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Industry Issue Paper: [A New Modal Classification System for Public Transportation](#)

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Industry Issue Paper

A New Modal Classification System for Public Transportation

by Arthur Guzzetti and John W. Neff

The gathering of public transportation statistics requires a system for classifying data by mode. The majority of naming conventions have consistently recognized transit operations as “heavy rail,” “commuter rail,” and “light rail” for the past 40 years (although some others still use older terms). New systems now emerging have unique characteristics, which have led some classifying organizations such as the National Transit Database (NTD) to begin using terms such as hybrid rail for light rail type or self-propelled passenger vehicles operated on freight rail tracks and regulated by the Federal Railroad Administration, and which were formerly classified as commuter rail or light rail until 2001, and streetcars which are electric rail circulator passenger vehicles operated primarily in streets in congested central city areas and reported as light rail until 2011. Similarly, NTD began designating some bus operations, reported as part of the general bus category until 2011, as bus rapid transit, which meets specific service criteria, as commuter bus for bus operations with significant closed door distances from distant suburbs to central cities; the remainder of bus service remained classified as simply bus. This presentation will take inventory of all types of bus and rail mode classifications, discuss the issues associated with changing classifications, and put forth a revised classification of transit modes.

PROBLEMS IN PUBLIC TRANSPORTATION MODAL CLASSIFICATION SCHEMES

Classification systems for collection and publication of transit operating and financial data identify modes to allow the analysis and comparison of service using different vehicles and with different operating characteristics. Changes, or a lack of change, to the names and number of basic modes of three most used transit data collection and publication modal classification systems have led to confusion and inaccurate data reporting. The three publications are the American Public Transit Association’s (APTA) *Public Transportation Fact Book*, the Federal Transit Administration’s (FTA) *National Transit Database* (NTD), and the Bureau of the Census *American Community Survey* (ACS). In the case of the FTA database, three modes that existed in the 2011 NTD were divided into two or three modes. The name of the single 2011 mode in each case was retained as one of the names of the new modes. Thus, the name that represented the old mode in its entirety in 2011 represented only a subset of those data in 2012. No new name was created to match the total of the new sets of two or three modes. This leads to potential confusion where the original named mode and the new part of that mode with the same name are thought to define the same set of agencies, and that there has been decline rather than growth in data associated with that mode.

Table 1 illustrates this problem. Table 1 counts only agencies that reported to the NTD in the year listed. All transit rail systems and whether or not they are included in NTD reports is reported in APTA's *Public Transportation Fact Book Appendix A: Historical Tables*. The screened back cells in Table 1 indicate that there is not a category to report summations of these pairs of modes in the NTD, and these data do not appear in the NTD.

Table 1: Number of Agencies Reporting Rail Modes of Service to the NTD, 2010 Compared to Later Years After Additional Modes Added

| Mode | Before Change 2010 | Reporting New Modes Optional | | Reporting New Modes Required | |
|------------------|--------------------|------------------------------|------|------------------------------|------|
| | | 2011 | 2012 | 2013 | 2014 |
| Light Rail | 31 | 24 | 23 | 23 | 23 |
| Streetcar | -- | 7 | 10 | 11 | 11 |
| Unreported Total | 31 | 31 | 33 | 34 | 34 |
| Commuter Rail | 25 | 24 | 24 | 23 | 24 |
| Hybrid Rail | --- | 4 | 4 | 5 | 5 |
| Unreported Total | 25 | 28 | 28 | 28 | 29 |

Data Sources: Federal Transit Administration. *National Transit Database*. Washington, annual 1979 to 2014.

Reporting a mode of service that belongs in the new category was optional in 2011 and 2012 but was required beginning in 2013. In 2010 there were 31 light rail systems, but in 2011 there were only 24. Where did the seven light rail systems go? They became streetcar system, of course, but since there is no summation mode totaling these two modes, it is not obvious. There are tables of other data such as passengers, vehicle miles, etc., where it will not be apparent that the two years of light rail data are for different groups of systems. As will be discussed in the next section, APTA now uses another name to represent the total and alleviate this problem.

The census data classification, in contrast, has changed little in the last century and results in misreporting of travel behavior because the mode names are unrelated to current technology or the names of transit modes with which commuters are familiar. This paper will describe the history of the three modal classification systems, describe the current difficulties with each of them, and propose a limited solution to those problems.

Using a confused or outdated naming system for transit modes may lead to errors in analysis of the impact of future rail system investments and the value of existing systems. Future investment decisions may be based, in part, on the costs and results of existing systems as recorded in standardized accounting systems such as the NTD. When the classification of rail systems is changed to include finer divisions into more categories but old names are retained for some of them, the possibility exists for comparing different groups of systems in an analysis without being aware of which systems are included in the two groups before and after the change in the classification system.

