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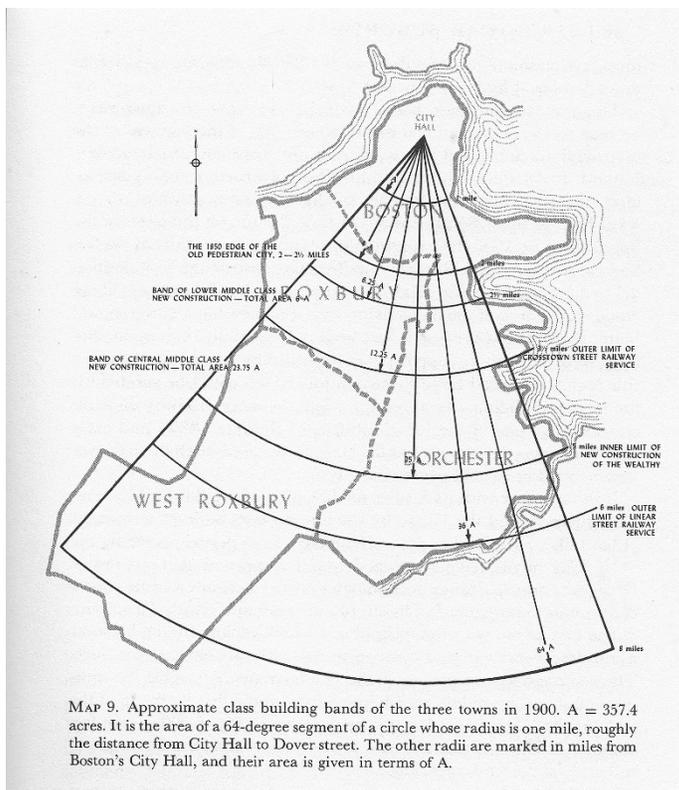
## Public Transportation growth, 1827-1923

*“For most of recorded history a majority of people worked at home. Most households produced food, shelter, and clothing under their own roofs, and merchants, blacksmiths, crafts people, and other who offered services for sale did so at their homes. This was true in the United States until well into the nineteenth century...”<sup>1</sup>*

U.S. public transportation began when America’s major cities’ growth as trading and manufacturing centers forced dispersion of dwellings beyond walking distances. In the early 1800s, workers could only walk to their jobs, since there was no public transportation, and this limited a city's growth to about two miles from its center — a little less than an hour’s walk in busy city traffic. This was not a problem in the early part of the 19<sup>th</sup> century since cities were so small.

However, as cities grew, the development of public transportation allowed the distance that one could travel in an hour to gradually lengthen to three miles with the introduction of the horse-drawn omnibus, then four miles with the horse-car on rail, and six miles with the electric streetcar.

By 1900, with [Boston’s] elevated and rapid transit still to be built, the outer limits of convenient street railway commuting stood about 6 miles from City Hall. By transferring one could travel 10 miles and even farther, but good linear service, with cars at ten- to fifteen-minute intervals, extended only 6 miles out. In 1900 a 6-mile trip, with a short walk to the car and the frequent stops of an ordinary surface ride, meant an hour's ride from home to office.<sup>2</sup>



in one hour and this has been a constant throughout the whole development of public

1 Scharff, Virginia. *Gender, Electricity, and Automobility* in Wachs, Martin & Crawford, Margaret, eds. *The Car and the City: The Automobile, the Built Environment, and Daily Urban Life*. University of Michigan Press. 1992. p. 88.

2 Warner, Sam Bass Jr. *Streetcar Suburbs: The Process of Growth in Boston, 1870-1900*. Harvard University Press. 1978. p. 52.

transportation.<sup>3</sup> Even today, fewer than five percent of U.S. workers commute more than one hour each way.<sup>4</sup>

A result of this extension of public transportation was a spillover of the then increasingly more congested city population to the suburbs. The ability of public transportation to shift population to the suburbs was seen at the time as a major public benefit because it relieved population pressures and provided a healthier environment for the suburbs' new inhabitants. Today, instead of dispersion, we are more likely to use the pejorative, *sprawl*.

The forces that led to the mid-19th century development of urban public transportation were principally:

- Urban population growth.
- Growth in personal incomes.
- The desire for better housing.
- Changes in transportation technology.

### **Urban population growth**

In 1810, the U.S. total urban population was 525,000 and by 1923 would grow to 54.3 million.<sup>5</sup> At the start, the labor force was 74 percent farm and 26 percent non-farm. Only 40 years later it was 55 percent farm and 45 percent non-farm. By 1900, farm work would be only 40 percent and non-farm 60 percent, with the primary growth being in manufacturing and trade.<sup>6</sup>

Non-farm work lay, for the most part, in the core of the compact towns and cities of the time. Increasing population densities and incomes led to a desire for better homes. The only areas available were the less expensive lands at the city's edge. What constrained people from moving there was the time and expense of traveling to work.

However, incomes grew rapidly during this period and provided the incentive to develop new transportation technologies for commuting longer distances.

In the early 1800's factories and warehouses had to be physically close to navigable waters to take advantage of lower transportation costs and the availability of waterpower to drive machinery. Land transportation was then so expensive that moving goods 30 miles overland by wagon cost as much as shipping the same amount of goods to Europe by sailing ship.<sup>7</sup>

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3 Warner, Sam Bass Jr. *Streetcar Suburbs: The Process of Growth in Boston, 1870-1900*. Harvard University Press. 1978. See also Hoyt, Homer. *The Structure and Growth of Residential Neighborhoods in American Cities*. U.S. Federal Housing Administration. Washington. 1939. HD7293.A5 & FL2.2:R31. p 101. See also Levy, Mark. *Transportation—A Fundamental of Land Values*. *Electric Railway Journal* 75, no. 12. November 1931. p. 625. Also Maltbie, Milo. *Transportation and City Planning*. Proceedings of the 5th National Conference on City Planning. Chicago. May, 1913. p. 108.

4 *Travel Behavior in the 90's*. Office of Highway Information Management, Federal Highways Administration, U.S. Dept. of Transportation. July 1992. Also Pisarski, Alan E. *Commuting in America: A National Report on Commuting Patterns and Trends*. Eno Foundation for Transportation, Inc. 1987. pp. 57-60.

5 <https://www.census.gov/population/censusdata/table-4.pdf>

6 *Labor Force and Employment, 1800—1960*. Stanley Lebergott. Wesleyan University. <http://www.nber.org/chapters/c1567.pdf>

7 Taylor, George Rogers. *The Transportation Revolution, 1815-1860*. Rinehart. 1951. pp. 132-152.

The need for direct communication between businesses also limited their dispersion. Sellers had to call on buyers, the transfer of goods had to take place, and the paperwork discussed and completed. Often bankers and lawyers needed to be consulted in the transaction, and post-sale problems attended to. The lack of remote telecommunication of any kind — even telegraph — meant that close physical contact was essential.

In the early 1800's cities worldwide were small and very dense. Some idea of how small U.S. cities were initially, and how fast they grew, may be seen from the adjacent population table.

City	1800	1850	1900	1950
New York	60,515	515,547	3,347,202	7,891,957
Chicago	---	29,963	1,698,575	3,620,962
Philadelphia	41,220	121,376	1,293,697	2,071,605
Los Angeles	---	610	102,479	1,970,358
Boston	24,937	136,881	560,892	801,444
Houston	---	2,396	44,633	596,163
San Francisco	---	34,776	342,782	775,357
Atlanta	---	2,572	89,872	331,314
Portland	---	821	90,426	373,628
Honolulu	---	14,484	39,306	248,034

New York was the largest and fastest growing city in the U.S. and logically it would be the first to develop public transportation. It grew faster than the other cities primarily because of its great port facilities and the opening of the 363-mile Erie Canal in 1825.<sup>8</sup> New York's position as the final terminus of the Erie Canal and with Manhattan surrounded by sheltered deep water made it a natural to take the lead in

economic activity among U.S. cities.<sup>9</sup> From then on the City averaged a 50 percent growth rate per decade through the end of the century.

The influx of the 19th century immigrants combined with a lack of affordable public transportation led to very high population densities with multistory factories, warehouses and housing. New York's peak population density in the late 1800's was the highest the world had seen since the packed city of ancient Rome.

The growth of the three largest U.S. cities is particularly interesting because of its rapidity. However, most workers could not live further than two miles from their workplace because they could not afford transportation. Thus, in the early part of our period these cities larger populations could only be achieved by increasing their density.

The author suggests that you note the page number for this table since it will be useful that you refer to it at various times later in the book.

In 1830 New York only extended for the first two miles of the island of Manhattan.<sup>10</sup> As with most of the larger cities of the time, at the center were the public buildings, the churches, and the homes of the well to do. Next were the homes of merchants and leading craftsmen, and further out were the homes of lesser skilled workers. Initially, there was a

<sup>8</sup> Ernst, Robert. *Immigrant Life in New York City, 1825-1863*. King's Crown Press. 1949. pp. 14-15.

<sup>9</sup> Pratt, Edward Ewing. *Industrial Causes of Congestion of Population in New York City*. Reprinted as Columbia University Studies, Social Science #109 of 1911. AMS Press, New York. 1968. p. 13

<sup>10</sup> Kouwenhoven, John A. *The Columbia Historical Portrait of New York*. Doubleday & Co. 1953. pp. 104-5.

tendency for poor people to live at the furthest ring of the city, not at its core.<sup>11</sup> Over time, particularly in New York and the larger cities, that would change and the poor would live near the center.

