Document Overview
This technical appendix documents the sources for data cited in the Quality of Life Report – Full Study and includes a brief summary of the process undertaken to acquire, calculate, and present each of the performance metrics shown in the study. Where relevant, it also discusses data availability over the life of the study. The technical appendix concludes with a recommendation for the timing of periodic updates.

Metrics Description
This document structure parallels the report and is organized by the same sections included in the Quality of Life Report – Full Study. Each Metric is identified by the corresponding title in the QoL Full Study Report and the page number on which it’s located. The following information is provided for each measure:

Definition: A concise explanation of what is being measured.

Reporting frequency: How often the measure is regularly calculated or updated; e.g., annually for ongoing monitoring measures.

Scale: Size of the area covered by the measure; e.g., region, corridor, and/or station level.

Sources(s): The provider(s) of the data needed to calculate the measure. When the data are available online, a link is provided to the data.

Methodology: A short description of the general steps involved in relevant methods and/or calculations to present the data as shown in the report.

Introduction Metrics

P 2 What is Measure R and Measure M?

Definition: Description of sales tax measures in Los Angeles County funding new transportation projects and programs, and accelerating some projects already underway prior to the measures’ passing.

Reporting Frequency: N/A

Scale: Region


Methodology: N/A

1 Unless otherwise noted, metrics calculations and GIS-based analyses were performed by Fehr & Peers
Service and Finance Metrics

P 9 Overall customer satisfaction
Definition: A measure of overall Metro customer satisfaction system wide.
Reporting frequency: Annual.
Scale: Metro system wide (rail and bus).
Methodology: Metro publishes the results of its annual on-board Customer Satisfaction surveys. The surveys contain questions touching on a range of customer service-related topics. For the purposes of this metric, the overall customer service satisfaction rates for 2008 and 2015 were presented and compared.

P 9 Customer complaints
Definition: An analysis of customer complaints received by Metro.
Reporting frequency: Annual.
Scale: Metro system wide (rail and bus).
Source: Metro staff – Richard Saldivar.
Methodology: Metro compiles all complaints received and organizes them by division, line, location, manner received, complaint category, and date. There are different complaint categories for bus and rail, and each category is given a code. Between 2008 and 2015, 46,400 complaints were received system wide, but the number of complaints received each year was relatively consistent. In order to provide a deeper look into the types of passenger experiences that impact overall customer satisfaction, an analysis of the complaint data was performed in which the percentage share of specific types of complaints were identified. There was some overlap in complaint categories between bus and rail, but there were also a number of categories unique to each service mode. To provide a uniform comparison, all bus and rail complaints were grouped into one of eight higher level complaint categories: Accessibility, Safety and Comfort, Fares, Service and Reliability, Operations and Mechanics, Staff, Miscellaneous, Vehicle/Station Quality (rail only). The percentage share of each higher level category was presented separately for bus and rail. Additionally, the top three complaint types for each mode were also identified, as was the number of passenger rides taken per complaint by mode.
**P 10 Past rider data**

**Definition:** Statistics about people who used to ride Metro but no longer do so.

**Reporting frequency:** Non-recurring.

**Scale:** Los Angeles County.

**Source:** Metro staff – Conan Cheung; Metro Online Survey conducted Summer 2016.

**Methodology:** In Summer 2016, Metro conducted an online survey of Los Angeles County Facebook users and asked questions about whether and why or why they did not ride Metro. Survey responses were analyzed by Metro staff and grouped by ridership status: current riders, infrequent riders, past riders, and non-riders. Relevant information was available from the survey to address multiple metrics and statistics about past riders were included in the appropriate section of the Full Study to further enhance understanding former customers’ perception of the topic at hand. For example, crime on Metro facilities is discussed on page 11, and a statistic showing that 21% of past riders stopped riding Metro due to safety concerns was included on page 10. For most questions in the survey, respondents were asked questions in which they could provide more than one answer and then also asked which of those answers represented the main answer to the question. For example, if asked why past riders stopped riding, a respondent could answer that their travel pattern changed, that they bought a car, and that transit is too slow, followed by a prompt to state which of those three reasons represents the primary reason they no longer ride Metro. In all cases where Past Rider Data was included in the Full Study, the statistic reported reflects the main reason past riders stopped riding Metro.

**P 10 Crime reduction measures**

**Definition:** Programmatic and other measures Metro is taking today or in the very near future to address existing crime on Metro.

**Reporting frequency:** Ongoing.

**Scale:** Metro system wide (rail, bus, and properties).

**Source:** Metro staff – Alex Wiggins.

**Methodology:** Metro's Chief Systems Security & Law Enforcement Officer, Alex Wiggins, was interviewed and provided a list of new security-related measures Metro is implementing to address existing crime issues on Metro.

**P 10 Crimes on Metro**

**Definition:** An analysis of all crimes reported on Metro vehicles, at stations/stops, and at Metro facilities.

**Reporting frequency:** Annual.

**Scale:** Metro system wide (rail, bus, and properties).

**Source:** Metro staff – Stephanie Burke.
Methodology: Since 2013, Metro has maintained a database of all reported crimes and arrests on Metro vehicles (buses and trains), at stations and stops, and at any other Metro facility (for example, at a train service yard). Metro tracks crime by service mode, line, and location. Crimes are categorized into one of 34 categories. The categories are then further grouped into the Federal Bureau of Investigation’s Uniform Crime Report’s two higher level categories: Part I and Part II crimes. Part I crimes include violent and property crimes such as aggravated assault, forcible rape, murder, robbery, arson, burglary, and motor vehicle theft. Part II crimes include all other crimes such as disorderly conduct, drug offenses, prostitution, weapons offenses, and public drunkenness. For the purposes of the Full Study, Metro’s crime database was evaluated for overall increases or decreases in crime, as well as changing trends for specific types of crimes.

P 10 Crime in Los Angeles County
Definition: An analysis of the overall crime trends in Los Angeles County for the period from 2013-2015.
Reporting frequency: Annual.
Scale: Los Angeles Countywide.
Source: State of California Department of Justice Open Justice Crime Statistics Database
Methodology: To provide local context to Metro crime trends, an analysis of the overall crime trends in Los Angeles County was performed. Annual crime statistics for each agency in the State of California are provided on the State of California Department of Justice’s website through their Open Justice Crime Statistics Database. Crimes for all agencies in Los Angeles County were downloaded and aggregated for the period from 2013-2015, for which Metro crime data is also available. Los Angeles County crime statistics were then analyzed to determine the change in overall crime in the County for the specified time period.

P 12 Perception of safety riding Metro
Definition: Metro riders’ perceptions of safety while on-board a Metro vehicle or while waiting at a station or stop.
Reporting frequency: Annual.
Scale: Metro system wide (rail and bus).
Source: Metro staff – Jeffrey Boberg; Metro Customer Satisfaction System wide Results.
https://www.metro.net/news/research/
Methodology: Metro publishes the results of its annual on-board Customer Satisfaction surveys. The surveys contain questions touching on a range of customer service-related topics, including passenger perceptions of safety. For the purposes of this metric, the passenger perceptions of safety rates while waiting for or on-board a bus and while waiting for or on-board a train for the years 2008 and 2015 were presented and compared. During the selected time period, bus passenger perceptions of safety improved, but rail passenger perceptions of safety deteriorated slightly.
**P 12   Light rail collisions**

**Definition:** Collisions involving Metro light rail vehicles.

**Reporting frequency:** Annual.

**Scale:** Metro light rail system.

**Source:** Metro staff – Jeffrey Neely.

**Methodology:** Prior to January 2015, Metro maintained a database of only those rail collisions that were CPUC reportable accidents. Information on those rail collisions is limited to the month and the line on which they occurred. Beginning in 2015, Metro revised its rail collision database to begin including the date and time of the collision, the approximate location of the collision, a description of the collision, an accident type code, and the number of fatalities or personal injuries. For the purposes of the Full Study, total light rail collisions were reported for the years from 2008 – 2015. Due to the limited scope of information on rail collisions available prior to 2015, a high level analysis of the data was conducted to tally the number of heavy and light rail collisions per year per line (heavy rail collisions are only mentioned in the text box on page 12, while light rail collisions are graphically represented). In future updates to the QoL report, it will be possible to provide a more detailed analysis of rail collisions due to the more detailed data collection procedures that Metro implemented in 2015. Bus and BRT collision data for the period through 2008 – 2015 was also provided by Metro and evaluated. Data on bus and BRT collisions include details on BRT line or bus route, as well as collision date and time, location, type, and description. BRT and bus collision data was not included in the Full Report however, because the database did not include information on collisions or fatalities. It is recommended that Metro begin recording this data for future analyses.

**P 12   Metro light rail collisions per Metro light rail revenue service miles**

**Definition:** Number of Metro light rail collisions per annual miles of travel by all light rail vehicles while in service.

