. There were no elevated roads, and thousands of people had to foot it up town in the rain and the slush, growling, cursing, hungry, wet, and mad. "Who did this?" was the angry question asked on all sides, and to this came but one reply, "Bergh," and the public at last discovered that he and his society had developed into a mighty power..."<sup>8</sup>*

By the end of the nineteenth century most animal traction lines had either been abandoned or modernized to another form of traction power such as electric traction discussed in section 2.2.13 and cable cars discussed in sections 2.2.8, 4.4 and 8.5. The last regular mule-drawn cars in the United States ran in Sulphur Rock, Arkansas until 1926.<sup>9</sup> Only theme parks operate animal traction streetcars in the United States today.

## 2.2.5 Trolley Parks

Trolley Parks, invented in the mid- to late-nineteenth century, were picnic and recreation areas along or at the ends of streetcar lines in many larger cities (Figure 2-6). Streetcar companies built parks with picnic groves and band stands for dances, firework displays, and concerts in order to increase service use on weekends. Many trolley parks added deluxe features to their parks in later years, which ranged from aquatic parks and carnival elements to sports fields and restaurants. These elaborated trolley parks later became known as amusement parks. Various sources report the existence of between 1,500 and 2,000 amusement parks in the United States by 1919, many of which originated as trolley parks.<sup>10</sup> The following trolley parks are believed to be still in operation:



**Figure 2-6.**  
**Merrymeeting Park, 1898,**  
**Brunswick, Maine**

- Camden Park, Huntington, West Virginia, 1903;
- Canobie Lake Park, Salem, New Hampshire, 1902;

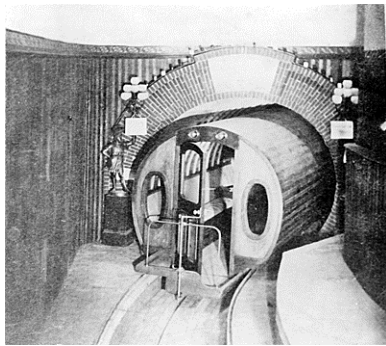
<sup>8</sup> "Death of Henry Bergh", Obituary, *The New York Times*, March 13, 1888.

<sup>9</sup> Encyclopedia of Arkansas, "Sulphur Rock Street Car," (accessed July 18, 2016), available: <http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=3727>.

<sup>10</sup> Wikipedia Contributors, "Trolley Park," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Trolley\\_park](https://en.wikipedia.org/wiki/Trolley_park); In the00s.com contributors, "Trolley Parks," (accessed July 18, 2016), available: <http://www.inthe00s.com/archive/Before70s/smf/1214364791.shtml>.

- Clementon Park, Clementon, New Jersey, 1907;
- Coney Island, Brooklyn, New York, 1829;
- Dorney Park & Wildwater Kingdom, Allentown, Pennsylvania, 1901;
- Kennywood, Pittsburgh, Pennsylvania, 1898;
- Lakemont Park, Altoona, Pennsylvania, 1894;
- Lakeside Amusement Park, Denver, Colorado, 1907;
- Lake Compounce, Bristol, Connecticut, 1846;
- Midway Park, Maple Springs, New York, 1898;
- Mountain Park, Holyoke, Massachusetts, 1894;
- Oaks Amusement Park, Portland, Oregon, May 30, 1905;
- Quassy Amusement Park, Middlebury, Connecticut, 1908;
- Ravinia Park, Highland Park, Illinois, 1904;
- Seabreeze Amusement Park, Rochester, New York, 1879; and
- Waldameer Park, Erie, Pennsylvania, 1896 <sup>11</sup>

## 2.2.6 Atmospheric (Pneumatic) Railway



**Figure 2-7.**  
Pneumatic Tunnel Under Broadway,  
New York City, February 2, 1870

Atmospheric railways utilized air pressure differential to push or pull railcars. Developers had tried a number of variations on the technology in England and Europe beginning in the nineteenth century. The most notable attempt was made in the city of New York by Alfred Ely Beach, the owner and editor of *Scientific American*, in 1870. Beach's single car ran through a nine-foot diameter tunnel for a distance of 312 feet (Figure 2-7). The line opened in February 1870 and closed in 1873 due to conflicts with city government and concerned landlords fearing the collapse of their buildings. The lack of success of Beach's line crippled the widespread adoption of atmospheric railways in the late nineteenth century.<sup>12</sup>

<sup>11</sup> Wikipedia Contributors, "Trolley Park," [https://en.wikipedia.org/wiki/Trolley\\_park](https://en.wikipedia.org/wiki/Trolley_park).

<sup>12</sup> Wikipedia Contributors, "Beach Pneumatic Transit," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Beach\\_Pneumatic\\_Transit](https://en.wikipedia.org/wiki/Beach_Pneumatic_Transit).



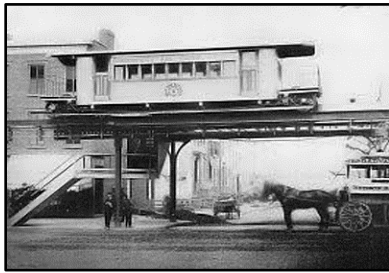
### 2.2.7 Steam Dummies

Between 1860 and 1890, many streetcar operators attempted to switch their motive power away from animals. Small steam engines were built to tow former horsecars with some small success. These “steam dummies,” wooden passenger cars that resembled horsecars but with an internal steam engine, were the result (Figure 2-8). Steam engines were still fussy to operate and produced smoke, steam, and noise and found disfavor with residents along the lines and passengers alike. Steam dummies existed only briefly, as it soon became practical to replace steam power with electric operation. Most street railways soon made the switch.<sup>13</sup>



**Figure 2-8.**  
Steam dummy, steam locomotive disguised as a streetcar, Southern Pacific Ry, 1895

### 2.2.8 Cable Car Railways



**Figure 2-9.**  
New York's West Side and Yonkers Patent Railway 1868

Cable car railways operate via rope or cable running continuously in a slot between running rails. Each car is equipped with a gripping mechanism capable of grabbing and releasing the perpetually moving cable, thereby enabling motion. The first American transit operation to utilize this technique to propel individual passenger cars was New York's West Side and Yonkers Patent Railway (Figure 2-9), which ran for two brief years, from 1868 to 1870.<sup>14</sup> Cable operations took advantage of the technology of the time, leveraging large stationary steam engines at centralized winding stations. These large and powerful engines could be attended to by full time mechanics with the advantage of removing noise, and animal waste, from city streets.<sup>15</sup> There was a brief but energetic period of cable car construction between 1882 and 1890 as approximately thirty American cities constructed one or more cable car lines. The downside to cable systems was their complexities and the cost to construct and maintain the systems.

In 1892, electric streetcars started running in San Francisco, operated by the San Francisco and San Mateo Electric Railway. Twenty-three cable car lines were in operation prior to the Great Fire and Earthquake of 1906, but by 1912 only eight cable car lines remained. These eight lines traveled routes too steep for

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<sup>13</sup>Wikipedia Contributors, “J. G. Brill Company,” (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/J.\\_G.\\_Brill\\_Company](https://en.wikipedia.org/wiki/J._G._Brill_Company); Wikipedia Contributors, “Steam Dummy,” (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Steam\\_dummy](https://en.wikipedia.org/wiki/Steam_dummy).

<sup>14</sup>NYCSubway.org, “The 9<sup>th</sup> Avenue Elevated-Polo Grounds Shuttle,” (accessed July 18, 2016), available: [http://www.nycsubway.org/wiki/The\\_9th\\_Avenue\\_Elevated-Polo\\_Grounds\\_Shuttle](http://www.nycsubway.org/wiki/The_9th_Avenue_Elevated-Polo_Grounds_Shuttle).

<sup>15</sup>Wikipedia Contributors, “Cable Car (railway),” (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Cable\\_car\\_\(railway\)](https://en.wikipedia.org/wiki/Cable_car_(railway)); Wikipedia Contributors, “Electric Cable Cars,” (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Electric\\_cable\\_cars](https://en.wikipedia.org/wiki/Electric_cable_cars).



electric streetcars, but becoming passable by the ever improving technology of road-going buses. By the end of World War II, San Francisco was down to five cable car lines and it was proposed to abandon all of them. Ultimately these lines (merged to form three lines) were saved by residents with a passion for the cable car system. San Francisco remains the only city in the United States to run cable car lines.<sup>16</sup>

## 2.2.9 Cable Railways

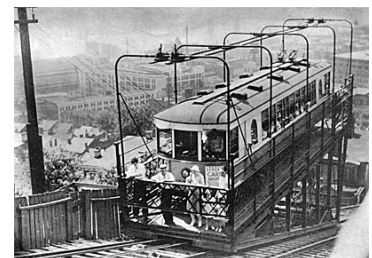


**Figure 2-10.**  
Morris Canal Inclined Plane  
Rockaway, New Jersey,  
September 2, 1906

Cable railways are different than cable car railways. In a cable railway, cars are affixed to the cable and two alike cars are usually arranged to balance one another. Funiculars are the most common type of cable railway and are best used for inclines that are too steep for adhesion trains. Often the cars share rails and stations at each end of the line with a passing section arranged in the middle of the run. Hydro-powered funiculars, or inclined planes, were used early in the nineteenth century to allow canal traffic to ascend and descend steep hills. The 1824 Morris Canal in New Jersey was a hydro-powered funicular that employed twenty-three locks and twenty-three inclined planes over its 107-mile length (Figure 2-10).

## 2.2.10 Incline Railways

Modern electrically-powered incline railways or funiculars began to appear in Europe in the 1860s; the Old Quebec Funicular opened in Quebec City, Canada in 1879; and one of the most famous American funiculars was constructed on the Mount Lowe Railway above Altadena, California in 1893. The Mount Adams Incline in Cincinnati (Figure 2-11) carried entire streetcars up a steep grade in the city.<sup>17</sup>



**Figure 2-11.**  
Mount Adams Incline Carrying  
Streetcars Up the Hill c.1930

The following incline railways are believed to be still in operation:

- Angels Flight, Los Angeles, California, 1901-1969, moved and re-opened 1996, closed 2001, re-opened 2010, closed 2013 with intent to reopen.
- Cape Fox Lodge Funicular, Ketchikan, Alaska, 1990.
- Cityplace/Uptown Station Inclines, DART system, Dallas, Texas, 2000.
- Convention Center Funicular, San Diego, California, 2003.

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<sup>16</sup> Wikipedia Contributors, "Cable Car (railway)," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Cable\\_car\\_\(railway\)](https://en.wikipedia.org/wiki/Cable_car_(railway)).

<sup>17</sup> Wikipedia Contributors, "Cable Car (railway)."; Wikipedia Contributors, "Funicular," (accessed July 18, 2016), available: <https://en.wikipedia.org/wiki/Funicular>.

- Duquesne Incline, Pittsburgh, Pennsylvania, 1877. Designated 1975, NRHP #75001609.
- Fajardo, El Conquistador Resort, Puerto Rico, 1962.
- Gateway Arch Trams, St Louis, Missouri, 1967. Designated 1987, NHL & NRHP #87001423.
- George Washington Masonic National Memorial, Alexandria, Virginia, 1947. Designated NHL 2015, NRHP #15000622.
- Getty Center Tram, Los Angeles, California, 1997.
- Grand Coulee Dam Third Power Station, Grand Coulee, Washington, 1974. 3<sup>rd</sup> Power Station with glass incline elevator that moves up and down the face of the dam with four stops, by Architect Marcel Breuer.
- Hillbilly Golf Incline, Gatlinburg, Tennessee, 1971.
- Hudson Yards Subway Station Inclines, Manhattan, New York City, New York, 2015. Two cars running parallel to nine escalators providing ADA access to the station platform 125 feet below street level.
- Idema Funicular, John Ball Zoo, Grand Rapids, Michigan, 2012.
- Huntington Station, Washington D.C. Metro, Funicular, Fairfax County, Virginia, 1983.
- Inner Space Cavern Funicular Railway, Georgetown, Texas, 1966.
- Johnstown Inclined Plane, Johnstown, Pennsylvania, 1891. Designated 1973, NRHP #73001597.
- June Lake Inclines, California (Southern California Edison), 1912. Incline #1 from Gem Lake along Rush Creek to Agnew Lake. Incline #2 from Agnew Lake to Rush Creek Substation.
- Lookout Mountain Incline Railway, Chattanooga, Tennessee, 1895. Designated 1973, NRHP #73001774. The railway is now operated by the Chattanooga Area Regional Transportation Authority, the area's public transit agency.
- Luxor Hotel Inclined Elevators, Las Vegas, Nevada, 1993.
- Marvel Cave Incline, Branson, Silver Dollar City, Missouri, 1957. Visitors walk down into the caves and ride the funicular back up; 218 feet long, 500 feet rise and curved.
- Monongahela Incline, Pittsburgh, Pennsylvania, 1870. Designated 1974, NRHP #74001742.
- Mount Pisgah Incline Railway, East Fork, North Carolina, 1953.
- Oregon City Municipal Elevator, Oregon City, Oregon, 1955. Designated 2014, NRHP #14000181.
- "The Orient Express," Six Flags Magic Mountain, Valencia, California, 1971.
- Royal Gorge Incline, Cañon City, Royal Gorge, Colorado, 1931-2013. Damaged in 2013 wildfire.
- St. Regis Deer Crest Resort, Park City, Utah, 2009. Two self-leveling cars that operate independently track with variable slope.
- Seattle City Light Incline Railway, Diablo Dam, Skagit, Washington, 1927-1954. No passenger traffic during World War II (1942-1949). Closed to the public since 2011 due to heightened security. Designated 1996, boundary increase 2011. MPS Hydroelectric Power Plants in Washington State, 1890-1938. NRHP #96000416 (original), #11000016 (increase).
- Shadowbrook Restaurant Incline, Capitola-by-the-Sea, California, 1958.

- Strand Beach Funicular, Dana Point, California, 2009. Municipally owned and operated.
- Tallulah Gorge Incline Railway, Georgia. Georgia Power Company's Tallulah Falls hydroelectric development of 1911-1914, 1911. 1915 passenger car is on display at the Georgia Power Picnic Area at the end of Tallulah Lodge Road.
- Villa Terrace Decorative Arts Museum Incline, Milwaukee, Wisconsin, 2001.<sup>18</sup>

## 2.2.11 Cog Railway

Cog railways (also known as rack railways) feature a self-powered locomotive pushing a passenger coach up a steep gradient. The rolling stock is similar to that found on a conventional railway. Typically the locomotive pushes the passenger car uphill and gravity “connects” the car to the locomotive on the downhill run. Cog railways employ a driven pinion gear running on a toothed third rail to overcome extremely steep rights-of-way that exceed the ability of a steel wheel on a steel rail to maintain the necessary friction to move forward or to brake safely (about 7-10% gradient).



Figure 2-12.  
Mount Washington Cog Railway

In 1852, Robert Marsh designed the first cog railway in the world for Mount Washington in New Hampshire. Marsh received several patents for his design.<sup>19</sup> Due to the Civil War, the railway did not open until 1868 (Figure 2-12). The railway was designed to carry tourists up the mountain and has been in continuous operation (except during war time) ever since.<sup>20</sup> Initially, all cog railways were steam powered. Steam boilers need to remain nearly level to work properly. To operate at the extreme angles found on a cog railway, special “inclined” locomotives that could not also serve a flat section of a line had to be custom designed and built. For that reason, cog railways remained a specialized and quite rare sub-category in American passenger transit.

There have only been a handful of passenger rack railways operated in the United States. A greater number of United States mining operations have utilized them underground to carry personnel and material in steeply sloped tunnels.

Following are examples that are still extant:

- Mt. Washington Cog Railway, Bretton Woods, New Hampshire, 1868;

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<sup>18</sup> Wikipedia Contributors, “List of Funicular Railways,” (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/List\\_of\\_funicular\\_railways](https://en.wikipedia.org/wiki/List_of_funicular_railways).

<sup>19</sup> Wikipedia Contributors, “Rack Railway,” (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Rack\\_railway#Abt](https://en.wikipedia.org/wiki/Rack_railway#Abt).

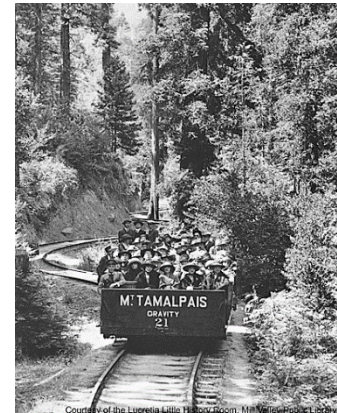
<sup>20</sup> Wikipedia Contributors, “Mount Washington Cog Railway,” (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Mount\\_Washington\\_Cog\\_Railway](https://en.wikipedia.org/wiki/Mount_Washington_Cog_Railway).

- Manitou and Pike's Peak Railway, Manitou Springs, Colorado, 1890; and
- The Quincy & Torch Lake Cog Railway, Hancock, Michigan, 1997.<sup>21</sup>

### 2.2.12 Gravity Railroad

A gravity railroad is a railroad on a slope that allows rail cars to proceed down the slope by the force of gravity. The speed of the cars is controlled by a braking mechanism. The cars are then hauled back up the slope using either stock animals or an engine and chain.<sup>22</sup>

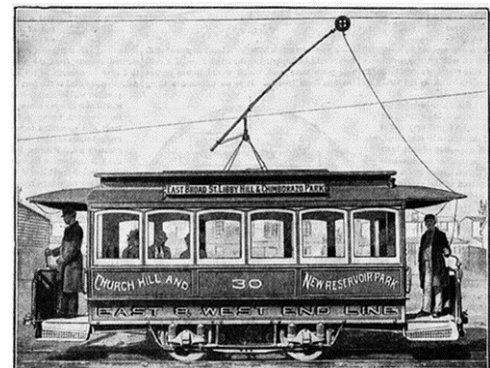
The Mount Tamalpais and Muir Woods Railway in California (1896-1930) used standard gauge steam engines to pull gravity cars to the summit of Mt. Tamalpais, (1902-1930) (Figure 2-13). Riders then had a choice of whether to ride down behind a steam locomotive or in one of the unpowered gravity cars.<sup>23</sup>



**Figure 2-13.**  
**Mount Tamalpais and Muir**  
**Woods Gravity Railway**

### 2.2.13 Electric Traction

Passenger and freight cars equipped with onboard electric traction motors revolutionized transit rail system development. Electrical traction offered several benefits over the then predominant steam traction, particularly in respect of its quick acceleration and power. Enough power was provided to climb hills and mountains, while quick acceleration provided the answer for commuter services with multiple, close stops. Electrically-powered trains had the advantage of cleaner power and moved other power source pollution, such as animal waste from railroad horsecars and coal emissions from steam locomotives, away from metropolitan areas. The bulk of systems gave electricity to rail cars via overhead wires that



**Figure 2-14.**  
**Sprague Electric Railway Car,**  
**Richmond, Virginia Electric Railway**

<sup>21</sup> Wikipedia Contributors, "Rack Railways, United States," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Rack\\_railway#United\\_States](https://en.wikipedia.org/wiki/Rack_railway#United_States).

<sup>22</sup> Wikipedia Contributors, "Gravity Railroad," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Gravity\\_railroad](https://en.wikipedia.org/wiki/Gravity_railroad).

<sup>23</sup>Wikipedia Contributors, "Mount Tamalpais," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Mount\\_Tamalpais](https://en.wikipedia.org/wiki/Mount_Tamalpais); Wikipedia Contributors, "Mount Tamalpais and Muir Woods Railway," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Mount\\_Tamalpais\\_and\\_Muir\\_Woods\\_Railway](https://en.wikipedia.org/wiki/Mount_Tamalpais_and_Muir_Woods_Railway); Wikipedia Contributors, "Gravity Railroad," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Gravity\\_railroad](https://en.wikipedia.org/wiki/Gravity_railroad).

were connected to the car using a trolley pole or pantograph device (Figure 2-14). In a few rare examples, including Washington, D.C. and some New York lines, power came from a third rail buried beneath the street and picked up through a slot in the ground. Electrically-powered trains utilized Frank J. Sprague's invention, called regenerative braking, to return unused energy back to the power grid.<sup>24</sup>

### 2.2.14 Frank J. Sprague – Street Railway Pioneer

After serving as a Navy ensign in the early 1880s, Frank J. Sprague worked as a scientist at the Edison Laboratory in Menlo Park, New Jersey. Sprague made a name for himself at Edison's labs by introducing mathematical procedures and methods for increasing accuracy, which in turn saved the labs a significant amount of money. In 1884, his interest in electricity and entrepreneurship led him to leave the Edison Laboratory and form the Sprague Electric Railway and Motor Company.<sup>25</sup> In its first two years of existence, the Sprague Electric Railway and Motor Company produced two important inventions: a constant-speed, non-reactive motor, and regenerative braking. His motor was the first to maintain constant speed under varying loads. It was instantly popular. Sprague's braking system provided much needed technology to enable the development of electric trains and elevators.<sup>26</sup>

### 2.2.15 Electric Streetcars

Sprague continued to innovate for electric streetcars through the 1880s. He particularly continued to focus on regenerative braking, worked on making overhead lines more efficient, and improved on designs and patents created by others. In 1888, Sprague completed the first massive electric railway system in hilly Richmond, Virginia. With regenerative braking, overhead lines, and electric power, the Richmond Union Passenger Railway conquered obstacles that urban rail travel had struggled with for decades.<sup>27</sup> Several other cities followed Richmond; by 1889 Boston was running its own electric system (Figure 2-15).



**Figure 2-15.**  
**West End Street Railway**  
**Scollay Square, Boston, June 2, 1896**

With multiple city systems in place in various terrains across the country, electric power began its reign as king of the metro system. By 1889, over 100 electric railways using Sprague's inventions were in operation

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<sup>24</sup> Wikipedia Contributors, "Railroad electrification in the United States," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Railroad\\_electrification\\_in\\_the\\_United\\_States](https://en.wikipedia.org/wiki/Railroad_electrification_in_the_United_States); Wikipedia Contributors, "Direct Current Traction," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Direct\\_current\\_traction](https://en.wikipedia.org/wiki/Direct_current_traction).

<sup>25</sup> "The Sprague Electric Railway System," *Manufacturer and Builder*, Vol. 20, Is. 12, December 1888, via <http://www.cable-car-guy.com/html/ccmanbl3.html#sprague>, (accessed July 19, 2016); Wikipedia Contributors, "Frank J. Sprague," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Frank\\_J.\\_Sprague](https://en.wikipedia.org/wiki/Frank_J._Sprague).

<sup>26</sup> Wikipedia Contributors, "Frank J. Sprague."

<sup>27</sup>Ibid.

or were planned in the United States and other countries, and the use of horse drawn carriages, animal traction, and steam power began to decline sharply. Thomas Edison, Sprague's former employer, bought his innovative technology in 1890 and Sprague moved on with other electric projects, including the elevator.<sup>28</sup>

### 2.2.16 Counterbalance

Incline railways operated by leveraging the weight of the downhill car to help lift a counterpart car traveling uphill: the two cars being connected by a steel cable running around large buried pulleys. In some systems, with only a single car, counterbalance was provided by a heavy weight traveling on rails. In several cities converting cable car lines into electric trolley lines, a counterbalance was installed on a particularly steep grade where the new electrically-powered cars could not manage the climb. An operator would wait until an electric streetcar was waiting at the top and bottom of the hill; the cars were hitched to the mechanism and then counterbalanced past the steep portion of the line.

## 2.3 Expansion, 1910s-ca. 1930

By the turn of the twentieth century, mass transit had coalesced around electric power for street railways, subways, elevated railways, and for interurban railways of around one-hundred miles or less. Animal and cable traction systems (Figure 2-16) had already undergone mass conversions to electricity or been abandoned altogether where the financial investment was proving unworthy. Steam-powered locomotives drove long distance railroads; by 1890 there was in excess of 130,000 miles of mainline track in service.



**Figure 2-16.**  
**Horsecar and Electric Car in Service,**  
**Broadway Near 17th Street, NY, 1917**

Interurbans were heavier, faster versions of city streetcars, used electric traction power, and were popular between approximately 1890 through the 1920s. Generally, these were privately owned and constructed quickly to provide passenger rail service from cities to outlying agricultural areas, sometimes encouraging the growth of suburbs. The popularity of interurbans declined in the 1920s as a result of the damage they caused to city streets and the increasing use of automobiles.<sup>29</sup>

In the thirty years leading up to 1900, hundreds of U.S. cities had seen private interests install one or more transit systems. Most systems had been built to promote real estate developments, a few systems having

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<sup>28</sup> Wikipedia Contributors, "Frank J. Sprague," (accessed July 18, 2016), available: [https://en.wikipedia.org/wiki/Frank\\_J.\\_Sprague](https://en.wikipedia.org/wiki/Frank_J._Sprague).

<sup>29</sup> Wikipedia Contributors, "Interurbans," (accessed November 14, 2016), available: <https://en.wikipedia.org/wiki/Interurban>.

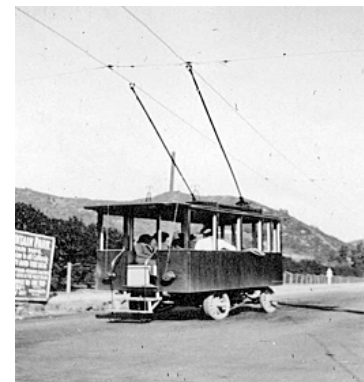
been built by town boosters seeking to elevate the stature of their community. Throughout the 1890s, individual commercial lines went bankrupt just as quickly as they had been created as the real estate along these new lines was sold and new profit to operate and maintain lines evaporated. As the new century arrived, lines were consolidated into large aggregate systems. No longer were real estate sales thought to be the economic driver of these consolidated systems; now it was thought that carrying passengers would be a profitable venture through fare box receipts.

This period saw a huge increase in street railway construction activity and ownership consolidation. Consolidating lines into systems often required new track route connections and along with them new government franchises. Older lines were often built in differing gauges purposely so that cars of one company would never travel the routes of another company; now consolidated lines needed to be re-gauged for uniformity. Older cable and animal car lines required “electricization.” Early horsecar lines had often been built by fly-by-night real estate interests. These new system consolidators were really only buying up existing franchises (permissions to operate and revenue sharing deals with local government) followed by complete rebuilding of the lines to modern standards. Some franchises required that the elaborate underground cable raceways only recently built at huge costs be dug up before tracks could be converted to electric traction. In many instances, cities were finding that electric trolley lines leaked substantial current into the ground, quickly eroding metal, water, and gas pipes and interfering with newly being built electric customer power systems and telephone lines.

New advances in electric power, metallurgy, mass production, and business practices along with all manner of practical innovation were driving trolley innovation at an unprecedented rate. As if all this activity was not enough, major electrical equipment manufacturers General Electric and Westinghouse were emerging as the two great powerhouses of electrical equipment supply and innovation. Competition between these two great industrial giants would continue to drive street railway innovation for decades past the zenith of new trolley system construction.<sup>30</sup>

### 2.3.1 Trolleybus (Trackless Trolley)

Electric street railway systems usually operated on 600 or 1200-volt direct current (DC) power supplied via an electrified overhead wire (Figure 2-17). In subway, elevated, and a few physically isolated at-grade lines, power is supplied via a raised third rail outside of the two running rails. All such systems rely on the conductive steel running rails to complete the electrical circuit and return power to the generating grid.



**Figure 2-17.**  
**Trackless Trolley Going to**  
**Lookout Mountain Park in**  
**Laurel Canyon, Los Angeles, 1912**

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<sup>30</sup> Wikipedia Contributors, “History of Rail Transport in the United States,” (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/History\\_of\\_rail\\_transport\\_in\\_the\\_United\\_States#Expansion\\_and\\_consolidation\\_.281878.E2.80.931916.29](https://en.wikipedia.org/wiki/History_of_rail_transport_in_the_United_States#Expansion_and_consolidation_.281878.E2.80.931916.29).

The trolleybus resembles an internal combustion engine passenger coach, but its electric traction motor is powered by a pair of overhead wires since there is no track for power return. Trolleybuses use the same types of motors and controllers as streetcars do.

In 1910, the first trolleybus line in America opened in Los Angeles. The Laurel Canyon Utilities Company created the trolleybuses by having a pair of locally-built coach bodies fitted to Oldsmobile-sourced truck chassis (Figure 2-17). The company purchased 600-volt DC overhead power from the adjacent Los Angeles Pacific Railway Company (LAPRC). The trolleybuses met the LAPRC's interurban cars at the end of their line. From there, the two trolleybuses plied a route up a steep unpaved dirt road into Laurel Canyon where the operator's real estate development, "Bungalow Land," was located. Unfortunately, the developers went bankrupt before the second line to a planned development in Signal Hill, California, could be built. The trolleybus was a minor success in America with approximately 65 systems being installed at one time or another, almost always with, or as a replacement for streetcar lines.