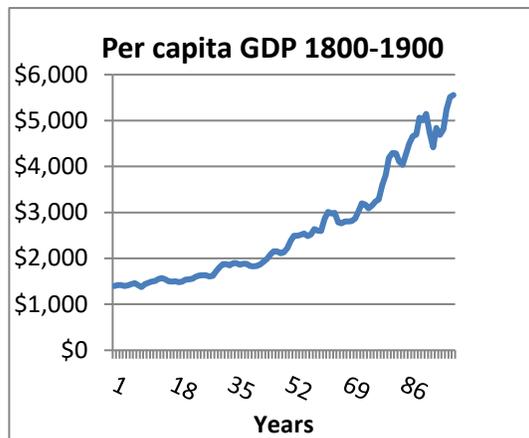
By 1850 New York had still not expanded much above 14<sup>th</sup> Street even though its population had grown seven-fold since the beginning of the century. As the city became more dense and noisy the wealthy migrated out to the northernmost part of the city.

### Growth in Personal Incomes in the 19th Century

The 19th century, particularly the later part, was a time of zero net inflation, declining transportation prices<sup>12</sup> and rising real wages<sup>13</sup>. Whereas real incomes had doubled in the 67 years from 1800, it only took the next 33 years for it to double again.<sup>14</sup>

In short, the average U.S. worker had quadrupled their living standards during this 100-year period with much sharper growth at the end of the period.

In 1850, all U.S. city workers walked to work because they had little left over after providing for the bare necessities of food, clothing and shelter. By 1900, some of the better-paid were enjoying the luxury of a streetcar ride home.



During the last 20 years of the century, a continuing increase in city populations combined with increases in discretionary spending resulted in a rapid development of the nation's sports and entertainment industries.

Baseball, basketball and football all became professional sports and stadiums were built to house them, cycling became a craze, vaudeville began in Boston, Emile Berliner invented the gramophone, Edison showed his first movie, the first Ferris Wheel opened, and they ran the first Boston Marathon, the

first Kentucky Derby and P.T. Barnum invented the three ring circus.<sup>15</sup> And, of course, to visit these attractions one would get there by public transportation.

In addition, as a further indication of growing incomes, while only 13 American magazines were published in the United States in 1800, by 1900, more than 3,500 magazines were published, including about 1,500 weekly magazines and in excess of 2,000 monthlies and quarterlies. Whatever you can think of today in entertainment had its roots in the last part of the 19<sup>th</sup> century.

<sup>11</sup> Warner, Jr., Sam B. *If All the World Were Philadelphia: A Scaffolding for Urban History, 1774-1930*. American Historical Review 74. October, 1958. p. 33.

<sup>12</sup> Brady, Dorothy S. *Relative Prices in the Nineteenth Century*. Journal of Economic History, June 1964. pp 145-203.

<sup>13</sup> U.S. Dept. Commerce, Bureau of the Census. *Historical Statistics of the U.S.* 1978. pp. xxx

<sup>14</sup> U.S. Historical Statistics. Series 736 & 725.

<sup>15</sup> <http://www.pbs.org/opb/circus/in-the-ring/history-circus/>

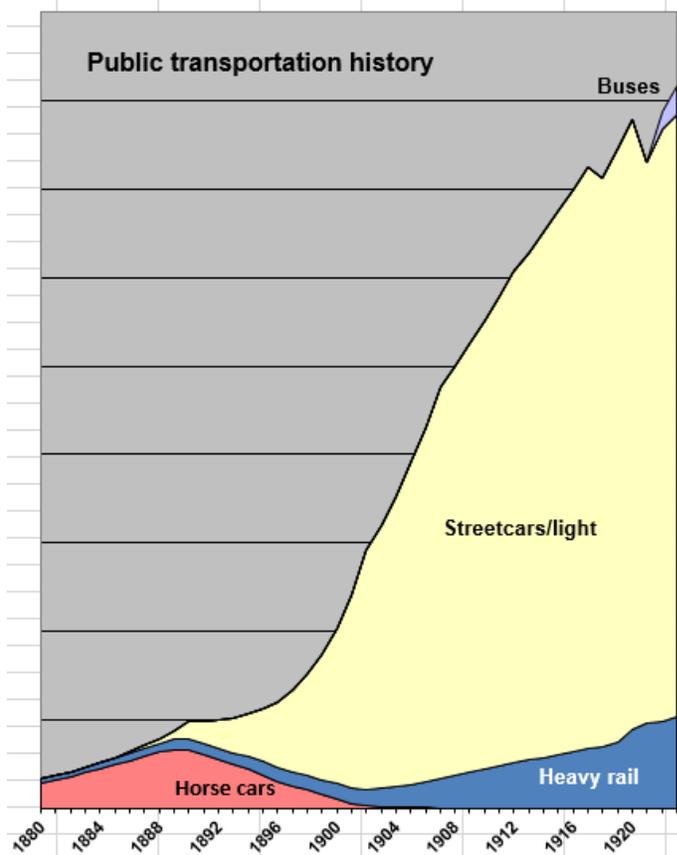
### The Desire for Better Housing

A driving force in the lives of most people is a desire for the largest possible home and lot. This dream has changed over the years with the home becoming more spacious as incomes rose. In 1850 that home was a 1000 square foot two-story home on a three thousand foot lot. By 1900 it had become a 1600 square foot home on a five thousand foot lot. By 1950 the dream was a 2500 square foot home on a 10,000 square foot lot.

One of the primary factors in determining the price of housing is always the size and price of the available land. Generally, land prices decline the farther one is from the city center.

Thus, the affordable home for the upper middle class was at some distance from the center of the city. Therefore, one of the primary concerns among prospective suburbanites in the 19th century was the availability of public transportation.

On the one hand, people wanted to get far from the dirt and grime of the city center to take advantage of less expensive and/or more spacious homes. On the other hand, there were limits to the cost and time of commuting. Fundamentally, a one-hour commute from a city center determined the outer limits of that city. The average worker living halfway



between the city center and the city limits commuted for half an hour. This average commuting time has not changed significantly over the last 150 years.

The development of public transportation resulted in dramatic increases in the value of new suburban properties. Such opportunities involved real estate developers in public transportation throughout its expansion period. In the days before the automobile, public transportation was a public utility as necessary as water and it had to be provided before lots or houses could be sold.

Consequently, many rail lines were installed before the first house was sold. Sometimes the transit company provided it but with the initial expense underwritten by the developer.

## Changes in Public Transportation Technology

Until the 1850's few U.S. cities had any public transportation. The wealthy used carriages; the workers walked. Because workers walked to work, it limited the distance between dwelling and workplace to about two miles, something less than an hour's walk.

The adjacent chart shows the changes nationally between 1860 and 1923.

The horse drawn omnibus was quite common by 1840 and this was followed by the horse-car on street railways, which predominated from 1860 until about 1890 when the electric streetcar took over.

For a short while after 1870, cable cars were thought to be the replacement for horse cars but the electric streetcar proved far less costly.

During this time New York, Philadelphia, Boston and Chicago — the largest U.S. cities — developed elevated rapid transit. But the streetcar became the dominant form of U.S. public transportation until the motor bus won out in the 1930's. These various changes in technology were each typically faster, quieter and less expensive to operate than their predecessors.

### Steam vehicles on the roads

“... the steam road-wagons, which, since 1784, have appeared and reappeared on the scene at intervals of about thirty years; in each instance springing into a brief notoriety, only to vanish by reason of their inherent defects.”<sup>16</sup>

Some mention needs be made of steam on the roads, which while not succeeding in the end, did promise at times to be of importance and does show that entrepreneurs were busily trying everything.

During the 1820-40's a few entrepreneurs experimented with steam driven coaches on the roads.<sup>17</sup> In 1830 Sir Goldsworthy Gurney of Great Britain designed a large stagecoach driven by a steam engine that may have been the first motor-driven bus.<sup>18</sup> However, it blew up the following year.<sup>19</sup>

In 1836 Walter Hancock's steam carriages were put in regular service on the road from Paddington to the City of London. Over 20 weeks, 13,000 passengers were carried on 700 round trips.<sup>20</sup> While convincing of steam's potential the carriages were discontinued for unknown reasons.

Mechanical problems, opposition from landowners together with regulatory issues and fear on the part of the general public appeared to prevent any widespread and continuous use of steam on the roads.

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<sup>16</sup> Krarup, M. C. *Automobile Development*. Outing 37, no. 5. Feb., 1901. p. 548.

<sup>17</sup> Bird, Anthony. *Roads and Vehicles*. London: Longmans, Green. 1969. p. 155.

<sup>18</sup> Wise, David Burgess. *Steam on the Road*. Hamlyn. 1973. p. 10 & 20.

<sup>19</sup> London Times. June 7, 1831.

<sup>20</sup> Wise, David Burgess. *Steam on the Road*. Hamlyn. 1973. pp. 12-13.

Steamers held the land speed record through 1906 and were still used for heavy trucking as late as 1917<sup>21</sup> and for uses on macadam-surfaced roads the last steamroller was manufactured in 1948.<sup>22</sup>

While steam driven cars were active in the U.S. particularly by the Stanley Motor Carriage Company's Stanley Steamers, there is no record of any American attempt to develop steam vehicles for public transportation.

### **The Omnibus**

Fundamentally, it was the kind of service (and only incidentally the type of vehicle) which differed from that previously afforded by the short-stage coach.<sup>23</sup>

There is general agreement about the origin of the word 'omnibus.' In 1826 in the French town of Nantes, a Monsieur Baudry began operating his vehicles and he was taken with the shop sign of a hatter named Omnes which read "*Omnes Omnibus*," Latin for 'everything for everyone.'

Baudry subsequently began service in Paris with an omnibus line called *Les Dames Blanches* (*The White Ladies*) that opened on April 11, 1828 in Paris using the first vehicles that can be reasonably defined as public transportation as we know it.<sup>24</sup> M. Baudry called his vehicle a *voiture omnibus* — a vehicle for all. This was subsequently shortened to *omnibus* and later, plain *bus*.