**Reporting frequency:** Annual.

**Scale:** Metro light rail system.

**Source:** Metro staff – Nancy Saravia.

**Methodology:** Metro tracks annual revenue service miles (miles transit vehicles travel while in service, as opposed to when they might travel between a terminal station and a rail yard at the end of the night) by service mode. Revenue service mile figures were used to normalize the number of light rail vehicle collisions per year. For the purposes of this report, an average of the collisions per service mile rate for only the years 2008 – 2014 was reported due to a limitation in 2015 data.
**P 12  Vehicular collisions per vehicle miles traveled**

**Definition:** Vehicular collisions in Los Angeles County per vehicle miles traveled.

**Reporting frequency:** Vehicle collisions – annual; vehicle miles traveled – every four years.

**Scale:** Los Angeles Countywide.

**Source:** Vehicle collisions – California Highway Patrol Statewide Integrated Traffic Records System (SWITRS) http://iswitr.chp.ca.gov/Reports/jsp/userLogin.jsp; vehicle miles traveled – Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan/Sustainable Communities Strategy (RTP) (SCAG, 2014).

**Methodology:** The total number of vehicle collisions in Los Angeles County for the years 2008 – 2013 (2014 data was not readily available at the time of analysis) were downloaded from the SWITRS website and averaged. The average annual number of vehicle collisions was then normalized by the average of the number of vehicle miles traveled in Los Angeles County for the years 2008 and 2014, as reported in the SCAG 2012 RTP. Vehicle miles traveled data from SCAG is available on an every four-year basis, and a 2015 vehicle miles traveled figure was not produced. See the Vehicle Miles Travelled Metric description for more details.

**P 12  Relative safety of light rail transit travel compared to driving in Los Angeles County**

**Definition:** A comparison of the per mile collision rate for light rail transit vehicles compared to driving.

**Reporting frequency:** Light rail collisions – annual; vehicle miles traveled – every four years.

**Scale:** Los Angeles Countywide.

**Source:** Metro staff – Jeffrey Neely; vehicle miles traveled – Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan/Sustainable Communities Strategy (RTP) (SCAG, 2014).

**Methodology:** The light rail transit and driving collision rates per mile were compared to evaluate the relative safety of traveling in a light rail transit vehicle or driving in an automobile.

**P 14  On-time bus and rail performance**

**Definition:** The percent of buses and trains departing stations and stops on-time per the schedule.

**Reporting frequency:** Annual.

**Scale:** Metro system wide (rail and bus).

**Source:** Metro staff – Nancy Saravia and Jeffrey Neely.

**Methodology:** Metro defines on-time performance as a transit vehicle departing stations and stops no more than one minute early or five minutes late at all time-points along a given route. Metro has an on-time performance target of 85%. Metro tracks on-time bus performance monthly by line, day type (weekday, Saturday, Sunday), and period of the day. For each month, Metro identifies what percent of transit bus vehicles arrived early, on-time, or late. To determine the annual average bus on-time performance rate, the on-time performance rate for all day types and time
periods for an entire year were averaged for the years 2008 – 2015. The average was weighted by day type (e.g., \((\text{DX}^*5)+\text{SA}+\text{SUN})/7\)). Year over year changes were documented and an overall change in bus on-time performance from 2008 to 2015 was reported. Metro tracks rail on-time performance similarly, except that it does not break down performance by period of the day, and records are only available for the years 2013 – 2015. A similar process as was used to determine bus on-time performance was applied to rail on-time performance. Rail on-time performance had extremely low variation year-over-year, even for light rail lines.

**P 14  Miles between bus breakdowns**

**Definition:** A measure of the number of bus miles driven between reported breakdown events.

**Reporting frequency:** Annual.

**Scale:** Metro bus system.

**Source:** Metro staff – Nancy Saravia.

**Methodology:** Metro tracks annual bus road calls (breakdowns) and hub miles (representing all miles driven by buses, including those miles driven between bus yards when buses are out of service). For the purposes of the QoL report, the annual number of road calls was divided by annual hub miles to determine miles between bus breakdowns, and the resulting numbers for the years 2008 and 2015 were reported.

**P 16  Real-time rider information**

**Definition:** Number of Metro rail and BRT stations and select bus stops with TVs displaying real-time vehicle arrival information.

**Reporting frequency:** As installation occurs.

**Scale:** Metro system wide (rail and bus).

**Source:** Metro staff – Al Martinez.

**Methodology:** In a discussion with Metro Senior Director of IT – Transit Applications Al Martinez, Martinez provided information regarding the history of real-time passenger information TV display installation at Metro rail and BRT stations and at select bus stops.

**P 16  Metro technology for customers**

**Definition:** Means of technology based access for the public to Metro.

**Reporting frequency:** As new programs/access points become available.

**Scale:** Metro system wide.

**Source:** Metro staff – Lan-Chi Lam.

**Methodology:** Through email and phone communications with Metro Director of Communications – Web & Mobile Lan-Chi Lam, Lam provided information regarding the various ways the public can communicate with Metro and/or use technology to improve or enhance their experience.
riding Metro. These access points include Metro’s own Trip Planner and the Source (Metro’s transportation news blog), developer-based mobile apps available through Apple’s App Store or Android’s Google Play Store, TAPtoGo, Twitter, and Facebook. Lam also provided information regarding when each access point first became available.

P 16  
**TAP card access**

Definition: Number of transit agencies with fare payment available through TAP, Metro’s stored value card.

Reporting frequency: As new agencies join TAP.

Scale: Metro and partner agency system wide.

Source: Metro staff – Gabriela Saravia and David Sutton; UFS/TAP Monthly Update to the Executive Management & Audit Committee – July 20, 2006

Methodology: Research through archived Metro Board Reports revealed TAP’s early history in a monthly update to Metro’s Executive Management & Audit Committee from July 20, 2006 on UFS/TAP. Through email communications with Metro Transportation Planning Manager, Customer Experience – TAP Technical Systems Gabriela Saravia, Saravia identified agencies currently accepting TAP.

P 18  
**Metro fare box recovery**

Definition: The percent of Metro’s operating expenses recouped through passenger fares.

Reporting frequency: Annual.

Scale: Metro system wide.

Source: Metro staff – Timothy Mengle.

Methodology: Through email communications with Metro Director, Budget – Office of Management and Budget Tim Mengle, Mengle provided information on Metro’s adopted budget fare box recovery ratio for the period through Fiscal Year (FY) 2008 – 2015. For the purposes of the QoL report, the fare box recovery ratio was reported for the years 2008 and 2015.

P 18  
**State and federal grants received**

Definition: A summation of all state and federal funding grants received by Metro by year.

Reporting frequency: Annual.

Scale: Metro system wide.

Source: Metro staff – Cosette Stark.

Methodology: Through email and phone communications with Metro Deputy Executive Officer, Regional Grants Management – Countywide Planning and Development Cosette Stark, Stark provided us with a detailed record of all state and federal grants received by Metro for the period from
FY 2008 – 2015. For the purposes of the QoL report, the grants were categorized by state or federal funding source and summed for each year. The grant totals for 2008 and 2015, rather than a summation of all grants received over the selected period, were reported.

**P18 Funding provided through Measure R to date**

**Definition:** A cumulative total of Measure R tax funds provided to various Metro projects, programs, operations, partner agencies, and local agencies through FY 2015.

**Reporting frequency:** Annual.

**Scale:** Metro system wide and Los Angeles Countywide.

**Source:** Metro Staff – Timothy Mengle.

**Methodology:** Through email communications with Metro Director, Budget – Office of Management and Budget Tim Mengle, Mengle provided data on Measure R expenditures from Inception (funds first became available in FY 2010) through FY 2015. Expenditure totals were broken down into eight categories, including Administration (1.5% of funds collected), Transit Capital, Bus Operations, Highway Capital, Local Return, Rail Improvements, Rail Operations, and Commuter Rail. For the purposes of the Full Study, total expenditures through FY 2015 by category were reported, as was a total for all categories.

**P18 Prop A and Prop C Funding**

**Definition:** A cumulative total of Prop A and Prop C funding returned to cities through Local Return

**Reporting frequency:** Annual.

**Scale:** Metro system wide and Los Angeles Countywide.

**Source:** Metro Staff – Carlos Vendiola.

**Methodology:** Through email communications with Metro Transportation Planning Manager Carlos Vendiola, Vendiola provided data on fund provided to local agencies through Local Return for Prop A and Prop C (two existing transportation tax measures in place prior to Measure R). Funding distributions were organized by local agency. For the purposes of the Full Study, Prop A and Prop C funds distributed through Local Return for the period FY 2010 – 2015 were summed and reported.
Mobility and Access Metrics

P.22 Racial makeup of Metro passengers
Definition: Racial makeup of passengers riding Metro rail or bus service
Reporting frequency: Annual.
Scale: Metro system wide.
Methodology: Metro publishes the results of its annual on-board Customer Satisfaction surveys. The surveys contain questions on passenger demographics, including passenger race. For the purposes of this metric, the passenger responses on race for the year 2014 were presented separately for rail and bus.