The retention of antiquated names in the collection of journey-to-work data by the census may lead to errors in analysis. The use of classification names for rail modes no longer associated with them in everyday language has led to demonstrable erroneous reporting in census data. In multi-mode rail areas this can lead to errors in the analysis of modal impacts when using census data for analysis.

APTA AND FTA RAIL CLASSIFICATION SCHEMES

The American Street Railway Association (ASRA), APTA's original predecessor, was founded in 1882. The ASRA and its successors published statistics in verbatim proceedings of their conventions, but the first stand-alone document of national data is still available; *Electric Railway Operations*, was published by the APTA predecessor American Electric Railway Association (AERA) in 1922. That publication differentiated Electric Railway (comparable to current light rail) into City Lines and Interurban Lines. In 1942, the American Transit Association began publishing the *Transit Fact Book*, which was renamed the *Public Transportation Fact Book* in 2000. Agencies operating service comparable to heavy rail were not included until 1933 and commuter rail until 1977. The years that modes were introduced or their names changed for APTA, FTA, and census classifications are shown in Table 2 for modes comparable to light rail, in Table 3 for modes comparable to heavy rail, and Table 4 for modes comparable to commuter rail. By 1977, the APTA classification reached what was considered the modern differentiation of basic modes, which lasted until 2011: light rail, heavy rail, and commuter rail. Tables 2 and 4 report inclusive category names and partial category names. Inclusive category names are summary mode names that include all data for all light rail type or commuter rail type modes. Partial category names define only a portion of the systems included in the inclusive category name.

The Federal Transit Administration's National Transit Database was first published in 1979 and included light rail and heavy rail type modes under the older names, streetcar and rapid rail. APTA had adopted the modern terms light rail and heavy rail in 1974. The NTD would not adopt those names as options until 1984 and as standard names until 1993. The term light rail was coined in 1972 (Thompson 2003). Adoption of heavy rail to describe what had been called subway and elevated differentiated the two primary urban rail modes by their capacity: light rail carried smaller volumes of traffic and heavy rail carried larger volumes of traffic. The terms streetcar and subway and elevated for the two primary urban rail modes differentiated physical attributes of the system. But both modes operated in tunnels and elevated structures so the names did not actually describe what the differences between the two modes were. Commuter rail was added in 1984.

Beginning in 2011, the NTD differentiated light rail into light rail and streetcar and differentiated commuter rail into commuter rail and hybrid rail. The problem created by this action is that light rail in 2010 and 2011 were a different set of agencies, and commuter rail in 2010 and 2011 were a different set of agencies. A new classification name to summarize the two new modes in each set was not introduced. Therefore, there is no continuation of total all light rail and total all commuter rail between 2010 and 2011. The decrease of "light rail" between the two classifications could be interpreted as a decrease in overall light rail; similarly, the decrease in "commuter rail" between the two classifications could be interpreted as a decrease in overall commuter rail. The fact that the new classification hybrid rail in 2012 included two former light rail agencies and two former commuter rail only further complicates matters. Because of this, the NTD no longer reports continuous summary data among rail modes from before and after 2011.

Table 2: Light Rail Type Mode Names, Data Years of Use in Publications

| Time Period | American Public Transit Association | | National Transit Database | | Census | |
|-------------|-------------------------------------|---|---------------------------|--------------------|--------------------------|---|
| | Inclusive Category | Partial Categories | Inclusive Category | Partial Categories | Inclusive Category | Partial Categories |
| 1890 | | | | | Street Railway | Electric Railway, Cable Railway, Horse Railway, Steam Railway |
| 1902-1911 | | | | | --- | Street and Electric Railway, Interurban Railway |
| 1912-1921 | | | | | Surface Railway | --- |
| 1922-1924 | Electric Railway | Urban Electric Railway, Interurban Electric Railway | | | Surface Railway | --- |
| 1925-1930 | Electric Railway | City Lines, Interurban Lines | | | Surface Railway | --- |
| 1931 | Electric Railway | City Lines, Interurban Lines, Commutation Lines, Suburban Lines | | | Surface Railway | --- |
| 1932-1935 | Electric Railway | City Lines, Interurban Lines | | | Surface Railway | --- |
| 1936 | City Surface Lines | --- | | | Street Railway | --- |
| 1937 | Railway | City Railway, Interurban | | | Street Railway | --- |
| 1938-1941 | Railway | City Railway, Interurban | | | | |
| 1942-1959 | Surface Railway | --- | | | | |
| 1960-1973 | Surface Railway | --- | | | Streetcar or Trolley Car | --- |
| 1974-1978 | Light Rail | --- | | | Streetcar or Trolley Car | --- |