Trolleybuses gave street railway companies the option to abandon trolley lines without violating their franchises by simply erecting a second overhead wire. This happened in most cities with trolleybuses and there are many photos of trolleybuses operating over streetcar track and being housed and serviced inside former car barns. Some American cities added trolleybuses to existing streetcar lines, allowing those cities to branch an existing streetcar line off into the suburbs without laying new rail. San Francisco was able to keep its streetcar lines because of the added flexibility and extended service afforded by electric trolleybuses.

Trolley lines remained viable because their powerhouses, substations, and other infrastructure could still be economically-operated. Rail operations would otherwise have been curtailed if not for the addition of the rubber tired coaches as in Los Angeles, for example.<sup>31</sup> Modern versions of trolleybuses continue to operate today. With service starting in 1923, the City of Philadelphia features the longest continuous operation of trolleybuses in the United States.<sup>32</sup> As of 2016, four trolleybus routes operate in the City of Boston.<sup>33</sup>

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<sup>31</sup> Wikipedia Contributors, "List of Trolleybus Systems in the United States," (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/List\\_of\\_trolleybus\\_systems\\_in\\_the\\_United\\_States](https://en.wikipedia.org/wiki/List_of_trolleybus_systems_in_the_United_States); Wikipedia Contributors, "Trolleybus," (accessed July 20, 2016), <https://en.wikipedia.org/wiki/Trolleybus>.

<sup>32</sup> Bob Wright, "SEPTA Trackless Trolley Lines," (accessed November 10, 2016), available: [http://www.nycsubway.org/wiki/SEPTA\\_Trackless\\_Trolley\\_Lines](http://www.nycsubway.org/wiki/SEPTA_Trackless_Trolley_Lines).

<sup>33</sup> Gil Propp, "Boston Streetcars," (accessed November 10, 2016), available: <http://www.bostonstreetcars.com/trackless-trolleys.html>.



### 2.3.2 The Birney Safety Car



**Figure 2-18.**  
**Birney Safety Car, Swarthmore, Philadelphia**  
**Transportation Company (PRT)**

Labor costs were the transit operators' biggest single expense. Up until the advent of the Birney Safety Car in 1915, nearly every mass transit vehicle regardless of traction type had a crew of two men. A motorman operated the car and a conductor was responsible for passenger safety, collecting fares, and all other aspects of customer service. The Birney Safety Car operated with a one-man crew, cutting the labor costs in half on the cars (Figure 2-18). The Birney Safety Car introduced automatic interlocks that prevented the car's brakes from releasing until switches confirmed that the car doors were fully closed. The single truck Birney car was less comfortable than larger double truck cars and the more harried motorman, now doing the work of the conductor also, tended to be less friendly for customers. The public did not like the little cars but the railways persisted in adding them to their fleets for use on more marginal lines. The advent of World War I with its shortages of able-bodied men created greater tolerance for these cars as the public made war-time accommodations.

Affordable automobiles and heavy haul highway trucks were also coming into their own around World War I. Better paved roads and an acceptance of one-man trolley operation would lead to the acceptance of motor buses as a substitute for streetcars.<sup>34</sup>

## 2.4 Depression Era until World War II, 1929-1941

The Great Depression hit the mass transit industry very hard. Almost all electric traction systems were still privately-owned and for-profit in the late 1920s and 1930s. Out of work Americans had little need of streetcars to commute to jobs that no longer existed. Many trolley parks operated by the street railway companies went out of business due to lack of patronage. During the Great Depression, most small towns in America permanently lost their trolley lines.

As the economy declined, companies looked for ways to cut costs. Maintenance was deferred and older cars that would have normally been replaced continued in operation. Sometimes, older wooden cars received a new sheet metal surfacing over their wooden sides in an attempt to "modernize" the cars in the eyes of the public. Companies sought to abandon service on the least profitable lines. Abandonment usually required permission from local and state utility authorities, and regulators did not make

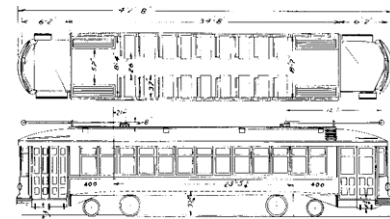
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<sup>34</sup> Wikipedia Contributors, "Birney," (accessed July 20, 2016), available: <https://en.wikipedia.org/wiki/Birney>.

abandonment simple. More than a few rail transit company boards of directors simply decided to go out of business rather than continue operating at a loss.<sup>35</sup>

### 2.4.1 One-Man, Two-Man Operation

Streetcar designs varied by region and by car builder. The floor plan for most cars was of a long rectangle with doors at the four corners (Figure 2-19). The motorman operated the car from a center position at whichever end of the car was headed, while the conductor wandered about the car seeing to fare collection and other passenger needs. During the Depression, most street railway operators converted their cars so that they could run as two-man cars during peak crush and as one-man cars at times of light load. These modifications consisted of the same types of door interlocks pioneered on the Birney car, signage directing the patrons to enter (or in some cities exit) past the motorman and the introduction of the fare box. The fare box allowed for easier money collection and was as much a device to serve the public as to keep the motorman honest. The increased stress among trolley motormen along with conductor layoffs gave labor unions an opening to try and unionize the transit operators and, by extension, the maintenance men and track crews too.<sup>36</sup>



**Figure 2-19.**  
**New Orleans Type 400 Streetcar**

### 2.4.2 Bus Substitution

Modern gasoline motor buses had their origins in World War I troop transports in which a cargo truck was fitted with seats to haul infantry. After the war, commercial truck body builders offered commercial buses in various styles fitted to truck chassis and eventually to more comfortable purpose-designed motor coach chassis. Bus manufacturers found their first customers in the unregulated jitney industry.<sup>37</sup>

Jitneys (Figure 2-20) were privately-owned motor buses that often shadowed streetcar routes in major American cities, offering the public rides for a penny or two less fare than the regulated street railways charged. The transit industry had to build and amortize their



**Figure 2-20.**  
**Jitney, Detroit Michigan, 1910**  
**Packard Chassis, Body by**  
**Procter Keefe Body Co.**

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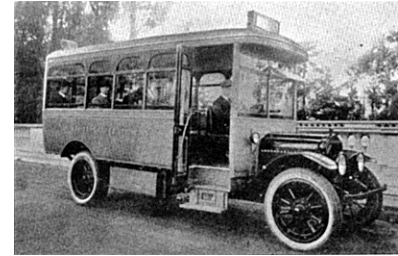
<sup>35</sup> Wikipedia Contributors, "History of Rail Transport in the United States," (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/History\\_of\\_rail\\_transport\\_in\\_the\\_United\\_States#Expansion\\_and\\_consolidation\\_.281878.E2.80.931916.29](https://en.wikipedia.org/wiki/History_of_rail_transport_in_the_United_States#Expansion_and_consolidation_.281878.E2.80.931916.29).

<sup>36</sup> Wikipedia Contributors, "One-man Operation, United States," (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/One-man\\_operation#United\\_States](https://en.wikipedia.org/wiki/One-man_operation#United_States).

<sup>37</sup> Wikipedia Contributors, "Bus," (accessed July 20, 2016), available: <https://en.wikipedia.org/wiki/Bus>.

investments in track and powerhouses, pay for all maintenance of right-of-way and equipment, as well as property taxes on their lands and lines plus franchise fees. Often the franchises had been established during the boom years of the late nineteenth century as a percentage of fares collected and those deals were coming back to haunt the industry in the Depression. Transit operators were largely successful in pushing government to regulate the Jitney industry. The transit operators were already well equipped to operate in a government-regulated environment and quickly capitalized on the economic advantages of having the government build and maintain roads by adding bus fleets of their own. Bus substitution also allowed for a smoother path towards abandoning marginal trolley lines.<sup>38</sup>

As more and more trolley lines were converted to motor coach operation (Figure 2-21), more and more members of the public bought automobiles to avoid riding on them. Ironically, because so many trolley lines became bus lines under utility commission regulations, old routes continued to be utilized for many decades after the streetcars had been abandoned. The street railway infrastructure often continued to be utilized as well. Old passenger stations and shelters were adapted for bus use; trolley turn-around loops were paved with asphalt; bridges, tunnels and viaducts were repurposed, and motorman's comfort stations (toilet facilities) stayed in operation for the use of motor coaches and their operators.



**Figure 2-21.**  
**1918 Autobus**  
**San Francisco Municipal Railway**

### **2.4.3 President's Conference Car (PCC)**

There was one bright spot for trolley operations during the Depression; an entirely new and truly modern streetcar. The President's Conference Car, named in honor of its design committee, came to fruition between 1929 and 1931 (Figure 2-22). Later the committee was renamed the Electric Railway Presidents' Conference Committee (PCC). The group was an amalgam of trolley, tram, and rail professionals who shared the goal of creating a modern streetcar.



**Figure 2-22.**  
**Brooklyn & Queens 1001 First PCC**  
**Car Delivered in 1936**

The PCC program was an unqualified success. The new cars were running by 1936. They were lighter and stronger, used less power, and provided a quiet and smooth ride. Between 1935 and the end of U.S. production in 1952, 4,078 cars were built for U.S. operators. Thousands

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<sup>38</sup> Shareable, "The History of Carpooling," (accessed July 20, 2016), available: <http://www.shareable.net/blog/the-history-of-carpooling-from-jitneys-to-ridesharing>; Miriam Webster, "Jitney," (accessed July 20, 2016), available: <http://www.merriam-webster.com/dictionary/jitney>; Wikipedia Contributors, "Share Taxi, Jitney," (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/Share\\_taxi#Jitney](https://en.wikipedia.org/wiki/Share_taxi#Jitney).

more were produced for overseas customers under license. Brooklyn, Chicago, Boston, and Cleveland also ordered multi-unit rapid transit PCC cars built from the same equipment used on the PCC streetcars.

Unlike the older streetcars that were double-ended, most PCC cars were single-ended, requiring many properties to rebuild the ends of their lines to incorporate turn-around loops. Often these later track rerouting and rebuilding efforts would prove to be the last track changes ever made to their respective systems.<sup>39</sup>

#### 2.4.4 Aerial Tramways



**Figure 2-23.**  
Cannon Mountain,  
Franconia, New Hampshire  
June 28, 1938

Aerial tramways generally consist of a wire cable stretched between two or more towers that serve as a fixed guideway. Two passenger-carrying gondolas are arranged so that they travel up and down this track cable, propelled back and forth between stations by a moving haulage rope. Some smaller systems only use a single car. Aerial tramways are generally used over rough terrain, over water where fixed rail transport would need costly trestles and bridges to support track work, or over scenic terrain. The first aerial tramway in North America was at Cannon Mountain in Franconia, New Hampshire, in 1938 (Figure 2-23). Although U.S. aerial tramways are most often used at ski resorts and theme parks, there are two in use as mass transit installations; Roosevelt Island, New York, and the Portland Aerial Tram in Oregon.<sup>40</sup>

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<sup>39</sup> Wikipedia Contributors, "PCC Streetcar," (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/PCC\\_streetcar](https://en.wikipedia.org/wiki/PCC_streetcar).

<sup>40</sup> The Gondola Project, *Cable Car Confidential, The Essential Guide to Cable Cars, Urban Gondolas & Cable Propelled Transit - Sample*, Creative Urban Projects, ebook, (accessed July 20, 2016), available: <https://www.scribd.com/doc/221825887/Cable-Car-Confidential-CUP-Sample>; Wikipedia Contributors, "Cannon Mountain, New Hampshire," (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/Cannon\\_Mountain\\_\(New\\_Hampshire\)](https://en.wikipedia.org/wiki/Cannon_Mountain_(New_Hampshire)); Wikipedia Contributors, "Aerial Tramway," (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/Aerial\\_tramway](https://en.wikipedia.org/wiki/Aerial_tramway).

## 2.5 World War II, 1941-1946

World War II was a dynamic period, full of contradictions for the American transit industry. Oil, gasoline, and rubber were strictly rationed during the war, and personal automobile use steeply declined. Conversely, train, trolley, and streetcar ridership increased as the federal government helped build new lines and restore abandoned track to help with the war effort. Shipyard railways were built at great speed in Los Angeles and Richmond, California, to haul workers to the ports. Transit operators were also called to provide thousands of buses to serve aircraft factories. As the war continued, the street railways began hiring women as “motormanettes” and “conductorettes” due to the scarcity of men available to work in transit (Figure 2-24).<sup>41</sup> In many cases, the companies had to establish special driving courses as so few women had held driver’s licenses. Wartime also brought about the hiring of African Americans as motormen and conductors in significant numbers. In 1944, the first hiring of African American women as conductors occurred in Los Angeles, for the Los Angeles Railway Company.<sup>42</sup>



**Figure 2-24.**  
**Los Angeles Railway (LARy)**  
**WWII "Motormanettes" at**  
**Division 4 Circa 1942**

Transit agencies set records for passenger use. Over 22 billion trips occurred in both 1945 and 1946, followed by 23.4 billion trips in 1945 during the last year of World War II and 23.5 billion trips in 1946. Returning military veterans increased travel demand sufficiently (before automobiles again became available) to make the year after the war the highest for transit travel.<sup>43</sup>

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<sup>41</sup> Metro, “First Woman Operators Motormanettes,” (accessed July 20, 2016), available: <https://www.metro.net/about/library/archives/historic-firsts/motormanettes/>.

<sup>42</sup> Metro, “First African American Motormen,” (accessed July 20, 2016), available: <https://www.metro.net/about/library/archives/historic-firsts/motormen/>.

<sup>43</sup> American Public Transportation Association, 2014 Public Transportation Fact Book, 65th Edition, November 2014, (accessed July 19, 2016), available: <https://www.apta.com/resources/statistics/Documents/FactBook/2015-APTA-Fact-Book-Appendix-A.xls>.

## 2.6 Post World War II Period, Late 1940s-1970s

The post war era brought about the biggest changes for the mass transit industry since its inception in the late nineteenth century. The Servicemen's Readjustment Act of 1944, also known as the G.I. Bill, was created to help veterans of World War II. Returning GIs were offered low interest mortgage loans, and the resulting construction boom created millions of homes in new suburban tracts that had not previously been served by any mass transit (Figure 2-25). Cities sprung up centered on the new Federal highway system, surrounded by suburban tracts, and served by ample local road networks.<sup>44</sup>



**Figure 2-25.**  
**Tract Housing**  
Levittown, Pennsylvania c.1955

### 2.6.1 The Interstate Highway System

In 1956, the Interstate Highway System was authorized. This new system of interstate highways was designed as a network of controlled-access highways. The Interstate Highway System was primarily designed for use by motor vehicles, therefore rail transit and even bus service was, at best, a minor part of their planning. For the first time, the average American home was being built with a two-car garage; in general, the husband was expected to drive to work and the housewife needed a second car to do the shopping and run errands.<sup>45</sup>

### 2.6.2 Shopping Centers



**Figure 2-26.**  
**Park Central Shopping Center,**  
Phoenix, Arizona, 1957

This new automobile age saw a steep decline in sales by mail order catalog giants Sears-Roebuck and Montgomery Ward, and these retailers began an intense period of building large department stores around the country in the new suburbs that

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<sup>44</sup> Wikipedia Contributors, "G.I. Bill," (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/G.I.\\_Bill](https://en.wikipedia.org/wiki/G.I._Bill).

<sup>45</sup> Wikipedia Contributors, "Interstate Highway System," (accessed July 20, 2016), available:

[https://en.wikipedia.org/wiki/Interstate\\_Highway\\_System](https://en.wikipedia.org/wiki/Interstate_Highway_System); Elisheva Blas, "The Dwight D. Eisenhower National System of Interstate and Defense Highways: The Road to Success?" *The History Teacher* 44.1 (2010): 127-42. Jstor.

came to be called shopping centers.<sup>46</sup> Shopping centers are characterized by paved parking lots, unlimited free parking, and a group of stores clustered in the middle of the property (Figure 2-26). Often the nearest mass transit, a bus stop, was located at the farthest edge of the parking lot. Mass transit and transit dependency came to be a symbol of the poor and needy with the middle class using automobile transportation and shunning various other forms of transit.

### 2.6.3 Urban Transit in the Automobile Age

Certain dense, urban cities such as New York, Chicago, Boston, and San Francisco never lost their mass transit systems (Figure 2-27). Those downtowns that were intensely developed before widespread automobile ownership often did not have adequate parking spaces to allow commuters to drive to work. Generally, local or regional governments stepped in and took ownership of mass transit rail systems from their original private companies as transit came to be seen as a public service utility. Transit was now no longer about profit, but about service provided by governments and subsidized by taxes.



**Figure 2-27.**  
**Chicago Elevated, 1976,**  
**Cars Painted for Bicentennial**

### 2.6.4 AMTRAK

Until the 1920s, rail was the most prominent form of intercity transport. This near monopoly was eroded by the introduction of inexpensive and reliable automobiles; intercity bus lines, such as Greyhound; and, a dramatic increase of well-built public roads and highways.

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<sup>46</sup> Brigid Sweeney, "Sears – Where American Shopped," Crain's Chicago Business, April 21, 2012, (accessed July 20, 2016), available: <http://www.chicagobusiness.com/article/20120421/ISSUE01/304219970/sears-where-america-shopped>.

During World War II, the railroads had used their fleets and miles of rail more than ever for transporting people and goods for the war efforts. Following the war, railroads attempted to makeover their fleets with plush streamliners to retain the demand for passenger travel. The most famous were the Super Chief (running between Chicago, Illinois and Los Angeles, California) and the California Zephyr (running between Chicago, Illinois and Oakland, California). These trains sparked what would be the last boom in long distance rail travel in the twentieth century.

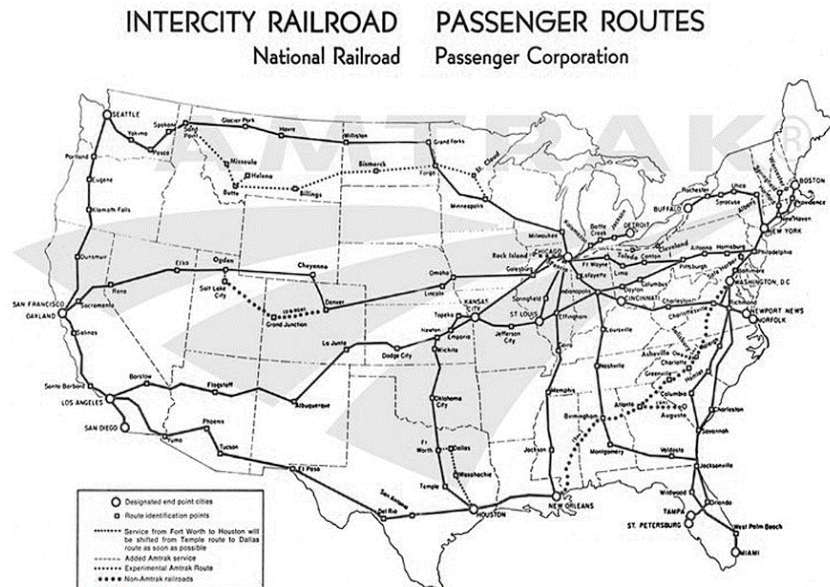


Figure 2-28.  
Amtrak System Map, July 1971.

In spite of this, the percentage of passenger rail rolling stock in the United States sharply declined between the end of World War II and 1965. Railroad post offices were closed, further cutting revenues for hurting railroad companies that operated passenger service at a net loss. By the late 1960s, passenger rail seemed near to its end as airline and automobile travel increased in popularity. Following a number of requests to terminate service and to file for bankruptcy, Congress passed the Rail Passenger Service Act in 1970 in an attempt to revive passenger rail service, and as a result, Amtrak was created.<sup>47</sup> In 1971, the National Railroad Passenger Corporation (Amtrak) was formed as a partially government-funded passenger railroad service to provide medium and long-distance intercity rail service in the contiguous forty-eight states.<sup>48</sup> Of the 364 trains operated previously by various carriers, Amtrak only continued 182 (Figure 2-28).<sup>49</sup>

<sup>47</sup> David W. Kendall, Amtrak Historical Society, "Experience the Spirit....The History....," (accessed November 10, 2016), available: <http://www.amtrakhistoricalsociety.org/bah.htm>.

<sup>48</sup> Wikipedia Contributors, "Amtrak," (accessed July 20, 2016), available: <https://en.wikipedia.org/wiki/Amtrak>.

<sup>49</sup> Wikipedia Contributors, "Amtrak." Classic Streamliners, "Amtrak – The National Railroad Passenger Corporation," (accessed July 20, 2016), available: <http://www.classicstreamliners.com/ci-amtrak.html>.



## 2.7 UMTA and the Heavy Rail/Light Rail Era, 1960s-1980s

### 2.7.1 Reinvestment in Light and Heavy Rail

The Urban Mass Transportation Act of 1964 directed \$375 million for large-scale urban rail projects in the form of matching funds to cities and states.<sup>50</sup> The Urban Mass Transportation Administration (UMTA), which is now the Federal Transit Administration, was formed to provide grants for up to 50% of the cost of transit improvements. UMTA provided a 50% match for improvements by agencies such as BART and WMATA.



**Figure 2-29.**  
**BART Train Arriving in Station. The**  
**System Opened in September 1972.**

The Urban Mass Transportation Act of 1970 (Pub.L. 91-453)<sup>51</sup> gave an additional \$10 billion matching funds over a 12-year period to those first authorized in the UMTA Act of 1964 for American transit. The flow of money encouraged an era of funding for large capital projects such as the Bay Area Rapid Transit (BART) system in the San Francisco Bay Area (Figure 2-29). Typical of such systems of the era, BART created an entirely new heavy rail/subway relying on new and untried technologies in order to replace electric interurban and trolley systems that once covered the same territory but had been abandoned in the pre-government ownership era. These matching fund programs rejuvenated interurban travel in many localities.<sup>52</sup>

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<sup>50</sup> Wikipedia Contributors, "Urban Mass Transportation Act of 1964," (accessed July 20, 2016), [https://en.wikipedia.org/wiki/Urban\\_Mass\\_Transportation\\_Act\\_of\\_1964](https://en.wikipedia.org/wiki/Urban_Mass_Transportation_Act_of_1964); Chapter 53, Public Transportation, Pub.L. 88-365, USC Title 49, Chapter 53, (accessed July 20, 2016), available:

<http://uscode.house.gov/view.xhtml?path=/prelim@title49/subtitle3/chapter53&edition=prelim>.

<sup>51</sup> "Urban Mass Transportation Act of 1970," Pub.L. 91-453, (accessed January 26, 2017), available:

<https://www.gpo.gov/fdsys/pkg/STATUTE-84/pdf/STATUTE-84-Pg962.pdf>.

<sup>52</sup> Wikipedia Contributors, "Urban Mass Transportation Act of 1964."

U.S. Transit Suppliers Coalition, "A Brief History of FTA's "Buy America" Requirements," (accessed June 9, 2016), available: <http://buyamericacoalition.org/history.htm>.

## 2.7.2 People Mover

Not all UMTA funding was aimed at new heavy rail projects. There was a movement in the mid-1970s to build downtown circulators intended to move people around a downtown core in automated, driverless, elevated trains of about 20-50 persons. One rationale was to link commuters in dense urban cores to large parking lots where they might leave their automobiles for the day. Other systems were created as an airport link connecting terminals to parking lots.<sup>53</sup>

People movers resemble conventional fixed rail guideway electric train systems except that there is no onboard human operator (Figure 2-30). People movers are self-service as found in most elevators or run on a timed schedule with no passenger intervention at all. The term “People Mover” seems to have been coined by Disney engineers working on a new attraction for Tomorrowland. The Westinghouse Company, who by this time had been manufacturing street railway components for nearly a century, marketed their people mover as a “horizontal elevator.”<sup>54</sup>



Figure 2-30.  
Detroit People Mover

## 2.7.3 Monorail



Figure 2-31.  
Aerial Trolley Car Co., Inc.,  
Burbank, CA c. 1908

The modern passenger monorail is a specialized form of electric street railway designed to run on only one rail. European experiments with monorail began in the steam power era as early as 1820. Monorails were almost non-existent in the United States prior to World War II with a few notable experimental lines being the exception. One such attempt was that of Joseph Fawkes of Burbank, California, in 1910.<sup>55</sup> The “Aerial Swallow” existed as a working 840-foot-long prototype in Fawke’s orange orchard (Figure 2-31). Another monorail was proposed

for New York City in the 1930s and various prototypes came and went, often at World and State Fairs and theme parks. It was not until 1962 that Seattle constructed the first transit-oriented public passenger carrying monorail connecting two stations one-mile apart in its downtown core.

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<sup>53</sup> Wikipedia Contributors, “People Mover,” (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/People\\_mover](https://en.wikipedia.org/wiki/People_mover).

<sup>54</sup> Wikipedia Contributors, “People Mover,” (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/People\\_mover](https://en.wikipedia.org/wiki/People_mover).

<sup>55</sup> Nathan Masters, “Before Its Time: Burbank’s Experimental Monorail,” *Los Angeles Magazine*, February 12, 2013, (accessed July 20, 2016), available: <http://www.lamag.com/citythinkblog/before-its-time-burbanks-experimental-monorail/>.

## 2.8 Discretionary Funding Program, 1990s-Present

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) created major changes in transportation planning and policy.<sup>56</sup> The law attempted to find a multi-pronged approach to highway and various other transit funding that let cities and municipalities have more power over their planning processes. Due to the large number of requests being made for Congressional earmarks, ISTEA established a process to help prioritize federal investment. This process included the development of criteria, a rating system, and an annual report to Congress by the FTA. The program helped Congress prioritize funding recommendations for new fixed guideways, extensions to existing systems, and installation of new Bus Rapid Transit (BRT) projects.

FTA's major capital investment funding program evolved during the late 1990s and the turn of the twenty-first century through several pieces of transportation legislation, including:

- Transportation Equity Act for the 21st Century (TEA-21), 1998;
- Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), 2005;
- Moving Ahead for Progress in the 21st Century Act (MAP-21), 2012;<sup>57</sup> and
- Fixing America's Surface Transportation Act (FAST Act), 2015.

The continued availability of federal matching funds for locally-sponsored transit projects led to the expansion of rail and bus projects across the United States. Medium-sized urban areas, such as Portland and Charlotte, were able to fund new, urban, modern light rail projects (Figure 2-32). BRT projects also sprouted up across the country in urban areas like Cleveland, Boston, and San Antonio.



**Figure 2-32.**  
**Charlotte Area Transit System (CATS)**  
**Funded in Part by FTA's Capital**  
**Investment (New Starts) Program**

## 2.9 Major Metropolitan Areas – Local Contexts

The narratives presented in the preceding text mentioned that several older, dense urban downtowns never lost their transit systems. Seven metropolitan areas were chosen for further study based on system age or frequency of Section 106 coordination. A localized context for each is provided in the next section of this report. The detail provided for each city varies and is dependent on the availability of existing data obtained during the literature search conducted for this report.

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<sup>56</sup> Wikipedia Contributors, "Intermodal Surface Transportation Efficiency Act," (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/Intermodal\\_Surface\\_Transportation\\_Efficiency\\_Act](https://en.wikipedia.org/wiki/Intermodal_Surface_Transportation_Efficiency_Act).

<sup>57</sup> Wikipedia Contributors, "Congressional High Priority Corridor," (accessed July 20, 2016), available: [https://en.wikipedia.org/wiki/Congressional\\_High\\_Priority\\_Corridor](https://en.wikipedia.org/wiki/Congressional_High_Priority_Corridor).

The cities are listed in alphabetical order and include:

- Boston (Section 3);
- Chicago (Section 4);
- New Orleans (Section 5);
- New York City (Section 6);
- Philadelphia (Section 7);
- San Francisco (Section 8); and
- Washington, D.C. (Section 9).

With some expected variation for each locality, the localized contexts that follow are organized according to the general chronological eras that were presented in the national context:

- Introduction;
- Early Period, 19<sup>th</sup> Century - Early 20<sup>th</sup> Century;
- Expansion, 1910s - 1930;
- Depression Era, 1929 - 1941;
- World War II, 1941 - 1945;
- Post World War II, Late 1940s - 1970s;
- UMTA/Heavy Rail/Light Rail Era, 1960s - 1980s;
- Discretionary Funding Program, 1990s - present; and
- Historic Properties in Each Locality.