The following year London's first omnibus appeared followed two years later by New York's first. Considering that London's population was twice that of Paris and ten times that of New York one would expect that the omnibus would have appeared in London first. However, London's regulations favoring the hackney coach prevented its earlier introduction. Only when we consider the hackney carriages, short stages and omnibuses in the aggregate, do we find a reasonable comparison between these three cities.

### **The Omnibus in London**

On July 4, 1829, George Shillibeer, a coach builder who had studied Baudry's Paris operation, introduced in London a 22-passenger omnibus, drawn by three horses, plying the route from the Bank up to the New Road and from thence to the *Yorkshire Stingo*, a public house in Paddington, for a fare of one shilling each way.<sup>25</sup>

Shillibeer was quoted in the Morning Herald of October 1829: "In an omnibus there is no delay in taking up and setting down; no calling at booking offices; no twenty-minutes-waiting at '*The Cellar*'."<sup>26</sup> In short, you got on or off at will and did not have to book in advance.

At the time of their introduction the regulations did not differentiate between short-stage

<sup>21</sup> McShane, Clay. *Down the Asphalt Path*. Columbia University Press. 1994. p. 98.

<sup>22</sup> Wise, David Burgess. *Steam on the Road*. Hamlyn. 1973. p. 32.

<sup>23</sup> Lee, Charles E. *Sources of Bus History*. Journal of Transport History II, no. 3. May 1956. p. 153.

<sup>24</sup> *History of Parisian Transport* from the RATP website: <http://www.ratpinfo.net/histtc.php>

<sup>25</sup> Yorkshire Stingo stood at what is now the SW corner of Lisson Grove North and Marylebone Road. Today, Shillibeer Place is adjacent to it.

<sup>26</sup> Lee, Charles E. *Sources of Bus History*. Journal of Transport History II, no. 3. May 1956. pp. 152-3.

coach lines and omnibuses and this prevented the omnibuses from operating efficiently. Shillibeer pushed for an end to the Hackney Coach monopoly in 1831 urging new rules for their use,

“Omnibii as in Paris ... especially to the middling class of trades-people whose finances cannot admit of the accommodation of a hackney coach and therefore ... lose ... time in walking ...”<sup>27</sup>

On January 5, 1832, the amendments to the Hackney Coach regulations took effect allowing omnibus passengers to board and exit where they wished.

Almost immediately fights began between hackney coach and omnibus drivers. In February, a witness detailed in court “that he had frequently witnessed the blackguard conduct of the hackney drivers towards Shillibeer’s omnibus as it passed.”<sup>28</sup> But in short order the hackney coach drivers accepted that the omnibuses would remain and relatively quickly they became the dominant form of transportation in London.

This led to an overabundance of suppliers, frequently experienced with highly successful new technologies. On September 10th, 1831, the operators on the Paddington-Bank route formed an association with Shillibeer as first chairman. They agreed to a reduction on the number of vehicles plying that route and employed inspectors to see that the omnibuses kept to the agreed schedules.<sup>29</sup> This was the world’s first route association of which we shall hear more in a later chapter.

By 1834, 376 omnibuses were licensed. And while the fare was much lower for the omnibus rider the sixpence fare was still too expensive for any but the middle classes. The *Penny Magazine*, of March 1837, found that the people using the short stages and omnibuses were those with incomes of £150-£600 annually, or three to twelve times the average wage of a skilled tradesman.<sup>30</sup> Even then a sixpence daily one-way fare amounted to nearly ten percent of income for those earning £150 annually if used for daily commuting.

By 1838, there were 625 omnibuses operating in London while the 416 short stages operating in 1825 had declined to 105.<sup>31</sup> By 1850, omnibuses in service increase to 1,300 and increased their average passenger capacity to 22.

Thus, in London in the 1830s, omnibuses had replaced many of the short stage line vehicles, although in aggregate there was still a significant increase in vehicles because of the lower omnibus fares.<sup>32</sup>

### **The Omnibus in the United States**

In the U.S., true publicly accessible transportation started in 1827 in New York City when Abraham Brower introduced a single twelve-seat horse-drawn vehicle he called,

<sup>27</sup> Quoted in Barker, T.C. & M. Roberts. *A History of London Transport, I*. George Allen & Unwin. 1963. p. 23.

<sup>28</sup> London Times. *Police*. 2/17/1832. p. 4. “A shillibeer driver hits a coach driver, case dismissed. When cabs introduced, coach drivers complained and now with the introduction of omnibuses they are complaining.” ST 139

<sup>29</sup> Dunbar, Charles S. *Buses, Trolleys and Trains*. Paul Hamlyn. 1967. p. 19.

<sup>30</sup> *London Transport*, Vol 1, p. 36.

<sup>31</sup> *London Transport*, Vol. 1, Appendix 1 & p. 37.

<sup>32</sup> Barker, T.C. and Robbins, M. *A History of London Transport, Vol. I*. George Allen & Unwin Ltd. 1963. p. 26.

*The Accommodation*, built by New York coachbuilder John Stephenson. It was different from a stagecoach in that it was designed to pick up and drop off passengers over a shorter distance — the length of Bleeker Street to Broadway. The fare was 12½ cents, regardless of distance.<sup>33</sup>

Brower's *Accommodation* was so expensive for ordinary people that it was two years before there was sufficient demand for him to be able to build and operate a second vehicle. In 1829 Brower had Stephenson build him another vehicle, the *Sociable*, with a rear entrance and seats running lengthwise.<sup>34</sup>



In 1831, Brower had Stephenson build the first American vehicle that was called an omnibus and this became, with minor modification over time, for many years the major form of public transportation in New York.<sup>35</sup> Other operators soon introduced omnibuses in New York with seats running lengthwise and rear entrances. Their exteriors were “adorned with fantastic figures ... in gorgeous colors” with names such as *Lady Clinton*, *Lady Washington*, *Phoenix*, and *Blue Bird*.<sup>36</sup>

The fare for the two miles from Battery to Bond Street was 12½ cents. Since the average daily wage of the time was \$1.00 for laborers and \$1.73 for artisans it meant that

<sup>33</sup> Stratton, Ezra. M. *The World on Wheels*. New York, by author. 1878. p. 438.

<sup>34</sup> Stratton, Ezra. M. *The World on Wheels*. New York, by author. 1878. pp. 431-3.

<sup>35</sup> Stratton, Ezra. M. *The World on Wheels*. New York, by author. 1878. pp. 437-8.

<sup>36</sup> Ringwalt, J.L. *Development of Transportation Systems in the United States*. Railway World Office. 1888. p. 64

commuting would consumed 14-25 percent of their wages. Commuting by omnibus was therefore, only for the affluent.

Fares on the omnibus declined to 5¢ over the next thirty years as competition increased and operators became more efficient. Lower fares combined with rising incomes made the omnibus more affordable and ridership grew steadily.

New York had 255 omnibuses in 1846 and 588 by 1856.<sup>37</sup> By 1860 the average time between vehicles on Broadway was 15 seconds. New York was not alone as Boston also began service in 1829, Philadelphia in 1831 and Baltimore in 1844.

A contemporary New York physician described his fellow passengers as,  
“... a load of men, women and children, in silks and rags — bankers and brokers, tinkers and tailors, laborers and lawyers ...”<sup>38</sup>

And the noise he described as,  
...the continual rumbling of ponderous wheels on flinty tracks — the clattering of legions of iron-bound hoofs, as though rushing to battle — the metallic rattling of bars of iron and roads of steel on the dray-man's cart — the gong-like, tornado-like, oceanic, unceasing roar and tumult of this bustling street...<sup>39</sup>

And the traffic grew to where,  
uptown-bound traffic congealed into a solid mass and you could sing as loud as you wanted in the heavy dense uninterrupted street bass of Broadway.<sup>40</sup>

While the horsecar replaced the omnibus in most places by the 1880's, omnibuses continued to operate for many years afterwards where street railways were not allowed such as along Fifth Avenue in New York.

Street railways were not welcome in fashionable neighborhoods either in London, Paris or New York. Affluent residents claimed they would reduce the value of their property and make the finer shops less exclusive.<sup>41</sup> In London the authorities had forbidden the use of street railways anywhere in the center of the City.

The primary transportation in 1905 in London's exclusive areas was the horse-drawn omnibus a vehicle which had largely disappeared in the U.S. by that time.

In 1900, London's largest omnibus company, the London General Omnibus Company, still owned 17,000 horses and 1,400 omnibuses and the Thomas Tilling Company owned 7,000 horses and 500 vehicles. In London, the prohibition allowed the omnibus to have business not only in central London but also in the suburbs for those people who had to cross central London since they did not need to change vehicles.

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<sup>37</sup> Taylor, George Rogers. *Beginning of Mass Transportation in Urban America, Part I*. Smithsonian Journal of History 1. Summer 1966. p. 45. Taken from the Manual of the Corporation of the City of New York.

<sup>38</sup> Ross, Joel H., M.D. *What I Saw In New York or A Bird's Eye View of City Life..* Derby & Miller, Auburn, NY. 1852. p. 170.

<sup>39</sup> Ross, Joel H., M.D. *What I Saw In New York*. Derby & Miller, Auburn, NY. 1851. p. 179.

<sup>40</sup> Morris, Lloyd. *Incredible New York, 1850-1950*. Random House. 1951.p. 9.

<sup>41</sup> Barker, T.C. and Robbins, Michael. *A History of London Transport*, Vol. I. George Allen & Unwin Ltd. 1963. p. 179 & p. 195.

The last horse-drawn omnibus finally left London's streets in 1911 and in New York's a little later — and then only when after the motor bus had proved itself.

The exclusion of surface rail from central London was, therefore, the driving force in the development of the motor bus much earlier than was the case in the U.S. except in New York where a similar situation existed, but only along Fifth Avenue.

## Ferries

Ferries were more important in the very early days before the bridges and tunnels were built in New York linking both sides of Manhattan to Brooklyn on one side and New Jersey on the other.

Ferries were Manhattan's earliest commuting method and for some years may well have carried more commuters than all the others combined.