Table 2: continued

| Time Period | American Public Transit Association | | National Transit Database | | Census | |
|-------------|-------------------------------------|-----------------------|---------------------------|-----------------------|--------------------------|--------------------|
| | Inclusive Category | Partial Categories | Inclusive Category | Partial Categories | Inclusive Category | Partial Categories |
| 1979-1983 | Light Rail | --- | Streetcar | --- | Streetcar or Trolley Car | --- |
| 1984-1992 | Light Rail | --- | Streetcar or Light Rail | --- | Streetcar or Trolley Car | --- |
| 1993-2010 | Light Rail | --- | Light Rail | --- | Streetcar or Trolley Car | --- |
| 2011-2014 | Surface Rail | Light Rail, Streetcar | --- | Light Rail, Streetcar | Streetcar or Trolley Car | --- |

█ No Summary data published or modes not reported in summary data publications.

– No partial categories reported for inclusive category or no inclusive category summing partial categories.

Sources:

American Electric Railway Association. *Electric Railway Operations*. Washington, annual 1922 to 1931.
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Table 3: Heavy Rail Type Mode Names, Data Years of Use in Publications

| Time Period | American Public Transit Association | National Transit Database | Census |
|-------------|-------------------------------------|---------------------------|---|
| | Inclusive Category | Inclusive Category | Inclusive Category |
| 1907-1911 | | | Included In “Street and Electric Railway” |
| 1912-1926 | | | Elevated and Subway Railway |
| 1927-1933 | Included In “Electric Railway” | | Elevated and Subway Railway |
| 1933-1935 | Rapid Transit | | Elevated and Subway Railway |
| 1936 | Rapid Transit Lines | | Elevated and Subway Railway |
| 1937 | Included In “Railway” | | Included In “Street Railway” |
| 1938-1941 | Included In “Railway” | | |
| 1942 | Rapid Transit | | |
| 1943-1959 | Subway and Elevated | | |
| 1960-1973 | Subway and Elevated | | Subway or Elevated |
| 1974-1978 | Heavy Rail | | Subway or Elevated |
| 1979-1982 | Heavy Rail | Rail Rapid | Subway or Elevated |
| 1983-1989 | Heavy Rail | Rapid Rail | Subway or Elevated |
| 1990-1992 | Heavy Rail | Rapid Rail or Heavy Rail | Subway or Elevated |
| 1993-2014 | Heavy Rail | Heavy Rail | Subway or Elevated |

 No Summary data published or modes not reported in summary data publications.

Sources:

American Electric Railway Association. *Electric Railway Operations*. Washington, annual 1922 to 1931.
 American Public Transit Association. *Transit Fact Book*. Washington, annual 1975 to 1999.
 American Public Transportation Association. *Public Transportation Fact Book*. Washington, annual 2000 to 2015.
 American Public Transportation Association. *Public Transportation Fact Book Appendix A: Historical Tables*. Washington: American Public Transportation Association, annual 2013 to 2016.
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 U.S. Census Bureau. *United States Census*. Washington, 1960 to 2010.

Table 4: Commuter Rail Type Mode Names, Data Years of Use in Publications

| Latest Data Year | American Public Transit Association | | National Transit Database | | Census | |
|------------------|-------------------------------------|----------------------------|---------------------------|----------------------------|--------------------|--------------------|
| | Inclusive Category | Partial Categories | Inclusive Category | Partial Categories | Inclusive Category | Partial Categories |
| 1960-1976 | | | | | Railroad | --- |
| 1977-1983 | Commuter Rail | --- | | | Railroad | --- |
| 1984-2010 | Commuter Rail | --- | Commuter Rail | --- | Railroad | --- |
| 2011 | Passenger Railroad | Commuter Rail, Hybrid Rail | --- | Commuter Rail, Hybrid Rail | Railroad | --- |
| 2012-2014 | Regional Railroad | Commuter Rail, Hybrid Rail | --- | Commuter Rail, Hybrid Rail | Railroad | --- |

No Summary data published or modes not reported in summary data publications.
 – No partial categories reported for inclusive category or no inclusive category summing partial categories.