P.22 Racial makeup of LA County
Definition: Racial makeup of Los Angeles County residents living within ½ mile of a Metro rail or BRT station or within ¼ mile of a bus stop.
Reporting frequency: Annual.
Scale: Los Angeles Countywide.
Source: American Community Survey (ACS) 2014 5-year Estimates of Demographics and Housing. https://www.census.gov/programs-surveys/acs/
Methodology: Data for this metric were collected from the ACS 2014 5-Year Estimates of Demographics and Housing. The U.S. Census identification of race and ethnicity identifies a primary race and separately defines any race in combination with Hispanic/Latino or not. When surveying riders, Metro specifically includes Hispanic/Latino as a distinct racial characteristic. In order to place these metrics in the same terms, the Census data were summed for all racial categories defined as “Not Hispanic or Latino – X race alone” where x includes White, Black, American Indian/Alaskan Native, Asian/Native Hawaiian/Pacific Islander or other. The Hispanic/Latino population figure is from the category “Hispanic or Latino (of any race).” This same methodology was used to calculate the racial makeup for people living near Metro Rail or BRT stations by selecting any census tract of which any part falls within a ½ mile radial buffer of a station. These population totals were added only once for all tracts regardless of how many station areas might be nearby. The totals for each racial category were added together and each category was divided by the total population to determine the percentage of each race. The same process was used for population living within ¼-mile radius of any bus stop in the county.
**P 24 Access riders using transit**

**Definition:** The number of Access card holder boardings on Metro fixed-route transit.

**Reporting frequency:** Annual.

**Scale:** Metro system wide.

**Source:** Metro staff – Giovanna Gogrewe.

**Methodology:** Access is an Americans with Disabilities Act (ADA)-mandated Paratransit service for functionally disabled individuals in Los Angeles County. Access transportation service provides curb-to-curb shared ride transportation service for any ADA Paratransit eligible individual during the hours that Metro systems are operational. Eligible individuals receive an Access card, which they utilize to secure Paratransit service. Access card holders may also use their Access cards to board fixed-route Metro services free of charge. Metro began tracking Access card user boardings to transit after Access transitioned to TAP in late 2011. Through email and phone communications with Metro ADA Paratransit Program Administrator Giovanna Gogrewe, Gogrewe provided data on the annual number of Access card holder boardings to transit for the period through 2012-2015. For the purposes of the Full Study, annual Access card holder boardings to fixed-route transit were reported, as was a percent change in boardings between 2012 and 2015.

**P 24 Languages at Metro**

**Definition:** The number of languages in which Metro Rider Guides, call center service, and other information is provided by Metro.

**Reporting frequency:** As changes occur.

**Scale:** Metro system wide.

**Source:** Metro staff – Gail Harvey.

**Methodology:** Metro Director, Customer Relations Gail Harvey provided information regarding the various languages in which Metro provides service at its call center, and in which Metro publishes Rider Guides and a selection of other information.

**P 24 Paratransit ridership**

**Definition:** The number of boardings to Access Paratransit services by Access card holders.

**Reporting frequency:** Annual.

**Scale:** Access Services.

**Source:** Metro Staff – Giovanna Gogrewe.

**Methodology:** Access is an ADA-mandated Paratransit service for functionally disabled individuals in Los Angeles County. Access transportation service provides curb-to-curb shared ride transportation service for any ADA Paratransit eligible individual during the hours that Metro systems are operational. Eligible individuals receive an Access card, which they utilize to secure Paratransit service. Through email and phone communications with Metro ADA
Paratransit Program Administrator Giovanna Gogreve, Gogreve provided data on the annual number of Access card holder curb-to-curb Paratransit rides provided for the period through 2008 – 2015. For the purposes of the Full Study, annual Access card holder Paratransit rides were reported, as was a percent change in boardings between 2008 and 2015.

**P 24 Wheelchair boardings**

Definition: Wheelchair boardings to Metro bus service (with or without use of an Access card).

Reporting frequency: Annual.

Scale: Metro bus system.

Source: Metro staff – Giovanna Gogreve.

Methodology: Through email and phone communications with Metro ADA Paratransit Program Administrator Giovanna Gogreve, Gogreve provided data on the annual number of wheelchair boardings to Metro fixed route bus services for the period through 2008 – 2015. For the purposes of the QoL report, annual wheelchair boardings to bus services were reported, as was a percent change in boardings between 2008 and 2015.

**P 26 Peak period drive time compared to going Metro**

Definition: A comparison of the end-to-end travel time and travel time reliability on Metro rail and BRT services with driving on a parallel route during the morning and evening peak commute period.

Reporting frequency: Based on frequency of Metro service and schedule changes.

Scale: Metro rail and BRT system.

Source: Google maps travel time information [https://www.google.com/maps](https://www.google.com/maps).

Methodology: Google maps travel time data was utilized to determine the morning and evening commute peak period travel times for both Metro rail and BRT transit and driving. Based on an analysis of changing conditions over the morning and evening travel periods, 8:00 AM was selected as the morning peak hour and 5:00 PM was selected as the evening peak hour. For each Metro rail or BRT route, end-to-end travel times were collected in both directions in both peak periods. Select Metro rail routes were subdivided to reflect changing conditions along the route, including the Gold Line (divided into Azusa to Sierra Madre, Sierra Madre to Union Station, and East LA to Union Station), the Expo Line (Santa Monica to Culver City and Culver City to Downtown Los Angeles), and the Orange Line ( Warner Center to North Hollywood and Chatsworth to North Hollywood). For each route, the slowest time period and direction was selected for comparison to driving travel times along a nearby parallel corridor. For example, for the Blue Line, morning and evening travel times for both north and southbound travel were collected. Of those four travel times, southbound travel from Downtown Los Angeles to Long Beach in the evening commute period was slower than southbound travel in the morning commute period or northbound travel in either the morning or evening commute period. This “worst case” transit travel time was then compared to a nearby parallel driving route and its own worst case travel time. In the case of the Blue Line, this meant a comparison between travel on the light rail route and travel on the I-110 freeway between...
Downtown Los Angeles and Long Beach. For transit, Google provides an exact travel time, whereas for driving, Google provides a range depending on traffic congestion levels. This range was used to provide a comparison between the travel time reliability of Metro rail and BRT service and driving, and demonstrated the degree of competitiveness of transit with driving. For example, on the Blue Line, in the evening commute hour traveling southbound between Downtown Los Angeles and Long Beach, Google estimates the trip on light rail will take 58 minutes, while driving could take anywhere from 55 minutes to 100 minutes—meaning that a trip on transit is almost as quick as a driving trip under the best conditions, and is much quicker than driving on a, especially congested day. Conversely, on the Silver Line, traveling from Downtown Los Angeles to Pacific/21st Street, transit travel is estimated to take 82 minutes, whereas a driving trip along the same corridor could take anywhere from 50 to 100 minutes—making transit slightly less competitive than driving on an average day.

**P 28 SigAlerts**

**Definition:** Change over time in the number of SigAlerts reported annually.

**Reporting frequency:** Annual.

**Scale:** Los Angeles County wide.

**Source:** Metro staff – Iain Fairweather; LA SAFE 511 Motorist Aid & Traveler Information System Annual Project Review Reports.

**Methodology:** A SigAlert is a large-scale freeway event last longer than 30 minutes and blocking one or more lanes of a roadway. In email communications with Metro Senior Program Manager – LA SAFE / 511 Iain Fairweather, Fairweather provided Annual Project Review Reports for the LA SAFE 511 Motorist Aid & Traveler Information System for the period through FY 2011 – 2015. The LA SAFE annual reports provide data on the number of annual SigAlerts. An analysis of change over time in the number of SigAlerts reported annually was conducted for inclusion in the QoL report.

**P 28 Average peak hour speeds on selected arterials**

**Definition:** Average driving travel speeds on selected major arterials in Los Angeles County during the morning and evening commute hour.

**Reporting frequency:** Annual.

**Scale:** Los Angeles County wide.

**Source:** INRIX.

**Methodology:** The INRIX database provides average vehicle speed estimates on arterials and freeways throughout Los Angeles County. The database includes approximately 20,000 individual roadway segments with speed data recorded in one minute intervals. Each speed record is assigned a score by INRIX that indicates whether the record is observed or estimated. The data is provided for an 18-month period from January 2014 through June 2015. Select major arterial segments from each of Metro’s seven Service Council sectors were selected for travel speed analysis in consultation with Metro staff. Approximately three or four arterials were selected per Service Council sector. The INRIX database was used to compute average vehicle
speeds on the identified arterial roadway segments. The data was first filtered to only include records from Tuesdays, Wednesdays, and Thursdays between March 6, 2015 and May 30, 2015. Data was only used from Tuesdays, Wednesday, and Thursdays because mid-week weekdays provide the most representative weekday travel conditions, unaffected by holidays and weekend travel plans. The speed data was averaged into 15-minute intervals for an AM period (6:00-9:00 AM) and a PM period (3:00-7:00 PM) for each day within the data range specified. Only those records identified as observed (with a score value of 30) were included in the analysis. This removed approximately 15% of the records from the arterial analysis that were estimated rather than observed. The speed data was then averaged across 15-minute intervals to provide results for a typical AM or PM peak period on a Tuesday, Wednesday, or Thursday in spring 2015. Speeds presented in the Full Study represent single peak commute hours (8:00 AM and 5:00 PM). For each Service Council sector, the selected study arterial segments speeds were calculated by weighting speeds along individual INRIX roadway segments by the roadway segment length to produce an accurate average speed, e.g., (roadway segment 1 length * average speed for roadway segment 1) + (roadway segment 2 length * average speed for roadway segment 2) / (length of all arterial segments in the Service Council sector). Metro has purchased INRIX data since 2014 and anticipates continuing to purchase it in upcoming years.