## 3. Boston-Localized Context

### 3.1 Introduction

The history of rail transportation in the Boston-area reaches back nearly two centuries to the development of some of the oldest railroads in the United States. Boston is among the few cities in the United States where publicly accessible rail transportation systems have continuously operated since these earliest days. This section includes an overview of the system's history and concludes with a description of seven of Boston's historic stations used by rail passengers and an unusual historic feature for a dense urban city—a cattle pass.

### 3.2 Associated Historic Contexts

- Early Period: the Horsecar Era, 1856-1900
- Expansion: the Electric Streetcar Era, 1889-present
- The Heavy Rail era, 1912-present (Red, Orange, & Blue lines)
- The Light Rail era, 1979-present

### 3.3 Boston's Street Railways

- Bay State Street Railway, 1911-1919
- Boston Elevated Railway (BERy), 1894-1947
- Boston and Worcester Street Railway, 1903-1932
- Cambridge Railroad, 1856-1912
- Conway Electric Street Railway, 1894-1908
- Eastern Massachusetts Street Railway, 1919-1968
- Metropolitan Transit Authority, 1947-1964
- Massachusetts Bay Transit Authority (MBTA), 1964-present
- Middlesex and Boston Street Railway, 1907-1930, 1930-1972
- Milford and Uxbridge Street Railway, 1901-1928
- Natick Electric Street Railway, 1891-1893
- Palmer and Monson Street Railway, 1898-1901
- South Middlesex Street Railway, 1893-1907

- Springfield and Eastern Street Railway, 1898-1927
- West End Street Railway, 1887-1922 (horse, electric) (merged with BERY)

### 3.4 Early Period: the Horsecar Era, 1856-1900

Three steam railroads operated in the Boston area by 1835: the Boston & Worcester; the Boston & Providence; and, the Boston & Lowell. Four more railroads were completed by the mid-1850s. In addition to stimulating economic development, these early railroads facilitated the development of the first suburbs.<sup>58</sup> At the same time, population growth created demand for urban mass transit within the city of Boston. This demand was first satisfied by horse-drawn railroad cars and eventually by electric railroads.

The first horse-drawn rail car company in Massachusetts was the Cambridge/Boston Company. This company created a transportation line between Harvard Square in Cambridge and Bowdoin Square in Boston via the West End Bridge (1793, the location of today's Longfellow Bridge). The Red Line subway would later approximate this route. Four main horse-drawn streetcar railways served different areas of Boston by 1865: the Middlesex Railroad (north), the Union Railway (west), the Metropolitan Railroad (southwest), and the South Boston Railroad (south). Subsequently developed lines included the Highland Street Railway (1872) and the Charles River Railway (1881). Throughout the nineteenth century, urban mass transit remained a commercial industry in which private companies received charters from the state legislature to create right-of-ways through eminent domain and operate the rail lines they developed as limited monopolies. During the 1880s, the industry began to undergo consolidation. Chartered In 1885, the West End Street Railway consolidated ownership of existing streetcar lines in Boston and the inner suburbs. The Middlesex and Boston Street Railway consolidated ownership in the western suburbs, while the Eastern Massachusetts Street Railway achieved control of the Boston's northern and southern suburbs. The first electricity-powered rail cars were introduced during this period of consolidation.<sup>59</sup>

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<sup>58</sup> Kennedy, Charles J. "Commuter Services in the Boston Area, 1835-1860," *Business History Review*, 36 (Summer, 1962): 155 [article pages are 153-170].

<sup>59</sup> Zaitzevsky, Cynthia R., *Historic American Engineering Record (HAER) for the Boston Elevated Railway Company Mainline Structure (Metropolitan Bay Transportation Authority, Orange Line)*, 1986 (accessed May 30, 2016), 14-16, available: <http://www.loc.gov/pictures/item/ma1288/>; Wikipedia contributors, "History of the Massachusetts Bay Transportation Authority (MBTA)," Wikipedia, The Free Encyclopedia, [https://en.wikipedia.org/w/index.php?title=History\\_of\\_the\\_MBTA&oldid=695514940](https://en.wikipedia.org/w/index.php?title=History_of_the_MBTA&oldid=695514940) (accessed May 31, 2016).

### 3.5 Expansion: the Electric Streetcar Era, 1889-Present

Increasing traffic congestion in downtown Boston created the need for improved mass transit. Railway vehicles shared the streets with pedestrians and other vehicles. Introduced in San Francisco in the 1870s, the cable car worked well in grid-planned cities with wide streets, but proved unsuited to Boston's increasingly congested streets. When Henry Melville Whitney's and Eben Jordan's West End Railway introduced electric streetcars to the company's Beacon Street line in 1887, Boston became the world's first major city to make use of the new technology. Within five years, electric trolley cars made up two-thirds of Boston's mass transit vehicles. The West End Railway also introduced grade-separated rail lines that reduced the congestion created by mixed traffic at cross-street intersections. Still, congestion continued to be a problem and Boston-area commuters began to call for the development of an elevated railway similar to those operating in New York and Chicago.<sup>60</sup>

While many downtown residents feared that an elevated railway would prove excessively noisy and unsightly, the governor appointed a special commission in 1891, the Rapid Transit Commission, to investigate public transportation requirements and to provide recommendations. In 1892, the Commission issued its report recommending development of elevated railways and a tunnel for streetcars under Tremont Street.<sup>61</sup> As a result, the State Legislature authorized incorporation of the Boston Elevated Railway Company (BERy), which was chartered in 1894, and creation of the Boston Transit Commission. A group of financiers led by J. P. Morgan acquired the charter in 1895 and purchased a controlling interest in the West End Railway in 1897. In 1895, the Boston Transit Commission began construction of the Tremont Street Subway. Completed in 1897, the Tremont Street Subway was the nation's first subway line. Boston eventually created a system characterized by mixed public and private management of the city's modernizing mass-transit system. The Boston Transit Commission leased use of the downtown subway tracks to BERy, and BERy financed and constructed the first elevated railway. "This solution," explains architectural historian Cynthia R. Zaitzevsky, "prevented the disfigurement of [central] Boston by elevated tracks while providing for their construction in the outlying suburbs of Roxbury and Charleston." Construction of BERy's Main Elevated Line occurred during the years 1898-1901.<sup>62</sup>

Other noteworthy transit development occurred after completion of the Tremont Street Subway and the BERy Main Line. On the heels of the BERy Main Line, construction of the Atlantic Avenue Elevated provided a second "El" line through downtown Boston. In 1904, rail vehicles began to travel under Boston Harbor in the new East Boston Tunnel. Completed in 1908, the Washington Street Tunnel provided elevated cars with a shorter route through downtown. Over the years, various branch subway lines were constructed to

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<sup>60</sup> Zaitzevsky, Boston Elevated Railway Mainline Structure HAER, 18-19; Wikipedia, "History of the MBTA."

<sup>61</sup> Massachusetts Bay Transportation Authority, "History," (accessed January 27, 2017), available: [http://www.mbtta.com/about\\_the\\_mbtta/history/](http://www.mbtta.com/about_the_mbtta/history/).

<sup>62</sup> Zaitzevsky, Boston Elevated Railway Mainline Structure HAER, 18-22, 24, 21 quoted.

extend service outward from the Tremont Street Subway line. Completed in 1912, the Cambridge Tunnel linked downtown Boston and Harvard Square.<sup>63</sup>

When BERY's predecessor, the West End Railway, introduced electrification in 1889, no commercial power was available for purchase, forcing the company to develop power stations. From the initial electrification effort to 1897, power generating stations were constructed in downtown Boston, Allston, Cambridge, Dorchester, Charlestown, East Cambridge, and East Boston. The system had 36 megawatts of generating capacity by 1904. Direct-current limitations and the challenge of transporting coal—the generating stations' fuel—hindered hopes of extending the passenger rail system inland. However, the large station completed in South Boston in 1911 (South Station) was equipped to produce 25-Hertz alternating current, thereby enabling high voltage transmission at increased distance to substations that were equipped to reduce the voltage as needed for train use. By 1931, the expanding system included 14 substations. This generating system remained in place until MBTA began purchasing power from utility providers in 1981.<sup>64</sup>

### 3.6 The Heavy Rail Era, 1912-Present

In Boston, where streetcars continued to operate well into the twentieth century, the Heavy Rail era began with completion of the Cambridge Tunnel, which accommodated a line from Boston west to Harvard Square in Cambridge. Additional construction extended this line from Boston south to Dorchester via the Dorchester Tunnel. Beginning in 1927, the Dorchester line would be extended farther south. During this period, numerous transfer stations operating as prepayment stations provided for passengers to make transfers between streetcar lines, subway lines, and elevated rail segments. Many of these stations would subsequently be converted to serve bus and trackless trolley transit, and some remain today as examples of historic-era architecture. Surviving prepayment stations include the Andrew, Harvard, Kenmore, and Lechmere stations.<sup>65</sup>

The advent of automobile travel gradually led to the decline of streetcar and passenger railroad transit. Inaugurating a process that eventually became known popularly as “bustitution,” the Boston Elevated Railway began replacing rail vehicles with buses in 1922. Middlesex and Boston Street Railway cars were eliminated in the early 1930s. The first trackless trolleys began to replace some BERY rail vehicles in 1936. Increasingly criticized as unsightly along with other elevated lines, the Atlantic Avenue elevated line was the location of several accidents that disrupted service, including the Boston molasses disaster of 1919. After partial closure, it was finally demolished in 1942.<sup>66</sup>

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<sup>63</sup> Wikipedia, “History of the MBTA.”

<sup>64</sup> Wikipedia contributors, “Boston Elevated Railway,” (accessed May 30, 2016), available: [https://en.wikipedia.org/wiki/Boston\\_Elevated\\_Railway](https://en.wikipedia.org/wiki/Boston_Elevated_Railway).

<sup>65</sup> Wikipedia, “History of the MBTA.”

<sup>66</sup> Wikipedia, “History of the MBTA;” MBTA, “About the MBTA—History—Public Control and the MTA” (accessed May 30, 2016), available: [http://www.mbta.com/about\\_the\\_mbta/history/default.asp?id=966](http://www.mbta.com/about_the_mbta/history/default.asp?id=966).



Streetcars dating to the mid-twentieth century continue to operate in Boston. As described in Section 2.4.3, PCCs were a type of street car that incorporated noise-reducing design features when introduced in the mid-1930s. Today in Boston, PCCs remain in service on the Mattapan Line, which is distinguished as the line with the oldest continuous PCC service in the nation. Most are rebuilt cars once shared between the Mattapan Line and the Green Line. PCCs continue to retain usefulness on lines originally built to accommodate the 1920s streetcar and where conversion to modern vehicles would require major reconstruction. Boston's existing PCCs were built by Pullman-Standard in 1945-1946 and began service on the Ashmont-Mattapan Line in 1955.<sup>67</sup>

The growth of automobile travel gradually reduced rail service profits, eventually leading to government intervention. Public control over BERY had increased with the Public Control Act of 1918 that set fares necessary to pay for the costs of continued service, protected BERY stockholders from financial loss, and appointed a panel of five trustees to oversee the railway's operations. With the subsequent Public Control Act of 1947, the Massachusetts Legislature created the Metropolitan Transit Authority (MTA), acquiring the BERY system outright and brought it under complete public control. MTA would serve metropolitan Boston's original 14 cities and towns: Arlington, Belmont, Boston, Brookline, Cambridge, Chelsea, Everett, Malden, Medford, Milton, Newton, Revere, Somerville, and Watertown. In 1957, the Legislature empowered MTA to develop a rapid transit line along the Newton Highlands Branch of the Boston and Albany Railroad, which had by then abandoned commuter service. MTA restored commuter service on this route in 1959. It became known as the Southeast Expressway.<sup>68</sup>

On August 3, 1964, the General Court created the Massachusetts Bay Transportation Authority (MTBA), which replaced MTA and provided for expanded metropolitan transportation planning and management in the greater Boston area. Over the next decade, MBTA would expand the area formerly served by MTA to include 78 towns and cities. The agency received federal funding from United States Department of Transportation, also formed in 1964. In addition to managing and planning rail transit—including subsidizing private railways and eventually acquiring some—MBTA acquired and expanded bus services in the metropolitan Boston area.<sup>69</sup>

MBTA began “rebranding” the major segments of Boston's metropolitan transit system in 1964. In 1965, MBTA assigned Boston's four rapid transit lines “color names” based on their alignments and histories. In reference to Harvard University's official crimson color, the route extending outward from Boston in different directions to Cambridge and Dorchester was designated as the Red Line. It incorporated the

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<sup>67</sup> Wikipedia contributors, “PCC Streetcar,” Wikipedia, The Free Encyclopedia (accessed May 30, 2016), available: [https://en.wikipedia.org/wiki/PCC\\_streetcar](https://en.wikipedia.org/wiki/PCC_streetcar); Boston Streetcars, “Trolley Types of Boston” (accessed May 30, 2016): <http://www.bostonstreetcars.com/trolley-types-of-boston.html>.

<sup>68</sup> MBTA, “About the MBTA—History—The Regional System and the MBTA” (accessed May 30, 2016), available: [http://www.mbta.com/about\\_the\\_mbta/history/default.asp?id=968](http://www.mbta.com/about_the_mbta/history/default.asp?id=968).

<sup>69</sup> MBTA, “About the MBTA—History—Public Control and the MTA.”

Cambridge Tunnel, the Dorchester Tunnel, and the Dorchester Extension created by BERY in the 1920s.<sup>70</sup> Boston's and the nation's first subway, the 1897 Tremont Street Subway, became part of the Green Line, which included five extensions from the original Tremont Street line constructed over the first half of the twentieth century.<sup>71</sup> Intersecting with the Blue and Red lines in downtown Boston, and extending from Forest Hills north to Oak Grove, the Orange Line evolved from BERY's main elevated line that began service in 1901, including the demolished Charleston Elevated and the Washington Street Elevated, as well as the Washington Street Tunnel (1908) and the demolished Washington Street Elevated extension to Forrest Hills (1909).<sup>72</sup> The Blue Line incorporated the East Boston Tunnel (1904) underneath the harbor, the extension northwest to Bowdoin (1916), and the extension northeast along the former Boston, Revere Beach, and Lynn Railroad (1952-54).<sup>73</sup>

### 3.7 The Light Rail Era, 1979-Present

At the end of the Vietnam War, the federal government looked to keep defense contractors busy and directed UMTA to work with defense contractors to create new light-rail vehicle designs to replace the nation's aged rolling stock. UMTA made Boeing Vertol its systems managers for a new program to modernize urban rail vehicles and systems. In 1973, Boeing Vertol began work on 230 light rail vehicles, 50 of which it created for MBTA. The contract with MBTA would eventually be expanded to 175 Boeing light-rail vehicles (LRV), the first of which began serving the Green Line "D" Branch in 1976.<sup>74</sup>

Boston's LRVs were the source of public controversy during their initial years of service as the vehicles broke down frequently. MBTA had difficulties acquiring replacement parts leading to maintenance crews "cannibalizing" new cars for parts to repair operating vehicles. A damaging newspaper report revealed that MBTA was hiding cannibalized vehicles from public view. As a result of this public relations disaster, MBTA began a program to rebuild PCC cars to supplement the LRV fleet and keep the Green Line in service. In a successful lawsuit against Boeing-Vertol, MBTA won financial damages for vehicle repairs and the right to reject the last 40 LRVs on order. It eventually became clear that the Boeing-Vertol LRVs would have a short

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<sup>70</sup> Wikipedia contributors, "Red Line (MBTA)" Wikipedia, The Free Encyclopedia (accessed May 30, 2016), available: [https://en.wikipedia.org/wiki/Red\\_Line\\_\(MBTA\)](https://en.wikipedia.org/wiki/Red_Line_(MBTA)); Wikipedia, "History of the MBTA."

<sup>71</sup> Wikipedia contributors, "Green Line (MBTA)" Wikipedia, The Free Encyclopedia (accessed May 30, 2016), available: [https://en.wikipedia.org/wiki/Green\\_Line\\_\(MBTA\)](https://en.wikipedia.org/wiki/Green_Line_(MBTA)).

<sup>72</sup> Wikipedia contributors, "Orange Line (MBTA)" Wikipedia, The Free Encyclopedia (accessed May 30, 2016), available: [https://en.wikipedia.org/wiki/Green\\_Line\\_\(MBTA\)](https://en.wikipedia.org/wiki/Green_Line_(MBTA)).

<sup>73</sup> Wikipedia contributors, "Blue Line (MBTA)" Wikipedia, The Free Encyclopedia (accessed May 30, 2016), available: [https://en.wikipedia.org/wiki/Blue\\_Line\\_\(MBTA\)](https://en.wikipedia.org/wiki/Blue_Line_(MBTA)).

<sup>74</sup> Boeing, "Historical Snapshot—Light Rail Vehicle/Rapid Transit Car" (accessed May 31, 2016), <http://www.boeing.com/history/products/rapid-transit-car.page>.

life, and during the latter 1980s MBTA began to purchase new Type 7 LRVs, but the Boeing-Vertol cars would continue to travel the MBTA system until the turn of the century.<sup>75</sup>

**Table 3-1. Major Systems, Operating Agencies, Transit Technologies and Design**

Rolling Stock and Motive Power			
Period	Rail Vehicles	Track gauge	Power Delivery
1820-1850	Steam Locomotive Passenger cars Freight cars	4'-8½"	Steam
1856-1900	Horsecar	4'-8½"	Horse
1895-1927 1928-1940	Steam Locomotive/ Electric Interurban	3'-0"	Steam Electric overhead 600v DC
1897-present	Streetcar Subway	4'-8½"	Electric overhead 600v DC
1889-present	Streetcar	4'-8½"	Electric overhead 600v DC
1901-1987	Streetcar Elevated	4'-8½"	Electric overhead 600v DC
1922-present	Motor Coach	-	Gasoline & Diesel
1924-present	Heavy rail subway	4'-8½"	Electric third rail and overhead catenary 600v DC
1936-present	Trolleybus	-	(2) Electric overhead 600v DC

#### MBTA Predecessor Companies

- West End Street Railway
  - Consisting of twenty predecessor horsecar companies
- Eastern Massachusetts Street Railway
  - Bay State Railroad Company
- Metropolitan Transit Authority
  - Boston Elevated Railway Company (streetcar, subway and elevated lines)
  - Boston, Revere Beach and Lynn Railroad
- Boston and Maine Railroad
- Conrail

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<sup>75</sup> Wikipedia, "U.S. Standard Light Rail Vehicle" (accessed May 30, 2016), available: [https://en.wikipedia.org/wiki/US\\_Standard\\_Light\\_Rail\\_Vehicle](https://en.wikipedia.org/wiki/US_Standard_Light_Rail_Vehicle).

- New York Central Railroad
- New York, New Haven and Hartford Railroad
- Penn Central
- Middlesex and Boston Street Railway (Newton and Boston Street Railway)

## 3.8 Historic Properties

The MBTA system includes numerous built-environment resources that reflect the history of transportation and infrastructure development more broadly in metropolitan Boston. These include MBTA stations, as well as other facilities and rights-of-way located within historic districts, with some rights-of-way aligned adjacent to some of the nation’s most significant historic resources.

### 3.8.1 Charles/MGH Station

The Charles/MGH Station is located within the boundary of the National Register listed Charles River Basin Historic District.<sup>76</sup> It is adjacent to both the Longfellow Bridge and the former Charles Street Jail that are also NRHP-listed. In 2007, MTBA completed a new headhouse for Charles/MGH station a half-block east of its former location providing station access to the disabled for the first time because the former station could not be fitted with elevators (Figure 3-1). The station’s redesign meets current requirements and has a modern design while incorporating a renovated historic elevated copper platform that connects to the Longfellow Bridge. The NRHP-listed bridge was constructed in 1906 and was the gateway between Boston and Cambridge.<sup>77</sup> Other elements of the former station retained or reused included track, a viaduct structure, and the copper-clad platform enclosure, including the copper panels, multi-pane windows, and cast-stone column enclosures.<sup>78</sup>



**Figure 3-1.**  
**New Charles/MGH Station**

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<sup>76</sup> MBTA, “Charles / MGH Station: Design Summary Report,” (accessed November 10, 2016), available: [https://www.mbta.com/uploadedFiles/documents/CharlesMGH\\_design\\_summary\\_report.pdf](https://www.mbta.com/uploadedFiles/documents/CharlesMGH_design_summary_report.pdf).

<sup>77</sup> MBTA, “Longfellow Bridge: Rehabilitation Project,” (accessed November 10, 2016), available: [https://www.massdot.state.ma.us/Portals/26/docs/Longfellow/Longfellow\\_0409C.pdf](https://www.massdot.state.ma.us/Portals/26/docs/Longfellow/Longfellow_0409C.pdf).

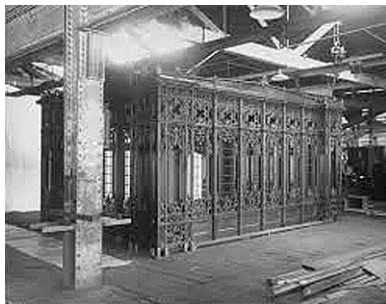
<sup>78</sup> MBTA, “About the MBTA—Sustainability—Historic Preservation” (accessed May 30, 2016), available: [http://www.mbta.com/about\\_the\\_mbta/environment/default.asp?id=25570](http://www.mbta.com/about_the_mbta/environment/default.asp?id=25570).

### 3.8.2 Copley Station

Copley Station is located within the boundary of the NRHP-listed Back Bay Historic District.<sup>79</sup> MBTA completed renovation and ADA compliance retrofit of the Copley Green Line Station in 2010 (Figure 3-2). As part of the project, MBTA repaired and preserved the station's 1914 Beaux Arts Headhouse, which fronts the Boston Public Library. The new station was designed to blend harmoniously with the historic character of the surrounding built environment, which includes the Boston Public Library McKim Building, the Old South Church, Trinity Church, and the historic landscape in front of the Trinity Church. The head house was designed by the architecture firm Fox and Gale and constructed by Chicago's firm of Hecla Winslow, renowned for their iron and bronze work on New York City's Grand Central Station and the Dakota apartments.



**Figure 3-2.**  
**Restored Copley Station**



**Figure 3-3.**  
**Restored Copley Station, interior**

Since its original construction in 1915, the headhouse suffered from deferred maintenance and insensitive repairs and renovations, graffiti defacement, rust damage, and multiple layers of deteriorating paint. The cast-iron headhouse experienced substantial deterioration over the past fifty years since the last major renovation in 1959. The 2010 renovation project involved a very detailed and extensive effort (Figure 3-3). As the MBTA website explains: “the dismantling of the building resulted in over 1,000 different sections that needed to be tagged and catalogued. Traditional blacksmith techniques along with modern technology were used to remove the old paint and corrosion. Models were used to reassemble the pieces to exact specification, and when needed, new pieces were cast that replicated the originals. In the end ninety percent of the original structure was preserved, and the MBTA made sure its riders could access the station safely, while keeping the historic and architectural integrity of the building.”<sup>80</sup>

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<sup>79</sup> Law Citations, “The Copley Station,” (accessed November 10, 2016), available: <http://www.lawcitations.com/case/n/the-copley-station>.

<sup>80</sup> MBTA, “About the MBTA—Sustainability—Historic Preservation.”

### 3.8.3 West Concord Station

The West Concord Station is listed on the NRHP (Figure 3-4). Originally known as Union Station, West Concord Station was constructed in 1894 at the junction of three major railroads serving the industrial district of Concord Junction (now called West Concord). Alternately classified as Queen Anne or Italianate in architectural style, the station originally had a tri-colored paint scheme of yellow clapboards above vertical red wainscoting and green colored trim, as well as copper finials and a sheltering eave overhang extending nine feet. After the station had its historical integrity diminished by a faux brick veneer applied during the 1980s, MBTA worked with the Town of Concord and the Friends of West Concord and shared costs to restore the building in accordance with the Secretary of the Interior Standards. This effort earned a Massachusetts Historical Commission Preservation Award in 2009.<sup>81</sup>



**Figure 3-4.**  
**Restored West Concord Station**

### 3.8.4 Swampscott Railroad Depot

The Swampscott Railroad Depot is listed on the NRHP (Figure 3-5). Situated near Lynn in the southwest area of Swampscott, Massachusetts, the Swampscott Railroad Depot is a historic passenger rail station designed in the Stick-Eastlake style. The building is not currently in use by MBTA for rail services, but the Newbury-Rockport Line continues to stop at the Swampscott park-and-ride location. Built in 1868, the station was designed by Boston-area housewright George W. Cram. Local preservationists renovated the building to temporary standards during the 1980s in an effort to avert demolition. The Swampscott Railroad Depot was listed on the NRHP in 1998, after a committee of locals raised a fund of \$15,000 for the restoration of the exterior.<sup>82</sup>



**Figure 3-5.**  
**Restored Swampscott Depot**

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<sup>81</sup> MBTA, "About the MBTA—Sustainability—Historic Preservation."

<sup>82</sup> Wikipedia contributors, "Swampscott (MTBA station)," Wikipedia, The Free Encyclopedia (accessed May 30, 2016), available: [https://en.wikipedia.org/wiki/Swampscott\\_\(MBTA\\_station\)](https://en.wikipedia.org/wiki/Swampscott_(MBTA_station)).

### 3.8.5 Beverly Depot

The Beverly Depot is listed on the NRHP (Figure 3-6). Located on the Newbury-Rockport Line in downtown Beverly, Beverly Depot is one of five stations in the city. Railroad service came to Beverly in 1839 with extension of the Eastern Railroad to Ipswich via Beverly. The original station was constructed in 1839 and replaced in 1855. Bradford Lee Gilbert designed the subject station building, which replaced the 1855 building in 1897. The station building was partially burned in a 1971 fire and subsequently renovated for use as a restaurant. Listed individually on the NRHP in 1979, the station is also a contributing resource within the Beverly Depot-Odell Park Historic District, listed on the NRHP in 2014.<sup>83</sup> The station receives an extremely high level of transit ridership, and modern ADA compliant platforms have been installed adjacent to the historic station building.



**Figure 3-6.**  
**Restored Beverly Depot**

### 3.8.6 Old Colony Railroad Station



**Figure 3-7.**  
**Old Colony Railroad Station**

The Old Colony Railroad Station is listed on the NRHP (Figure 3-7). Located off Oliver Street in North Easton, Massachusetts, the Old Colony Railroad Station was designed by architect H. H. Richardson at the behest of the Old Colony Railroad's director, Frederick Lathrop Eames. The station's construction started in 1882. Frederick Law Olmstead designed the landscaping of the station's grounds, which were completed in 1884. The Ames family bought the property from the Penn Central Railroad and donated it to the Easton Historical Society. The station was listed on the NRHP in 1972 and is a contributing resource within the H. H. Richardson National Historic Landmark District. The South Coast Rail project proposes to join the historic station to the modern Easton Village station.<sup>84</sup>

### 3.8.7 Allston Railroad Station

Named for painter and local resident Washington Allston, the area known as Allston originally formed the eastern portion of the town of Brighton, which the City of Boston annexed in 1874. The Boston and



**Figure 3-8.**  
**1887 Allston Railroad Station**

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<sup>83</sup> Wikipedia contributors, "Beverly Depot (MTBA station)," Wikipedia, The Free Encyclopedia (accessed May 30, 2016), available: [https://en.wikipedia.org/wiki/Beverly\\_Depot\\_\(MTBA\\_station\)](https://en.wikipedia.org/wiki/Beverly_Depot_(MTBA_station)).

<sup>84</sup> Wikipedia contributors, "Old Colony Railroad Station (North Easton, Massachusetts)," Wikipedia, The Free Encyclopedia (accessed May 30, 2016), available: [https://en.wikipedia.org/wiki/Old\\_Colony\\_Railroad\\_Station\\_\(North\\_Easton,\\_Massachusetts\)](https://en.wikipedia.org/wiki/Old_Colony_Railroad_Station_(North_Easton,_Massachusetts)).

Albany Railroad was completed through the area in 1867. Constructed in 1887, the Allston Railroad Station was one of nine Boston and Albany stations designed by the architect H. H. Richardson (Figure 3-8). The station became the focal point of a community that took shape around a major slaughterhouse, stockyards, and the Boston and Albany Railroad yards.<sup>85</sup> While the Allston Railroad Station is no longer owned by MBTA, it is directly adjacent to the transit line and serves current commuters as a restaurant.<sup>86</sup> The Allston Railroad Station is a contributing resource within the Harvard Avenue Historic District, listed on the NRHP in 2000.