Ferry service began with a Royal Charter in 1700 but it was not until the early 1800s and Manhattan's spectacular growth that Brooklyn and Jersey City became attractive as homes for Manhattan workers.

In 1855, an estimated 7 million people a year used the Jersey City ferries. They did not all come from Jersey City which at that time had a population of fewer than 10,000. The New Jersey Railroad brought passengers from Philadelphia and elsewhere to its Jersey City terminal. Soon, 850-ton ferries, carrying 2,000 passengers each, as well as horses, wagons and carriages, crossed the Hudson every 10 minutes, 15 minutes at night.



*Ferry Fulton ca. 1890*

The traffic across the East River was even greater and more frequent. A fleet of six ferries combined for 1,250 ferry crossings a day from Williamsburg to Peck Slip every 10 minutes and every five minutes to Grand Street.

In the year 1860, the East River ferries carried nearly 33 million passengers. That would increase to 50 million a year by 1870. Especially remarkable was Brooklyn, which in 1860 had a population of fewer than 300,000, a third of whom it was estimated commuted to New York City each day.

That all changed with first, the Brooklyn Bridge in 1883 and then a series of other bridges over the East River. Then in the early 1900s a series of tunnels were built under the Hudson River. The Uptown and Downtown tube tunnels brought the trains to Manhattan and the Holland tunnel brought the bus, truck and automobiles.

Thus, the Manhattan ferries peaked in 1927, and today, with the exception of the free Staten Island ferry, and some small operators, there is very little ferry service left.

Passenger ferries have developed elsewhere in the U.S. particularly in Seattle's Puget Sound, and to a lesser extent in the San Francisco Bay Area

### **Commuter rail**

Commuter rail is a service provided by passenger trains operating between city centers and suburbs and beyond to commuter towns. The term *commuter* stems from the practice of the early steam railroads to commute the fares of regular riders. Railroads issued commutation tickets and *commuters* were those who used them.

Beginning in the 1830s steam train lines were built with terminal stations at or close to the edge of the largest cities. Typically both costs and regulation prohibited building closer to city centers. For example, all during the 1800s the closest train station to the center of New York was Central Station at 42nd Street, four miles from Wall Street. In London, the rail stations form a starfish pattern around the built up extent of the London that existed in the mid-1800's as rail was developing.

While it was not their primary business, the railway companies offered commuter service. Economics would only allow a stop every 1½ miles or so mainly because of the cost and operation of the necessary rail stations. This led to new villages growing up within walking distance around the rail stations sometimes forming a string-of-pearls effect. Most of the stations were within ten miles of downtown.<sup>42</sup>

The first of such lines was the New York and Harlem Railroad that opened in downtown New York City in 1832 with the eventual intent to reach the Harlem River. The permitted rate of expansion of the line and the limitations placed on it give us an indication of the burgeoning growth at that time of not only New York but all U.S. cities.

The line opened offering service between Prince and 23rd Streets just two miles apart, with locomotives down to 14th Street and below that regulation required that the line operate horsecars so as not to disturb local residents. In the ensuing few years, as the locomotive rail lineage moved further uptown to meet residential growth, the horsecar regulatory requirement also moved up, first to 23<sup>rd</sup> street, then 32<sup>nd</sup> Street, and finally in 1850 to 42<sup>nd</sup> Street, where it remained. By 1850, the line expanded in stages both south to City Hall and 127 miles north to Chatham where it met other lines and provided service through to Albany, the State Capitol.

By 1835 Boston had eight commuter rail lines. They offered low-priced commutation tickets and at no time did they ever cover their costs. By 1848 there were 83 commuter stations within 15 miles of downtown Boston.

It is difficult to determine the volume of urban transportation the steam trains provided because operators commingled passenger counts with those of their longer distance passengers. In London the passenger volume was greater because the government required railway companies to subsidize urban commuters. In the U.S. however, the commuter rail was usually for the more affluent.

In spite of the widespread tendency to think of commuter rail as cheap rail transit, experience throughout the world demonstrates that the notion that commuter rail services

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<sup>42</sup> Kennedy, Charles J. *Commuter Services in the Boston Area, 1835-1860*. Business History Review. xxx

can provide low-cost commuter transportation is largely illusory. Few, if any, examples of unsubsidized commuter rail operations exist, and in most instances the subsidies for commuter rail operations per passenger carried are enormous, typically exceeding those required for even light and heavy rail transit.<sup>43</sup>

### 1850-1885, the horsecar takes over

In 1832, the first U.S. horsecars — horse drawn cars on street railways — ran on the New York & Harlem Railroad as a regulatory required adjunct to its locomotives in

New York City		
Year	Population	Growth
1830	202,300	63.5%
1840	312,710	54.6%
1850	515,547	64.9%
1860	813,669	57.8%
1870	942,292	15.8%
1880	1,206,299	28.0%
1890	1,515,301	25.6%
1900	3,437,202	126.8%
1910	4,766,883	38.7%
1920	5,620,048	17.9%
1930	6,930,446	23.3%

Manhattan. New Orleans followed with a line the same year but they may both have been a little premature because there was little further growth of the U.S. horse-car rail lines until the 1850's.

New York City grew 150 percent from 1830 to 1850<sup>44</sup> and this generated a major increase in horsecar lines. During the 1850s, six horsecar companies were established along the major avenues and in the subsequent 15 years another 12 companies.<sup>45</sup> As these companies gained business it was largely at the expense of the Omnibus companies.

The economics of the horsecar replacing the omnibus were, regulations aside, that the smoother ride was preferred by passengers, it took one-third to one-half of the horse power to pull the same weight using rail, two

horses were used to carry a passenger load that was as much as four times that of the omnibus pulled by a single horse. The net result was lower fares as long as there was sufficient business on the route to justify the larger vehicle.

From the 1850s on,<sup>46</sup> horsecars expanded rapidly. The car on rail needed a third to a half the horsepower (literally) to carry the same load. For example, an innovative French horsecar line was convertible from flanged iron wheels running on rails to regular wheels when the rail line ceased as it entered central Paris. However, as it did so it had to add a third horse to pull the same load.<sup>47</sup>

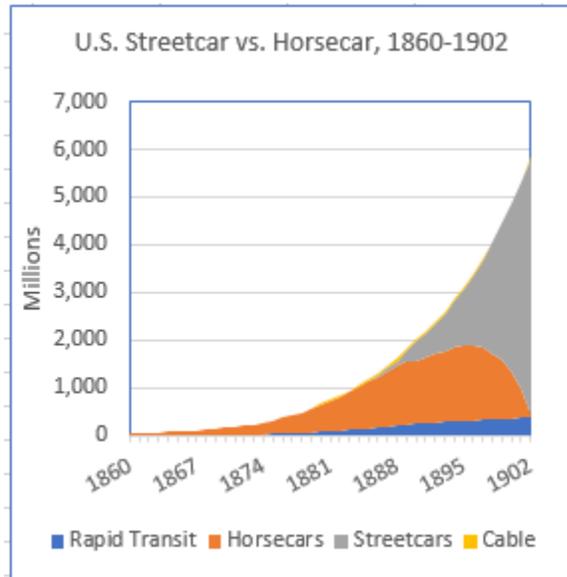
<sup>43</sup> U.S. Dept. of Transportation. *Increasing the Productivity of the Nation's Urban Transportation Infrastructure*. January 1992. (DOT-T-92-17).

<sup>44</sup> <https://www.census.gov/library/working-papers/1998/demo/POP-twps0027.html>

<sup>45</sup> Carman, Harry James. *The Street Surface Railway Franchises of New York City*. Columbia University Studies in the Social Sciences, 1919. Reprinted by AMS Press, New York. 1969.

<sup>46</sup> In New York City, the New York & Harlem Railroad operated the first horsecar charter from Pine Street to 14th Street extending the line northward in subsequent years. McShane, Clay & Joel A. Tarr. *Horse in the City: Living Machines in the Nineteenth Century*. John Hopkins University Press. 2007.

<sup>47</sup> Dunbar, Charles S. *Buses, Trolleys and Trains*. Paul Hamlyn. 1967. p. 22.



Following New York's lead, the other large cities launched horsecar line in the 1850s. Boston in 1856,<sup>48</sup> Philadelphia in 1858,<sup>49</sup> and Chicago in 1859.<sup>50</sup> From very little mileage in 1850 there were over 400 miles of track by 1860.<sup>51</sup>

Since the cost of horses and their maintenance was a major part of the total expense, they proved less expensive to operate than omnibuses. This led to lower fares compared to the omnibus companies and the displacement of the omnibus by the horse-car. The difference was simply that the horse-car used flanged iron wheels and ran on iron rails.<sup>52</sup> This offered a much smoother, quieter and faster ride

than the omnibus with its iron-shod wooden wheels rolling over cobblestone streets.

By 1880, there were no more than 140 omnibuses left in New York, down from 588 in 1860. Many of these remaining omnibuses were operating on Fifth Avenue, from which railed vehicles were banned.

While the term horsecar was used generically, a great use was made of mules especially in the hotter climates. Generally, mules stood the heat better, and horses the cold. Horses



being stronger were better for dense traffic and greater inclines although they were more expensive to keep than mules.<sup>53</sup>

The faster speed of the horse car on rail pushed the outer limits of a commute out to four miles from the three miles that it had been using an omnibus. The addition of a new one-mile outer ring meant that the new area suitable for suburban use nearly doubled in size.

48 *The Hub's Metropolis: Greater Boston's Development from Railroad Suburbs to Smart Growth*. By James C. O'Connell. MIT Press. p. 5.

49 *Borderland: Origins of the American Suburb, 1820-1939*. By John R. Stilgoe .P. 131.