**P 30 Peak hour travel speeds in general purpose lanes on Los Angeles County freeways**

**Definition:** Average driving travel speeds using general purpose lanes on selected major freeways in Los Angeles County during the morning and evening commute hour.

**Reporting frequency:** Annual.

**Scale:** Los Angeles County wide.

**Source:** INRIX.

**Methodology:** Select major freeways in Los Angeles County were selected for analysis in consultation with Metro staff. The selected freeways were subdivided into freeway study segments extending from interchange to interchange (for example, the I-405 freeway from the US-101 freeway to the I-10 freeway) or to the Los Angeles County border. The naming conventions in the shapefile provided by INRIX were not consistent across freeway facilities, especially related to ramps and HOV/HOT lanes. The segments making up each study corridor were initially selected using the roadway name attribute. Then, the project team manually reviewed the selected links in each study corridor to 1) correctly identify and separate mainline facilities from HOV/HOT facilities and 2) remove access ramps and freeway to freeway ramps from the selected facilities. Following these modifications, average speed in general purpose lanes per freeway segment was calculated similarly to the average arterial speed. For freeway data, the removal of records with a score lower than 30 removed less than 1% of the records from the freeway analysis.
P 30  **Peak hour travel speeds in HOV and HOT lanes on Los Angeles County freeways**

**Definition:** Average driving travel speeds using HOV or HOT lanes on selected major freeways in Los Angeles County during the morning and evening commute hour.

**Reporting frequency:** Annual.

**Scale:** Los Angeles County wide.

**Source:** INRIX.

**Methodology:** The same process previously described for general purpose travel lanes was used to calculate average peak hour travel speeds on all HOV and HOT lanes along the selected major freeways in Los Angeles County. For HOV data, the removal of records with a score lower than 30 removed approximately 10% of the records from analysis.

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**P 30  Comparison of average travel speeds in HOV and HOT lanes to general purpose lanes**

**Definition:** Comparison of average travel speeds in HOV and HOT lanes to travel speeds in general purpose lanes along selected major freeways in Los Angeles County.

**Reporting frequency:** Annual.

**Scale:** Los Angeles County wide.

**Source:** INRIX.

**Methodology:** Average travel speeds for selected study freeway general purpose lanes were compared to average travel speeds for selected study freeway HOV and HOT lanes.

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**P 32  Completed Metro highway improvements**

**Definition:** A comprehensive presentation of all completed Metro-funded highway improvements.

**Reporting frequency:** As improvements are made.

**Scale:** Los Angeles County wide.

**Source:** Metro staff – Benkin Jong.

**Methodology:** Metro Highway Group staff member Benkin Jong provided a spreadsheet listing all Metro-funded highway improvements completed in the period from 2008 – 2015. These improvements include carpool lanes, ExpressLanes (toll carpool lanes), freeway connectors, lane expansions, and ramp upgrades. Jong was consulted in order to carefully map each project in ArcGIS. Once mapped, ArcGIS analysis was conducted to determine the total lane miles of new carpool lanes opened in Los Angeles County since 2009 that were funded by Metro.
**P 3.2 Metro ExpressLanes**

**Definition:** Rate of carpooling and number of carpoolers on Metro ExpressLanes.

**Reporting frequency:** Annual.

**Scale:** Metro ExpressLanes system.

**Source:** Metro staff – Shahrzad Amiri.

**Methodology:** Through email and phone communications with Metro Executive Officer – Congestion Reduction Shahrzad Amiri, Amiri provided data on usage of the Metro ExpressLanes on the I-110 between Downtown Los Angeles and Long Beach and on the I-10 east of Downtown Los Angeles. For both facilities, data is available for the period from 2013 – 2015. Data is categorized by the number and percent share of single-occupant vehicle trips, HOV-2 trips (vehicles with two occupants), and HOV-3 trips (vehicles with three or more occupants). ExpressLanes vehicle data were analyzed to determine the total number of vehicles using the ExpressLanes facilities (a summation of the different vehicle types), the average vehicle occupancy (AVO) (a weighted average of the number of vehicles by type multiplied by their occupancy; for HOV-3 vehicles the occupancy was assumed to be three), the total person throughput (multiplication of the total number of vehicles by the AVO), and the percent share of vehicles carpooling (a summation of the percent share of total vehicles comprised of HOV-2 and HOV-3 vehicles). These calculations were produced for each ExpressLane facility individually and for both facilities combined.

**P 3.2 Population**

**Definition:** The population of Los Angeles County.

**Reporting frequency:** Annual.

**Scale:** Los Angeles County wide.

**Source:** (ACS) 2009 and 2014 5-year Estimates of Population. https://www.census.gov/programs-surveys/acs/

**Methodology:** ACS 2009 and 2014 5-year estimates of population by census tract for Los Angeles County were used to calculate population and change in population in the period from 2009 – 2014.

**P 3.2 Vehicle hours of delay**

**Definition:** Daily total number of hours of delay per vehicle on roadways within Los Angeles County due to congestion.

**Reporting frequency:** Every four years.

**Scale:** Los Angeles County wide.

**Source:** SCAG 2012 RTP (SCAG, 2014).

**Methodology:** Vehicle hours of delay is a measure that demonstrates how much extra time is spent traveling on the region’s freeways due to congestion, as opposed to the ability to always travel under free-flow conditions. Increased delay has an impact on the movement of both people and
goods, and stop and go traffic has negative impacts on air quality in the region. In its RTDs, SCAG utilizes its Travel Demand Model to provide an estimate of daily vehicle hours of vehicle delay for all of Los Angeles County. The 2012 RTP provided estimates for the year 2014, as well as a baseline number from the prior RTP (2008). These numbers as well as percent change over the period from 2008–2014 were reported in the Full Study.

P 32 Vehicle miles traveled
Definition: Daily number of miles traveled by motor vehicles within Los Angeles County.
Reporting frequency: Every four years.
Scale: Los Angeles County wide.
Source: SCAG 2012 RTP (SCAG, 2014).
Methodology: Vehicle miles traveled is a measurement of miles traveled by vehicles within a specified region for a specified time period. In its RTPs, SCAG provides an estimate of daily vehicle miles traveled for all of Los Angeles County. The 2012 RTP provided estimates for the year 2014, as well as a baseline number from the prior RTP (2008). These numbers as well as percent change over the period from 2008–2014 were reported in the QoL report.

P 32 Freeway Service Patrol
Definition: Freeway breakdown service assists by the Freeway Service Patrol
Reporting frequency: Annual (fiscal year).
Scale: Los Angeles County wide.
Methodology: The Metro Freeway Service Patrol (FSP) is a congestion mitigation program operated in partnership with Metro, the California Highway Patrol, and Caltrans. Metro contracts with local tow service providers to dispatch a fleet of roving tow and service trucks designed to reach disabled vehicles quickly and efficiently and either get them running again or remove them from the freeway to a designated location in order to reduce traffic congestion. Quickly removing disabled vehicles from the freeway reduces the chances of further incidents caused by onlookers and impatient drivers. In addition, it helps save fuel and reduces air polluting emissions by reducing stop-and-go traffic. The service is free to motorists and operates seven day a week. Through email and phone communications with Metro Motorist Services Program Administrator John Takahashi, Takahashi provided the number of annual FSP assists in Los Angeles County and the average disabled motorist wait time for a service vehicle. Metro DEO, Congestion Reduction Kathleen McCune provided a report produced in collaboration between the University of California, Berkeley’s Institute of Transportation Studies and Caltrans titled California’s Freeway Service Patrol Program: Management Information System Annual Report FY 2013-14. This was the most recent report available at the time of analysis. The report includes data on annual motorist fuel and vehicle hours of delay savings. Data on the annual number of assists, average disabled motorist vehicle wait
time, annual gallons of fuel saved, and annual vehicle hours of delay saved for FY 2013 – 2014 were included in the QoL report.

**P 34 Changes in rail and bus trips**

**Definition:** A comparison of changes in ridership on bus and rail nationally.

**Reporting frequency:** Annual.

**Scale:** National.

**Source:** American Public Transit Association (APTA) Report on Ridership by Mode and Quarter from 1990 - 2015

**Methodology:** APTA collects ridership information by mode quarterly and annually dating back to 1990, and provides the data to the public for download on its website. The report includes quarterly and annual estimated unlinked transit passenger trips by transit mode. For the purposes of the Full Study, the report was utilized to compare trends in Metro ridership to national public transit trends. Data on the percent change in rail and bus trips nationally between 2008 and 2015 was reported in the Full Study and compared to Metro ridership trends in rail and bus trips.

**P 34 Annual trips on rail and BRT**

**Definition:** Number of annual unlinked passenger trips (boardings) on rail, BRT, and commuter rail by line.

**Reporting frequency:** Annual.

**Scale:** Metro rail and BRT system.

**Source:** Metro staff – Nancy Saravia; Metrolink staff – Henning Eichler.

**Methodology:** Metro tracks unlinked passenger trips annually by line. Through phone and email communications, Metro Transportation Planning Manager V – Executive Office, Transit Operations Nancy Saravia provided Metro rail and BRT ridership by line for the years 2008 – 2015. Metrolink Planning Manager Henning Eichler provided Metrolink ridership by line for the same time period. Silver Line ridership data are not available prior to 2010 as, before that time, Silver Line was not categorized as BRT or tracked individually. For the purposes of the Full Study, the data were presented annually for each line. Additionally, the data were analyzed to determine percent change in ridership over the selected time period.