Sources:

- American Public Transit Association. *Transit Fact Book*. Washington, annual 1975 to 1999.
- American Public Transportation Association. *Public Transportation Fact Book*. Washington, annual 2000 to 2015.
- American Public Transportation Association. *Public Transportation Fact Book Appendix A: Historical Tables*. Washington: American Public Transportation Association, annual 2013 to 2016.
- Federal Transit Administration. *National Transit Database*. Washington, annual 1979 to 2014.
- U.S. Census Bureau. *American Community Survey*. Washington, annual 2010 to 2014.
- U.S. Census Bureau. *United States Census*. Washington, 1960 to 2010.

APTA has dealt with this problem by creating two new classification categories to maintain continuity between 2010 and later data sets. In 2011 through 2014, APTA has used “surface rail” as a term for the sum of the new light rail and streetcar modes and a continuous historical comparison to the former light rail. In 2011, APTA used “passenger railroad” as a term for the sum of the new commuter rail and hybrid rail and in 2012 through 2014, APTA used “regional railroad” as a sum for commuter rail and hybrid rail. Passenger railroad was used for only one year because it might have been incorrectly viewed as including intercity passenger railroad. This allowed APTA to publish continuous data for the old light rail and a sum of the new light rail and streetcar modes and the old commuter rail and the new commuter rail and hybrid rail modes.

The difficulty of selecting a new modal classification scheme to summarize light rail and streetcar and commuter rail and hybrid rail is the difference in the basis of modal names. Some names have been based on the generalized location of the light rail type modes, e.g., streets, urban, surfaces, interurban, but commuter rail is based on a description of activity. The APTA selection as a summary mode for the new light rail and the new streetcar cannot, of course, use either of those names and uses a name popular over a century ago, surface rail. This name is chosen because most light rail and streetcar service is provided on the surface rather than in tunnels or elevated structures, and all other historical names appear to be inappropriate. This was the primary location of each mode, and was the basis of the classification by the census as far back as 1917, as reported in this quote.

“Classification according to character of roadway. This classification presents statistics of elevated and subway roads in comparison with the surface roads, or those which are essentially surface. The elevated and subway group includes those having elevated or subway trackage in excess of surface trackage.”

(Bureau of the Census, *Census of Electrical Industries 1917: Electric Railways*. Washington, 1920.)

“Surface rail” and “regional rail” are currently used as inclusive summary mode names in the *APTA Public Transportation Fact Book, Appendix A: Historical Tables* because that publication compares transit data over time on sum tables for nearly a century. Historical comparison requires categories that may have changed names over time but do not change the group of systems and type of operation included over time. Regional rail is taken from European usage and describes shorter travel within a region on systems operating on current or former freight railroad type infrastructure. In the *APTA Public Transportation Fact Book*, which was data solely for the reported year, summary categories are not needed for continuity and have not been used.

CENSUS RAIL CLASSIFICATION SCHEMES

The current rail classification scheme used in the census *American Community Survey* to describe the primary mode of travel by commuters is outdated and results in obviously incorrect data. These data are nevertheless published by the census and may result in erroneous planning, research, and political decision making.

The original census classification scheme used from 1890 through 1937 was for statistical reports describing the transit railway industry in the same manner as the current *APTA Public Transportation Fact Book* and the *FTA National Transit Database*. Most of those publications differentiated between surface railway and elevated and subway railway. The last census publication of rail transit data was for 1937 data.

Beginning in 1960, the census began collecting, as part of the *Decennial Census* and then the *American Community Survey*, data on mode of transportation for commuters. For transit they adopted variations on the categories used to collect transit data earlier in the century. Rail modes were “streetcar or trolley car,” “subway or elevated,” and “railroad.” In 1960, these names were not inconsistent with industry practice and represented the rail service available at that time. The common names used to describe these modes by transit passengers and the industry have changed since then, but the census names have not. A passenger who rides a light rail system likely does not know the correct commute mode response on a census form is “streetcar or trolley car.”

Census data indicate the commuter frequently selects the wrong rail mode. The effect of this is shown on Table 5, which reports commute mode data from the 2014 *American Community Survey*. Each of these urbanized areas has a single type of transit rail service. In many cases the reported number of commuters is skewed to modes of service not operated in that urbanized area.