50 *Inland Architect*, Vol. 29, 1985. Inland Architect Press. p. 4

51 Ringwalt, J.L. *Development of Transportation Systems in the United States*. Railway World Office. 1888. p. 167

52 Within a few years the plunging cost so steel would be the preferable material for rail lines. Brooke, David. *The advent of the steel rail, 1857-1914*. The Journal of Transport History 7, no. 1. March 1986. pp. 18-31.

53 Schmidt, Emerson p. *Industrial Relations in Urban Transportation*. University of Minnesota Press. 1937. p. 8.

However, the new property could not be developed until the horse car lines were actually in place since they were the only way to get to work. They were as essential to real estate development as any other utility. Thus, developers invested in public transportation throughout the initial expansion period into the early 1900's. At times, they either owned the companies or subsidized construction.

However, in the 1850's the horse-car was still not affordable as a commuting vehicle for the average worker. New York City, as an example, was still quite small. Its 500,000 population was densely packed into a 3-mile length of Manhattan with only the affluent living farther out since they could afford the horse and carriage necessary for the journey.

By the 1880's, throughout the U.S. there were a total of 100,000 horses and mules pulling 18,000 cars on 3,000 miles of track<sup>54</sup>. In 1882, there were a total of 412 different horse-car lines in the U.S. and Canada.

Fifth Avenue omnibuses reached up to 42nd or the horsecars on 3<sup>rd</sup>, 6<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup>, or Broadway which all ran up to 59th St. in the late 1860s.<sup>55</sup>

In 1880 New York City removed fifteen thousand dead horses from its streets, and as late as 1912 Chicago carted away nearly ten thousand horse carcasses.<sup>56</sup> In New York City alone, the city government had had to remove 1,250 tons of manure, 60,000 gallons of urine and 40 dead horses daily.<sup>57</sup> The removal of thousand tons of horse manure from the streets daily and together with urine were a major sanitary problem for the larger cities.

However, no one realized the impact the electric streetcar was about to have. The horse-car was at its peak and would shortly be replaced by the streetcar.

### **Cable cars**

Cable cars also played a significant but brief role during the 1873-1890 period. Essentially, they provided an interlude of horse-less travel before the introduction of the electric streetcar. They are now used solely in San Francisco where they are charming but highly expensive to operate.

Cable cars are propelled by a moving one-inch diameter wire cable that is threaded through city streets in a conduit about 9" below street level. A steam-driven winch drives the cable through the conduit at a continuous steady speed of about 8 mph. The car operator uses a grabbing device on the car to hold the cable that then pulls the car along. The operator stops by letting go the cable and applying brakes.

Cable cars were a great improvement over the horse-cars. They were much faster and far better at climbing steep grades. They were introduced to hilly San Francisco in 1871 and property values on Nob Hill doubled overnight.

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<sup>54</sup> Hon. Moody Merrill, president of the Highland Street Railway of Boston, in a speech at the first convention of the American Street Railway Association. Quoted from *Fares Please!* p.32.

<sup>55</sup> Morris, Lloyd. *Incredible New York*. Random House. 1951. p. 91.

<sup>56</sup> <http://www.banhdc.org/archives/ch-hist-19711000.html>

<sup>57</sup> Clay McShane & Joel A. Tarr. *The Horse in the City*. John Hopkins University Press. 2007. pp. 120-6,

By 1890, 500 miles of cable track had been installed in the U.S. and 5,000 cars were operating on them carrying 400 million passengers annually in 16 cities. Chicago was the biggest system with 86 miles of track, then St. Louis with 45 miles and Denver with 44 miles.

Streetcars replaced cable cars in Providence and Philadelphia in 1895, Baltimore in 1897, Washington in 1897 and St. Louis in 1902. San Francisco has cable cars to this day but they are more for tourism and charm than for efficiency. Other than San Francisco, the last city to replace them was Chicago in 1906. The brief life of the cable car as a practical means of transportation was over.

### Streetcars 1888 - 1923

The explosive growth of the electric streetcar, and the horsecar before it, was caused by the nation's urban population growth. For example, New York City, which has always comprised a majority of the nation's public transportation ridership, grew at a phenomenal rate during this time as may be seen from the adjacent table. Other factors were the growth in disposable incomes and the rapidly declining price of steel.

New York City		
Year	Population	Growth
1830	202,300	63.5%
1840	312,710	54.6%
1850	515,547	64.9%
1860	813,669	57.8%
1870	942,292	15.8%
1880	1,206,299	28.0%
1890	1,515,301	25.6%
1900	3,437,202	126.8%
1910	4,766,883	38.7%
1920	5,620,048	17.9%
1930	6,930,446	23.3%

The development of electric streetcars spelled the end of the horse-car. The advantages of the electric streetcar were overwhelming. Without the clatter of steel-shod horses' hooves and their manure the streets were much quieter and cleaner. Streetcars also ran at twice the speed of horse-cars thus allowing commutes that opened up vast tracts of suburban land that had formerly been inaccessible. As can be seen from the graph on page 5, the horse-car almost disappeared within ten years after the introduction of the streetcar.

There had been various attempts to develop electrically driven versions of the horse car from the late 1870's on. The first city to have all-electric transportation was Montgomery, Alabama in 1886. The system was not

very practical and did not catch on.

By 1887 electric streetcars were what one historian describes as "a faltering fact" even though an 1888 review of U.S. transportation systems does not even mention them.<sup>58</sup> At this time there were only 60 miles of track and less than 100 streetcars in all America. This hodge-podge of vehicles operated on high and low voltages, received their electricity using third rails, underground conduits, or from overhead trollers. Their motors were sometimes on or under the cars or even out in front. The drive was by belts, chains or gears. To complicate the issue small steam engines<sup>59</sup> on 534 miles of street railway line

<sup>58</sup> Ringwalt, J.L. *Development of Transportation Systems in the U.S.* Railway World. 1888.

<sup>59</sup> Also known as steam dummies.

also had 287 million boardings<sup>60</sup> annually for a brief period.<sup>61</sup>

Then Frank Sprague developed the first practical electric streetcar system in Richmond, Virginia in 1887. It was in full operation by 1888 and its success would totally transform the American city. Boston's adoption of Sprague's concept in 1888 broke the dam and by the end of the year there were 200 electric streetcar systems either in operation or under construction. Within two years there was 1,260 miles of electrified track in the U.S. compared to 5,700 miles of track for horse cars. The next twelve years saw dramatic changes. By 1902 there was 22,000 miles of streetcar track — a nearly twenty-fold increase — whereas horse car lines had shrunk to 250 miles, a twenty-fold decrease.

Underlying these were the changes in the fundamental technology of steel making and electricity generation. Steel production was quite low until the invention of the Bessemer process, which both improved the quality and lowered costs.

Between 1867 and 1884, just 18 years, the price per ton of steel rail dropped from \$166 to \$30.<sup>62</sup> Experiments in the UK and U.S. in the 1860s showed that steel rail outlasted iron rails twenty times over.<sup>63</sup>

In 1870 only 77,000 tons of steel were produced in the U.S. By 1875 that increased to 376,000 tons, and by 1890, 4,800,000 tons. Clearly 1870-80 was the period when steel came alive in the U.S.

These new steel processes, principally the Bessemer process, allowed grooved flush rails to be produced at a much lower cost.

The generation of electricity was born at the same time. In 1880, we find no listing for generating plants in the census data. The next count was in 1889 and there were 120 plants and the following year 447. The primary use of electrical energy in these early days was for streetcars, with many of the streetcar companies owning the electrical utility.<sup>64</sup> This was a major factor in the awarding of franchise agreements since there was typically not enough business in most towns for two electrical utilities.

In England, the authorities accepted streetcars with reluctance. The first service did not begin in London until April 1901 because there was concern with the unsightliness of rail's overhead electrical wiring in the city's streets.<sup>65</sup>

The result was that the authorities banned street railways from the central core of London altogether. In the outer London area they allowed only half of the street railway mileage

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<sup>60</sup> It is preferable to use boarding, the act of boarding one vehicle, rather than riders or passengers since that is what transit agencies count. It may take one person two or more boardings, transferring from one vehicle to another to make a trip from home to work and two more to reverse the process.

<sup>61</sup> Knight, J.B. *Steam on Street Railways*. Journal of the Franklin Institute 103. June 1877. See also Holt, Glen E. *The Main Line and Side Tracks: Urban Transportation History*. Journal of Urban History 5, No. 3. May 1979. p. 397-406.

<sup>62</sup> Ringwalt, J.L. *Development of Transportation Systems in the United States*. Railway World Office. 1888. p. 201

<sup>63</sup> Ringwalt, J.L. *Development of Transportation Systems in the United States*. Railway World Office. 1888. p. 198-9

<sup>64</sup> Cudahy, Brian J. *A Century of Service : the story of public transportation in North America*. American Public Transit Association, 1982. p. 71.

<sup>65</sup> Barker, T.C. & Robbins, Michael. *A History of London Transport*, Vol. II. George Allen & Unwin Ltd. 1963. p. 62.

to have overhead wire. The others took their electrical power from conduit buried well below the street surface that the streetcars picked up with a probe.

The British were critical of the American disregard for the aesthetics.<sup>66</sup> They said, ...there were many places in America — small towns and suburban districts — where the cheap, overhead wiring could be slung above the streets without veto from the local authority.<sup>67</sup>

Even in those areas of London that allowed streetcars about half of the rail mileage used underground conduit to transfer electric power to the vehicles.<sup>68</sup>



In the U.S. the only underground electrical conduit systems in U.S. were installed in New York and by the Metropolitan Railroad of Washington DC in 1895.<sup>69</sup>

The adjacent photo shows the conduit slit in the paving between the two rail lines. The conduit system was required in parts of New York City and all of Washington DC.

The link below<sup>70</sup> is useful to view the street activity of 1902. Note the lack of crosswalks, the population density on the sidewalks versus today, which all makes more understandable the exceedingly high accident of the times. Note also the conduit slot between the rails. There is no overhead wiring since the electricity supplied by a probe

reaches the live wire below the conduit slot.