### 3.8.8 Walden Street Cattle Pass

The Walden Street Cattle Pass was constructed to serve the thriving nineteenth-century cattle market at Porter Square. The construction of the Fitchburg Railroad through the area in 1843 gave birth to the cattle market. The cattle trade remained an important element of the local economy into the early twentieth century. Essentially a brick tunnel (Figure 3-9), the cattle pass structure was constructed in association with the creation of Walden Street in 1857. Preventing traffic disruption from cattle crossing Walden Street, the tunnel provided for livestock unloaded from trains to be driven underneath Walden Street and into the stockyards. The Walden Street Cattle Pass structure is today covered from public view by the Walden Bridge.<sup>87</sup> While the significance of the cattle pass is related to railroad transportation in this corridor prior to transit service and the important cattle market in Porter Square, it remains in place and is located directly adjacent to the MBTA Fitchburg Line ROW in Cambridge.<sup>88</sup> It was listed on the NRHP in 1994.



**Figure 3-9.**  
**Walden Street Cattle Pass**

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<sup>85</sup> Wikipedia contributors, "Alston." Wikipedia, The Free Encyclopedia (accessed May 30, 2016), available: <https://en.wikipedia.org/wiki/Allston>.

\_Station\_(North\_Easton,\_Massachusetts).

<sup>86</sup> Historic Boston, Inc., "Commercial Casebook: Allston Village," (accessed November 11, 2016), available: <http://historicboston.org/wp-content/uploads/Casebook-Allston-Village.pdf>.

<sup>87</sup> Somerville Cambridge History, "Walden Street Cattle Pass" (accessed May 30, 2016), available: <https://sites.google.com/site/somervillecambridgehistory/walden-street-cattle-pass>.

<sup>88</sup> Landmark Hunter.com, "Walden Street Cattle Pass" (accessed November 11, 2016), available: <http://landmarkhunter.com/109156-walden-street-cattle-pass/>.



### 3.8.9 South Station



**Figure 3-10.**  
**South Station c. 1910**

The South Station is listed on the NRHP. South Station, the largest railroad station in metropolitan Boston and the second largest transportation center in New England, was constructed in 1899 in Dewey Square (Figure 3-10). Replacing multiple stations associated with different railroad companies, the station would also become a bus terminal during the twentieth century. The Neo-Classical Revival-style station was designed by architects Shepley, Rutan, and Coolidge of Boston and constructed by Norcross Brothers at a cost of \$3.6 million. By 1910, South Station had distinguished itself as the busiest

railroad station in the nation. The station was a stop on the Atlantic Avenue Elevated between 1901 and 1938. In 1913, it became the terminus of a route that today forms the Red Line. South Station included one of the world's largest train sheds, which suffered decades of corrosion as a consequence of its proximity to the ocean and was demolished in 1930. As a result of the decline of passenger railroad travel which resulted in closures of several Boston area railroads following World War II, the Boston Redevelopment Authority acquired the station in 1965. Although slated for demolition to make way for a new facility, South Station was listed on the National Register of Historic Places in 1975. The MBTA acquired South Station in 1978 and renovated the facility in 1989. It serves a high number of transit passengers daily.<sup>89</sup>

### 3.8.10 Tremont Street Subway



**Figure 3-11.**  
**Subway under Tremont Street, near Hollis Street, ca. 1898.**

The Tremont Street Subway is the oldest subway tunnel in North America and the third oldest worldwide to exclusively use electric traction (Figure 3-11). Opening in 1896, the system was designed to get streetcar lines off the surface streets, and it now forms the central part of the Green Line. The tunnel originally serviced five stations: Boylston, Park Street, Scollay Square, Adams Square, and Haymarket, and also had branches that extended to the Public Garden Portal and Pleasant Street Incline south of Boylston. Park, Scollay, and Haymarket stations were altered in the early twentieth century as transfers were added to

the Cambridge-Dorchester Subway, the East Boston Tunnel, and the Main Line Elevated (currently part of the Red, Blue, and Orange Lines). In 1962, the southern portal of the Tremont Street Tunnel at Pleasant Street was closed, and in 1963, the northern half of the tunnel was heavily altered when the Government Center and Boston City Hall stations were constructed, replacing Scollay and Adams Squares. The subway was listed on the National Register in 1966 and is a National Historic Landmark, known for its important

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<sup>89</sup> South Station Boston, "South Station Train Terminal: A Building with History" (Accessed May 31, 2016), available: <http://www.south-station.net/station-history/>; Wikipedia contributors, "South Station," Wikipedia, The Free Encyclopedia (accessed May 30, 2016), available: [https://en.wikipedia.org/wiki/South\\_Station](https://en.wikipedia.org/wiki/South_Station).

role in the development of the subway as a public transit system in the United States. The landmark designation includes still extant sections of the early tunnel, from Court Street to approximately Charles Street. The resource also includes the original Classical Revival headhouses of the Park and Boylston stations.

### 3.8.11 Dudley Station Historic District



**Figure 3-12.**  
**Dudley Square Station**

The Dudley Station Historic District is located on Washington, Warren, and Dudley streets in the Roxbury section of Boston, and was listed on the National Register in 1985 (Figure 3-12). The primary feature of the historic district is the Dudley Square MBTA station, a Beaux Arts/French Renaissance building designed by Alexander Wadsworth Longfellow and built by the Boston Elevated Railway (BERy), a predecessor to today's MBTA, in 1901. It is one of the best preserved BERy stations remaining.



**Figure 3-13.**  
**Egleston Substation ca. 1922**

### 3.8.12 Egleston Substation

The Egleston Substation is a historic electrical substation located at 3025 Washington Street in the Roxbury section of Boston and was listed on the National Register in 2010 (Figure 3-13). The brick Renaissance Revival building was constructed in 1909 by the BERy during the extension of the Washington Street Elevated to Forest Hills. The substantial building was designed by Robert S. Peabody of the firm of Peabody and Stearns and was used by the Boston Elevated to provide AC to DC conversion for streetcars and elevated trains until 1987 when it stopped being used for transit power purposes.

### 3.8.13 Roslindale Substation



**Figure 3-14.**  
**Roslindale Substation ca. 1920**

The Roslindale Substation is a historic electrical substation located at 4228 Washington Street in the center of Roslindale village in Boston (Figure 3-14). It was listed on the National Register in 2013. It is a brick Classical Revival building, constructed in 1911 by the BERy and designed by Robert S. Peabody. This building was also used by the BERy and its successors to provide AC to DC conversion for streetcars until 1971. It is one of four (of the original seven constructed) built by the BERy to survive.

## 4. Chicago-Localized Context

### 4.1 Introduction

As in other major American cities, public rail transit in Chicago evolved from a network of rail lines carrying horse-drawn cars in the mid-nineteenth century to a modern passenger rail system featuring electric cars, elevated lines, and subways. In the process, Chicago would become the first major American city to develop an automobile expressway that included a median subway line. In 2016, the city's Chicago Transit Authority (CTA) system included 1,888 buses that operate 130 routes and 1,492 rapid transit rail cars that provide 1.6 million rides on an average weekday.<sup>90</sup>

Chicago also demonstrates how a long-running transit system can become an important part of a city's identity. The downtown area commonly referred to "the loop" gets its origin, name, and demarcation from the Union Loop Elevated Structure.

### 4.2 Associated Historic Contexts

- Early Period: The Horsecar Era, 1852-1882
- Expansion: Chicago's Cable Cars and Elevated Passenger Rail Lines, 1883-1913
- Expansion/Depression Era: "L" Unification and Chicago Subway Development, 1911-1947
- Post World War II Period: The Chicago Transit Authority and Modernization, 1947-1973
- The Regional Management Era, 1974-present

### 4.3 Early Period: The Horsecar Era, 1852-1882

Chicago remained a "walking city" during the first decades of its existence. By the 1850s, however, population growth created increasing demand for public transportation in what would become the Midwest's leading industrial city. A variety of private transportation companies attempted to satisfy this demand over the next century. Providing a cheaper option than horse-drawn cabs, Chicago's first horse-drawn omnibuses, an enclosed vehicle designed to carry many passengers, began transporting people through the city in 1852, but were frequently paralyzed in Chicago's rain-drenched streets. Omnibuses gave way to horse-drawn railcars beginning in 1859. Although Chicago-area residents began traveling

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<sup>90</sup> CTA, "CTA Facts at a glance," Spring 2016, (accessed January 30, 2017), available: <http://www.transitchicago.com/about/facts.aspx>.

mainline railroads between the city and resort locations that evolved into the area's first suburbs, public transportation within the city was dominated by horse-drawn streetcar railways into the early 1880s.<sup>91</sup>

## **4.4 Expansion: Chicago's Cable Cars and Elevated Passenger Rail Lines, 1883-1913**

Mechanically-powered rail travel came to Chicago during the early 1880s, after several failed attempts to convert steam locomotives known as "steam dummies" to streetcar use. Following the lead of San Francisco, which introduced the cable car during the prior decade, Chicago got its first cable car service on the Chicago City Railway's State Street line between Madison and 21<sup>st</sup> Streets in January of 1882. Numerous other cable car lines were developed thereafter, and while other cities created electric rail systems, the cable car flourished in Chicago for a time. Transit mogul Charles Tyson Yerkes, who acquired the North Chicago City Railway in 1886 along with a syndicate of investors, quickly began to convert horse-car lines to cable lines across Chicago's North and West Sides. As cable car lines spread throughout the city, Chicago, like other growing industrial cities, experienced increased traffic congestion.<sup>92</sup>

In an effort to satisfy demand for speedier public transit amid growing congestion, Chicago transportation entrepreneurs successfully developed elevated railways along the lines of New York's pioneering elevated trains beginning in the early 1890s. Incorporated in 1888, the Chicago and South Side Rapid Transit Railroad Company opened the city's first elevated railway, the Southside "L," in 1892. Also known as the Alley "L," this 3.6-mile line was constructed through municipally controlled alleys rather than along streets in order to avoid the trouble of securing approval from street-front property owners, a necessity for development using city streets under Chicago municipal law. Another distinguishing feature of the Southside L was its use of steam locomotive engines to pull passenger cars rather than electrically-powered cars up until 1898. The company subsequently extended the line to the grounds of the World's Colombian Exposition of 1893. Within a little more than a decade, branch lines had been constructed to Englewood; Normal Park; the Stock Yards and Packingtown area; and Kenwood. A second elevated, the Lake Street "L," was completed a year after the South Side "L." It also ran steam locomotives at first. This line ran from what was then the west end of the city at today's Laramie Avenue to the edge of Chicago's central business district. Yerkes eventually acquired the line and added it to his growing transportation empire. Incorporated in 1892, and opening after the Lake Street "L," the Metropolitan West Side "L" was

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<sup>91</sup> Ibid.

<sup>92</sup> Greg Borzo, "Cable Car Remnants," Forgotten Chicago Website (accessed July 27, 2016), available: <http://forgottenchicago.com/features/cable-car-remnants/>; Chicago Transit Authority, The L System History—Historic Figures—Charles Tyson Yerkes (1837-1905) (accessed July 24, 2016), available: <http://www.chicago-l.org/figures/yerkes/>.

the first of Chicago's elevated railways to make use of electric traction. Also known as the Met or "Polly," this line ran west from a terminal at Franklin Street and split into several branches.<sup>93</sup>

Although Chicago had three elevated lines developed in a relatively short period of time, none of them accessed or provided service within the central business district. Yerkes led the effort to solve this problem. He used his political power to influence street-front property owners, created two new companies to develop elevated segments, and acquired additional rights-of-way through two existing "L" companies while coordinating development of Chicago's downtown Union Loop (known today simply as "the Loop"). Opening in stages from 1895 to 1897, the Loop quickened and increased circulation downtown while dramatically boosting overall ridership on all the existing "L" lines.<sup>94</sup>

One more elevated railway backed by Yerkes, the Northwestern "L," was developed in the latter 1890s by the Northwest Elevated Railroad Company. It commenced service in 1900. Beginning at a connection to the Loop, the line extended north to a terminal at Wilson Avenue. The company completed a branch line northwest to the growing Ravenswood neighborhood in 1908. At the same time, the company acquired right-of-way on the Chicago, Milwaukee & St. Paul Railway alignment and electrified the trackage to extend the main Northwestern "L" line as far north as the Chicago suburb of Evanston.<sup>95</sup> The "Forgotten Chicago" website provides useful information on remnants of the elevated railway system that have survived.<sup>96</sup>

## **4.5 Expansion/Depression Era: "L" Unification and Chicago Subway Development, 1911-1947**

Although Yerkes had sought to bring the city's multiple "L" companies together under a single management structure, it was Samuel Insull who ultimately led the successful effort to realize this goal. A corporate public utilities mogul, Insull worked with others to create the Chicago Elevated Railways Collateral Trust (CER) to coordinate management of the city's "L" companies in 1911. Improvements to the elevated railway system completed under the CER included new crosstown service on electric rail cars traveling multiple "L" lines, universal transfers between "L" lines, and a new interurban service from Chicago to Milwaukee using a connection from the Northwestern "L" to Insull's Chicago, North Shore, and Milwaukee line. In 1924, Insull went a step farther and consolidated Chicago's existing "L" companies under the new Chicago Rapid Transit Company (CRT). Chicago's "L" system continued to grow under CRT.

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<sup>93</sup> Chicago Transit Authority, The L System History—The Early Years (1888-1913) The Original L Lines (accessed July 24, 2016), available: <http://www.chicago-l.org/history/index.html>.

<sup>94</sup> Ibid.

<sup>95</sup> Ibid.

<sup>96</sup> Terence Bamich, Forgotten Chicago, "Remnants of the "L", (accessed July 24, 2016), available: <http://forgottenchicago.com/features/remnants-of-the-l/>.

The North Shore Line was extended to Niles Center (today's Skokie). Service would continue to Skokie until 1948 when buses replaced the line. In 1925, electric cars also began to travel beyond the "L" system using another of Insull's interurban lines that extended service beyond Westchester by 1930.<sup>97</sup>

Receiving federal New Deal grants and loans, Chicago began to develop subway lines to supplement "L" service during the second half of the 1930s. In 1938, construction began based on a plan for underground lines below State and Dearborn Streets. The two subway tunnels would not be constructed as part of a plan to replace the Loop, but rather, to reduce congestion by providing new transit lines to be integrated into the Loop system. It proved difficult to dig tunnels through the dense clay below the surface of Chicago. The State Street Tunnel was completed in 1943, and after construction delays resulting from World War II rationing, the Dearborn Tunnel opened in 1951.<sup>98</sup> Both the State Street Tunnel and Dearborn Tunnel are located on the present-day Blue Line.<sup>99</sup>

By the late 1930s and early 1940s, apart from the new subway tunnels under construction, Chicago had a rapidly aging rail-transit infrastructure. Most of the rail cars—"Big Pullmans," "Small Pullmans" and "Stave Bolts"—dated to the years 1905-1910, and the newest cars on the city's "L" lines were 20 years old. Some cars on the "L" dated to as early as the nineteenth century. The Great Depression and World War II hindered CRT's ability to maintain its aged rolling stock sufficiently.<sup>100</sup>

## **4.6 Post World War II Period: The Chicago Transit Authority and Modernization, 1947-1973**

With financial woes plaguing Chicago's urban rail transit system, the city opted for municipal ownership. In 1947, the Illinois General Assembly created the Chicago Transit Authority (CTA) to take over and operate Chicago's metropolitan transit system. The CTA would be overseen by the Chicago Transit Board that would consist of four board members appointed by the mayor and three members appointed by the governor, with the board selecting the individual to lead the agency's day-to-day management. CTA raised revenue bonds in the amount of \$105 million to purchase the Chicago Rapid Transit (the "L" system) and the Chicago Surface Lines system (the electric street car system that had evolved from the 1880s cable car system). The CTA immediately began closing underused stations and lines and replacing the closed lines with cheaper bus service. It also introduced "skip stop" trains and express trains to reduce overall travel

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<sup>97</sup> Chicago Transit Authority, *The L System History—Unification: Enter the CER, CRT and Subway (1913-1947)* (accessed July 24, 2016), available: <http://www.chicago-l.org/history/unification.html>.

<sup>98</sup> Ibid.

<sup>99</sup> Chicago-L.org, "Blue Line: Milwaukee-Dearborn Subway," (accessed November 11, 2016), available: [http://www.chicago-l.org/operations/lines/dearborn\\_subway.html](http://www.chicago-l.org/operations/lines/dearborn_subway.html).

<sup>100</sup> Ibid.

times on some lines. By 1960, the CTA had eliminated the entire streetcar system and reduced the rapid-transit rail system by 25 percent.<sup>101</sup>

The CTA also undertook to modernize the rail transit system. In 1950, the CTA introduced new all-metal PCC 6000-series rapid transit cars designed and built by the Pullman and St. Louis Car Company. These featured components that were interchangeable with the cars that had been purchased in 1947 for street lines, just before the agency began phasing out street lines, allowing for street car components to be used for transit car maintenance and repair. The completed subways included stations designed in the Moderne style with features such as fluorescent lights, reverse-direction escalators that improved safety, and block signals. The postwar growth in automobile travel strongly influenced transit planning. When Chicago prepared to create the first automobile expressway within the city limits, the Congress Expressway (later the Eisenhower Expressway), it also became the first city to incorporate a mass transit line within the median of an urban expressway. The project required demolition of the Garfield Park Branch “L” that was originally developed as part of the Metropolitan “L.” Completed in 1958, the Congress Line (or West Side Subway) connected to the Milwaukee-Dearborn-Congress Subway and formed the new West-Northwest Route. In 1964, CTA restored rail service to Skokie on an Insull interurban line that it acquired. This line became known as the Skokie Swift and its success demonstrated that a market remained for suburban passenger rail service. Additional expressway median lines, the Dan Ryan Line and the Milwaukee-Kennedy Extension, were developed during the years 1967-1970, both as entirely new transit routes rather than “L” replacement lines. The Dan Ryan brought Loop service to Chicago’s south side below 63<sup>rd</sup> Street for the first time. The new line incorporated nine stations designed by the firm of Skidmore, Owings & Merrill in the International style.<sup>102</sup>

## 4.7 The Regional Management Era, 1974-Present

The creation of the Regional Transit Authority (RTA) in 1974 occurred in response to several important changes that had taken place since Chicago opted for municipal ownership through the CTA. The census revealed that as of 1970 the population in Chicago’s suburbs exceeded the number of residents within the city for the first time. After construction of the Dan Ryan and Kennedy Extension Lines, CTA operating costs began to exceed fare revenues. Unlike the CTA, the RTA was empowered in the wake of Illinois’ 1970 Constitutional Convention to raise funds through taxation. The RTA would oversee CTA’s budget and have a measure of control over its planning. A majority of city residents voted in favor of RTA, but a majority of the region’s suburbanites opposed it.<sup>103</sup>

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<sup>101</sup> Chicago Transit Authority, The L System History—The CTA Takes Over: Resurrection through Modernization (1947-1970) (accessed July 24, 2016), available: <http://www.chicago-l.org/history/CTA2.html>.

<sup>102</sup> Ibid.; Chicago Transit Authority, Lines and Routes—Red Line: Dan Ryan Branch (accessed July 25, 2016), available: <http://www.chicago-l.org/operations/lines/danryan.html>.

<sup>103</sup> Chicago Transit Authority, Chicago Goes Regional: The RTA is Created (1974) (accessed July 25, 2016), available: <http://www.chicago-l.org/history/RTA.html>.

Unfortunately, even under the RTA, the CTA's operating costs, which stood at \$188.7 million in 1970, reached \$446.1 during the last year of that decade. When fares were doubled in 1981 to boost revenues, CTA ridership declined 9%. In a series of subsequent price hikes fares rose from \$0.80 in 1981 to \$1.25 in 1990, and ridership fell another 5% during that decade. Within this context, most of the CTA's planning focused on station closures and service cutbacks. Exceptions included development of the O'Hare Extension from the Kennedy Extension to O'Hare International Airport, which included four new stations when completed in 1984, and upgrades to the system's rolling stock. The CTA began to purchase Boeing-Vertol 2600-series cars during the early 1980s and eventually accumulated 600 of them.<sup>104</sup>

The CTA has continued to evolve with the aid of federal and state funds to supplement revenues. During the early 1990s, the CTA gave its main routes new color names that are retained today: the Red Line (Howard-Dan Ryan), the Blue Line (O'Hare Congress-Douglas), the Green Line (Lake-Englewood-Jackson Park, which incorporates portions of the original South Side and Lake Street "L" lines), the Brown Line (Ravenswood, which incorporates the original North Side Main Line and Ravenswood Branch), the Purple Line (Evanston, originally the Northwestern "L"), and the Yellow Line (Skokie Swift). Two lines have been developed since the color system's initial creation: the Orange Line from the Loop to Midway Airport through southwest Chicago, and the most recently developed route, the Pink Line from the Loop west to 54<sup>th</sup> Avenue in Cicero.<sup>105</sup>

## 4.8 Historic Properties

Based on an analysis of data obtained from the National Park Service, National Register Program,<sup>106</sup> at the time of publication there are two historic properties related to the Chicago transit system.

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<sup>104</sup> Chicago Transit Authority, *The CTA in the Auto Age: Subsidies and Lines Grow, Ridership Falls (1974-1990)* (accessed July 27, 2016), available: <http://www.chicago-l.org/history/CTA3.html>.

<sup>105</sup> *Ibid*; Chicago Transit Authority, *Lines and Routes* (accessed July 27, 2016), available: <http://www.chicago-l.org/operations/index.html#line>.

<sup>106</sup> National Park Service, *National Register of Historic Places: Research* (accessed March 17, 2016), available: <https://www.nps.gov/nr/research/>.



#### 4.8.1 Chicago Union Loop Elevated Structure



**Figure 4-1.**  
Chicago Union Loop Elevated Structure, HAER  
Recordation, ca. 1983.

The Chicago Union Loop Elevated Structure built in 1897, designed by John Alexander Low Waddell, and built by Charles T. Yerkes of the Union Consolidated Elevated Railway (Figure 4-1). The Loop is located on Wells Street, between Lake and Van Buren, Van Buren between Wells and Wabash, Wabash between Van Buren and Lake, and Lake between Wabash and Wells in Cook County, and was determined eligible by the Keeper of the National Register on July 23, 1978 (current eligibility unknown). The Loop does not appear to have been formally listed on the National Register. In 1983, it was also recorded in the Historic American Engineering Record (HAER) as IL-1, which notes that data was drawn from the National Register of Historic Places Determination of Eligibility file.<sup>107</sup>

#### 4.8.2 West Loop--LaSalle Street Historic District (Union Loop and Elevated Structure and Quincy Station)



**Figure 4-2.**  
Quincy Station, within the West Loop-LaSalle  
Street Historic District. ca. 1983.

The West Loop--LaSalle Street Historic District, roughly bounded by Wacker Drive, Wells Street, Van Buren Street and Clark Street, within the City of Chicago, was listed on the National Register on 06/01/2013, under two criteria:

- Criterion A, in the areas of significance of commerce and politics/government; and
- Criterion C, in the area of significance of architecture.

While this is a historic district containing 72 resources, many of which are commercial buildings, it does include the two contributing features that are related to transit: the Chicago Union Loop Elevated Structure (mentioned above) and the Quincy Station, both built in 1897 by the Union Consolidated Elevated Railroad.<sup>108</sup> In 2016,

<sup>107</sup> Library of Congress, Union Elevated Railway, Union Loop, Van Buren, Lake Streets... (accessed August 13, 2016), available: <http://www.loc.gov/pictures/item/il0389/>.

<sup>108</sup> City of Chicago, West Loop-La Salle Historic District National Register Nomination, (accessed August 13, 2016), available: [http://www.cityofchicago.org/content/dam/city/depts/zlup/Historic\\_Preservation/Publications/WestLoopLaSalleHD\\_NR\\_nom\\_WO\\_photos\\_and\\_map\\_FINAL.pdf](http://www.cityofchicago.org/content/dam/city/depts/zlup/Historic_Preservation/Publications/WestLoopLaSalleHD_NR_nom_WO_photos_and_map_FINAL.pdf).

the CTA proposed an \$18.2 million renovation to the Quincy Station, which serves the Brown, Orange, Pink and Purple lines.<sup>109</sup>

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<sup>109</sup> Chicago Transit Authority, “Quincy Station Improvements,” (accessed November 11, 2016), available: <http://www.transitchicago.com/quincy/>.

# 5. New Orleans-Localized Context

## 5.1 Introduction

New Orleans transit system is among the oldest presented in this report. The St. Charles Streetcar line was designated a National Historic Landmark in part because it has operated in some form since 1835. It is recognized as the oldest continuously operating streetcar line in the world and still uses streetcars that have been operated since 1923-1924.

New Orleans rail transportation system also played a part in our nation's history of racial segregation. The 1896 Supreme Court case *Plessy v. Ferguson* originated in New Orleans on its intercity rail, where Homer Plessy bought his train ticket in 1892 and was arrested for sitting in the "whites only" car. The court's decision upheld the State of Louisiana's Separate Car Act and legitimized segregation with the ruling of the "separate but equal," doctrine. Official segregation on public transit in New Orleans did not end until 1958.

## 5.2 Associated Historic Contexts

- Early Period: The Horsecar Era, 1835-1899
- Expansion: The Electric Streetcar Era, 1893-present
- New Orleans Regional Transit Authority (RTA), 1979-present

## 5.3 Early Period: The Horsecar Era, 1831-1899

- Pontchartrain Railroad Company, 1831-1861
- New Orleans and Carrollton Railroad Company, 1835-1893
- New Orleans City Railroad Company, 1860-1883
- New Orleans City and Lake Railroad, 1883-1892
- Magazine Street Railroad Company, 1866-1866
- Crescent City Railroad Company, 1866-1892
- St. Charles Street Railroad Company, 1866-1893
- Canal and Claiborne Streets Railroad Company, 1867-1899
- Orleans Railroad Company, 1868-ca. 1895

Rail service in the New Orleans area began in 1831 with the suburban Pontchartrain Railroad Company.<sup>110</sup> The Pontchartrain Railroad ran five miles between downtown New Orleans and the lakeside community of Milneburg, through miles of marsh and swamp. Service was initially provided by horsecars, but by 1832 a steam train (the “Pontchartrain”) enabled about three quarters of the rail service to be steam powered, while horsecars took care of the remaining trips. In 1835, city service began with the New Orleans and Carrollton Railroad’s three lines—two horsecar railroads ran on Poydras-Magazine Street and a line to the suburb of Lafayette. A third steam line connected the then-suburb of Carrollton running along what is now called St. Charles Avenue. Totalling five miles, these lines provided connections that would eventually cover the City of New Orleans (Carrollton was eventually incorporated into New Orleans in 1874) and would be the oldest continuously-running railroad in the United States. While the Poydras-Magazine line was discontinued in 1836, the Lafayette and Carrollton lines persevered and eventually came to be called the Jackson and St. Charles streetcar lines.<sup>111</sup>

By the late 1850s, the time for a comprehensive city-wide rail system had come. The only company at the time running streetcars was the New Orleans and Carrollton Railroad (most of these ran above Canal Street on horse power, after the company gave up steam due to complaints from both passengers and those who lived along the route). People who did not live near one of these four main railcar lines had to resort to horse drawn omnibuses that provided the bulk of transportation for the burgeoning population of New Orleans. Horses, pulling the large carriages over rough and muddy streets, were much slower than horse drawn railcars that glided easily over steel rails, making omnibus transportation less desirable. On June 15, 1860, the New Orleans City Railroad was created with its first line, the Rampart and Esplanade, opening almost exactly a year later, on June 1, 1861. The Magazine, Camp and Prytania, Canal, Rampart and Dauphine, Bayou Bridge, and City Park lines all followed, also opening in 1861.<sup>112</sup>

With the beginning of the Civil War, the creation of new lines slowed. New Orleans came under Federal (Union) control from 1862 until the end of the war, causing reductions in rail service and cuts to fares. After the war, new railroad companies and lines began to appear again. The Magazine Street Railroad Company was first, soon merging with the second railroad company to come to fruition after the war, the Crescent City Railroad Company, in 1866. The Cana and Claiborne Streets Railroad Company and the Orleans Railroad Company were created in 1867 and 1868, respectively. All railroads attempted to serve

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<sup>110</sup> Wikipedia Contributors, “Pontchartrain Railroad,” (accessed November 11, 2016), available: [https://en.wikipedia.org/wiki/Pontchartrain\\_Railroad](https://en.wikipedia.org/wiki/Pontchartrain_Railroad).