Table 5: Number of Rail Commuters Reporting Alternative Rail Modes of Travel in Single Mode Urbanized Areas, 2014 American Community Survey

| Urbanized Area/ Transit Agency | Only Available Mode of Service in 2014 | Number of Commuters Using Streetcar and Trolley Car | Number of Commuters Using Subway and Elevated | Number of Commuters Using Railroad | Percent Correct Response |
|---|---|---|--|---|--------------------------------|
| St. Louis, MO-IL: Bi-State Development Agency | Light Rail | 587 | 5,914 | 981 | 7.85% |
| Denver-Aurora, CO: Regional Transportation District | Light Rail | 1,348 | 9,460 | 3,717 | 9.28% |
| Atlanta, GA: Metropolitan Atlanta Rapid Transit Authority | Heavy Rail | 330 | 21,633 | 2,336 | 89.03% |
| Houston, TX: Metropolitan Transit Authority of Harris County | Light Rail | 931 | 701 | 703 | 39.87% |
| Nashville-Davidson, TN: Nashville Metropolitan Transit Authority | Commuter Rail | 9 | 182 | 206 | 51.89% |
| Sacramento, CA: Sacramento Regional Transit District | Light Rail | 2,299 | 2,012 | 2,195 | 35.34% |

 Modes not operated in urbanized area.

Source: U.S. Census Bureau. *American Community Survey*. Washington, 2014.

St. Louis' only rail service is a light rail system. In the census, light rail would be classified as streetcar and trolley car. But only 7.85% of commuters in St. Louis reporting any form of rail transit as their primary commute mode report the mode correctly. The light rail line does go into a tunnel in downtown St. Louis and crosses bridges and other elevated structures, thus, subway and elevated could be a logical choice, and is incorrectly selected by 79% of respondents. Changing this classification would require action by the census.

APTA AND FTA BUS CLASSIFICATION SCHEMES

Similar to the way they divided light rail and commuter rail into two modes in 2011, the NTD also divided the existing bus category into three modes: bus rapid transit, commuter bus, and bus. As with the rail modes, one new category has the same name as the previous total category. This does not present the same degree of problem as the division of light rail and commuter rail does. The new bus modes are operational divisions using the same technology and often the same vehicles. APTA, in the *Public Transportation Fact Book, Appendix A: Historical Tables*, addresses this problem by simply having a "total bus" column that adds the three new modes together and provides continuity with historical data.

Table 6 illustrates this problem for bus modes. In this, case the number of agencies in the basic mode continues to increase. In the rail categories, light rail and streetcar are an either/or mode selection as are commuter rail and hybrid rail. In bus, however, a bus mode agency before 2011 may have operated what is now termed bus service as well as bus rapid transit service and commuter bus service. An agency reporting the new modes will likely also continue to report the bus mode. The increase in bus systems between 2011 and 2012 results in part from the 2010 Census delimiting 32 more urbanized areas than the 2000 Census, and the expansion of existing urbanized areas brought some formerly rural systems into urbanized areas. If an agency has both directly operated and purchased transportation service for any of these modes, the agency would have been counted twice.

Table 6: Number of Agencies Reporting Bus Modes of Service to the NTD, 2010 Compared to Later Years After Additional Modes Added

| Mode | Before Change 2010 | Reporting New Modes Optional | | Reporting New Modes Required | |
|-------------------|--------------------|------------------------------|------|------------------------------|------|
| | | 2011 | 2012 | 2013 | 2014 |
| Bus | 584 | 609 | 688 | 695 | 700 |
| Bus Rapid Transit | --- | 5 | 4 | 7 | 10 |
| Commuter Bus | --- | 36 | 72 | 110 | 120 |
| Unreported Total | 584 | 650 | 764 | 802 | 830 |

No Summary data published.

Source: Federal Transit Administration. *National Transit Database*. Washington, annual 1979 to 2014.

CONCLUSION

In 2011, the National Transit Database subdivided its light rail modal category into three modes, commuter rail into two modes, and bus into three modes. In each case, the former names, light rail, commuter rail, and bus, were used to identify one of the new subsets of the old modes. This use of the same name for different modes, which include different sets of transit agencies, may lead to errors in historical analysis. APTA, in its historical statistics, uses new names to include all of the previous modes in order to report data that is inclusive of the entire former modal sets of transit systems. The current modes that were included in light rail in the NTD before 2011 are summarized under the name surface rail in APTA historical reports. The current modes that were included in commuter rail in the NTD before 2011 are summarized under the name regional railroad in APTA historical reports. The current modes that were included in bus in the NTD before 2011 are summarized under the name total bus modes in APTA historical reports. This allows a continuity of reporting data for the same groups of transit agencies for historical comparisons. These new names are subject to change if more appropriate names are proposed; but they would be changed back to 2011 names to maintain the new continuity.

The Bureau of Census continues to use names for rail modes that date back as far as 1912. These names are no longer in everyday use and are selected incorrectly for journey-to-work modes by respondents to the American Community Survey. This may lead to incorrect analysis using census data. These names would need to be changed by the census.

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