The problem with conduit operation was not only the higher cost of installation but also the cost of far more maintenance from the difficulty of clearing snow from the conduit to the mischief of young boys inserting metal items to short circuit the lines.<sup>71</sup> For this reason, conduit operations in the U.S. were only conducted in New York City and Washington, DC.

<sup>66</sup> Barker, T.C. & Robbins, Michael. *A History of London Transport*, Vol. II. George Allen & Unwin. 1963. p. 32.

<sup>67</sup> Barker, T.C. & Robbins, Michael. *A History of London Transport*, Vol. II. George Allen & Unwin. 1963. p. 20.

<sup>68</sup> Dunbar, Charles S. *Buses, Trolleys and Trams*. Paul Hamlyn. 1967. p.62.

<sup>69</sup> Transit Journal, 9/15/34, p. 322.

<sup>70</sup> <https://www.youtube.com/watch?v=954L9MpfCEo> 2:25 minutes. New York City 1902.

<sup>71</sup> *Difficulties of Conduit Operation in New York*. Electric Railway Journal. Vol. XLIII, No. 14. p. 768. April, 1914.

Since the streetcar doubled the land area new accessible to the city population, new house lots naturally became larger than the existing ones.<sup>72</sup>

At first, housing construction only took place within walking distance of either side of the main streetcar routes radiating out from the central city. Accordingly, real estate development took on a starfish shape. The areas between the arms of the starfish remained as farm land long after areas on either side had been highly urbanized.<sup>73</sup> Then, over time, operators built cross town rail to fill in the areas between the main radial lines.

The streetcars were still for the middle class; they were still too expensive for the poor for regular daily travel. The poor remained in the central city within walking distance of jobs.

Special variants of the streetcar lines were the interurban lines<sup>74</sup> that ran between the cities and towns all over the U.S. They ran along the streets when in town and on their own right of way transiting between towns. At one point it was possible to travel from Boston or Chicago to New York by interurban electric streetcar. To travel from Boston to New York by streetcar meant using 12 different streetcar lines and 20 hours travel time and cost \$2.40.<sup>75</sup> New York to Chicago was a much longer trip once made merely to prove the point by the editor of Electric Railway Journal.



It is instructive to leaf through one of the many pictorial histories of the streetcar to realize how much the streetcar pervaded the lives of everyone at the turn of the century. Even towns with populations of only 25,000 had streetcars.<sup>76</sup> Streetcar companies developed cemeteries at the ends of their lines and so, naturally, there were special funeral streetcars charging \$15 for a three-hour usage. It is difficult for today's American to envision using public transportation to bury a loved one.

Streetcar lines always preceded suburban development because it was the only way that average people could travel around. Thus, at the end of any streetcar line there was open country. What followed was the building of parks, cemeteries, fairgrounds and ball parks all encouraged by the streetcar companies. In those days the busiest day for the streetcars was Sunday. "Take me out to the ball game," meant, take me out there by streetcar.

<sup>72</sup> Warner, Sam Bass Jr. *Streetcar Suburbs: The Process of Growth in Boston, 1870-1900*. Harvard University Press. 1978. p. 81

<sup>73</sup> Smerk, George M., ed. *Readings in Urban Transportation*. Indiana University Press. 1968. Chapter I.

<sup>74</sup> Hilton, George W. & Due, John F. *The Electric Interurban Railways in America*. Palo Alto. 1970.

<sup>75</sup> Miller, John Anderson. *Fares, Please!* D. Appleton-Century Company - New York. 1941. p.109

<sup>76</sup> Foster, Mark S. *From Streetcar to Superhighway: American City Planners and Urban Transportation 1900-1940*. Temple University Press. 1981. p14.

America had become mobile. By 1917 streetcar systems consisted of 80,000 passenger cars on 45,000 miles of track and the following year saw the peak for miles of track. Note that the peak of rail mileage was a few years before the peak of *ridership* and maybe before anyone could foresee that future ridership declines would prove to be a major problem.

The streetcar companies began to experience severe financial difficulties in the decade leading up to their peak ridership in 1923. They had over-extended the rail mileage with very shaky financing. The various municipalities were demanding that the street railways extend their mileage even further into the suburbs. The public was no longer riding as much during the evenings and weekends and so the service became highly peaked during the commute period, which affected profitability. The public was demanding that the streetcar companies maintain the 5¢ flat fare. At the same time, inflation became a problem with the establishment of the Federal Reserve system and the onset of the First World War.

It was not then surprising that in 1922 it was reported that, “between 1915 and 1920, 91 electric railway companies operating 5,330 miles (or more than one-fifth of the total electric railway mileage in the United States went into receivership.”<sup>77</sup>

Still, the public had no sympathy for the streetcar companies. They regarded them as, ...heartless monopolists squeezing the last pennies out of widows and orphans who had little choice but to ride their rickety, dangerous cars.<sup>78</sup>

Workers had no other choice for transportation and it was expensive. Five cents in 1906 was the price of a loaf of bread. In that year, a seamstress would have to work almost an hour to earn her daily carfare.<sup>79</sup>

In the ten years preceding the 1923 peak in streetcar ridership, the automotive revolution began to affect public transportation.

The automobile was taking commuters away from public transportation but this was more than offset by the considerable increase in average wages during this period that allowed more working people to afford the streetcar.<sup>80</sup> But this growth moderated until 1923 when streetcar ridership hit its all-time peak.

### **Rapid Transit — The Els to Subways**

"How the elevated railroads could ever be built, let alone endure for as long as they did, is astonishing for the public and private outrage against racing, dirty, noisy locomotives down the middle of four of the principal avenues of the city was enormous...the worst seems to have been the noise — the deafening, bewildering racket of countless trains thundering along the overhead iron bridge, every sound and vibration intensified and reflected

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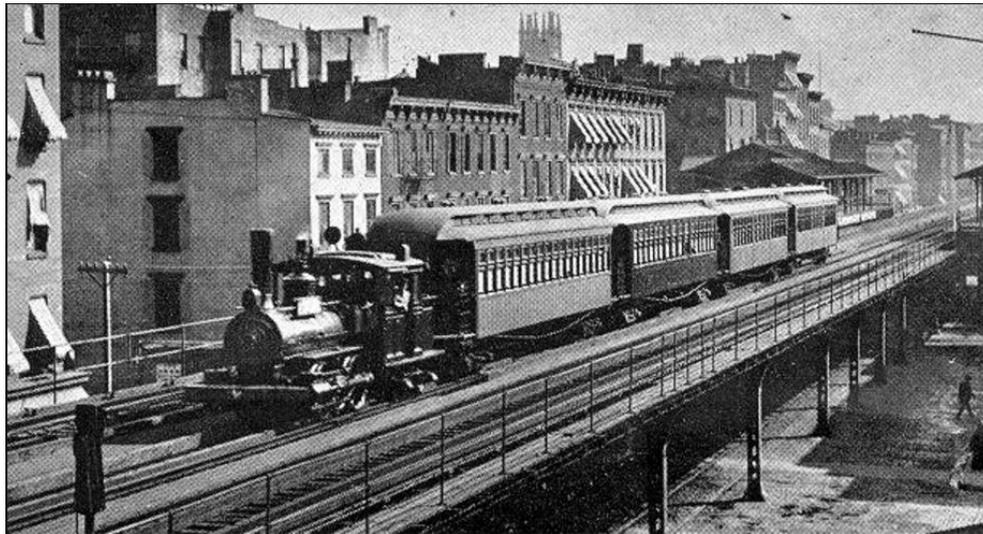
<sup>77</sup> Bus Transportation, January 22, 1922. p.37.

<sup>78</sup> Barrett, Paul. *The Automobile and Urban Transit: The Formation of Public Policy in Chicago, 1900-1930*. Temple University Press. 1983. pp. vii & 20.

<sup>79</sup> Barrett, Paul. *The Automobile and Urban Transit: The Formation of Public Policy in Chicago, 1900-1930*. Temple University Press. 1983. p. 25.

<sup>80</sup> <http://www.econlib.org/library/Enc1/WagesandWorkingConditions.html>

downward by the huge sounding board of the structure and the car bottoms."<sup>81</sup> Brian Cudahy.



In most of the towns and cities throughout the U.S. the evolution of public transit was from the omnibus to horse-cars, maybe cable cars, then streetcars and later, motor buses.

In the nation's biggest cities, New York, Boston, Philadelphia, and Chicago it was "rapid transit," or transit totally separated from roads, that from 1870 on was seen as the way to deal with the rapidly growing congestion.

It started with the EIs in New York. Steam trains running on elevated iron rail beds above the New York's principal avenues.

The story of New York's elevated rail lines is an example of politics getting in the way of evolution. London had successfully operated subway service beginning in 1863 and it was only logical that New York do the same.



However, during the 1860s, the powerful horse-car lobbies and others intervened and managed to block their development. They were not, however, able to block the development of elevated rail lines — the EIs — in the 1870s even though inner city residents were on their side. These citizens resisted the EIs as being for the affluent suburbanites — to the discomfort of inner city residents

<sup>81</sup> Cudahy, Brian. *The New York Elevated*. 1988.