**P 34 Annual trips on Metro and local bus**

**Definition:** Annual number of unlinked passenger trips (boardings) on Metro and partner agency buses in Los Angeles County.

**Reporting frequency:** Annual.

**Scale:** Metro and partner agency bus system wide.
Source: Metro staff – Nancy Saravia.

Methodology: Metro tracks unlinked passenger trips annually by line. Through phone and email communications, Metro Transportation Planning Manager V – Executive Office, Transit Operations Nancy Saravia provided Metro rail and BRT ridership by line for the years 2008 – 2015. For the purposes of the Full Study, the data were presented annually for all Metro bus lines combined and all Metro partner agency operated bus lines combined. Additionally, the data were analyzed to determine percent change in ridership over the selected time period.

P 36 Metro Rideshare program

Definition: The number of employers participating in Metro’s Rideshare program.

Reporting frequency: Annual.

Scale: Los Angeles County wide.

Source: Metro staff – Dolores Roybal.

Methodology: Metro Rideshare offers a variety of commuter and employer programs to encourage ridesharing to work. Metro supports local employers through sustainability programs, incentives for employees who rideshare, a Guaranteed Ride Home program, discounted Metro TAP passes. Metro Director of Shared Mobility and Implementation Dolores Roybal provided data on the number of employers participating in the Metro Rideshare program in 2008 and 2015.

P 36 Annual vanpool trips

Definition: The number of annual commute trips made using the Metro Vanpool program.

Reporting frequency: Annual.

Scale: Los Angeles Countywide and beyond.

Source: Metro staff – Kevin Holliday.

Methodology: Vanpools are similar to carpools, except they generally involve more people. In the Metro Vanpool program, a vanpool is a group of 5 to 15 people who regularly travel together to work 30 miles or more (roundtrip) in at least 13 days out of the month. Riders pay a monthly fare and maintenance fee, while drivers ride at a discounted rate in exchange for driving and maintaining the van. The Metro Vanpool Program offers up to a $4000 monthly lease subsidy for commuter vanpools of 7-15 passengers that have a destination to a Los Angeles County worksite. Metro’s Vanpool program is the largest of its kind in the nation. Metro Transportation Planner – Metro Vanpool Program Kevin Holliday provided data on Vanpool program ridership broken down by month and year and categorized into unlinked passenger trips and the number of vehicles operated in maximum service for the period through 2008 – 2014. Additionally provided were daily vanpool vehicle occupancy rates for the month of December 2015. Vanpool statistics were analyzed to estimate the number of daily single occupancy vehicle trips removed from the roadway through Vanpool ridership (annual monthly average vehicles operated * average vanpool occupancy for December 2015). For the
purposes of the Full Study, the total number of Vanpool trips taken in 2008 and 2015 were reported, as was the percent change during the same time period.

**P 36 Vanpool pickup locations**

**Definition:** Vanpool program pickup locations in December 2015.

**Reporting frequency:** Monthly.

**Scale:** Los Angeles Countywide and beyond.

**Source:** Metro staff – Kevin Holliday.

**Methodology:** Metro Transportation Planner – Metro Vanpool Program Kevin Holliday provided geospatial data on Vanpool pick-up locations for the month of December 2015. Vanpool pick-up locations change frequently as participants sign up and drop out of the program. Metro does not maintain a database of discontinued pick-up locations, and was only able to provide a record of pick-up locations current to the time of analysis. The geospatial pick-up data was provided by pick-up zip code location and then mapped in ArcGIS in order to provide a visualization of how widespread across Los Angeles County the Vanpool program is, and to identify certain areas with very high usage (such as the San Fernando Valley and North County).

**P 38 Riders who walk or bike to transit**

**Definition:** The percent of Metro transit riders who arrive to the station by walking or bicycling.

**Reporting frequency:** Annual.

**Scale:** Metro system wide (rail and bus).

**Source:** Metro staff – Jeffrey Boberg: Metro Customer Satisfaction System wide Results. https://www.metro.net/news/research/

**Methodology:** Metro publishes the results of its annual on-board Customer Satisfaction surveys. The surveys contain questions touching on a range of customer service-related topics. For the purposes of this metric, the percentages of Metro transit riders who walked or bicycled to either rail or bus in 2015 were presented and compared.

**P 38 Vehicle parking at Metro**

**Definition:** Number of vehicle parking spaces supplied at Metro park & ride lots.

**Reporting frequency:** As changes are made.

**Scale:** Metro system wide.

**Source:** Metro staff – David Castro and Frank Ching.

**Methodology:** Metro Director, Parking Management – Countywide Planning & Development Frank Ching provided data on the number of park & ride parking spaces by location, the number of spaces at a given location that are free or paid, and the 2016 parking utilization rate for both free and
paid spaces (where available). The data were analyzed to determine the free, paid, and total
number of parking spaces per line and system wide, as well as the line utilization rate (where
available – for example, the most recent utilization study was conducted before the opening of
Expo Phase II, so there is no utilization data available for that line).

**P 38  Bike parking at Metro**

Definition: Number of bicycle parking spaces supplied at Metro rail and BRT stations.

Reporting frequency: As changes are made.

Scale: Metro rail and BRT system.

Source: Metro staff – Laura Cornejo.

Methodology: Metro Deputy Executive Officer – Countywide Planning Laura Cornejo provided data on
bicycle parking at rail and BRT stations across the Metro system for the years 2008 and 2015.
Data was categorized by station and line, and whether it included rack spaces or locker spaces.
The data were analyzed to determine the following:

- The overall number of bicycle parking spaces in racks and lockers
- The number of new rack and locker spaces added
- The percent change in bicycle parking available between 2008 and 2015
- The number of bicycle parking spaces by line
- The overall average number of bicycle parking spaces by station system wide
- The average number of bicycle parking spaces per station per line
- The stations that gained the most new bicycle parking over the selected time period
- And the number and percent of stations with no bicycle parking at all.

**P 40  Miles of bicycle facilities in LA County**

Definition: Miles of bicycle facilities in Los Angeles County by class

Reporting frequency: Annual.

Scale: Los Angeles County wide.

Source: Metro staff – Laura Cornejo.

Methodology: Metro Deputy Executive Officer – Countywide Planning Laura Cornejo provided data on miles
of bicycle facilities in Los Angeles County by class (Class I, Class II, Class III, Class IV Cycle
Tracks) in the years 2007 and 2015. For the purposes of the Full Study, bicycle facility miles
by Class and percentage change over the selected time period were reported.
**P 40 Metro-funding first/last mile projects in LA County from 2008-2014**

**Definition:** Number of first/last mile projects funded by Metro in Los Angeles County by mode, including total dollar amount provided by mode.

**Reporting frequency:** Annual.

**Scale:** Los Angeles County wide.

**Source:** Metro staff – Tham Nguyen and Jingyi Fan.

**Methodology:** Metro Transportation Planning Manager – Countywide Planning & Development Tham Nguyen provided a database of all first/last mile projects Metro funded through the Call for Projects for the cycles through 2007 – 2013. Metro’s Call for Projects is a competitive process that distributes discretionary capital transportation funds to regionally significant projects and occurs every other year in odd years. At the time of analysis, the 2013 Call for Projects represented the most recent Call. Project data were categorized by project description, classification (pedestrian, bike, pedestrian/bike, multimodal, transit), city, and funding amount. For the purposes of the Full Study, the projects were totaled by classification.

**P 40 Car share at Metro stations**

**Definition:** Number of car share vehicles parked at Metro stations available for public use.

**Reporting frequency:** As changes are made.

**Scale:** Metro system wide.

**Source:** Metro staff – David Castro and Frank Ching.

**Methodology:** In 2015, Metro partnered with car sharing company Zipcar to provide car share vehicles at Metro park & ride lots, providing a critical first/last mile connector. Metro Transportation Planner – Countywide Planning David Castro provided data on the number of car share vehicles parked at Metro stations. The data were analyzed to determine the number of stations with car share and the number of car share vehicles per line, including at Union Station. In future updates to the QoL report, Metro may want to consider requesting user data for vehicles parked at Metro stations.

**P 42 Population near transit**

**Definition:** Percent of Los Angeles County population living within ½ mile of a Metro rail or BRT or Metrolink station.

**Reporting frequency:** Annual.

**Scale:** Los Angeles Countywide.

**Source:** Metro; Metrolink; ACS 2014 5-Year Estimates of Total Population. https://www.census.gov/programssurveys/acs/

**Methodology:** The Los Angeles County population living near rail or BRT was calculated by creating a ½-mile radial buffer around each Metro Rail and BRT station (open as of summer 2016,
including Expo Phase II and the Gold Line extension to Azusa) and those Metrolink stations located within Los Angeles County. The station buffers were used to select any census block group that had any portion falling inside the ½-mile radial buffer. Population data were collected from the ACS 2014 5-Year Estimates of Total Population. The population was calculated independently for each rail line; thus a Block Group that fell within the buffer for both the Purple Line and the Red Line, for example, would be included in the count for each. For the countywide population living near Metro Rail/BRT or Metrolink service, census block groups were added only once, regardless of how many station areas or lines might be nearby. The population that fell within these selected block groups was added together and then divided by the total population of Los Angeles County to determine the percent of Los Angeles County population that lived near any rail or BRT service. Additionally calculated was the number of Los Angeles County residents who gained access to new rail or BRT services in the period between 2008 and 2016.