<sup>111</sup> Wikipedia Contributors, “Streetcars in New Orleans,” (accessed July 25, 2016), available: [https://en.wikipedia.org/wiki/Streetcars\\_in\\_New\\_Orleans](https://en.wikipedia.org/wiki/Streetcars_in_New_Orleans); Louis C. Hennick and Elbridge Harper Charlton, *The Streetcars of New Orleans* (Gretna, La.: Pelican Pub. Co., 2005), accessed via Google Books, July 25, 2016, 5-15; RTA, “RTA History,” (accessed July 26, 2016), available: <http://www.norta.com/About-the-RTA/RTA-History.aspx>.

<sup>112</sup> Louis C. Hennick and Elbridge Harper Charlton, *The Streetcars of New Orleans*; RTA, “RTA History”; Wikipedia Contributors, “Streetcars in New Orleans”.

different parts of the city and sometimes overlapped. The South Peters Line, established in 1890, was the last horse-powered line in New Orleans.<sup>113</sup>

### **5.3.1 Alternatives to Horse and Steam Power**

Horsecar and steam service often operated on the same lines, both having their advantages and disadvantages. Boiling hot steam engines gave off noise and sparks but provided consistent power. Horses needed upkeep including boarding and medical care, but were quieter and more pleasant for riders. Several alternatives were tried during different periods in the late nineteenth century, including an overhead cable car system, pneumatic propulsion, an “ammonia” system, and a thermo-specific system that used highly-heated water. None of these temporary solutions to the problems of steam and horsecar travel had an overall impact; steam and horses remained the favored methods for rail travel until the coming of electrification. By the 1860s, over thirty steam and horsecar lines operated by several different companies were pulling cars all around New Orleans and to its suburban and rural outposts. Alternative power sources to steam and horsepower, as described in the following sections, carried most of New Orleans rail service from the late-nineteenth century into the twentieth century, when electrification became standardized and was adopted across the city’s systems.<sup>114</sup>

The New Orleans City Railroad Company operated their West End line with “steam dummies” instead of horsecars. Steam dummies are small steam locomotives disguised by a streetcar body. The West End line eventually became part of the electrified streetcar grid.

#### **5.3.1.1 General Beauregard's Cable Car**

George T. Beauregard was famous for his role in Charleston, South Carolina, at beginning the Civil War, but after the Confederate states headed home in defeat, Beauregard returned to New Orleans to build an experimental cable car line. In approximately 1869, Beauregard attempted to build an overhead line that ran over steel track and was propelled by a cable above (Figure 5-1). The invention of this particular cable side grip would become standard on all cable cars.<sup>115</sup>

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<sup>113</sup> Louis C. Hennick and Elbridge Harper Charlton, *The Streetcars of New Orleans*.

<sup>114</sup> RTA, “RTA History”; Wikipedia Contributors, “Streetcars in New Orleans”.

<sup>115</sup> Joe Thompson, “General Beauregard’s Cable Car,” (accessed July 26, 2016), available: <http://www.cable-car-guy.com/html/ccno.html>.

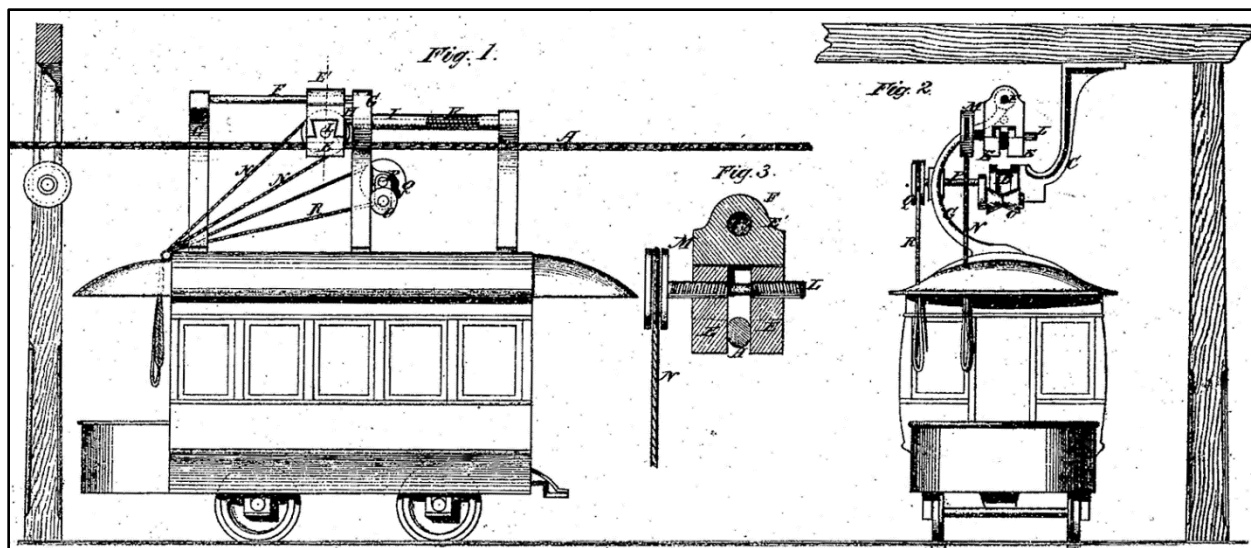


Figure 5-1.  
Improvement in Machinery for Propelling Cars and Boats  
US Patent 97343, November 30, 1869

### 5.3.1.2 The Lamm Fireless Engine

Invented by Emile Lamm to combat the soot of steam and the inconveniences of horsepower, Lamm's Fireless Engine used heated water in sealer boiler at a centralized location (such as a depot) piped into a tank attached to a locomotive for power. This enabled cars to travel approximately seven to eight miles, according to its inventor. The St. Charles Line used the engine in the 1870s and 1880s.<sup>116</sup>

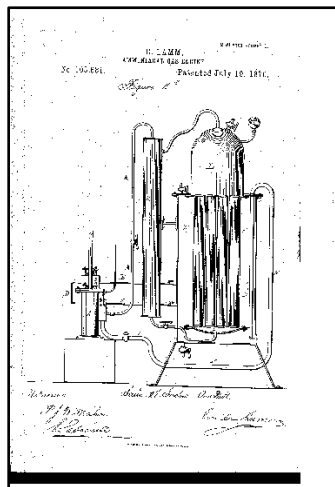


Figure 5-2.  
The Lamm Fireless Engine  
Patent Drawing, 1870

<sup>116</sup> Wikipedia Contributors, "Streetcars in New Orleans"; Wikipedia Contributors, "Emile Lamm," (accessed July 26, 2016), available: [https://en.wikipedia.org/wiki/Emile\\_Lamm](https://en.wikipedia.org/wiki/Emile_Lamm).

### 5.3.2 Horsecar Companies and Their Lines

New Orleans was serviced by a wide variety of horsecar companies in the mid to late nineteenth century (Figure 5-3), listed below.<sup>117</sup>

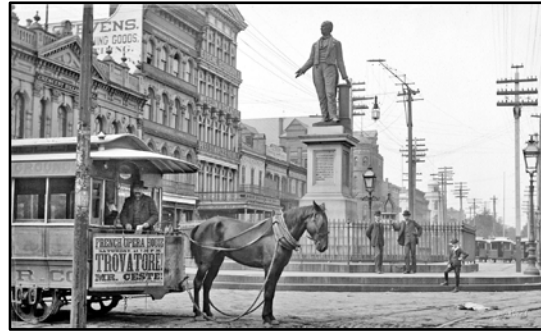


Figure 5-3.  
New Orleans circa 1890. "The Clay Mounument, Canal Street." Photo by William Henry Jackson

#### 5.3.2.1 *New Orleans and Carrollton Railroad Company, 1831-1900s* (Figure 5-4)

- Poydras-Magazine
- Carrollton
- Nayades
- Jackson Avenue (Lafayette)
- La Course
- Louisiana
- Napoleon

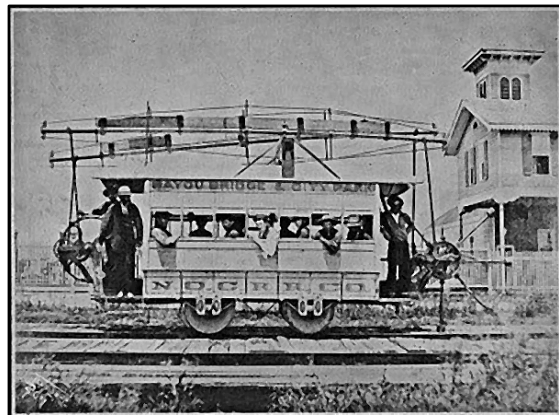


Figure 5-4.  
New Orleans and Carrollton Railroad Company Walking Beam Car, New Orleans Public Library

#### 5.3.2.2 *New Orleans City Railroad Company, 1861-1883*

- Rampart and Esplanade
- Magazine, Camp, and Prytania
- Canal, Rampart, and Dauphine
- Bayou Bridge and City Park
- Barracks and Slaughter House
- French Market

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<sup>117</sup> Wikipedia Contributors, "Streetcars in New Orleans".

- Levee and Barracks
- West End (steam dummy line)

#### **5.3.2.3 *Crescent City Railroad Company, 1866-1892***

- Annunciation
- Coliseum
- South Peters
- Tchoupitoulas

#### **5.3.2.4 *St. Charles Street Railroad Company, 1866-1893***

- Clio
- Carondelet
- Dryades

#### **5.3.2.5 *Canal and Claiborne Streets Railroad Company, 1867-1899***

- Claiborne (North)
- Tulane
- Girod and Poydras

#### **5.3.2.6 *Orleans Railroad Company, 1868-ca. 1902***

- Bayou St. John
- Broad
- City Park
- French Market

## **5.4 Expansion: The Electric Streetcar Era, 1893-Present**

Companies using electrical power began to emerge and operate streetcar lines in New Orleans in the late nineteenth century, as follows.

- |   |           |
|---|-----------|
| • New Orleans and Carrollton Railroad Company | 1893-1902 |
| • New Orleans City Railroad Company           | 1860-1883 |
| ○ New Orleans City and Lake Railroad          | 1883-1892 |
| ○ New Orleans Traction Company                | 1892-1899 |



○ New Orleans City Railroad	1899-1902
• Magazine Street Railroad Company	1866-1866
• Crescent City Railroad Company	1866-1892
○ New Orleans Traction Company	1892-1902
• St. Charles Street Railroad Company	1866-1904
• Canal and Claiborne Streets Railroad Company	1867-1899 (absorbed by the NO&Cry)
• New Orleans and Carrollton Railroad Company	1899-1902
• Orleans Railroad Company	1868-1902
• World's Fair Railway	1884-1885
• New Orleans Railways Company	1902-1905
○ New Orleans Railway and Light Company	1905-1922
○ New Orleans Public Service Incorporated	1922-1922
• New Orleans Regional Transit Authority (RTA)	1983-present (1 <sup>st</sup> public ownership)

#### 5.4.1 Electrification of the City's Horsecar Lines

Electrification came to New Orleans with the approval by the city council to convert the many overhead cable streetcar lines to electric power in 1891. In 1893, the Carrollton line was the first to be fully electrified. Over the next few years, practically all streetcar lines of the remaining five railroads were electrified as follows:<sup>118</sup>

- New Orleans Traction Company, 1892-1899;
- New Orleans City Railroad, 1899-1902;
- New Orleans Railways Company, 1902-1905;
- New Orleans Railway and Light Company, 1905-1922; and
- New Orleans Public Service Incorporated, 1922-1983.

#### 5.4.2 Ford Bacon & Davis Engineers

The men responsible for the first push towards electrification of the city's streetcars were Frank R. Ford and George W. Bacon, when they were called to New Orleans in 1894 by the St. Charles Street Railway. While the St. Charles Street Railroad Company eschewed their work, the Orleans Railroad, the Canal and Claiborne Railroad, and the New Orleans and Carrollton lines all electrified their streetcars with Ford and

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<sup>118</sup> Wikipedia Contributors, "Streetcars in New Orleans"; Louis C. Hennick and Elbridge Harper Charlton, *The Streetcars of New Orleans*.

Bacon. In 1895, given their heavy workload, they added George H. Davis to their partnership, becoming Ford, Bacon & Davis (Figure 5-5). The improvements made by the firm included cars with wide clerestory roofs, cross seating, and steel construction.<sup>119</sup>



**Figure 5-5.**  
**Ford Bacon & Davis Designed Rail Grinder Car #29,**  
**August 1955. Photo by Charles Howard**

### **5.4.3 New Orleans Public Service Incorporated**

The amalgamation of the six electrified railroad companies began in the 1890s, with various firms absorbing each other and rejoining into new collective groups. For instance, the Canal and Claiborne line merged with the New Orleans and Carrollton in 1899. Eventually, these consolidations culminated in the formation of the

New Orleans Public Service Incorporated( NOPSI) in 1922 (Figure 5-6). Consolidation simplified rail travel within New Orleans, particularly on the popular Canal Street. The reorganization led to the creation of the Freret, Desire, Gentilly, and St. Claude lines.<sup>120</sup>

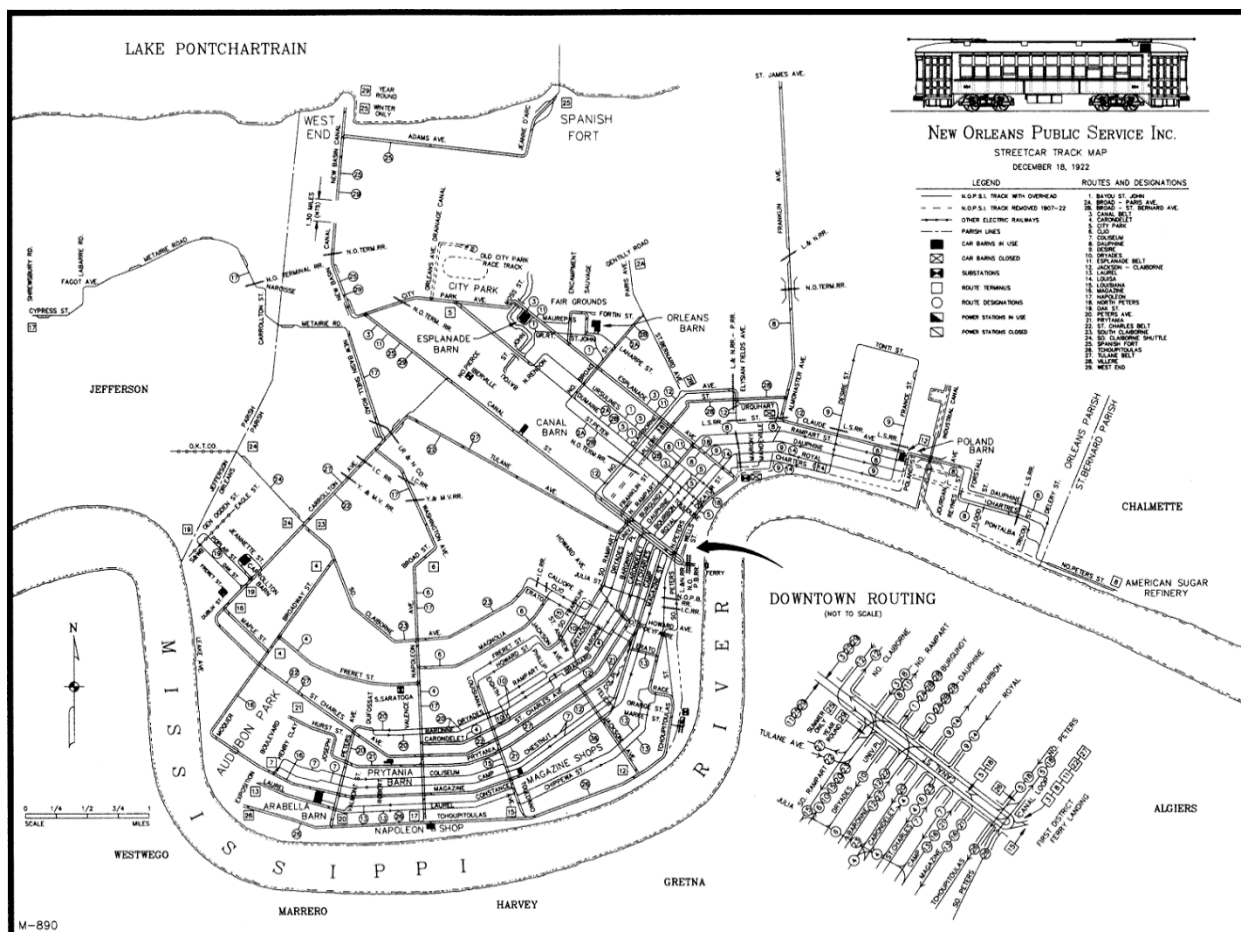
The Public Utility Holding Company Act (PUHCA) of 1935 broke up the monopoly that held 73 percent of America's investor-owned electric utilities, including NOPSI. By special request of New Orleans officials, NOPSI was allowed to keep its gas and transit operations in the city.<sup>121</sup>

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<sup>119</sup> H. George Friedman, "New Orleans Car 29," (accessed July 26, 2016), available: <http://friedman.cs.illinois.edu/car29/Car29.htm>.

<sup>120</sup> Wikipedia Contributors, "Streetcars in New Orleans"; Louis C. Hennick and Elbridge Harper Charlton, *The Streetcars of New Orleans*; Paul Marston, "New Orleans and Carrollton Railroad," (accessed July 26, 2016), available: [http://www.olderailhistory.com/index.php?option=com\\_content&task=view&id=244&Itemid=279](http://www.olderailhistory.com/index.php?option=com_content&task=view&id=244&Itemid=279).

<sup>121</sup> Entergy Newsroom, "Company History," (accessed July 26, 2016), available: <http://www.entergynewsroom.com/history/>.



#### 5.4.4 “Po’ Boy” Sandwiches

During these consolidations in the early twentieth century, recurring labor strikes and union issues plagued railroads throughout New Orleans (Figure 5-7). The Poor Boy sandwich, known as a po’ boy (a white bread sandwich normally encasing fried seafood) was invented by Bennie and Clovis Martin at their coffee shop in 1929 to serve to hungry strikers during a particularly violent July strike.<sup>122</sup>

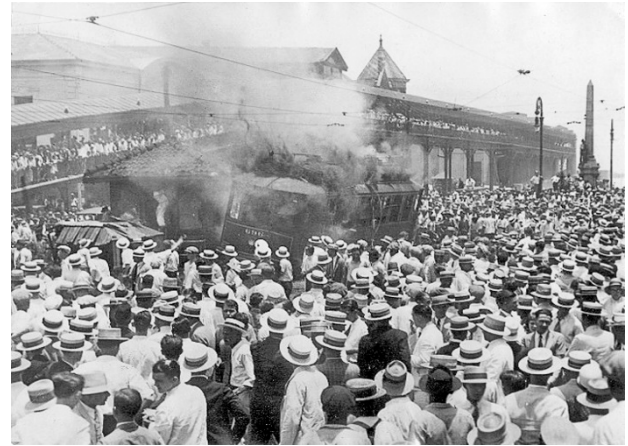


Figure 5-7.  
“Palace” Car 696 eventually made its way to the foot of Canal Street, where it was engulfed by rioters in 1929.

#### 5.4.5 From Streetcar to Bus

Buses began to be used in New Orleans transit in 1924. Several streetcar lines were the first to be converted to bus operation between 1924 and 1939. After 1945 and the end of war rationing, a larger number of the remaining streetcar lines were replaced by buses, which were considered more economical and practical.

In 1950, only four streetcar lines remained in New Orleans. Shortly thereafter, three of the four were also replaced by motor buses. The South Claiborne and Napoleon lines were closed in 1953 and the Canal Street line was converted in 1964. After public outcry and citizen intervention, the St. Charles line was listed on the National Register of Historic Places in 1973 and remains a functional streetcar in downtown New Orleans.<sup>123</sup>

#### 5.4.6 Segregation

Racial segregation on the New Orleans streetcars and in rail service throughout the south has a long, grim history, in which New Orleans played a major part. The 1896 Supreme Court case *Plessy v. Ferguson* originated in New Orleans on its intercity rail where Homer Plessy bought his train ticket in 1892. The court’s decision upheld “separate but equal.” Official segregation on public transit in New Orleans did not end until in 1958.<sup>124</sup>

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<sup>122</sup> Po’ Boy Fest, “History of the New Orleans Po-Boy,” (accessed July 26, 2016), available: [http://www.poboyfest.com/files/History\\_of\\_the\\_Po-Boy\\_web.pdf](http://www.poboyfest.com/files/History_of_the_Po-Boy_web.pdf).

<sup>123</sup> Wikipedia Contributors, “Streetcars in New Orleans”.

<sup>124</sup> Wikipedia Contributors, “Plessy v. Ferguson,” (accessed July 26, 2016), available: [https://en.wikipedia.org/wiki/Plessy\\_v.\\_Ferguson](https://en.wikipedia.org/wiki/Plessy_v._Ferguson); Wikipedia Contributors, “Streetcars in New Orleans”.

## 5.5 New Orleans Regional Transit Authority (RTA), 1979-present

In 1979, the Louisiana legislature voted to create the New Orleans Regional Transit Authority (RTA) and in 1983 the RTA became the sole owner and operator of the New Orleans transit system. Under the RTA, the St. Charles line went under rehabilitation and remained in operation; the RTA also restored a fleet of streetcars that were built in 1922.<sup>125</sup>

In 1988, the Riverfront line was created, utilizing out-of-service track along the Mississippi River levee. The Riverfront line was the first newly built streetcar line in New Orleans since 1926. Rail fans in New Orleans organized the moving of four ex-New Orleans streetcars that had been housed at trolley museums to service the line. In order to meet ADA requirements, RTA purchased additional Australian cars that were large enough to enable ADA access to service the same line.<sup>126</sup> In 2004, the Canal Street line was created.<sup>127</sup>

Hurricane Katrina changed the face of New Orleans on August 29, 2005. After the levee failure, flooding submerged thirty streetcars, leaving them completely destroyed. The St. Charles' line's infrastructure was severely damaged, and service was suspended on the Canal or Riverfront lines until the end of 2005. RTA used several historic St. Charles line streetcars on the Canal Street and Riverfront lines until 2009 when enough modern cars were repaired to operate on the lines.<sup>128</sup>

## 5.6 Historic Properties

Based on an analysis of data obtained from the National Park Service's National Register Program,<sup>129</sup> there are three previously designated historic properties related to the New Orleans transit system, two of which are still extant, as follows.

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<sup>125</sup> H. George Friedman Jr., "New Orleans Riverfront Streetcar Line," (accessed July 26, 2016), available: <http://friedman.cs.illinois.edu/riverfront/Riverfront.htm>; Wikipedia Contributors, "Streetcars in New Orleans".

<sup>126</sup> H. George Friedman Jr., "New Orleans Riverfront Streetcar Line".

<sup>127</sup> Wikipedia contributors, "New Orleans Streetcars," (accessed November 11, 2015), available: [https://en.wikipedia.org/wiki/Streetcars\\_in\\_New\\_Orleans](https://en.wikipedia.org/wiki/Streetcars_in_New_Orleans).

<sup>128</sup> Wikipedia contributors, "New Orleans Streetcars," (accessed November 11, 2015), available: [https://en.wikipedia.org/wiki/Streetcars\\_in\\_New\\_Orleans](https://en.wikipedia.org/wiki/Streetcars_in_New_Orleans).

<sup>129</sup> National Park Service, National Register of Historic Places: Research (accessed March 17, 2016), available: <https://www.nps.gov/nr/research/>.

### **5.6.1 St. Charles Streetcar**

The St. Charles Streetcar line was listed on the National Register of Historic Places on May 23, 1973, under Criterion A, in the area of significance of transportation, with a period of significance of 1835.

The St. Charles Streetcar line was further designated by the Secretary of the Interior as a National Historic Landmark on September 30, 2014. Notwithstanding a period of nonoperation because of damage by Hurricane Katrina in 2005, the St. Charles Streetcar is recognized as the oldest continuously operating streetcar line in the world, operating within its original system since 1835. The line is further considered important for the continuing use of its 35 Perley Thomas streetcars, which represent a technological advance and have been operating since 1923-1924.

### **5.6.2 Canal Station**

The no longer extant Canal Station, 2819 Canal Street, originally constructed in 1861 as a car barn complex, was listed on the National Register on February 4, 1993, and was found eligible under two criteria:

- Criterion A, engineering area of significance, period of significance 1861; and
- Criterion C, transportation area of significance, periods of significance 1876 and 1887.

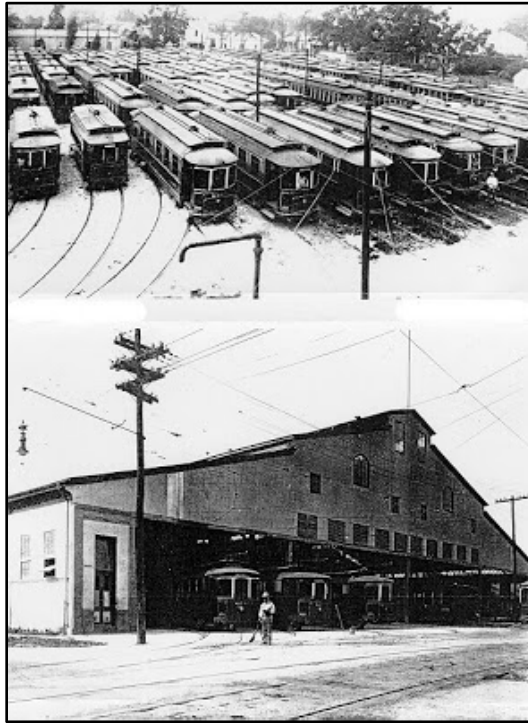
The Canal Station was demolished in 1992 for a transit storage and administration facility and removed from the National Register on March 31, 2015.<sup>130 131</sup>

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<sup>130</sup> Historic Structures, "Canal Street Transit Station, New Orleans Louisiana," August 18, 2016 (accessed November 11, 2016), available: [http://www.historic-structures.com/la/new\\_orleans/canal\\_train\\_station.php](http://www.historic-structures.com/la/new_orleans/canal_train_station.php).

<sup>131</sup> Edson Beall, NPS, "Weekly List of Actions taken on properties 3/30/15 through 4/05/15," (accessed November 11, 2016), available: <https://www.nps.gov/nr/listings/20150410.htm>.

### 5.6.3 Arabella Station Car barn



**Figure 5-8.**  
**Arabella Station Car barn, Early 20<sup>th</sup> Century.**

The Arabella Station Car barn was listed on the National Register in 1996 under Criterion A in the area of significance of transportation as a rare example of a resource associated with streetcar light rail transit (Figure 5-8). The massive steel structure, designed by Linus W. Brown (city engineer), was built between 1893 and 1894. Built for the New Orleans Traction Company, the large building is a steel frame structure with brick side walls, and occupies almost a full city block bounded by Arabella, Magazine, Joseph and Constance streets. The most prominent feature of the car barn is its massive roof with two levels forming a double clerestory. The company, which had purchased the Crescent City Railroad and the New Orleans City and Lake Railroad, both streetcar companies, moved forward with plans to convert both to electric trolley operations. The company also planned to erect six steel framed car barns, each covering a full city block, but only one was actually constructed, the Arabella Station car barn. The building was one of the three largest barns of the New Orleans system serving most of the streetcar lines west of Canal Street until they were replaced by buses after World War II. Arabella Station<sup>132</sup> is now a Whole Foods store with a bus stop on Magazine St (outside the Whole Foods entrance).

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<sup>132</sup>Louisiana Office of Cultural Development, Division of Historic Preservation, National Register of Historic Places Database, (accessed March 23, 2017), available: <http://www.crt.state.la.us/dataprojects/hp/nhl/view.asp>.

# 6. New York City-Localized Context

## 6.1 Introduction

The New York City-Localized context described in this section summarizes information contained in *The Historic Resources of the New York City Subway System National Register of Historic Places Multiple Property Documentation Form*<sup>133</sup> (MPDF, Attachment A). The MPDF documents the rail infrastructure development in New York City and informs the nationwide historic rail infrastructure context. The MDPF was prepared in 2004 by the New York State Office of Parks, Recreation & Historic Preservation.

Other than New York City, none of the other major metropolitan areas have a completed historic property evaluation for their respective transit system.

## 6.2 Associated Historic Contexts

The Historic Contexts section of the MPDF identifies and describes the periods of development associated with the New York City Subway System's growth over time, transportation agencies associated with the system's development, technological developments, design features, and notable engineers and architects associated with the system. The following subsections describe the relationship between the local context documented in the MPDF and the context periods identified in Section 2 of this report. The contextual periods identified for this localized context generally match those in the national context identified in this report.