Objections to the proposed overhead rail lines came from shopkeepers and residents affected by the noisy steam trains that would cut out the light to their stores and come by their windows. However, the strong public demand for rapid transit service separated from the street level traffic overcame all their objections. After some abortive attempts, elevated service began in New York in 1871.<sup>82</sup> By 1876 there were forty steam trains daily from Battery to 59 St. The fare was 10 cents — 5 cents in the rush hour. The Els expanded quickly throughout the late 1800's with the last extension built in 1920. Operators substituted electric power starting in the late 1890's. Boston, Chicago and Philadelphia only allowed Els after electrification.<sup>83</sup>

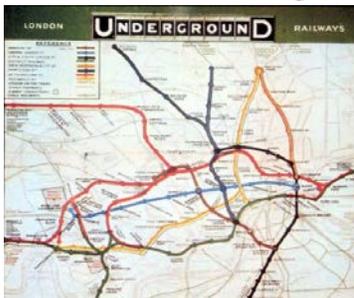
New York's most important manufacturing industry was the mass production of ready-made clothing, and this was founded on the "ghetto." If, late at night, you rode uptown from Chatham Square on the Second Avenue elevated, every window of the big tenements, lining both sides of the way like continuous brick walls, gave you a glimpse of men and women hunched over sewing machines or, half-naked, wearily pressing garments in a cloud of hot steam. The elevated was a gangway through a vast workroom where multitudes were forever laboring, morning, noon and night.<sup>84</sup>

This link below<sup>85</sup> will give you a 1955 ride on the 3<sup>rd</sup> Avenue El, which you will find quite unbelievable. The trains pass so close to apartment windows that they disturb the curtains.

However, the Els were a U.S. phenomenon almost exclusively; none were allowed in Europe. Chicago opened its first elevated in 1895 and completed the Loop in 1897. Kansas City, Chicago, Boston and Philadelphia also built elevated rail lines during the late 1800's but only in New York was it the dominant form of public transportation.

Subways provided the same advantage of transportation service separated from street traffic. The underground cars were inaudible from the street whereas the Els were of iron or steel and noisy. The subways were out of sight whereas the Els were a constant visual blight. Once the first subway opened and its advantages became obvious, cities with Els began replacing them with subways. By the end of the 1950's the Els no longer existed in any city core area other than the Chicago Loop.

### The London "Underground"



The world's first subway opened in London in 1863. Its trains were steam powered and the line was only 3.7 miles long. But it was so popular that, despite the grime that the trains caused, the "Underground" grew rapidly and by 1908 covered a good part of London. (see map). The line carried 9.5 million passengers in 1863 and 11.8 million the following year.<sup>86</sup>

<sup>82</sup> Walker, James Blaine. *Fifty Years of Rapid Transit*. Law Printing. 1918. Reprint Arno 1970. p. 80.

<sup>83</sup> McShane, Clay. *Down the Asphalt Path*. Columbia University Press. 1994. p. 26.

<sup>84</sup> Morris, Lloyd. *Incredible New York*. Random House. 1951. p. 277.

<sup>85</sup> <https://www.youtube.com/watch?v=cFrHARsFtO4> 2:38 minutes.

<sup>86</sup> Barker, T.C. and Robbins, Michael. *A History of London Transport*, Vol. I. George Allen & Unwin Ltd. 1963. p. 179 & p. 125.

Initially, the cut and cover method was used, cutting open existing streets, constructing the underground facility, and then covering it and paving it over. This was done for the first two or three miles before bringing the line to the surface in the open country.

Judging from the adjacent recent image of an original Metropolitan Line steam locomotive brought out to celebrate 150 years of the London Underground, these steam trains must have been quite unbearable at the time even though the tunnels were quite well ventilated. The only thing worse would have been the London traffic.



As in the U.S., public transportation, of which the Underground was a main element, was a necessity for the burgeoning population. Horse drawn carriages were too expensive and automobiles were not available in the early

years and even when they were available they were too expensive for ordinary people. It should not surprise then that the various Underground railway companies became involved in real estate and housing development as a way to build a customer base as the streetcar companies did in the U.S.

In 1890, the City and South London Railway was opened as the first deep-level underground "tube" railway in the world. It was built by tunneling rather than the earlier method of cutting relatively shallow trenches, building the tunnels in place, and then covering them. This line was also the first major railway to use electric traction.<sup>87</sup>

While the trains were driven by electricity, coal gas was used both for lighting the carriages and the stations.

In the early stages of electrification, companies would electrify the below ground section of the line and switch to steam trains for the above ground remainder of the route. By 1907, most of the below ground sections of all the lines had been electrified and all of them were by 1916. The above ground sections became mostly electrified over time with the last one holding out until 1961.<sup>88</sup>

## The New York City Subways

There was great opposition to more elevated rail lines because of their effects on the environment. After some experience with the subsidies needed for the New York subways which were first opened in 1904<sup>89</sup> there began to be dissent from that view mainly on the basis of cost.

In the early 1900's there was a consensus among city planners that the way to reduce traffic congestion was to get the street traffic onto a subway or elevated rail line that, by being separated from the street itself, would take much of the traffic off the street.

<sup>87</sup> [www.gracesguide.co.uk/City\\_and\\_South\\_London\\_Railway](http://www.gracesguide.co.uk/City_and_South_London_Railway)

<sup>88</sup> Pask, Brian. When was the last steam train on the Underground? London Underground Society website.

<sup>89</sup> Walker, James Blaine. Fifty Years of Rapid Transit. Law Printing. 1918. Reprint Arno 1970. p. 186.

Noted planner Edward Bassett disagreed. He ignored the costs saying,

Such passenger transit become vital for the growth of a large city, because street surface transit takes more time than the average working man can allow and...is the only thing that will bring low rent and sunny homes to working people in great cities.<sup>90</sup>

However, some city planners, among them Chicago planner Alfred J. Roewade, opposed a 1902 subway system plan on the grounds it would cause congestion.<sup>91</sup>

Henry C. Wright, one of the core members of the Regional Planning Association, said in 1913,

No city can afford a subway. New York cannot afford one...A subway built in any city is such an expensive proposition that you practically are forced to have congestion in order to get enough traffic to pay the carrying charges upon it. Congestion is always a corollary of subways; I do not believe that a person can get away from that proposition. It simply forces us, if we do not want congestion and if we do want people in single houses, so far as we can give them that, to have some other means of rapid transit than the subways.<sup>92</sup>

Towards the end of our period, it began to be clear to New York's city planners that just building transit was not working to reduce congestion.

I believe it has been pretty well demonstrated that rapid transit has increased congestion...to diffuse the population by one means or another is the solving of our present problems in city planning.<sup>93</sup>

Compounding the problem was that not only could the working class not afford public transportation to move out of the city<sup>94</sup> but,

It is quite useless to blame a working man for hesitating to move from the city, which is filled with pleasure and excitement, to settle in some small humdrum town. The ordinary workman pursues the same monotonous task day after day. It cannot be wondered at that he should hunger after excitement, stimulus and pleasure.<sup>95</sup>

Edward Bassett, wrote of,

"supplementing the rapid transit plan by a system of regulatory laws that would prevent overbuilding at locations affording the best transit facilities. The view was expressed that if

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90 Mr. Edward M. Bassett responding to Milo Maltbie's Transportation and City Planning. Proceedings of the 5th National Conference on City Planning. Chicago. May, 1913. p.

91 Foster, Mark S. From Streetcar to Superhighway: American City Planners and Urban Transportation 1900-1940. Temple University Press. 1981. p. 41.

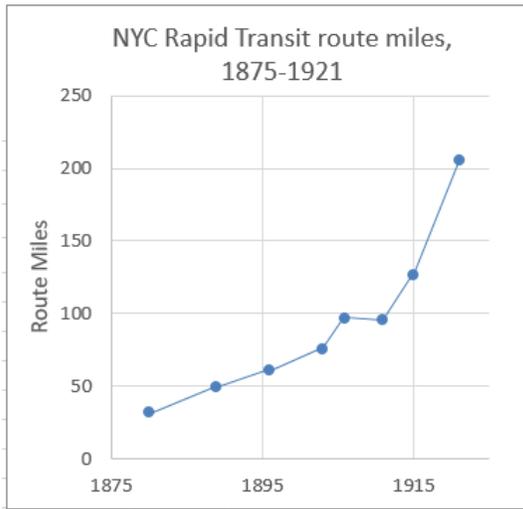
92 Henry C. Wright, New York City, responding to Milo Maltbie's Transportation and City Planning. Proceedings of the 5th National Conference on City Planning. Chicago. May, 1913. pp. 107-137.

93 Gillespie, John. *The Automobile and Street Traffic*. Proceedings of the 8th National Conference on City Planning. Cleveland. June, 1916. p. 75.

94 "Commutation at the rate of ten cents per day will scarcely take the passenger out of sight of the skyscrapers of Manhattan. It is evident that at present few factory employees make use of commutation privileges." Pratt, Edward Ewing. *Industrial Causes of Congestion of Population in New York City*. Studies in History, Economics and Public Law, No. 109. Columbia University Press. 1911. Reprinted as Columbia University Studies in the Social Science #109 of 1911. AMS Press, New York. 1968. p. 195. Also, the same pertained in London. In 1897 fewer than 25 percent of London union workers used public transportation regularly. Barker, T.C. and Robbins, Michael. *A History of London Transport*, Vol. I. George Allen & Unwin Ltd. 1963. p. xxvi.

95 Pratt, Edward Ewing. *Industrial Causes of Congestion of Population in New York City*. Studies in History, Economics and Public Law, No. 109. Columbia University Press. 1911. Reprinted as Columbia University Studies in the Social Science #109 of 1911. AMS Press, New York. 1968. p. 102.

the new subways produced only increased congestion of living and business conditions, they would be a doubtful benefit to the city."<sup>96</sup>



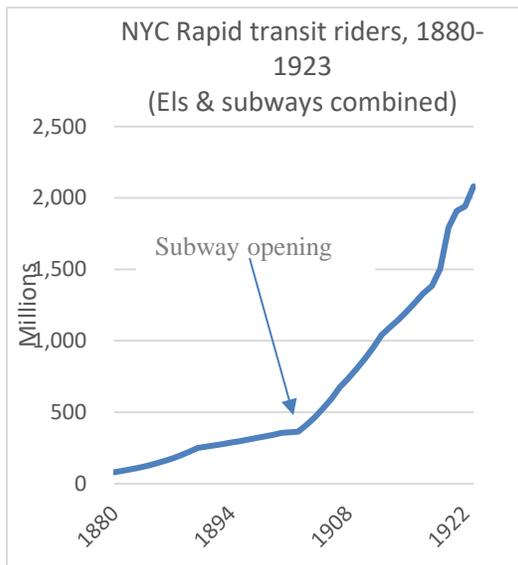
Regardless of planners' views, the New York subways were built. The public pressure to rid the city of the elevated rail lines that then covered most of Manhattan's major avenues dictated it.