**P.42  CalEnviroScreen 2.0 disadvantaged communities**

**Definition:** The percent of population living within ½ mile of Metro rail and BRT or Metrolink identified as disadvantaged by the California Environmental Health Hazard Screening tool.

**Reporting frequency:** Non-recurring.

**Scale:** Los Angeles County wide.

**Source:** California Environmental Health Hazard Screening Tool (CalEnviroScreen 2.0) (California Office of Environmental Health and Hazard Assessment, 2016 [http://oehha.ca.gov/ej/ces2.html](http://oehha.ca.gov/ej/ces2.html))

**Methodology:** CalEnviroScreen 2.0, last updated in October 2014, helps identify communities in California that are disproportionately burdened by various sources of pollution and are most vulnerable to its impacts. It is a screening methodology that assigns a score for each census tract based on data for 12 types of pollution and environmental factors, as well as population characteristics, socioeconomic factors, and unemployment rates, and ranks communities in California against one another. For the purposes of the Full Study, ArcGIS was used to compare CalEnviroScreen 2.0 data to Metro’s rail, BRT, bus system, and frequent bus network, as well as to bus services provided by Metro’s partner agencies, and Metrolink’s rail system, in order to identify the percent of population living in transit accessible areas that is among the 25% most disadvantaged communities according to CalEnviroScreen 2.0. Transit accessible areas were defined as the block groups that intersect a ½-mile radial buffer of Metro rail and BRT stations, and ¼-mile radial buffer of Metro or partner agency bus stops. The population of the transit accessible block groups was summed separately for areas within disadvantaged community areas and for those not within disadvantaged community areas.

**P.42  Environmental Justice Screening Method disadvantaged communities**

**Definition:** The percent of population living within ½ mile of Metro rail and BRT or Metrolink identified as disadvantaged by the Environmental Justice Screening Method (EJSM).

**Reporting frequency:** Unknown.

**Scale:** Los Angeles County wide.
Source: USC Program for Environmental and Regional Equity.

Methodology: EJSM is a screening method to identify disadvantaged communities similar in nature to CalEnviroScreen 2.0. Features exclusive to EJSM include user flexibility to determine the thresholds for consideration depending on the end use of the data, and inclusion of income and race/ethnicity as population and socioeconomic factors. Inclusion of income and race/ethnicity factors address research showing that environmental justice issues impact low-income communities of color at a disproportionate race to other communities. EJSM data ranks impact to census tracts in comparison to the other census tracts included for analysis. Geographic comparisons are available at the Los Angeles County and SCAG region levels. For the purposes of the Full Study, ArcGIS was used to compare Los Angeles County data to Metro’s rail, BRT, bus system, and frequent bus network, as well as to bus services provided by Metro’s partner agencies, and Metrolink’s rail system to identify the percent of population living near transit that is among the 24.4% most disadvantaged communities, similar to the process used in Metric 43. A key difference to note between this measure and CES 2.0 is that the communities identified as disadvantaged by EJSM are compared only to other communities in Los Angeles County as opposed to communities across California as a whole.

**Population near bus stops**

**Definition:** Percent of Los Angeles County population living within ¼ mile of a Metro or partner agency bus stop.

**Reporting frequency:** Annual.

**Scale:** Los Angeles Countywide.

**Source:** Metro; ACS 2014 5-Year Estimates of Total Population. https://www.census.gov/programs-surveys/acs/

**Methodology:** The percent of Los Angeles County population living within ¼ mile of a bus stop was calculated for all Metro Bus service and all bus service in Los Angeles County provided by partner agencies. Population data were obtained from the ACS 2014 5-Year Estimates of Total Population. The bus stop locations for both Metro and partner agency services were provided by Metro and analyzed in ArcGIS. For general bus service, whether Metro or all countywide agencies, a ¼-mile radial buffer was drawn around every bus stop and used to select any census block group of which any part fell within the ¼-mile radius. Census block groups were added only once each, regardless of how many station areas might be nearby. The population that fell within these selected block groups was added together and then divided by the total population of Los Angeles County to determine the percent of Los Angeles County population that lived near Metro bus service and the percent of Los Angeles County population that lived near any bus service.
P 46   Population near frequent service bus stops

**Definition:** Percent of Los Angeles County population living within ¼ mile of a Metro or partner agency bus stop providing frequent service.

**Reporting frequency:** Annual.

**Scale:** Los Angeles Countywide.

**Source:** Metro; ACS 2014 5-Year Estimates of Total Population. 
[https://www.census.gov/programssurveys/acs/](https://www.census.gov/programssurveys/acs/)

**Methodology:** The LA County population near frequent bus services was calculated similarly to Metric 41. The service frequency data were sourced from publicly-available General Transit Feed Specification (GTFS) data for a particular agency. Frequent service was defined as a bus on any particular route departing from a stop on average every 15 minutes or less between the hours of 6:00 AM and 7:00 PM. This calculation was derived from agencies that provide GTFS data; agencies that do not provide this data were reviewed individually for any service that met these criteria, but none were found. The percent population living near these frequent bus stops was calculated following the same methodology as described in Metric 45.
Sustainability and Economy Metrics

**P 50 Drought awareness**
Definition: Drought awareness including water reduction goals to respond to California’s drought conditions.
Reporting frequency: non-recurring.
Scale: Metro system wide.
Methodology: Metro’s Urban Green Implementation Action Plan, adopted in 2015, was reviewed to identify water reduction goals implemented to respond to the ongoing drought.

**P 50 Metro’s clean bus fleet**
Definition: The percent of Metro’s bus fleet comprised of clean fuel vehicles.
Reporting frequency: Not Applicable (conversion is at 100%)
Scale: Metro bus system.
Source: Metro staff – Nancy Saravia.
Methodology: Metro Transportation Planning Manager V – Executive Office, Transit Operations Nancy Saravia provided a historic database of Metro’s bus fleet composition organized by vehicle fuel type. The database was reviewed to determine when Metro’s bus fleet began operating exclusively clean fuel vehicles.

**P 50 Select sustainability measures**
Definition: New construction policies designed to reduce the environmental impact of construction projects.
Reporting frequency: Non-recurring.
Scale: Metro system wide.
Source: Green Construction Policy (Metro, 2011).
Methodology: The Metro Green Construction Policy, adopted in 2011, was reviewed to identify new policy measures Metro has implemented to reduce the environmental impact of its construction projects.
**P 50  Countywide air quality**

**Definition:** Number of days per year in which Los Angeles County air quality measures exceeded Clean Air Act standards.

**Reporting frequency:** Annual.

**Scale:** Los Angeles County wide.


**Methodology:** SCAQMD publishes annual air quality data tables. Among the air quality issues reported on in the table are Ozone “Air Quality Exceedance Days” where the ozone in the air exceeds acceptable standards. SCAQMD does not provide a number of days in which Ozone exceeded air quality standards for Los Angeles County as a whole, but reports the number of days exceeded in individual air quality receptors located around the county. For the purposes of the Full Study, the number reported for each year represents the receptor in Los Angeles County with the highest number of air quality exceedance days for the State of California current > 0.070 ppm 8-hour standard. In most cases, the receptor with the highest number of exceedance days was located in Santa Clarita.

**P 50  Metro’s impact on CO2 emissions**

**Definition:** Pounds of CO2 emitted by Metro vehicles per vehicle mile traveled, by vehicle type.

**Reporting frequency:** Annual.

**Scale:** Metro system wide.

**Source:** Metro staff – Cris Liban.

**Methodology:** Metro Executive Officer, Environmental Compliance and Sustainability – Program Management Cris Liban provided data on pounds of CO2 emitted by Metro vehicles per vehicle mile traveled for the period from 2011 – 2015. The data was broken down by vehicle category (heavy rail, light rail, metro bus fleet, contracted bus fleet, vanpool, and support vehicles), and was provided in total. For the purposes of the QoL report, percent change from 2011 to 2015 in the pounds of CO2 emitted per vehicle type was calculated and reported.

**P 52  Construction project workforce diversity**

**Definition:** Metro construction project workforce diversity.

**Reporting frequency:** Annual.

**Scale:** Metro system wide.

**Source:** Metro staff – Miguel Cabral.

**Methodology:** In 2012, Metro adopted the Project Labor Agreement Construction Careers Policy which includes targeted hiring goals for minorities, disadvantaged workers, and women for federally funded construction projects. All contractors working on Metro construction projects covered by the PLA and CCP are required to comply with the targeted hiring requirements. Metro
tracks workforce diversity hiring and hours logged by targeted hires for all eligible projects. Metro Deputy Executive Officer – Diversity & Economic Opportunity Department Miguel Cabral provided a database of hours worked by project. The database includes worker race, sex, and disadvantaged status. The database was evaluated to determine whether goals set by the PLA and CCP have been achieved for projects under construction since 2012. Total hours worked for each worker demographic for all projects were tallied and the percent achieved for the targeted categories were calculated.