### 6.2.1 Early Modes of Public Transit before 1900

The early modes of public transit before 1900 correlate with the Early Period (19<sup>th</sup> Century-Early 20<sup>th</sup> Century) in the nationwide context. As described in the MPDF on page E-2 of Attachment A, "The early period covers the construction of the elevated lines, some of which still exist, notably sections of the Broadway/Jamaica line. It also saw the origins of several steam railroads built to serve seaside resorts that were later rebuilt and incorporated into the rapid transit system."

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<sup>133</sup> Howe, Kathy, New York State Office of Parks, Recreation & Historic Preservation. *The Historic Resources of the New York City Subway System*. National Register of Historic Places Multiple Property Documentation Form, April 12, 2004.



### **6.2.2 Development of the Original Interborough Rapid Transit Subway, 1900-1908**

The original Interborough Rapid Transit (IRT) subway development occurred between 1900 and 1908. As described in the MPDF on page E-2 of Attachment A, “This period covers the construction of the original subway. Groundbreaking took place in 1900, and the initial segments opened in 1904. The original IRT subway (Contracts 1 and 2) was completed in 1908.” As described in the MPDF on page E-12 of Attachment A, “The line followed a Z-shaped route from City Hall, up Lafayette Street and Fourth Avenue to Grand Central, and then continued across 42<sup>nd</sup> Street and up Broadway, eventually extended to 242<sup>nd</sup> Street in the west Bronx. A branch at 96<sup>th</sup> Street ran to Bronx Park via Lenox Avenue, 149<sup>th</sup> Street and Westchester Avenue....” The original IRT line follows approximately the present day #4-5-6 line from City Hall to 42<sup>nd</sup> Street, the westerly shuttle line to Grand Central Terminal and Times Square, then north along the present day #1-2-3 lines to 145<sup>th</sup> Street and Broadway.<sup>134</sup>

### **6.2.3 Development of the Dual Contracts (IRT and Brooklyn Manhattan Transit Corporation), 1909-1931**

The development of Dual Contracts occurred during the Expansion (1910s - ca. 1930) contextual period in the nationwide context. As described in the MPDF on page E-2 of Attachment A, “This was a period of vast expansion known as the Dual Contracts or Dual System of Rapid Transit. Although the Dual Contracts were signed in 1913, planning for the system began as soon as the first IRT subway opened, and construction was started before 1912 on three new subway lines. The last of the Dual System lines were opened in 1931.” According to [nycsubway.org](http://nycsubway.org), both entities operated new lines to Flushing and Astoria. The IRT lines include the current 7<sup>th</sup> Avenue Line south from Times Square, the Lexington Avenue Line north from Grand Central, the Jerome, White Plains, and Pelham Bay Park Lines in the Bronx, and the Brooklyn lines beyond Atlantic Avenue. The Brooklyn Manhattan Transit Corporation (BMT) operated what are now the Broadway Line and Nassau Street Line, the 14<sup>th</sup> Street Eastern District Line, and the Fourth Avenue, West End, and Culver Lines in Brooklyn.<sup>135</sup>

### **6.2.4 Development of the Independent System, 1932-1941**

This period, as described in the MPDF on page E-2 of Attachment A, covers the development of the basic Independent Subway System (IND) and correlates with the Depression Era (1929 to 1941) contextual period in the nationwide context. The first line, the Eighth Avenue subway, opened in 1932. The opening of the last trunk line in 1940, the Sixth Avenue subway, essentially completed the basic IND [Independent] system. Unification (acquisition of the IRT and the BMT) by the City also occurred in 1940, after which several elevated lines were demolished and the system actually reduced in size. In 1941, the now defunct

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<sup>134</sup> [Nycsubway.org](http://nycsubway.org), “Subway FAQ: Which Lines Were Former IRT, IND, BMT,” (accessed November 23, 2016), available: [www.nycsubway.org/wiki/Subway\\_FAQ:\\_Which\\_Lines\\_Were\\_Former\\_IRT,\\_IND,\\_BMT](http://www.nycsubway.org/wiki/Subway_FAQ:_Which_Lines_Were_Former_IRT,_IND,_BMT).

<sup>135</sup> Ibid.

NY Westchester & Boston Railway (opened in 1912), was added to the subway system as the Dyre Avenue line, and continues to operate in that capacity to the present time.

### **6.2.5 Post Unification, 1942-present**

The Post Unification Period, 1942 to the present correlates with World War II and later contextual periods in the nationwide context. As described in the MPDF on pages E-2 and E-3 of Attachment A, “The post-unification period saw the completion of some delayed extensions to the IND system, the construction of several connections between lines, the addition of the Rockaway Line, and the implementation of some sections of the Metropolitan Transportation Authority’s (MTA) 1968 ‘grand design’ program – the 63<sup>rd</sup> Street and Archer Avenue lines. One of the major recent achievements was the reopening of the 1/9 subway line between Liberty and Barclay Streets one year after the World Trade Center attacks. MTA New York City Transit has also undertaken many station rehabilitation projects in this period as the subway system approaches its 100<sup>th</sup> year.”

## **6.3 Associated Property Types**

The Associated Property Types section of the MPDF summarizes the National Register of Historic Places criteria, evaluation parameters for the MPDF, and describes seven property types identified as components of the New York City Subway System.

- National Register Criteria for Evaluation: the MPDF quotes these directly from the NRHP.
- New York City Subway Evaluation Parameters: While these parameters are written to apply directly to the New York City Subway System, they are also relevant for identifying eligible rail system properties in other geographies. Historic themes that could support identification of eligibility under Criterion A include broad patterns of historical development in transportation history, community planning and development, and/or social history. In support of evaluating eligibility under Criterion C, this section of the MPDF also emphasizes consideration of properties that are examples of unique or typical technology (civil engineering, electrical/mechanical engineering, and/or construction technology); work by notable architects, engineers and craftsmen; rare or typical architectural subway plan design; and/or unique or typical architectural design.
- The Associated Property Types: Section F of the MDPF (Attachment A), identifies and describes seven property types as components that could contribute to conveying the historic significance of the New York City Subway System. These property types are relevant to other local, regional, and national rail systems. They include stations, substations, tunnels, signal towers, shops, yards, rolling stock, and other types. In general, the property type summaries identify periods of construction, and describe function, typical architectural styles and design details, and typical alterations. Notable variations among the property type descriptions include:
  - Stations: This section identifies the three primary station sub-types within the New York City Subway System and notes challenges associated with the station property type, such as the physical complexity and frequency of alteration.

- Substations: The description of the substation property type notes the importance of these structures for their visual presence on the streetscape (only above-ground substations were surveyed) and pays particular attention to describing technological evolution associated with these structures.
- Tunnels: The tunnel description is unique for its focus on methods of construction.
- Signal Towers: This section describes function but does little to inform regarding typical features. The notable challenge for this property type is abandonment due to obsolescence.
- Shops and Yards: This description notes the two types are combined because “shops are located in and are an integral part of, the yards.” This section also features greater detail in terms of describing specific NYC rail yards.
- Rolling Stock: This type was out of the scope of the MPDF, but the description notes further exploration is merited.
- Other Resources: Additional property types beyond the scope of the MPDF included fan chambers, compressor rooms, emergency exits, pump rooms, bridges, surface locations, and miscellaneous transit buildings. These were not described in detail.

## 6.4 Registration Thresholds

In addition to the description provided with each property type, Section F of the MPDF (Attachment A) offers Registration Requirement guidance for each type. These thresholds may be applicable for evaluating NRHP eligibility for rail properties beyond the scope of the MPDF. In general, for all property types, this guidance notes properties that meet requirements for listing under Criterion C for architectural and/or engineering design may also meet Criterion A under the broad historic trends of transportation history, community planning and development, and social history. Other notable thresholds include:

- Retention of plans and spatial configuration is particularly important for conveying significance for stations;
- Retention of original equipment is not necessary for substations and signal towers to convey architectural significance under Criterion C, but there is historic engineering significance under Criterion C in cases where equipment does remain intact; and
- The tunnel property type is infrequently eligible under Criterion C for architectural design, but tunnels are more often eligible under Criterion C for engineering design.

## 6.5 Identification and Evaluation Methods

Section H of the MPDF (Attachment A) outlines the process employed in the development of the MPDF. This process included: Phase I Reconnaissance Level Survey (identification of historic context, property types, and specific properties that merit intensive study); Phase II Intensive Level Survey (design of an inventory form specific to collecting data relevant to this study and identification of repositories accessed

for research); and Phase 3: MPDF and National Register Nominations (preparation of the MPDF and National Register nomination forms for eligible properties).

## 6.6 Supplemental Materials

Supplemental Materials included in the MPDF offer relevant examples of bibliographic references and attachments that could be included to support efforts associated with national context development.

- Bibliographic references (Section I of the MPDF, see Attachment A): While the majority of resources are specifically relevant to the New York Subway System, some of these materials may be directly relevant for development of a national context and general review of these materials may spur inspiration for the types of resources that should be referenced for other local, regional, or national efforts, particularly in terms of the types of individuals identified in the “Personal Communications” section.
- Attachments: Inclusion of a population summary (Appendix A of the MPDF, Attachment A) supports the role of transit in facilitating growth. Transit history chronologies and capsule histories offer brief summaries of historic context. Inclusion of maps illustrates the evolution of rail system line development.

## 6.7 Historic Properties

The process of developing the MPDF resulted in the creation of National Register of Historic Places nomination forms for 64 properties within the New York City Subway System. Prior to development of the MPDF, at least seven transit-related properties had already been listed on the National Register (see Attachment A, MPDF Section number H, page 5.) as follows:

- New York, Westchester and Boston Railroad Administration Building (180<sup>th</sup> Street IRT Station), Bronx;
- Mott Avenue Control House (IRT), Bronx;
- Atlantic Avenue Control House (IRT), Brooklyn;
- Battery Park Control House (IRT), Manhattan;
- 72<sup>nd</sup> Street Control House (IRT), Manhattan;
- IRT Broadway Line Viaduct (Manhattan Valley Viaduct), Manhattan; and
- Grand Central Station (IRT; part of Grand Central Terminal), Manhattan. Grand Central Terminal was also designated an NHL on December 8, 1976.

In addition, several NYCT properties are noted as contributing buildings to National Register listed historic districts, including:

- The Willow Place Fan Chamber (formerly a rowhouse) on Joralemon Street in the Brooklyn Heights Historic District;

- The IND Substation on Essex Street in the Lower East Side, Manhattan;
- The entrance pavilion to the York Street subway station in DUMBO, Brooklyn; and
- The substation on West 13<sup>th</sup> Street in Greenwich Village, Manhattan.

Subsequent to the issuance of the final MPDF on April 12, 2004, an analysis of the National Register Information System Database downloaded from the National Park Service website on March 17, 2016,<sup>136</sup> indicated the following 61 other New York Subway System properties have been listed on the National Register:

- 4<sup>th</sup> Avenue Station (IND), listed on July 6, 2005;
- 9<sup>th</sup> Avenue Station (Dual System BRT), listed on July 6, 2005;
- 14<sup>th</sup> Street-Union Square Subway Station (IRT; Dual System B), listed July 6, 2005;
- 15<sup>th</sup> Street/Prospect Park W and SW, listed on July 27, 2005;
- 28<sup>th</sup> Street Subway Station (IRT), listed on March 30, 2005;
- 33<sup>rd</sup> Street Subway Station (IRT), listed on September 17, 2004;
- 45<sup>th</sup> Road-Court House Square Station (Dual System IRT), listed on March 30, 2005;
- 59<sup>th</sup> Street-Columbus Circle Subway Station, listed on September 17, 2004;
- 72<sup>nd</sup> Street Subway Station (IRT), listed on September 17, 2004;
- 79<sup>th</sup> Street Subway Station (IRT), listed on September 17, 2004;
- 86<sup>th</sup> Street Subway Station (Dual System IRT), listed on March 30, 2005;
- 110<sup>th</sup> Street-Cathedral Parkway Subway Station (IRT), listed on September 17, 2004;
- 116<sup>th</sup> Street-Columbia University Subway Station (IRT), listed on September 17, 2004;
- 145<sup>th</sup> Street Subway Station (IRT), listed on March 30, 2005;
- 168<sup>th</sup> Street Subway Station (IRT), listed on March 30, 2005;
- 181<sup>st</sup> Street Subway Station (IND), listed on March 30, 2005;
- 181<sup>st</sup> Street Subway Station (IRT), listed on March 30, 2005;
- 190<sup>th</sup> Street Subway Station (IND), listed on March 30, 2005;
- 207<sup>th</sup> Street Yard-Signal Service Building and Tower B, listed on February 9, 2006;
- 242nd Street-Van Cortlandt Park Station (IRT), listed on March 30, 2005;
- Astor Place Subway Station (IRT), listed on September 17, 2004;
- Atlantic Avenue Subway Station (IRT and BMT), listed on September 17, 2004;

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<sup>136</sup> National Park Service, National Register of Historic Places: Research (accessed March 17, 2016), available: <https://www.nps.gov/nr/research/>.

- Avenue U Station (Dual System BRT), listed on July 6, 2005;
- Bay Parkway Station (Dual System BRT), listed on July 6, 2005;
- Beverly Road Subway Station (BRT pre-Dual System), listed on September 17, 2004;
- Bleecker Street Subway Station (IRT), listed on September 17, 2004;
- Borough Hall Subway Station (IRT), listed on September 17, 2004;
- Brooklyn Bridge-City Hall Subway Station (IRT), listed on July 6, 2005;
- Central IND Substation, listed on February 9, 2006;
- Chambers Street Subway Station (Dual System BMT), beneath the Municipal Building, listed on July 6, 2005;
- Chamber Street Subway Station (IRT), under West Broadway, listed on March 30, 2005;
- City Hall Subway Station (IRT), listed on September 17, 2004;
- Concourse Yard Entry Buildings, listed on February 9, 2006;
- Concourse Yard Substation, listed on February 9, 2006;
- Coney Island Electric Motor Repair Shop, listed on February 9, 2006;
- Coney Island Yard Gatehouse, listed on February 9, 2006;
- Dyckman Street Subway Station (IRT), listed on September 17, 2004;
- Elmhurst Avenue Subway Station, listed on July 6, 2005;
- Jackson Avenue Subway Station (IRT), listed on September 17, 2004;
- Joralemon Street Tunnel, listed on February 9, 2006;
- Main Street Subway Station (Dual System IRT), City of Flushing, listed on October 14, 2004;
- Morris Park Station, listed on July 6, 2005;
- New Utrecht Avenue Station (Dual System BRT), listed on July 6, 2005;
- Ocean Parkway Station (Dual System BRT), listed on July 29, 2005;
- Pelham Parkway Station (Dual System BRT), listed on March 30, 2005;
- Prospect Avenue Subway Station (IRT), listed on September 17, 2004;
- Simpson Street Subway Station and Substation #18 (IRT), listed on September 17, 2004;
- Substation 7, February 9, 2006;
- Substation 13, February 9, 2006;
- Substation 17, February 9, 2006;
- Substation 42, February 9, 2006;
- Substation 219, February 9, 2006;
- Substation 235, February 9, 2006;
- Substation 401, July 6, 2005;

- Substation 409, February 9, 2006;
- Times Square-42<sup>nd</sup> Street Subway Station, listed on September 17, 2004;
- Wall Street Subway Station (IRT), listed on September 17, 2004;
- West 28<sup>th</sup> Street Subway Station (Dual System IRT), listed on March 30, 2005;
- Westchester Square Station (Dual System IRT), listed on March 30, 2005;
- Wilson Avenue Subway Station (Dual System IRT), listed on July 6, 2005; and
- Woodlawn Station (Dual System IRT), listed on July 6, 2005.

The MPDF (see Section H Page 6 in Attachment A) also mentions the interiors of twelve subway stations that were designated as interior landmarks by the NYC's Landmarks Preservation Commission in 1979 as follows:

- Contract 1 subway stations
  - City Hall
  - Bleecker Street
  - Astor Place
  - 33<sup>rd</sup> Street
  - 59<sup>th</sup> Street-Columbus Circle
  - 72<sup>nd</sup> Street
  - 79<sup>th</sup> Street
  - 110<sup>th</sup> Street
  - 116<sup>th</sup> Street
- Contract 2 stations (Brooklyn extension)
  - Fulton Street
  - Wall Street
  - Borough Hall

# 7. Philadelphia-Localized Context

## 7.1 Introduction

The evolution of Philadelphia's public rail transit – vehicles and routes – has helped define the city's growth and regional influence. Complex in its variety of transportation options, the landscape of Philadelphia's rail system is characterized by consistent technological transition that has been spurred by the economics of private competition, public administration, and rider demand.

The Philadelphia transit system is also remarkable for how it has continued to utilize former railroad and rail transit depots well into the modern era. The quality of design and construction by private entities such as the Pennsylvania Railroad and Reading Railroad has been recognized and revitalized by the Southeastern Pennsylvania Transportation Authority (SEPTA).

## 7.2 Associated Historic Contexts

- Early Period: Introduction of Passenger Rail and Beginning of the Streetcar Era, 1832-1869
- Early Period: Passenger Rail and Streetcar Electrification, 1870-1898
- Expansion: Competition for Passenger Rail and Development of Rapid Transit, 1899-1910
- Expansion: Streetcar, Subway and Passenger Rail System, 1911-1928
- Depression Era-Post World War II Period: Philadelphia Transit Systems Struggle, 1929-1959
- SEPTA and Regional Management, 1960-Present

## 7.3 Early Period: Introduction of Passenger Rail and Beginning of the Streetcar Era, 1832-1869

Beginning in 1832, the Philadelphia, Germantown & Norristown Railroad (PGN) line began commuter rail operation to serve local passenger traffic via steam train. The Philadelphia, Wilmington & Baltimore Railroad, which initially began its operation carrying passengers as a long-distance freight and passenger line, also began actively developing commuter traffic servicing Philadelphia in the 1850s.<sup>137</sup> With the introduction of this transportation option, middle- and upper-class patrons who could afford the fares had a chance to “separate home from work, not just within the city, but also in portions of Philadelphia County,

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<sup>137</sup> John Hepp, “Commuter Trains,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/commuter-trains/>.



like East Falls, Germantown, and Chestnut Hill.”<sup>138</sup> Consequently, a larger geographic range became economically bound to the city.

During the 1830s and 1840s, small independent railroads located their passenger facilities on the fringes of the Philadelphia’s commercial district, but were required by ordinance to engage in an “expensive and inefficient practice of using horses to propel their trains within the old city.”<sup>139</sup> During the 1850s, the railways were able to move to larger depots further from downtown and end the use of horses in this fashion. The transition was facilitated by the introduction of a new transit mode – the horse-drawn streetcar.<sup>140</sup>

Philadelphia’s first horse-drawn streetcars were operated by the Frankford and Southwark Philadelphia City Passenger Railway Company in 1858. The cars, which were pulled by horses, glided along steel rails. Initially, streetcar routes in Philadelphia were adopted from the city’s first on-street public transportation option, the omnibus.<sup>141</sup> The omnibus was a horse-drawn vehicle designed to offer easier ingress and egress for passengers than its predecessor, the stagecoach.<sup>142</sup> The streetcar rail system, however, perceived as a technological improvement, offered a smoother and faster ride. In addition to superior passenger experience, rails also offered the advantages of requiring fewer horses and cars to maintain the same level of service provided by the omnibuses, and allowing streetcars to operate in areas where poorly paved or unpaved streets had prevented omnibus access.<sup>143</sup>

Together with the commuter rail, growth of Philadelphia’s streetcar network facilitated the city’s geographic expansion. A growing middle class, along with technological innovation, provided a greater volume of people the means to expand daily travel beyond the limitations of walking distance. In most cities, Philadelphia included, “city limits extended only about two miles from the center of town, or the distance a person could walk in half an hour,” but, with public transportation options, people could live beyond the two-mile radius and continue to commute to work with a half-hour period of time.<sup>144</sup>

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<sup>138</sup> John Hepp, “Public Transportation,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/public-transportation/>.

<sup>139</sup> John Hepp, “‘Such a Well-behaved train Station’: Evolving Spatial Patterns at Philadelphia’s Late-Victorian Central Passenger Depots, 1876-1901,” *Pennsylvania History: A Journal of Mid-Atlantic Studies*, Vol. 70, No. 1 (Winter 2003), Penn State University Press, pp. 2-3.

<sup>140</sup> Ibid.

<sup>141</sup> John Hepp, “Streetcars,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/streetcars/>.

<sup>142</sup> John Hepp, “Omnibuses,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/omnibuses/>.

<sup>143</sup> John Hepp, “Streetcars,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/streetcars/>.

<sup>144</sup> Michael Massouh, “Innovations in Street Railways before Electric Traction: Tom L. Johnson’s Contributions,” *Technology and Culture*, Vol. 18, No. 2 (April, 1977), pp. 203.

Middle-class families moved to new residential developments in West Philadelphia, east of Fortieth Street, and lower North Philadelphia. Just as the streetcar facilitated expansion outside of Center City during the 1850s and 1860s, it simultaneously helped Philadelphia retain its commercial, retail, and entertainment supremacy in an ever-expanding region by facilitating travel into the city from outlying areas.<sup>145</sup>

## **7.4 Early Period: Passenger Rail and Streetcar Electrification, 1870-1898**

During the 1870s and 1880s, an increase in commuter railway consolidation and greater competition among the surviving companies resulted in development of new passenger railway stations in Center City Philadelphia. Of the ten railroad passenger facilities in use in the mid-1870s, four were the busiest. These included: Prime Street, West Philadelphia, Ninth and Green rail terminals, and Market Street ferry.<sup>146</sup> During this time, the region's three railroad systems – the Pennsylvania, the Philadelphia & Reading, and the Baltimore & Ohio – developed extensive commuter networks that centered on Philadelphia and Camden, New Jersey.<sup>147</sup> “The steam commuter trains were not used by many middle-class Philadelphians for their daily commute in 1880 simply because all of the downtown termini were a long walk or streetcar ride from the business district,” but “by 1893, all three rail systems serving the city relocated their main facilities to Center City, and the daily commute by steam train became more viable for those who could afford the fares.”<sup>148</sup> On December 5, 1881, the Pennsylvania Railroad was the first to make travel more convenient for commuters, locating its new depot just west of the main business district, 10 minutes from the old State House. When it opened its Broad Street Station at Center Square, it replaced its West Philadelphia depot and, because of corporate consolidations, also replaced the West Chester & Philadelphia and Prime Street terminals.<sup>149</sup> Pennsylvania Railroad's primary competitor, the Philadelphia &

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<sup>145</sup> John Hepp, “Streetcars,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/streetcars/>.

<sup>146</sup> John Hepp, “‘Such a Well-behaved train Station:’ Evolving Spatial Patterns at Philadelphia’s Late-Victorian Central Passenger Depots, 1876-1901,” *Pennsylvania History: A Journal of Mid-Atlantic Studies*, Vol. 70, No. 1 (Winter 2003), Penn State University Press, pp. 5.

<sup>147</sup> John Hepp, “Commuter Trains,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/commuter-trains/>.

<sup>148</sup> John Hepp, “Public Transportation,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/public-transportation/>.

<sup>149</sup> John Hepp, “‘Such a Well-behaved Train Station:’ Evolving Spatial Patterns at Philadelphia’s Late-Victorian Central Passenger Depots, 1876-1901,” *Pennsylvania History: A Journal of Mid-Atlantic Studies*, Vol. 70, No. 1 (Winter 2003), Penn State University Press, pp. 6.

Reading, located its terminal at Twelfth and Market streets in Center City and closed two of its other depots.<sup>150</sup>

By 1876, Philadelphia had the largest streetcar railway system in the country. The city had many narrow, one-way streets, forcing streetcars to operate in a split configuration with out-bound streetcars on one street and city-bound streetcars on another. During this time, the annual ridership of Philadelphia's streetcar system was more than 100 million passengers.<sup>151</sup> However, a nationwide outbreak of an equine flu known as the Great Epizootic in 1872 had prompted streetcar operators to explore alternative modes of power. Unsuccessful experimentations with steam engines (1876 and 1878) were followed by transition to cable in 1883. William Kemble, Peter A. B. Widener, and William Lukens Elkins formed the Philadelphia Traction Company and acquired existing streetcar lines for the purpose of converting them to cable operations. This investment resulted in a relatively slow transition to electrification. While electric trolley cars were invented and implemented by other cities in the mid-1880s, Philadelphia passengers did not travel via electric trolley until 1892. In 1895, Widener and Elkins created the Union Traction Company which spurred a swift transition to electrically-powered cars. The last horse-drawn streetcar operation ended 1897<sup>152</sup> and Philadelphia joined the national trend, which saw urban street railways as necessary infrastructure, not only for public transportation, but also civic pride.<sup>153</sup>

## **7.5 Expansion: Competition for Passenger Rail and Development of Rapid Transit, 1899-1910**

With the introduction of electric trolley cars, Philadelphia's commuter railways began to experience increased pressure of competition for short-range travel (distances of less than 5 miles). Although some experimented with using electric trolley technology on existing steam train lines, the railroads more frequently conceded short-range passenger traffic to trolleys.<sup>154</sup> For the electric streetcars, the most dramatic transportation change of the early twentieth century was "the combination of rising working-class wages and regulated fares [that] allowed streetcars, once a middle-class means of transport, to

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<sup>150</sup> John Hepp, "'Such a Well-behaved train Station:' Evolving Spatial Patterns at Philadelphia's Late-Victorian Central Passenger Depots, 1876-1901," *Pennsylvania History: A Journal of Mid-Atlantic Studies*, Vol. 70, No. 1 (Winter 2003), Penn State University Press, pp. 7.

<sup>151</sup> John Hepp, "Streetcars," *The Encyclopedia of Greater Philadelphia* (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/streetcars/>.

<sup>152</sup> *Ibid.*

<sup>153</sup> Michael Massouh, "Innovations in Street Railways before Electric Traction: Tom L. Johnson's Contributions," *Technology and Culture*, Vol. 18, No. 2 (April, 1977), pp. 205.

<sup>154</sup> John Hepp, "Commuter Trains," *The Encyclopedia of Greater Philadelphia* (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/commuter-trains/>.

become a key component of a truly heterogeneous mass transit system.”<sup>155</sup> In the twentieth-century, mass transit shifted to a paradigm that sought to move as many people as possible, with political and technological change driving the trend.

By 1898, the Union Traction Company controlled nearly all the electric trolley lines in Philadelphia<sup>156</sup> and political consensus grew around the sentiment that more government planning and regulation was needed in public transit in response to monopolistic practices and labor strife. Philadelphia’s population growth further spurred a demand for inexpensive mass transit. “New franchise agreements allowed for increased government regulation at a time when both politicians and civic boosters envisioned a New Philadelphia in which working-class Philadelphians could live at greater distances from their work.”<sup>157</sup>

To meet this demand, looking to precedents in London and New York, Philadelphia considered both the electric underground subway (employed in London in 1890) and steam-powered trains on elevated tracks (used in New York since 1871). In 1901, Pennsylvania approved a rapid transit ordinance for Philadelphia that allowed both subway and elevated lines.<sup>158</sup>

In 1902, Widener and Elkins formed a new company, Philadelphia Rapid Transit (PRT), to take over Union Traction and build the Market Street Subway-Elevated through West Philadelphia.<sup>159</sup> In 1905, subway surface cars first operated between Fifteenth Street and the Schuylkill River. Subway-elevated service began in 1907 between Fifteenth Street and Sixty-Ninth Street, with stations on the elevated portion of the routes west of the Schuylkill River opening over time. In 1908, subway service was extended to Second Street station and the elevated loop terminating at Delaware Avenue opened to accommodate disembarking ferry passengers arriving from New Jersey. In 1907, the PRT and the City negotiated an agreement that provided the City oversight of PRT operations. In exchange for the limitation on autonomy, PRT received favorable regulatory and route changes, as well as the transfer of franchises for remaining lines into the city.<sup>160</sup>

Development of the Market Street line during this period helped reduce trolley congestion in Center City, provided a larger ridership population, and also bolstered the economy by expanding the market of clientele for retail, entertainment, and employment. Mass transit encouraged residential development of West Philadelphia beyond Fortieth Street by connecting with crosstown trolley lines throughout West

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<sup>155</sup> John Hepp, “Streetcars,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/streetcars/>.

<sup>156</sup> Ibid.