The first New York subway was opened in 1904, and London's was in 1863; while built at different times, they were each built when their populations were a little over three million.

By the 1880s, fares for both the horse car lines and the elevated rail lines were all five-cents. This made the construction of subways in New York a doubtful financial proposition and one reason that capital was slow coming to the support of subways.

Another significant obstacle to the establishment of subways was the political opposition of not only the elevated rail line operators, but even more politically stronger were the surface railway companies operating both horse cars and electric streetcars. The political shenanigans become an art form in the hands of New Yorkers from Boss

Tweed's time through the first half of the last century. For those with an interest in it, the 1918 book, *Fifty Years of Rapid Transit*,<sup>97</sup> is worth the read.



New York State's Rapid Transit Act of 1894 changed the situation by providing that the City of New York could take the risk in building and financing the subways, then turn it over to a private operator who would lease it from the city for a 50-year period, provide all the equipment needed to operate the line and provide the service to the public at a fixed five-cent fare.<sup>98</sup>

On this basis, the first New York City subway opened in October 1904, running from City Hall in downtown Manhattan up nine miles to West 145<sup>th</sup> Street. Within months this route was added to and

by the end of our period the subway length would triple.

### Traffic congestion

Some improvements began to appear around mid-decade as horse-drawn drays were replaced by motor trucks, which because of their speed and maneuverability greatly reduced the congestion caused by the slow drays.

<sup>96</sup> Sussna, Stephen. *Zoning as a Traffic Remedy*. Traffic Quarterly, Vol. XVI, no. 3. July 1962. p. 434.

<sup>97</sup> Walker, James Blaine. *Fifty Years of Rapid Transit*. Law Printing. 1918. Reprint Arno 1970

<sup>98</sup> Walker, James Blaine. *Fifty Years of Rapid Transit*. Law Printing. 1918. Reprint Arno 1970. Chapter XI.

Traffic congestion is not a recent phenomenon. In 48 BC, Julius Caesar banned wheeled traffic from the center of Rome during the day solely because of traffic congestion. Subsequently other Roman emperors expanded his edict to include other cities and to restrict vehicle movement even at night.<sup>99</sup> Rome had an extremely high population of 1,250,000<sup>100</sup> with a very high population density. New York achieved the same population around 1860 with the same kind of density.

Traffic congestion began to be a serious problem in London and other European cities in the early 1800s and then began to seriously impact New York City in the 1850s with its burgeoning population. The larger cities around the world began to experience traffic congestion again with the rise of the Industrial Revolution when once more population density levels would rise.



The provision of supplies for such crowded areas combined with narrow roads and slow horse-drawn freight caused the traffic congestion in both these cities. These occurrences of transportation gridlock were long before the advent of the automobile.

In the 1800s, American cities where the primary travel was by foot, the practical city boundary was about two miles from its center. Citizens had the choice of unpleasant crowded living conditions or a very long walk to get anywhere. Most chose central city living.

By the 1870's New York's population had grown to over one million people and was growing at close to 50% every ten years. Traffic congestion was a major problem. It is illustrated on the opposite page and

was well described by a contemporary,

Carts, vans, grocery and express wagons, mingle with the great drays, which, loaded high with hides, paper bundles, and other bulky materials, drawn by enormous Norman horses, force their way by superior weight and momentum through the press. United States mail-wagons, claiming undisputed right of way, work their way in and out of the throng; and sometimes a hack, in haste to make a short-cut to the boat-landing, venture into the dangerous maze of heavy vehicles, with the uncertain prospects of emerging on time and unharmed. In the mid-day hours, and notably from two to four in the afternoon, the moving counter-processions tangle up her into seemingly inextricable blockades...So the crush goes

<sup>99</sup> Mumford, Lewis. *The City in History: Its Origins, Its Transformations, and Its Prospects*. Harcourt Brace Jovanovich. 1961. p. 218-9.

<sup>100</sup> [http://penelope.uchicago.edu/Thayer/E/Journals/CP/29/2/Population\\_of\\_Rome\\*.html](http://penelope.uchicago.edu/Thayer/E/Journals/CP/29/2/Population_of_Rome*.html)

on, to continue and intensify until adequate means are found for the transportation of freight through the commercial quarter of town.<sup>101</sup>

Horse-drawn streetcars subsequently made New York's congestion worse because, owing to the rails they rode on, they had no maneuverability. And the arrival of the electric streetcar made little difference since,

"The existence of a double line of (street)cars moving on a fixed track and claiming the right of way over other vehicles is a hindrance to the even flow of traffic, for it both delays traffic and is itself delayed."<sup>102</sup>

Until well into the 1900's street traffic in the larger cities mainly consisted of electric streetcars and horse-drawn wagons. As can be seen from the 1910 photo (see over) of Chicago streets, automobiles were not the only cause of traffic congestion. The major problem was that streetcars had limited speeds and had no maneuverability. The horse-drawn drays were maneuverable but traveled even slower at around 3.2 mph.<sup>103</sup> In addition, the streetcars had to load and unload their passengers in the middle of the street and the drays had to load and unload at the curb.

Trade Vehicles		Passenger vehicles	
1 horse (fast)	3	Electric [Streetcars]	10
1 horse (slow)	7	Omnibus (horse)	5
2 horse (fast)	4	Omnibus (motor)	3
2 horse (slow)	10	Cabs (horse)	2
Motor (fast)	2	Cabs (motor)	1
Motor (slow)	5	Carriage (horse)	2
Barrows	6	Carriage (motor)	1
Cycles	½		

This table<sup>104</sup> showing the British authorities assessment of the weighted causes of traffic congestion. Note that the electric trams (streetcars) are considered the worst cause along with two-horse drays.

As New York City transportation moved on from horses pulling carts and buses and rail cars, we must realize the relief that New Yorkers would feel from not having to cope

with endless amounts of manure and urine together with frequent dead horses left where they dropped.

101 *A Street Blockage in Gotham*. Harper's Weekly 36. 1892.

102 *The Motor Car in England*. Scientific American. December 12, 1896.

103 *Improved Traffic Regulation Needed to Reduce Congestion and Prevent Premature Decentralization*. American City. September 1928. p. 137.

104 Lewis, Nelson p. *The Automobile and the City Plan*. Proceedings of the Eighth National Conference on City Planning. Cleveland. June 5-7, 1916. pp. 43.



Chicago traffic 1909.



Chicago traffic circa 1920.

The lack of adequate inexpensive public transportation meant that the workers all had to live within walking distance of their work. This led to multi-story tenement buildings and greater density than any city since Ancient Rome. It was understandable that this would produce such a congestion of people and traffic.

The accounts of the 1850s, and later, paint a picture of horse-drawn vehicles choking streets slippery with horse manure and urine. Just crossing the street was a dirty and dangerous undertaking.

And the dangers of using public transportation were considerable. Between March 5 and April 25, 1906, Chicago streetcars killed 21 and injured 86.<sup>105</sup> By the end of November, streetcar and El accidents killed 132 Chicagoans and injured another 1314. In New York, 42 people died in one 27-day period from mass transit accidents.<sup>106</sup> Public opinion was quite supportive of public ownership of the streetcar companies as the solution.<sup>107</sup> Despite many political battles, significant public ownership would not occur until the 1960's and for far different reasons.

What also exacerbated the congestion problem was that as New York City grew, land became more expensive and led to significant changes in the industries located there.<sup>108</sup>

With increasing land values those businesses requiring extensive space and bulk handling such as stone cutting moved out and small manufacturing such as piano and other musical instrument manufacturing moved in.<sup>109</sup> These changes led to even greater congestion of population since small manufacturers would employ more workers per square foot than the stone masons and similar businesses they replaced.

New York tried to solve the problem with elevated rail transit but the city's rapid growth constantly overwhelmed it. This was not surprising since the expansion of the elevated rail lines was accompanied by the building of skyscrapers and more dense tenement buildings.

### **At the Peak**

The early 1920s saw the all-time highest use of U.S. public transportation, never to be exceeded. The year 1923 was the peak year for streetcar ridership, while 1926 was the all-time peak for total U.S. public transportation ridership — but no one knew it. It was inconceivable at the time for people to believe that within forty years the streetcars would cease to exist. But the wolf was at the door; the automotive revolution was being unleashed in full force. The motor bus was to start taking over public transportation and

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105 Barrett, Paul. *The Automobile and Urban Transit: The Formation of Public Policy in Chicago, 1900-1930*. Temple University Press. 1983. p. 18.

106 Barrett, Paul. *The Automobile and Urban Transit: The Formation of Public Policy in Chicago, 1900-1930*. Temple University Press. 1983. p. 224.

107 Wilcox, Delos F. *What Shall We Do With Street Railways?* American City 20, No. 4. April 1919. p. 336.

108 Pratt, Edward Ewing. *Industrial Causes of Congestion of Population in New York City*. Studies in History, Economics and Public Law, No. 109. Columbia University Press. 1911. Reprinted as Columbia University Studies in the Social Science #109 of 1911. AMS Press, New York. 1968. p. 107.

109 Pratt, Edward Ewing. *Industrial Causes of Congestion of Population in New York City*. Studies in History, Economics and Public Law, No. 109. Columbia University Press. 1911. Reprinted as Columbia University Studies in the Social Science #109 of 1911. AMS Press, New York. 1968. p. 107.

all forms of public transportation would soon be fighting for their lives against the automotive revolution.