**P 52** Employment near transit

**Definition:** Percent of Los Angeles County jobs accessible by Metro rail and BRT or Metrolink.

**Reporting frequency:** Annual.

**Scale:** Los Angeles County wide.

**Source:** Metro; Metrolink; Longitudinal Employer-Household Dynamics (LEHD). https://onthemap.ces.census.gov/

**Methodology:** The U.S. Census Bureau, though the Department of Commerce, publishes data on every job in the United States via its LEHD program. Jobs are included in the database if a worker is employed with positive earnings during a reference quarter as well as in the quarter prior to the reference quarter. Each job is identified by industry from one of 20 top-level North American Industry Classification System (NAICS) sector codes. Job locations in LEHD are available at the block group level. For the purposes of the Full Study the number of jobs in transit accessible areas was compared to the number of jobs in Los Angeles County as a whole to determine the percent of Los Angeles County jobs accessible by transit. The number of jobs accessible within a ½-mile radial buffer of Metro rail or BRT and Metrolink was calculated by conducting geospatial analysis in ArcGIS using 2013 LEHD data, which represents the most recent year for which data was available at the time of analysis. Employment in transit accessible areas was defined as the total number of jobs within block groups that intersect with a ½-mile radial buffer of the relevant transit stations or stops. ArcGIS was also utilized to determine the number of jobs newly accessible by transit due to transit service expansions during the period from 2008 – 2016.

**P 54** Average home lease rates in real estate submarkets and station clusters

**Definition:** Average residential rents per square foot in CoStar real estate submarkets and in station clusters near Metro rail and BRT stations.

**Reporting frequency:** Annual.

**Scale:** Los Angeles County wide.

**Source:** BAE; CoStar. http://www.costar.com

**Methodology:** BAE calculated Asking Rents for all multifamily residential properties tracked by CoStar, a commercial real estate information service, in Los Angeles County, in existing CoStar real estate submarkets, and around Metro rail and BRT stations for the years 2008 and 2015. This analysis indicates how station clusters compare with their relevant submarkets both in average asking rent, and in change over time. To provide a basis for analysis in the CoStar
database, each station along Metro’s rail system was grouped into existing CoStar real estate submarkets and then further into distinct “Station Area Clusters”. Using “Station Area Clusters” as opposed to individual stations areas was necessary due to inconsistency between CoStar geography and census tract geography, and ensured that any one multifamily property within a 1/2-mile radial buffer of two or more transit stations (e.g., in Downtown Los Angeles) would not be double-counted. Station area clusters were created within CoStar using the “Line” function, whereby each station in the cluster was marked with a pin. Once the line linking each pin was drawn, a 1/2 mile radial buffer was defined around each cluster. CoStar only records a rental rate if a property happens to go on the market. Therefore, areas that saw new market-rate developments placed into service during the analysis years (2008 and 2015, not the whole 7-year period cumulatively) may see larger than normal increases in asking rent. This is especially true for Station Area Clusters with relatively low inventory to begin with. For example, within the Culver City-La Cienega-La Brea-Farmdale Station Area Cluster, only 808 multifamily units are currently tracked by CoStar. Thus, the delivery of a 112-unit luxury complex adjacent to the Culver City Expo Line station in 2015 had a significant impact on that Station Area Cluster’s Asking Rents for 2015. Lease dollar amounts for 2008 were adjusted for inflation using the Consumer Price Index for Los Angeles Metro Area, with 2015 as a base year.

P 56  Average commercial lease rates in real estate submarkets and station clusters

Definition: Average commercial rents per square foot in CoStar real estate submarkets and in station clusters near Metro rail and BRT stations.

Reporting frequency: Annual.

Scale: Los Angeles County wide.

Source: BAE; CoStar; Metro. http://www.costar.com

Methodology: BAE calculated the lease rates per square foot for all new and existing commercial properties tracked by CoStar in Los Angeles County, in existing CoStar real estate submarkets, and around Metro rail and BRT stations for the years 2008 and 2015. This analysis indicates how station clusters compare with their relevant submarkets both in average commercial lease rates and in change over time. To provide a basis for analysis in the CoStar database, each station along Metro’s rail system was grouped into existing CoStar real estate submarkets and then further into distinct “Station Area Clusters”, as described in Metric 54. For office space, “Gross Direct Rent” was the dataset used to quantify the asking rent. A gross lease is a type of commercial lease whereby the landlord pays the building’s property taxes, insurance, and maintenance. For retail space, “Triple Net Direct” (NNN) was the dataset used. An NNN lease is a common form of lease in the retail market, whereby the tenant is responsible for all expenses associated with their proportional share of occupancy in the building. CoStar only records a rental rate if a property happens to go on the market. Therefore, in submarkets and Station Area Clusters where there is not much commercial inventory, one open listing for that year can have a sizable effect on the running lease rate. Thus, a Station Area Cluster’s current inventory should always be considered when analyzing the data. Lease dollar amounts for 2008 were adjusted for inflation using the Consumer Price Index for Los Angeles Metro Area, with 2015 as a base year.
**P 58 Average income in communities and near stations**

**Definition:** Change in average household income within ½ mile of transit compared to wider neighborhoods.

**Reporting frequency:** Annual

**Scale:** Los Angeles County wide

**Source:** BAE; ACS 2014 5-year Estimates of Median Household Income in the Past 12 Months; Metro. https://www.census.gov/programssurveys/acs/

**Methodology:** BAE calculated change in median household income using the ACS 2010 and 2014 5-year Estimates of Median Household Income in census tracts within a ½-mile radial buffer of a Metro rail or BRT station, in Community Plan Areas, and County wide. The latter time series was the most recent dataset available at the time of analysis. Household income trends show how household incomes are changing around transit investment areas compared with larger benchmark geographies. ACS does not provide 1-year data (e.g., most current) at the census tract level. Therefore, to calculate housing unit growth at the station area (e.g., census tract) level, it was necessary to use 5-year data as opposed to 1-year data. Five-year data was used for analysis at the Community Plan Area and County wide level to maintain consistency. Median income dollar amounts for 2010 and 2014 were adjusted for inflation using the Consumer Price Index for the Los Angeles Metro Area, with 2015 as a base year.

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**P 60 Vehicle access**

**Definition:** Household access to vehicles statistics for locations proximate to transit (households living within ½ mile)

**Reporting frequency:** Annual

**Scale:** Los Angeles Countywide

**Source:** Metro; ACS 2014 5-year Estimates of Vehicles Per Household; ACS 2014 5-Year Estimates of Total Population. https://www.census.gov/programssurveys/acs/

**Methodology:** Household vehicle access was evaluated in relation to proximity to transit. Households living near rail or BRT was calculated by creating a ½-mile radial buffer around each Metro Rail and BRT station (open as of summer 2016, including Expo Phase II and the Gold Line extension to Azusa) and those Metrolink stations located within Los Angeles County. The station buffers were used to select any census block group that had any portion falling inside the ½-mile radius. Next, the average number of vehicles to households within a given block group was calculated. ACS Estimates of Vehicles per Household provide the number of households within a given block group who have access to zero, one, or two or more vehicles. For those households with access to two or more vehicles, the average number of vehicles accessible was assumed to be 2.5. Finally, the average number of vehicles accessible to all households near transit and all households not near transit was compared.
P 60  Multifamily Housing Units within ½ mile of rail and BRT

Definition: New Multi-Housing Deliveries within ½ mile of rail and BRT

Reporting frequency: Annual

Scale: Los Angeles Countywide.

Source: Bay Area Economics Urban Economics (BAE); CoStar; Metro. http://www.costar.com

Methodology: BAE calculated the number of new multifamily units (including public, private, and nonprofit developers) delivered in the period through 2008 – 2015 (cumulative) Countywide and within a ½ mile radial buffer of Metro rail and BRT stations using CoStar. For a unit to be considered “delivered”, CoStar requires that a Certificate of Occupancy must have been issued for the property. Multifamily delivery data compare how multifamily unit delivery compared around transit investments versus larger benchmark areas. To provide a basis for analysis in the CoStar database, each station along Metro’s rail system was grouped into a distinct “Station Area Cluster” as described in Metric 54. CoStar’s “Delivered Units” dataset was used to identify the total number of multifamily units that were delivered each year Countywide and within the Station Area Clusters.

P 60  New Housing Units within ½ mile of rail and BRT

Definition: New housing units within ½ mile of rail and BRT

Reporting frequency: Annual

Scale: Los Angeles Countywide.

Source: BAE; ACS 2014 5-year Estimates of Units in Structure; Metro. https://www.census.gov/programssurveys/acs/

Methodology: BAE calculated housing unit growth using the ACS 2010 and 2014 5-year Estimates of Units in Structure. The latter time series was the most recent dataset available at the time of analysis. Housing unit data compare change around transit investments versus larger benchmark areas. Similar to the process applied in Metric 54, housing unit growth was assessed at the Countywide level and at the station area level. Station area clusters used in the CoStar analysis were matched to census tracts for analysis using ACS data. ACS does not provide 1-year data (e.g., most current) at the census tract level. Therefore, to calculate housing unit growth at the station area level (e.g., census tract level), it was necessary to use 5-year data as opposed to 1-year data. Five-year data was used for analysis at the Countywide level to maintain consistency.

P 60  Affordable housing

Definition: Percent of new affordable housing built within ½ mile of Metro rail and BRT stations.