<sup>157</sup> John Hepp, “Public Transportation,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/public-transportation/>.

<sup>158</sup> Ibid.

<sup>159</sup> John Hepp, “Streetcars,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/streetcars/>.

<sup>160</sup> John Hepp, “Subways and Elevated Lines,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/subways-and-elevated-lines/>.

Philadelphia, and making land beyond accessible for development. Furthermore, “it helped establish patterns in suburban development by turning Upper Darby (where the Market Street line interchanged with suburban transportation lines) into a key commercial and transit node.”<sup>161</sup> Together, the combination of the electrified streetcar and subway system provided Philadelphia with its first affordable rapid transit system.

## **7.6 Expansion: Streetcar, Subway, and Passenger Rail System, 1911-1928**

Following two violent strikes and amid financial struggles, Thomas Eugene Mitten took over the PRT in 1911. With this leadership transition, the electric streetcar system was upgraded and efforts were undertaken to improve employee and passenger relations.<sup>162</sup> In 1912, the City of Philadelphia created the Bureau of City Transit, tasking it with the responsibility of developing a master transportation plan. While this document provided guidance for twentieth-century development, most of the proposed lines were never built.<sup>163</sup> Expansion of the Market Street subway line began with the Frankford elevated extension in Northeast Philadelphia, construction of the City Hall station of the proposed Broad Street subway, and a Center City subway loop. However, by 1917, work stopped on all but the Frankford elevated extension. The city purchased the cars necessary to operate the extension and leased the cars and the line to the PRT. Operation by PRT began in 1922. After completion of the Frankford subway extension, the city resumed work on the Broad Street subway and the PRT began operating this line between Olney and City Hall in 1928. Two years later, the Broad Street subway line was extended to South Street. In 1932, a branch under Ridge Avenue to Eighth and Market streets opened.<sup>164</sup>

For passenger rail, increased capacity demands at the busy Broad Street Station in Philadelphia triggered the Pennsylvania Railroad to electrify lines to Paoli in 1915 and lines to Chestnut Hill in 1918.<sup>165</sup> By substituting electricity for steam, a railroad could run heavier trains and at more frequent intervals since electric trains consumed less time in route. “In this way, electrification permitted a railroad to increase the capacity of a given segment of line without having to resort to the necessity of laying additional tracks.”<sup>166</sup> The technology that the Pennsylvania Railroad chose – overhead catenary – would become the standard

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<sup>161</sup> Ibid.

<sup>162</sup> John Hepp, “Streetcars,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/streetcars/>.

<sup>163</sup> John Hepp, “Subways and Elevated Lines,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/subways-and-elevated-lines/>.

<sup>164</sup> Ibid.

<sup>165</sup> John Hepp, “Commuter Trains,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/commuter-trains/>.

<sup>166</sup> Michael Bezilla, “Steam Railroad Electrification in America, 1920-1950: The Unrealized Potential,” The Public Historian, Vol. 4, No. 1 (Winter 1982), pp. 31.

for transitioning steam passenger rail to electric across the region. Successful electrification of these lines led the Pennsylvania Railway and Reading Railway to launch a period of line electrification that would continue through 1933.<sup>167</sup>

## **7.7 Depression Era-Post World War II Period: Philadelphia Transit Systems Struggle, 1929-1959**

With the death of Mitten in 1929, the PRT suffered renewed financial challenges and filed for bankruptcy in 1934. By the 1920s, trolley line expansion had already ended and the PRT had transitioned to using buses and trackless trolleys on new routes. Suburban trolley service contracted in the 1930s, but, within the City of Philadelphia, the trolley system remained intact.<sup>168</sup>

During the Great Depression, subway construction also slowed. While tunnels for the Broad Street line to Snyder Avenue in South Philadelphia were completed in 1933, the PRT funding challenges delayed opening of the line until 1938. Tunnels for the Locust Street subway line, which were started in 1917, were not completed until 1931 and did not open until after the end of World War II. The Delaware River Joint Commission, which later became the Delaware River Port Authority of Pennsylvania and New Jersey (DRPA), opened a subway line in 1936 over the Benjamin Franklin Bridge between Eighth and Market streets in Philadelphia and on Broadway in Camden, New Jersey. As with subway lines developed by the City, this DRPA line was operated by the PRT. In 1939, increased automobile ownership and use of the Benjamin Franklin Bridge led to decreased ferry ridership. In response, the PRT ended operation on the elevated subway line on Delaware Avenue.<sup>169</sup>

Economic hardship also prompted cuts in service for the passenger rail lines that had not already been electrified. This was a significant blow to the system. Despite the trend of declining passenger rail service that began with competition from trolleys in the 1890s, most of the passenger rail system had remained intact until the Great Depression.<sup>170</sup>

In 1940, the PRT reorganized as the Philadelphia Transportation Company (PTC), led by Albert M. Greenfield, a real estate developer and civic leader. During this reorganization, the PTC began to upgrade to a modern style of streetcar, the President's Conference Car (PCC). This brief stint of modernization was

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<sup>167</sup> John Hepp, "Commuter Trains," The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/commuter-trains/>.

<sup>168</sup> John Hepp, "Streetcars," The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/streetcars/>.

<sup>169</sup> John Hepp, "Subways and Elevated Lines," The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/subways-and-elevated-lines/>.

<sup>170</sup> John Hepp, "Commuter Trains," The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/commuter-trains/>.

stalled by World War II, and a labor strike in August 1944 provided an additional set-back for the company. A week-long PTC labor strike, now recognized as the largest labor demonstration during World War II, featured workers protesting the hire of African Americans to fill skilled labor roles. This event impacted war-time productivity to such a degree that the U.S. Army was deployed by order of President Roosevelt to take control of the transit system.<sup>171</sup>

Subway construction that had begun prior to the war was finally completed during the 1950s. In 1953, the Locust Street subway began operation as part of the Broad Street and Camden systems. A new portal was constructed after the Fortieth Street station and the Market Street subway was extended westward under the Schuylkill River. As a result, operation of the section of elevated subway that served that route ended in 1955. In 1956, a park-and-ride facility at Fern Rock became the northernmost stop on the Broad Street subway line.<sup>172</sup>

PTC's efforts to upgrade the streetcar system were renewed with the conclusion of the war – they purchased more of the PCC-style cars. However, in 1955, National City Lines, which was owned by General Motors and oil and rubber companies, acquired the PTC and, with this transition, 200 miles of track were abandoned as 24 trolley routes were replaced by buses.<sup>173</sup> “Although public transportation ridership rose greatly during World War II, this increase was temporary” and at the end of the war, automobile ownership increased as middle-class families left Philadelphia for the city's suburbs.<sup>174</sup>

## 7.8 SEPTA and Regional Management, 1960-Present

As operators sought to cut costs through further service reductions, local and state governments responded to this trend by becoming more actively involved in passenger rail administration. Auto traffic on Philadelphia's narrow streets prompted the city to arrange a subsidy program for commuter service on the Chestnut Hill branches of the Pennsylvania and Reading passenger railroads in 1958 and on Reading's

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<sup>171</sup> John Hepp, “Philadelphia Transportation Company (PTC) Strike,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/philadelphia-transportation-company-ptc-strike/>.

<sup>172</sup> John Hepp, “Subways and Elevated Lines,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/subways-and-elevated-lines/>.

<sup>173</sup> John Hepp, “Streetcars,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/streetcars/>.

<sup>174</sup> John Hepp, “Public Transportation,” The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/public-transportation/>.

Fox Chase branch in 1959. In 1960, the city established a nonprofit corporation to carry on similar operations. The proposed commuter subsidy budget in 1961 was \$1.5 million.<sup>175</sup>

In 1966, the City of Philadelphia funded electrification of Reading Railway's Newtown line within the city limits of Fox Chase.<sup>176</sup> The Southeastern Pennsylvania Transportation Authority (SEPTA) formed in 1963 to fund and coordinate all local passenger service in the Philadelphia region, including the City of Philadelphia and counties of Bucks, Chester, Delaware, and Montgomery. SEPTA management responsibilities include the complex system of subways, trolleys, passenger rail lines, and buses. Similar to other regional transportation agencies that formed throughout the country during the 1960s, SEPTA's mission focused on curbing trends in reduced urban public transportation use. This mission was further complicated by its tri-state (Pennsylvania, New Jersey, and Delaware) jurisdiction. The SEPTA Board of Directors offered equal representation for each Pennsylvania county, despite the fact that service and ridership in the City of Philadelphia represented the majority.<sup>177</sup>

In 1968, SEPTA acquired the PTC from National City Lines. Initially, no changes were made to the streetcar system. However, with fire destroying one of the car barns and the loss of approximately 60 PCC cars, SEPTA began to end service on trolley routes. PCC cars were abandoned in the 1980s when SEPTA purchased new streetcars for the subway-surface lines in West Philadelphia. All remaining surface streetcars were abandoned by 1992. PCC cars were then reintroduced for service between Port Richmond and West Philadelphia via the Philadelphia Zoo.<sup>178</sup>

In 1969, the Port Authority Transit Corporation (PATCO) Speedline was developed as a new model for public transportation in the Greater Philadelphia region, operating a high-speed rail line from Center City Philadelphia, PA, across the Delaware River, into Camden, NJ, to suburban Lindenwold, NJ.<sup>179</sup>

Back in 1951, Pennsylvania and New Jersey had created the Delaware River Port Authority (DRPA) and charged it with creating an integrated passenger rail system that would serve Philadelphia and New Jersey suburbs. Opening in 1969, the PATCO Speedline was the result of that partnership. The single line, which incorporated the existing Philadelphia (Locust Street subway line) to Camden (Camden line) subway systems, was extended east on the right-of-way of the railroad to Atlantic City. The PATCO Speedline incorporated innovative new technology. The trains were among the first in the country to be computer-

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<sup>175</sup> George W. Hiron, "The Decline of Railroad Commutation," *The Business History Review*, Vol. 36, No. 2 (Summer, 1962), pp. 178-179.

<sup>176</sup> John Hepp, "Commuter Trains," *The Encyclopedia of Greater Philadelphia* (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/commuter-trains/>.

<sup>177</sup> John Hepp, "SEPTA," *The Encyclopedia of Greater Philadelphia* (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/septa/>.

<sup>178</sup> John Hepp, "Streetcars," *The Encyclopedia of Greater Philadelphia* (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/streetcars/>.

<sup>179</sup> John Hepp, "PATCO," *The Encyclopedia of Greater Philadelphia* (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/patco/>.



operated, the system employed an advanced fare collection system, and suburban stations included park-and-ride with bus connections. During an era of suburban sprawl, this line helped the area at Eighth and Market Streets (where the line connects with the Market-Frankford subway) retain its vitality as a transportation hub and shopping destination.<sup>180</sup> In 1973, the Broad Street subway line was extended southward to Pattison Avenue to facilitate access to the city's sport complex.

All passenger railroad service in the region was merged into the Consolidated Rail Corporation (Conrail) in 1976, but by 1983 Conrail ceased operating commuter trains and transferred that responsibility to SEPTA. While SEPTA bought new equipment and built the Center City Commuter Connection in 1984, commuter trains struggled with uncertain funding and shifting patterns of development and population through the end of the twentieth century. By 2013, weekday ridership averaged about 1 million trips.<sup>181</sup>

## 7.9 Historic Properties

Based on, but not limited to, an analysis of data obtained from the National Park Service, National Register Program,<sup>182</sup> the following previously-listed historic properties are related to the Philadelphia area transit system.



**Figure 7-1.**  
**Germantown Junction Station (North Philadelphia Station), 1915.**

### 7.9.1 Germantown Junction Station (North Philadelphia Station)

Now known as the North Philadelphia Station, the Germantown Junction Station (Figure 7-1) is located at 2900 North Broad Street in the City of Philadelphia, and is served by SEPTA's Chestnut Hill East Regional Rail. It is included in the Historic American Buildings Survey as PA-5958<sup>183</sup> and was listed on the National Register in 1999, under two criteria:

- Criterion A in the area of significance of transportation, with periods of significance of 1896 and 1901; and

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<sup>180</sup> John Hepp, "PATCO," The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/patco/>.

<sup>181</sup> John Hepp, "Public Transportation," The Encyclopedia of Greater Philadelphia (accessed July 29, 2016), available: <http://philadelphiaencyclopedia.org/archive/public-transportation/>.

<sup>182</sup> National Park Service, National Register of Historic Places: Research (accessed March 17, 2016), available: <https://www.nps.gov/nr/research/>.

<sup>183</sup> Library of Congress, Historic American Buildings Survey: North Philadelphia Station (accessed August 14, 2016), available: <https://www.loc.gov/item/pa2749/>.

- Criterion C in the area of significance of architecture, with a period of significance of 1915.

### 7.9.2 Graver's Lane Station



Figure 7-2.  
Graver's Lane Station, ca. 1950.

Graver's Lane Station is located at Gravers Lane and the Reading Railroad Line in the City of Philadelphia, and is served by SEPTA's Chestnut Hill East Regional Rail (Figure 7-2). It was listed on the National Register on November 7, 1977, under two criteria, with a period of significance of 1879:

- Criterion A in the area of significance of transportation; and
- Criterion C in the area of significance of architecture.

### 7.9.3 Mount Airy Station



Figure 7-3.  
Mount Airy Station, Early 20<sup>th</sup> Century.

Mount Airy Station is located at East Gowen Avenue, in the City of Philadelphia, and is served by SEPTA's Chestnut Hill East Regional Rail (Figure 7-3). It was listed on the National Register on September 22, 1977, under Criterion C in the area of significance of architecture, with a period of significance of ca. 1875.

## 7.9.4 North Broad Street Station, Reading Company



Figure 7-4.  
North Broad Street Station, ca. 2007.

The North Broad Street Station is located at 2601 North Broad Street is a SEPTA Regional Rail Station in the City of Philadelphia (Figure 7-4). It was listed on the National Register on May 28, 1996, under two criteria, both with a period of significance of 1929:

- Criterion A in the area of significance of transportation; and
- Criterion C in the area of significance of architecture.



Figure 7-5.  
Suburban Station, ca. 1940.

## 7.9.5 Suburban Station Building

The Suburban Station is served by multiple SEPTA Regional Rail lines and is located at 1617 John F. Kennedy Boulevard in the City of Philadelphia (Figure 7-5). It was listed on the National Register on September 5, 1985, under two criteria:

- Criterion A in the area of significance of transportation, with a period of significance of 1929; and
- Criterion C in the area of significance of architecture, with a period of significance of 1930.



Figure 7-6.  
Thirtieth Street Station, ca. 1977.

## 7.9.6 Thirtieth Street Station

Thirtieth Street Station is located at West River Drive, and Market, 30th, and Arch Streets in the City of Philadelphia (Figure 7-6). It was listed on the National Register on June 7, 1978, under Criterion C, area of significance in architecture, with periods of significance of 1929 and 1934. While the Thirtieth Street Station is not exclusively used for transit, it is included here



because SEPTA identifies it as “a major City and Inter-City rail transit hub.”<sup>184</sup>

### 7.9.7 Tulpehocken Station Historic District (Walnut Lane Station)



**Figure 7-7.**  
Tulpehocken Station, ca. 1906.

The Tulpehocken Station Historic District is roughly bounded by McCallum Street, West Walnut Lane, the Penn Central Railroad tracks, and West Tulpehocken in the City of Philadelphia, and is served by SEPTA’s Chestnut Hill East Regional Rail (Figure 7-7). Also known as the Walnut Lane Station, the Tulpehocken Station was identified as a contributing feature of the historic district. The district was listed on the National Register on November 26, 1985, under two

criteria: Criterion A in the area of significance of transportation and Criterion C in the areas of significance of architecture and landscape architecture.

### 7.9.8 Wayne Junction Historic District (Wayne Junction Station)



**Figure 7-8.**  
Wayne Junction Station, ca. 1915.

The Wayne Junction Historic District is roughly bounded by West Berkley Street, Roberts, Germantown, and Wayne Avenues in the City of Philadelphia (Figure 7-8). It was listed on the National Register on April 16, 2012. The Wayne Junction Station, built in 1901, is included as a contributing feature to the historic district. SEPTA completed renovation of the Wayne Junction Station in 2015.<sup>185</sup>

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<sup>184</sup> SEPTA, Visitors on the Go: Destination Philadelphia (accessed August 13, 2015), available: <http://www.septa.org/welcome/welcome.html>.

<sup>185</sup> SEPTA, Gateway to Germantown: Wayne Station Construction Project (accessed August 13, 2016), available at <http://www.septa.org/construction/projects/wayne/index.html>.

## 8. San Francisco-Localized Context

### 8.1 Introduction

San Francisco is one of the few cities where part of the transit system—the cable cars—is so uniquely associated with the identity of the city that it has become a tourist attraction. As discussed in this section, the cable car was actually invented in San Francisco. In 1871, Andrew Halladie patented the cable car, and the technology had its first test run in 1873 on Clay and Kerney streets. It is one of the few places where nineteenth century technology is still in daily use in a modern urban environment. The localized context steps through the different technological advances in transit in San Francisco, ending with the Bay Area Rapid Transit (BART) system that began service in 1972.

### 8.2 Associated Historic Contexts

- Early Period: the Horsecar Era, 1861-1913
- Early Period: the Steam Dummy Era, 1877-1905
- Early Period: the Cable Car Era, 1873-Present
- Expansion: the Electric Streetcar Era, 1892-Present
- BART and the Heavy Rail Era, 1972-Present
- Muni and the Light Rail Era, 1979-Present

### 8.3 Early Period: the Horsecar Era, 1861-1913

San Francisco rail service began with horsecar lines in the nineteenth century. Though reported dates of the first horsecar trip vary, the first company to run horsecars was the Market Street Railways in 1860. In 1861, it was followed by the horsepower railcars of the Omnibus Railroad Company owned by Gustav Sutro and formally called the Red Line. Other horsecar companies included the North Beach and Mission Railroad Company, who served those neighborhoods beginning in 1863, and the Central Railroad Company whose lines provided the particular convenience of serving several steamer landings, enabling seamless sea-to-land transport. For a complete list of horsecar companies, see the end of this section.<sup>186</sup>

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<sup>186</sup>Cable Car Museum, “The Omnibus Railroad & Cable Company,” (accessed July 27, 2016), available: <http://www.cablecarmuseum.org/co-omnibus>; SF Genealogy, “San Francisco History: Early Street Railroads,”

Throughout the late nineteenth century, many companies operated horsecars that were eventually converted to either cable or electric power, particularly after the 1873 invention of cable cars by Andrew Hallidie. The last horsecar service ended in 1914.<sup>187</sup> Cable car technology would dominate the San Francisco market for approximately 30 years until the coming of electrification in 1892.

### 8.3.1 Carville-by-the-Sea

The quickly shifting technology in the late nineteenth and early twentieth centuries led to an excess of old technology remains, particularly horsecars. Many were abandoned at Ocean Beach, where industrious citizens of the ever-expanding metropolis converted them to homes, bars, and clubs (Figure 8-1). The area became known as "Carville-by-the-Sea" or simply "Carville." With the need for land in San Francisco, Carville met its end by the 1920s. Only one Carville horsecar is known to still be in existence.<sup>188</sup>



**Figure 8-1.**  
Example of Carville Architecture

### 8.3.2 Horse Car operators of San Francisco

- |   |                          |                                 |
|---|--------------------------|---------------------------------|
| • Omnibus Railroad Company                              | 1861-1889                |                                 |
| • Market Street Railway Company                         | 1860-1882                |                                 |
| • North Beach and Mission                               | 1862-1893                | (sold to MSR)                   |
| • Central Railroad                                      | 1863-1893                | (sold to MSR)                   |
| • Front Street, Mission & Ocean Railroad <sup>189</sup> | 1863-unknown             | (sold to Sutter Street Railway) |
| • Sutter Street Railroad <sup>190</sup>                 | 1872-1902                | (sold to United Railroads)      |
| • Sutter Street Railway <sup>191</sup>                  | 1879-1913 <sup>192</sup> |                                 |

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(accessed July 27, 2016), available: <http://www.sfgenealogy.com/sf/history/hgoe27.htm>; SFMTA, "MUNI's History," (accessed July 27, 2016), available: <https://www.sfmta.com/about-sfmta/our-history-and-fleet/muni-history>.

<sup>187</sup> Wikipedia Contributors, "Market Street Railway (transit operator)".

<sup>188</sup> Wikipedia Contributors, "Carville, San Francisco," (accessed July 27, 2016), available: [https://en.wikipedia.org/wiki/Carville,\\_San\\_Francisco](https://en.wikipedia.org/wiki/Carville,_San_Francisco).

<sup>189</sup> Rice PhD, Walter and Echeverria, Emiliano, The Sutter Street Railway - San Francisco's Second Cable Car Line.

<sup>190</sup> Name changed to Sutter Street Railroad.

<sup>191</sup> Name changed to Sutter Street Railway.

<sup>192</sup> Last horsecar in San Francisco.

## 8.4 Early Period: The Steam Dummy Era, 1877-1905

Despite the proliferation of horsecar lines in the late nineteenth century, the Ocean Beach area remained difficult to access for the bulk of San Francisco residents. The recreational opportunities of Ocean Beach, Harbor View, and Sutro's Cliff House attracted the need for a transportation solution.<sup>193</sup>

The Sutter Street Railroad was the first company to attempt steam dummy service to this section of San Francisco in 1877. The route connected horsecar service at Broadway and Polk streets to a steam dummy that took riders to Harbor View, but its location, remote from the many amusements of the beach, caused it to be unsuccessful.<sup>194</sup>

The Presidio & Ferries Railroad opened in 1882. The Presidio & Ferries ran from the downtown core to Cow Hollow-Harbor View. The line ran its steam dummies until the Great San Francisco Earthquake in 1906, but between 1885 and 1906 steam service continued being cut as ridership decreased on steam lines and electrified service emerged. The line was fully electrified after the earthquake like many railroads all over the city. The lack of services after the earthquake and the need for industrialized rebuilding in the San Francisco area led Harbor View to become more of an industrial area, ending the need for reduced tourist fares around 1914.<sup>195</sup>

Other railroads that ran steam engines to the Ocean Beach area included the Park & Ocean Railroad (helped by the economic prowess of Adolf Sutro), beginning in 1883 and ending in 1898. The Park & Ocean also had a hand in helping transport World's Fair visitors in 1894. The Ferries and Cliff House Railway, opening in 1888 and designed to be extremely scenic, was Sutro's answer to increasing the revenues of the tourist areas of Ocean Beach. The line closed in 1895, despite the high praise it earned for being well-run and particularly beautiful.<sup>196</sup> Most of these lines became electrified, merged, and continued to serve the coastal area of San Francisco in the twentieth century.

### 8.4.1 Steam Dummy Operations in San Francisco

- |   |           |
|---|-----------|
| • Sutter Street Railroad                | 1879-1902 |
| • Presidio & Ferries                    | 1882-1914 |
| • Park & Ocean Railroad                 | 1883-1893 |
| • Ferries & Cliff House Railway Company | 1887-1893 |
| • Sutro Railway Company                 | 1888-1902 |

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<sup>193</sup> Walter Rice and Emiliano Echeverria, "When Steam Ran on The Streets of San Francisco Part I," Nov/-Dec 1999 issue of *Live Steam*, accessed via <http://www.cable-car-guy.com/html/ccsfwhensteam1.html>.

<sup>194</sup> Walter Rice and Emiliano Echeverria, "When Steam Ran on The Streets of San Francisco Part I".

<sup>195</sup> Ibid.

<sup>196</sup> Ibid.

## 8.5 Early Period: the Cable Car Era, 1873-Present

### 8.5.1 The Invention of the Cable Car in San Francisco

Using skills acquired while making wire rope for use in the gold mining industry, where he worked in a variety of roles between 1852 and 1857, Scotsman Andrew Hallidie unwittingly invented the key tool that would lead him to making the cable car. His superbly strong wire rope first went to making suspension bridges, and in 1871 he patented the cable car, a railcar propelled by underground cables. First tested on Clay and Kerney streets on the Clay Street Hill Railroad, the cable car had its first run in 1873.<sup>197</sup>

### 8.5.2 Cable Cars in San Francisco

During the second half of the nineteenth century, cable cars replaced some of the horse and steam-powered rail lines in the city. The foremost among horsecar-to-cable conversion was the Market Street Railway Company, which opened in 1860. While there was a brief interlude involving steam power, cable conversion occurred in 1882, when railroad tycoon Leland Stanford bought the line. The name of the company was altered to become the Market Street Cable Railway Company, and it eventually became San Francisco's biggest cable car operation. At the peak of its success, five lines ran cars that left every 15 seconds.<sup>198</sup>

Twenty-three lines were established between 1873 and 1891, including the Telegraph Hill Railroad, the California Street Cable Railroad, and the Ferries & Cliff House Railways, which had previously run steam dummies (Figure 2-8). However, the coming of the electric streetcar in 1892 marked the beginning of decline of cable cars. Electric cars were adequately capable on gradual slopes and much cheaper to build and operate than cable cars. The 1906 earthquake destroyed a huge amount of cable car stock and line, opening the way for electric railways to replace the cable cars in the rebuilding process.<sup>199</sup>

By 1912, only eight cable car lines were left in San Francisco where they climbed intensely graded hills that electric streetcars were incapable of handling. Their future competition was nimble buses, belonging to

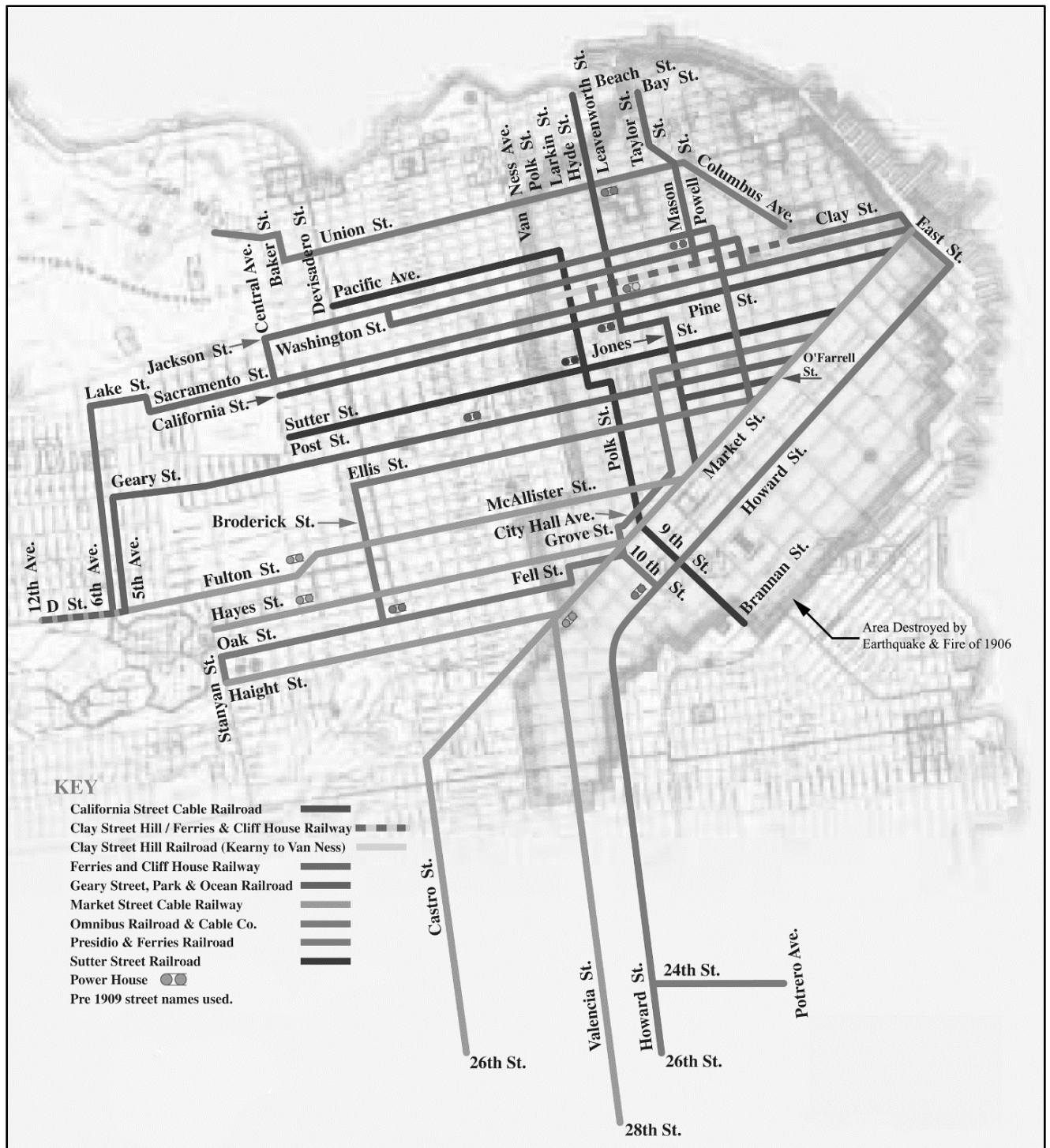
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<sup>197</sup> Edgar Myron Kahn, "Andrew Smith Hallidie," *California Historical Quarterly*, 1940, as on the Virtual Museum of San Francisco, accessed July 27, 2016 at <http://www.sfmuseum.org/bio/hallidie.html>.

<sup>198</sup> Wikipedia Contributors, "Market Street Railway (transit operator)," (accessed July 27, 2016), available: [https://en.wikipedia.org/wiki/Market\\_Street\\_Railway\\_\(transit\\_operator\)](https://en.wikipedia.org/wiki/Market_Street_Railway_(transit_operator)).

<sup>199</sup> Wikipedia Contributors, "San Francisco Cable Car System," (accessed July 27, 2016), available: [https://en.wikipedia.org/wiki/San\\_Francisco\\_cable\\_car\\_system](https://en.wikipedia.org/wiki/San_Francisco_cable_car_system).





**Figure 8-2.**  
**Map of San Francisco Cable Car Lines at Maximum Route Mileage<sup>200</sup>**

<sup>200</sup> Cable Car Museum.

the San Francisco Municipal Railway, known as Muni. Despite the pressure from all sides, cable cars were beloved in San Francisco and pressure from civic groups saved the Powell Street lines in 1947. In 1951, the final system in existence today was formed, with the California Street line, the Powell-Mason, and Powell-Hyde lines. These are all amalgamations of previous owners, including Cal Cable and Muni.<sup>201</sup>

San Francisco Cable Cars, despite the major changes to the system and some of the stock, were listed on the National Register of Historic Places in 1966 with major retrofitting and rehab projects occurring in both 1979 and 1982. Muni now cares for the system, which caters mainly to tourists who wait at the bottom of Powell Street, watching the turntable, almost every day of the year.<sup>202</sup>

### 8.5.3 San Francisco Cable Railway Operating Companies (totaling 53 miles of track)

• Clay Street Hill Railroad	1873-1888
• Sutter Street Railroad	1877-1902 (later Railway)*
• California Street Cable Railroad	1878-1952
• Geary Street Park and Ocean Railway	1880-1912*
• Presidio and Ferries Railway	1882-1913
• Market Street Cable Railway	1883-1893**
• Ferries and Cliff House Railway	1888-1893**
• Omnibus Railroad and Cable Company	1889-1893**
• Market Street Cable Railway company	1893 – March 1902
• United Railroads of San Francisco Railway Company)	1902 – 1921 (previously the Market Street Cable Railway Company)
• San Francisco Municipal Railway	1912 – present*, **
* initial Geary line purchased by the San Francisco Municipal Railway	
**consolidation Market Street Cable Railway Ferries & Cliff House Railway, and Omnibus Railroad & Cable Company	

Between 1893 and 1944 there were several mergers and consolidations of the City's cable car companies in San Francisco. The Market Street Cable Railway Company merged the original Market Street Cable Railway, Ferries & Cliff House Railway, and Omnibus Railroad & Cable Company (Figure 8-2) and operated between October 1893 to March 1902. The Company was sold and renamed the United Railroads of San Francisco and operated between March 1902 and April 1921. The consolidated companies were again

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<sup>201</sup> Wikipedia Contributors, "San Francisco Cable Car System."

<sup>202</sup> Ibid.

renamed the Market Street Railway Company in 1921 until their eventual purchase by the San Francisco Municipal Railway.

#### 8.5.4 Expansion: the Electric Streetcar Era, 1892-Present

The hilly terrain of San Francisco provided many challenges for various rail technologies having great success in other parts of the country. The invention and wide-spread adoption of the electric streetcar finally provided a type of transport that was capable of dealing with the majority of hills in the bay area. Some San Franciscans objected to the spider web of overhead lines that provided electricity to the cars, but at the dawn of the twentieth century, the great San Francisco Earthquake struck. The destruction of the city by both earthquake and fire led to the quick adoption of the technology, and lines multiplied in the rebuilding period. Simultaneously, cable cars, horsecars, and steam dummy use dwindled.<sup>203</sup>

Two companies fought for control of the San Francisco transit market in the early transit industry: 1) the United Railroads of San Francisco, or URR, formed from the Market Street Railways, the San Francisco and San Mateo Railway and the Sutter Street Railroad in 1902, and 2) the San Francisco Municipal Railway, formed by bond measure to compete with the URR in 1909. The ability of the URR to buy up smaller lines and form a monopoly so angered voters that this bond measure enabled the San Francisco Municipal Railway to run its first service in 1912 down Geary Street and 33<sup>rd</sup> Avenue. URR became the Market Street Railway in 1921 after labor strikes. The unpopularity of the company continued, and in a seventh vote, San Franciscans voted to buy the operations of the Market Street Railway. Muni absorbed the company in 1944 and replaced many of its electric lines with trolleybus service, although several electric lines continued to be run into the 1980s.<sup>204</sup>

Muni ran many different important services in the twentieth century, including connecting service to the Key system across the Bay Bridge from the Transbay terminal from 1939 to 1958, service to Pacific Heights, and the running of the Fillmore Hill counterbalance. However, electric and cable car service still waned as Muni directed their efforts to buses. The Market Street line still runs with heritage streetcars, and citizen action groups consistently form to advocate for and protect Muni electric streetcar service across the city.<sup>205</sup>

#### 8.5.5 Electric Streetcar Operators in San Francisco

- San Francisco and San Mateo Electric Railway                      1892-1902
- Geary Street, Park & Ocean Railway                                      1878-1912

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<sup>203</sup> Wikipedia Contributors, "Market Street Railway (transit operator)."

<sup>204</sup> Wikipedia Contributors, "Market Street Railway (transit operator)"; SFMTA, "MUNI's History" Wikipedia Contributors, "San Francisco Municipal Railway," (accessed July 28, 2016), available: [https://en.wikipedia.org/wiki/San\\_Francisco\\_Municipal\\_Railway](https://en.wikipedia.org/wiki/San_Francisco_Municipal_Railway).

<sup>205</sup> Wikipedia Contributors, "San Francisco Municipal Railway".

- United Railroads 1901-1912
- Market Street Railway Company 1918-1944
- San Francisco Municipal Railway (Muni) 1912-present

## 8.6 BART and the Heavy Rail Era, 1972-Present

Heavy rail in the Bay Area for local transit is operated by BART. The system was created by the state legislature in 1957 and construction commenced in 1964. The system replaced the Key System, electric streetcars running over the Bay Bridge, offset increasing motor vehicle usage, and connected three counties.<sup>206</sup>

The hallmark of the BART system was the Transbay tube, a tunnel running from Oakland to San Francisco under the bay. At the time of completion, it was the world's longest and deepest tunnel. BART service commenced in 1972, with the Transbay tube running trains by 1974. Operations were partly run by staff and partly automated, a first for an interurban transit system of its size. Despite issues with "ghost trains" (trains that showed up on computer systems as in certain locations, but were not actually there, due to technical glitches in the train monitoring systems), and other technical delays, automated operations continued to be finessed into the 1980s, operated out of Oakland.<sup>207</sup>

The BART system has continued to expand, with lines now reaching both Bay Area airports (San Francisco in 1996, and Oakland in 2014) and service to Dublin/Pleasanton, among others.<sup>208</sup>

## 8.7 Muni and the Light Rail Era, 1979-Present

Light rail service in San Francisco was initiated in 1980 and is operated by Muni. Light rail service allowed the use of multiple cars, a distinct advantage over the streetcar service. The initial fleet contained 203 Boeing light rail trains in a new subway beneath Market Street. These vehicles were later replaced with a fleet of large Breda cars in the 1990s. Muni runs seven light rail lines that serve the city both above-ground and on the second deck of subterranean BART stations. The agency initiated seven day-a-week service in 1982, helping it to grow to become the third busiest light rail system in America. More recent expansions

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<sup>206</sup> Wikipedia Contributors, "History of Bay Area Rapid Transit," (accessed July 28, 2016), available: [https://en.wikipedia.org/wiki/History\\_of\\_the\\_Bay\\_Area\\_Rapid\\_Transit](https://en.wikipedia.org/wiki/History_of_the_Bay_Area_Rapid_Transit). Wikipedia Contributors, "Bay Area Rapid Transit," (accessed July 29, 2016), available: [https://en.wikipedia.org/wiki/Bay\\_Area\\_Rapid\\_Transit](https://en.wikipedia.org/wiki/Bay_Area_Rapid_Transit).

<sup>207</sup> Wikipedia Contributors, "History of Bay Area Rapid Transit"; Wikipedia Contributors, "Bay Area Rapid Transit" (accessed July 29, 2016), available: [https://en.wikipedia.org/wiki/Bay\\_Area\\_Rapid\\_Transit#History](https://en.wikipedia.org/wiki/Bay_Area_Rapid_Transit#History).

<sup>208</sup> Ibid.

of the system include the 2007 opening of the Third Street Light Rail Project<sup>209</sup> and the current construction of the Central Subway Line.<sup>210</sup>

**Table 8-1. San Francisco Rail Transit Operators**

Name	From	To	Successor
Bay Area Rapid Transit Authority (BART)	1957	present	Not applicable
Bay Shore and South San Francisco Street Railway	Unknown	Unknown	Ferries and Cliff House Railway
California Street Railroad	Unknown	1884	California Street Cable Railroad
California Street Cable Railroad	1884	1951	San Francisco Municipal Railway
Central Railroad	1863	1893	Market Street Railway
City Railroad	1863	1893	Market Street Railway
Clay Street Hill Railroad	Unknown	Unknown	Ferries and Cliff House Railway
Ferries and Cliff House Railway	1887	1893	Market Street Railway
Front Street, Mission and Ocean Railroad	1863	Unknown	Sutter Street Railway
Gough Street Railroad	Unknown	Unknown	Unknown
Market Street Cable Railway	1882	1893	Market Street Railway
Market Street Railway	1918	1944	San Francisco Municipal Railway
Market Street Railway	1893	1902	United Railroads of San Francisco
Market Street Railway	Unknown	1882	Market Street Cable Railway
Market Street and Fairmount Railway	1886	1893	Market Street Railway
Metropolitan Railway	1891	Unknown	Market Street Railway
North Beach and Mission Railroad	1862	1893	Market Street Railway
Ocean Beach Railway	1885	1893	Market Street Railway
Ocean Shore Railroad	1905	1921	Western Pacific Railroad
Ocean Shore Railway	unknown	1911	Ocean Shore Railroad
Omnibus Cable Company	1888	1893	Market Street Railway
Omnibus Railroad	Unknown	Unknown	Omnibus Railroad and Cable Company
Omnibus Railroad and Cable Company	Unknown	Unknown	Omnibus Cable Company
Park and Cliff House Railway	Unknown	1888	Ferries and Cliff House Railway
Park and Ocean Railroad	1883	1893	Market Street Railway
Parkside Transit Company	Unknown	1909	San Francisco Electric Railways
Potrero and Bay View Railroad	1866	1893	Market Street Railway
Presidio and Ferries Railroad	1882	1914	San Francisco Municipal Railway

<sup>209</sup> Wikipedia Contributors, "Third Street Light Rail Project," (accessed November 14, 2016), available: [https://en.wikipedia.org/wiki/Third\\_Street\\_Light\\_Rail\\_Project](https://en.wikipedia.org/wiki/Third_Street_Light_Rail_Project).

<sup>210</sup> Boeing, "Light rail Vehicle/Rapid Transit Car: Historical Snapshot," (accessed July 29, 2016), available: <http://www.boeing.com/history/products/rapid-transit-car.page>; Wikipedia Contributors, "Central Subway," (accessed July 29, 2016), available: [https://en.wikipedia.org/wiki/Central\\_Subway](https://en.wikipedia.org/wiki/Central_Subway).

Name	From	To	Successor
San Francisco Electric Railways	1909	Unknown	Gough Street Railroad
San Francisco Municipal Railway	1909	present	N/A
San Francisco and San Mateo Railway	Unknown	1896	San Francisco and San Mateo Electric Railway
San Francisco and San Mateo Electric Railway	1896	1902	United Railroads of San Francisco
South San Francisco Railroad and Power Company	1903	Unknown	Unknown
Southern Heights and Visitacion Railway	1892	1893	Market Street Railway
Sutro Railroad	Unknown	1902	United Railroads of San Francisco
Sutter Street Railway	1879	1902	United Railroads of San Francisco
Telegraph Hill Railroad	Unknown	1886	N/A
United Railroads of San Francisco	1902	1918	Market Street Railway

## 8.8 Historic Properties

Based on, but not limited to, an analysis of data obtained from the National Park Service, National Register Program,<sup>211</sup> at the time of this publication, the following previously-listed or previously determined eligible historic properties are related to the San Francisco area transit system.

### 8.8.1 Forest Hill Station



The Forest Hill Station, located northeast of Woodside Avenue in the City of San Francisco (Figure 8-3), was determined eligible for the National Register by the Keeper of the National Register on June 24, 1977 (current eligibility unknown). The station is currently used for Muni service.<sup>212</sup>

**Figure 8-3.**  
**Forest Hill Station, 2017.**

<sup>211</sup> National Park Service, National Register of Historic Places: Research (accessed March 17, 2016), available: <https://www.nps.gov/nr/research/>.

<sup>212</sup> Wikipedia Contributors, "Forest Hill Station (San Francisco)," (accessed February 16, 2017), available: [https://en.wikipedia.org/wiki/Forest\\_Hill\\_Station\\_\(San\\_Francisco\)](https://en.wikipedia.org/wiki/Forest_Hill_Station_(San_Francisco)).



**Figure 8-4.**  
Geneva Office Building and Power House, 1907.

### 8.8.2 Geneva Office Building and Power House

The Geneva Office Building and Power House, located at 2301 San Jose Avenue in the City of San Francisco, was listed on the National Register in 2010 under Criterion A in the areas of social history and transportation and under Criterion C in the area of architecture (Figure 8-4). Periods of significance were identified as 1901, 1903, and 1917. It was constructed to serve the San Francisco and San Mateo Railroad Company.<sup>213</sup>

### 8.8.3 San Francisco Cable Cars



**Figure 8-5.**  
San Francisco Cable Car (Washington and Jackson Line),  
1890s.

The San Francisco Cable Cars were among the first properties listed on the National Register, on October 15, 1966 (Figure 8-5). They were found to meet Criterion A in the area of significance of transportation, with a period of significance of 1873.

<sup>213</sup> National Park Service, National Register of Historic Places; Research (accessed April 6, 2017), available: <https://npgallery.nps.gov/NRHP/AssetDetail?assetID=1a0e7a5a-e259-474b-a794-9c78a298e1ba>.



### 8.8.4 Twin Peaks Tunnel



The Twin Peaks Tunnel, City of San Francisco, was determined to be eligible for listing on the National Register on August 31, 1976 (current eligibility unknown) (Figure 8-6). In 2016, Muni began a construction project to conduct a seismic upgrade, repair the tunnel's ceilings and walls, and replace the tracks along the entire length of the tunnel. The tunnel originally opened in 1918 and extends the length of the Muni subway between the West Portal and Castro stations, over two miles.<sup>214</sup>

Figure 8-6.  
Twin Peaks Tunnel at Forest Hill Station, 1955.



Figure 8-7.  
Union Ferry Depot, ca. 1900.

### 8.8.5 Union Ferry Depot

The Union Ferry Depot, also known as the Ferry Buildings, is located on the Embarcadero at Market Street in the City of San Francisco (Figure 8-7). It was listed in the National Register on December 1, 1978 under Criterion A in the area of transportation and Criterion C in the area of architecture. The NRHP nomination includes a statement that the area in front of the Union Ferry Depot was the hub of the local transportation system, with streetcars and cable cars from all parts of the city connecting there.<sup>215</sup>

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<sup>214</sup> Wallace, Kevin (March 27, 1949). "San Francisco History - City's Tunnels." *San Francisco Chronicle*.

<sup>215</sup> National Park Service, National Register of Historic Places Inventory (accessed August 14, 2016), available: <http://focus.nps.gov/pdfhost/docs/NRHP/Text/78000760.pdf>.



## 9. Washington, D.C. -Localized Context

### 9.1 Introduction

In November 1966, Congress approved the WMATA Compact, an interstate agreement among the District of Columbia, the State of Maryland, and the Commonwealth of Virginia, to plan, develop, build, finance, and operate a rapid passenger rail system for the nation's capital. WMATA was created in 1967, and the first phase of construction began in 1969. The first line to be constructed was the Red Line and included the first five stations: Rhode Island Avenue, Judiciary Square, Gallery Place, Metro Center, and Farragut North, with a stop at the previously constructed Union Station. Operations began in 1976. In 1968, WMATA expanded the system plan from the original 25-mile system to an Adopted Regional System (ARS) totaling 98 miles.

Between the opening of the Red Line in 1976 and today, WMATA has added new lines and stations totaling 103 miles. With an average daily ridership of approximately 720,000 passengers, WMATA Metro is second only to New York as the busiest rail transit system in the country.

With the possible exception of BART in San Francisco, the transit system in the Washington, D.C. metropolitan area is unique among the other cities presented in this report in that it was planned, designed, and constructed as an entirely new system and did not incorporate pre-existing lines and stations except for Union Station. Presented in the following text is a high-level summary of the WMATA system development.

### 9.2 Associated Historic Context

- Pre-Metro Transportation, 1862-1962
- WMATA and Metro, 1959-present

### 9.3 Pre-Metro Transportation, 1862-1962

Like other major American cities, Washington's transportation system evolved in the nineteenth century by technology, with horsecars in 1862 followed by electric streetcars in 1888. By the turn of the twentieth century, two private companies, the Washington Railway and Electric Co. (WRECo) and Capital Traction Co. (CTCo), provided transportation services for most of the District of Columbia and parts of Maryland. The DC system was noteworthy for obtaining power from an underground utility line through a slot in the

pavement, a relatively rare technology.<sup>216</sup> The privately-owned systems peaked service in the 1920s, then began to decline as automobile ownership became commonplace and local bus service was provided. In the 1930s, the streetcars and buses were merged under one entity, Capital Transit, the franchise of which was terminated by Congress in 1955. Privately purchased in 1956 and renamed the D.C. Transit System, the last streetcar of this early system ceased operation in 1962.

## 9.4 WMATA and Metro, 1959-Present

### 9.4.1 Metro Planning Studies

In 1959, the National Capital Planning Commission (NCPC) prepared the final Mass Transportation Survey (MTS), which studied transportation needs in the area, including train, bus, and highway planning. In 1960, the National Capital Transportation Agency (NCTA) was created with the responsibility for directing further transit planning. In 1962, the NCTA prepared a report entitled *Transportation in the National Capital Region: Finance and Organization* that presented a financial plan for an 83-mile rail system, but it did not pass the House of Representatives. In 1965, NCTA released a shorter report, *Rapid Rail Transit for the Nation's Capital*, supporting construction of a shorter 25-mile subway, mostly in Washington D.C. In 1965, Congress passed the National Capital Transportation Act, authorizing the system.

The passing of the National Capital Transportation Act of 1965 was part of President Lyndon Johnson's Great Society initiative, beginning with civil rights but expanding to other societal needs, to end poverty, improve education, rejuvenate cities, and protect the environment. In a January 1966 letter to the administrator of the NCTA, President Johnson urged that the transit system for the Nation's Capital be attractive, by combining utility with good urban design, and serve as a model to other cities in decay.

### 9.4.2 Metro Design Team

In January 1966, NCTA hired a Chicago engineering firm, De Leuw Cather & Company as the consultant for conceptual engineering. In March 1966, after soliciting proposals to a group of architectural firms, architectural firm Harry Weese & Associates was hired to assist the engineering firm with design. The design team also included graphic designer Massimo Vignelli and lighting expert William Lam.

After an international tour of cities observing their transit systems, Weese's team concluded there were three basic types of transit systems: utilitarian, commercial, and public. Weese preferred that the Washington system be a public type, with the spaces treated with dignity and elegance. While Weese originally wanted the stations to have large open spaces with vaulted ceilings, De Leuw Cather and the NCTA pushed for more economical flat ceilings and exposed rock tunnel walls. But in making further

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<sup>216</sup> Topher Mathews, "DC begins removing old streetcar tracks., article dated June 7, 2011, (accessed November 14, 2016), available: <http://greatergreaterwashington.org/post/10775/dc-begins-removing-old-streetcar-tracks/>.

presentations to the Commission of Fine Arts (CFA) in 1967, the Commission suggested finished walls and a vaulted ceiling, which reinvigorated Weese's original design concept.

In February 1967, the Washington Metropolitan Area Transit Authority (WMATA) was created, and it absorbed the last of the NCTA's staff. At about the same time Weese was negotiating with the CFA, WMATA was defining the layout of the future system. WMATA finalized the ARS of 98 miles, and Congress approved it in March 1968.

WMATA moved forward with the implementation of Weese's CFA-approved design. In December 1969, groundbreaking took place at Judiciary Square, site of the current Red Line station. The initial five-mile segment of Metro finally opened in March 1976, and the design was well received. From 1976 to 2001, WMATA made slight adjustments to the original system plans. On January 13, 2001, WMATA opened the five-station, 6.5-mile Green Line segment to Branch Avenue in Washington, D.C., thereby completing all the lines of the originally planned Metrorail System in the ARS.<sup>217,218</sup> Growth of the Metrorail System continued past the original planned system with the extension of the Blue Line to Largo Town Center in Maryland (opened on December 18, 2004), the in-fill station along the Red Line at New York Avenue and Gallaudet University (opened on November 20, 2004), and the extension to Dulles Airport being constructed in two phases (phase 1 opened on July 26, 2014).<sup>219</sup>

### **9.4.3 Architectural Significance**

Weese preferred that the Metrorail System be simple, relate to the surface, and reflect the L'Enfant Plan by paying close attention to the natural topography. Weese used public parks in the L'Enfant Plan as places to accommodate broader turns and used soft earth tunneling under park areas to minimize traffic disruption and avoid demolition of existing buildings.

Brutalism, a subset of Modernism that primarily used concrete materials, was the design system employed by Weese for the station interiors. Following the ideals of the Great Society, the interiors of the stations bring both beauty and function to an urban area (Figure 9-1).

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<sup>217</sup> WMATA, "Metro History," (accessed February 2, 2017), available: <https://www.wmata.com/about/upload/history.pdf>.

<sup>218</sup> Schrag, Zachary M. "Building the Washington Metro: An Online Exhibit," (accessed February 2, 2017), available: <http://chnm.gmu.edu/metro/index.html>.

<sup>219</sup> Wikipedia Contributors, "Washington Metro," (accessed February 2, 2017), available: [https://en.wikipedia.org/wiki/Washington\\_Metro](https://en.wikipedia.org/wiki/Washington_Metro).



*Source: DC Public Library, and WMATA draft historic context statement.*

**Figure 9-1.**  
**Rendering of a Metro Station in 1967.**

## **9.5 Historic Properties**

Because groundbreaking for construction did not occur until 1969, the Washington Metro system is not yet 50 years of age. To be considered eligible for the National Register of Historic Places, an element constructed within the previous 50 years would have to meet Criteria Consideration G, having exceptional importance.

# 10. Conclusions

## 10.1 Summary Findings

On a national level, the contexts related to rail transit tend to break down within major time periods associated with technological advances as well as private versus public funding, essentially as follows:

- Early Period (19<sup>th</sup> Century - Early 20<sup>th</sup> Century)
- Expansion (1910s - 1930)
- Depression Era (1929 - 1941)
- World War II (1941 - 1945)
- Post World War II (Late 1940s - 1970s)
- UMTA/Heavy Rail/Light Rail Era (1960s - 1980s)
- Discretionary Funding Program (1990s - present)

For each of the transit systems studied (Boston, Chicago, New Orleans, New York, Philadelphia, San Francisco, and Washington D.C.), the localized contexts generally followed these major time periods, but the specific contextual themes and periods of significance for technological advances varied. Individual components of the transit systems in each locality may have already been listed on the National Register, but New York City is the only one that has completed a system-wide evaluation.

## 10.2 System-Wide Evaluations

In 2004, the New York State Office of Parks, Recreation & Historic Preservation prepared a National Register Multiple Property Documentation Form (MPDF) for *The Historic Resources of the New York City Subway System* (Attachment A). This MPDF may prove as a useful template for the evaluation of transit systems in other localities, including:

- Associated historic contexts
- Associated property types
  - Stations
  - Substations
  - Tunnels
  - Signal Towers
  - Shops and Yards
  - Rolling Stock

- Other Resources
- Registration Requirements
- Registration Thresholds
- Identification and Evaluation Methods
- Supplemental Materials

At present, WMATA is conducting a study of the Washington, D.C. area transit system to evaluate its historic context. This study, when completed, may serve as a useful template for other agencies to evaluate transit properties that may have achieved significance within the past 50 years.

## 10.3 Examples with Particular Importance

Some examples of components of local transit systems that have particular importance include, but are not limited to, the following:

- The significance of a transit system to the development and character of a City is evidenced by the
  - Cable car system in San Francisco,
  - The Elevated Loop in Chicago, and
  - IRT Broadway Line Viaduct (Manhattan Valley Viaduct) in New York City;
- Architectural significance of public spaces in the rail transit system such as stations, are evident in
  - Boston,
  - New York,
  - Philadelphia, and
  - Washington D.C.;
- Individual lines may have particular significance, such as the
  - St. Charles Streetcar Line in New Orleans, which is a National Historic Landmark and is recognized as the world's oldest continuously operating streetcar line;
- In Boston, a historic cattle pass is recognized as a historic property; and
- The Ferry Building in San Francisco was primarily water transportation-oriented (however, it was a major hub for the City's streetcars and cable cars to drop-off and pick-up transit passengers who also used the ferry).

Although some known historic properties are identified at the end of each localized context, it should be recognized that this is not a complete list for these major cities. There are likely to be significant transit properties in these, and in other major cities. For example, the Denver Rapid Transit District and Los Angeles County Metropolitan Transportation Authority have each become owners of their respective city's

railroad Union Station and are using them as transit hubs. In another example, the Dallas Area Rapid Transit District acquired and has rehabilitated Monroe Shops, a former Interurban shop building.

## **10.4 Issues Encountered**

The literature and online sources are very helpful, but they do not replace the value of a field survey or knowledgeable stakeholder input to identify extant elements, including whether those elements represent an important context and whether they possess integrity.

## **10.5 Recommendations**

Several themes emerged that may help evaluate significance in other localities. For example:

- In New Orleans, associations with civil rights were identified;
- In New Orleans and Philadelphia, associations with labor strikes over worker integration were identified;
- In San Francisco, the transition from cable to electric power was an important theme, and the preservation of the cable lines has been a key defining feature of that City's tourism market; and
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- Figure 2-14 Thompson, Joe. Sprague Electric Railway Car, Richmond, Virginia Electric Railway. Digital image. Selected Articles From Manufacturer and Builder 1885-1889. N.p., n.d. Web. 21 June 2016.
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- Figure 2-21 *1918 Autobus San Francisco Municipal Railway*. Digital image. *San Francisco Public Works*. City & County of San Francisco, n.d. Web. 23 June 2016.
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2. Worldcat (OCLC access to 10,000 library collections worldwide): <https://www.worldcat.org/>
3. DOT Headquarters and Volpe Center Libraries:  
<https://d10090.eos-intl.net/D10090/NTL/Index.aspx>

## 12.2 Other Online Repositories

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<http://ntl.bts.gov/tldir/>
2. Northwestern University Transportation Library:  
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3. UC Berkeley Institute of Transportation Studies Library: <http://www.lib.berkeley.edu/libraries/its-library>
4. Smithsonian Institution – American on the Move:  
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18. The American Planning Association – Knowledge Center: <https://www.planning.org/library/>
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2. Electric Railway Journal:  
<http://archive.org/search.php?query=Electric%20Railway%20Journal%20AND%20collection%3Aamericana>
3. The Street Railway Journal: <http://library.si.edu/digital-library/book/street-railway-journal>
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# Attachment A

## **The Historic Resources of the New York City Subway System**

A National Register Multiple Property Documentation Form (MPDF) prepared in 2004 by the New York State Office of Parks, Recreation & Historic Preservation.