Reporting frequency: Annual.

Scale: Los Angeles Countywide.
Source: BAE; U.S. Department of Housing and Urban Development Low Income Housing Tax Credits (LIHTC) Database; Metro.

Methodology: BAE pulled data from HUD’s LIHTC Database Access System to track the number and location of new low-income housing units placed into service in Los Angeles County during the years 2008 and 2013. At the time of data collection, 2013 was the most recent year for which data was available. Figures only include the number of low-income units within a given development project that used Low Income Housing Tax Credit Financing (both 4% and 9%), and include all target populations (e.g., Senior, Homeless, Disabled) and Area Median Income (AMI) income ceilings. Figures do not include Affordable Units placed into service using other means including Density Bonus and/or Specific Plan Area Requirements. ArcGIS was used to determine the percent of new low-income housing units located within a ½-mile radial buffer of Metro rail and BRT stations.

Page 60  Metro joint development
Definition: The number of housing units built through Metro’s Joint Development program, including the percent of units that qualify as affordable.

Reporting frequency: Annual.

Scale: Los Angeles County wide.

Source: Metro staff – Jenna Hornstock.

Methodology: Joint Development is the real estate development program through which Metro collaborates with qualified developers to build transit-oriented developments on Metro-owned properties. Metro Deputy Executive Officer, Countywide Planning & Development – Joint Development/Strategic Initiatives/Parking Management Jenna Hornstock provided data on the history of Metro Joint Development for the period through 2008 – 2014. Information on each development included the rail line on which the property was located (or “Other”), the name of the project, the acreage, the developer name, and a description of what was developed, including a breakdown of housing units by “affordable” or “market rate.” Projects were categorized by completion status (completed projects, under construction, and in negotiation). Per Metro’s Joint Development Program: Policies and Process, affordable housing is housing that is covenant controlled and provided on an income-restricted basis to qualifying residents earning 60% or less of the AMI as defined by the California Tax Credit Allocation Committee, and that is often subsidized by public or non-profit funding sources.
2016 Accomplishments and Looking Ahead

**P 62 New light rail extensions**

**Definition:** New light rail service opened in 2016 as extensions to existing lines.

**Reporting frequency:** As changes are made.

**Scale:** Metro light rail service.

**Source:** Metro staff – Conan Cheung; Metro Interactive Estimated Ridership Statistics.

**Methodology:** Metro opened a six-station extension on the Gold Line eastward through the San Gabriel Valley from its former terminus at Sierra Madre Station in Pasadena to Azusa in March of 2016, and a seven-station extension on the Expo Line westward from its former terminus in Culver City to 4th Street in Downtown Santa Monica in May 2016. In a comparison of year-over-year ridership statistics available on Metro’s Interactive Estimated Ridership Statistics portion of its website, weekday ridership on both lines were compared for the months of November 2015 and November 2016. Ridership for November was selected because it represented a non-summer and non-holiday month and, as of November 2016, was at least six months out from the opening of each extension, allowing early ridership irregularities to normalize. Following the opening of the extensions, weekday ridership on the Gold Line increased 13% year over year, while weekday ridership on the Expo Line increased 54%. Per Metro Executive Officer, Finance – Office of Management and Budget Conan Cheung, in a survey of riders conducted at extension stations, 71% of riders on the Gold Line extension were new riders and, of that 71%, 66% used to drive. In a similar survey conducted on at Expo Line extension stations, 70% of riders were new riders, while 44% of those new riders used to drive.

**P 62 Green Construction Policy**

**Definition:** Metro Green Construction Policy.

**Reporting frequency:** Non-recurring.

**Scale:** Metro system wide.

**Source:** Metro website [https://www.metro.net/projects/gcp/](https://www.metro.net/projects/gcp/).

**Methodology:** An expansion to Metro’s 2011 Green Construction Policy, approved in February 2016, was reviewed.

**P 62 Paid Parking Program**

**Definition:** Information about Metro’s implementation of a pilot Parking Management Program (paid parking) at its park & ride facilities.

**Reporting frequency:** Non-recurring.

**Scale:** Metro Park & ride system wide.
Source: Metro staff – Frank Ching.

Methodology: Metro Senior Director, Parking Management – Countywide Planning & Development Frank Ching provided information about a pilot paid parking program Metro kicked off in May 2016. The pilot will continue for four years.

**P 62 Metro Bike Share in Downtown LA**

**Definition:** Metro Bike Share launch information.

**Reporting frequency:** As new stations are added.

**Scale:** Metro Bike Share system wide.

**Source:** Metro staff – Avital Shavit.

**Methodology:** In July 2016, Metro launched a new kind of public transportation with its Bike Share program. The program launched in Downtown Los Angeles with 61 stations and an additional 65 stations in the works. Bike Share will be headed to Venice, the Port of Los Angeles, and Pasadena in 2017. Metro Transportation Planning Manager Avital Shavit provided a geocoded database of the existing Bike Share stations for inclusion in the QoL report.

**P 62 Wi-Fi and cell service**

**Definition:** Wi-Fi and Cellular Services added to Metro Rail and Bus

**Reporting frequency:** As service is added.

**Scale:** Metro system wide.

**Source:** Metro staff – Al Martinez.

**Methodology:** In a discussion with Metro Senior Director of IT – Transit Applications Al Martinez, Martinez provided information regarding the implementation of Wi-Fi and Cellular services on Metro Rail, BRT, and bus services.

**P 64 Measure R & M projects**

**Definition:** Construction status of highway and transit capital improvement projects funded through Measures R and/or M.

**Reporting frequency:** Annual.

**Scale:** Los Angeles County wide.

**Source:** Metro staff – Mark Yamarone.

**Methodology:** Metro Senior Director – Long Range Planning Mark Yamarone provided a geolocated database of all highway and transit capital improvement projects funded through Measures R and M. For each project, information was provided on the project’s status (complete, under construction, planned) as of the end of 2016. Included in the list of transit projects were Metrolink projects.
**P 64 Measure M projects and programs**

**Definition:** Projects and program types funded by Measure M.

**Reporting frequency:** N/A

**Scale:** Los Angeles County wide.

**Source:**

**Methodology:** In 2016, LAEDC published economic analyses of the two different parts of Measure M – capital construction projects and funds for projects and programs. These reports were reviewed to determine the projects and program types funded by Measure M.

**P 64 Measure R & M dollars fueling the economy**

**Definition:** Total economic output of Measures R and M.

**Reporting frequency:** N/A

**Scale:** Los Angeles County wide.

**Source:**

**Methodology:** In 2016, LAEDC published economic analyses of the construction impact of both Measures R and M. These reports were reviewed to determine the economic impact construction of Measure R and M projects would have on the Los Angeles County economy. For the purposes of the QoL report, the number reported represents the total direct, indirect, and induced economic output, in millions of dollars, of the Measures, including compensation for jobs created.

**P 64 Measure R & M jobs**

**Definition:** Total job creation associated with Measures R and M.

**Reporting frequency:** N/A

**Scale:** Los Angeles County wide.

**Source:**

**Methodology:** In 2016, LAEDC published economic analyses of the construction impact of both Measures R and M. These reports were reviewed to determine the number of jobs expected to be created.
through construction of Measure R- and M-funded projects in Los Angeles County. This includes direct, indirect, and induced job creation.
Recommended timeline for period updates

A majority of the metrics included in this report are able to be updated annually. The recommended timeline for periodic updates of the QoL report is every two to three years, in order to allow for a meaningful difference in new data to develop for a substantial number of metrics. Updates more frequent than every other year may not provide actionable data without a meaningful difference evident in developing trends. Updates less frequent than every three years may prevent Metro from taking timely action to address developing issues. For those metrics updated less frequently than every two to three years, there may be an update for that metric in the QoL report only every other time the report is produced. A table showing the update frequency available for each metric is included below.

<table>
<thead>
<tr>
<th>Metric QoL Metric Update Frequency Table</th>
<th>Update Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric Title</td>
<td>Update Frequency</td>
</tr>
<tr>
<td>1. What is Measure R and Measure M?</td>
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<td>2. Overall customer satisfaction</td>
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<td>3. Customer complaints</td>
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<td>4. Past rider data</td>
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<td>5. Crime reduction measures</td>
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<td>6. Crimes on Metro</td>
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<tr>
<td>7. Crime in Los Angeles County</td>
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<tr>
<td>8. Perception of safety riding Metro</td>
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<tr>
<td>9. Light rail collisions</td>
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<tr>
<td>10. Metro light rail collisions per Metro light rail revenue service miles</td>
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<tr>
<td>11. Vehicular collisions per vehicle miles traveled</td>
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<tr>
<td>12. Relative safety of light rail transit travel compared to driving in Los Angeles County</td>
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<tr>
<td>13. On-time bus and rail performance</td>
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<td>14. Miles between bus breakdowns</td>
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<td>15. Real-time rider information</td>
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<td>16. Metro technology for customers</td>
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<td>17. TAP card access</td>
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<td>18. Metro fare box recovery</td>
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<td>19. State and federal grants received</td>
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<tr>
<td>20. Funding provided through Measure R to date</td>
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<tr>
<td>21. Prop A and Prop C Funding</td>
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<td>22. Racial makeup of Metro passengers</td>
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<tr>
<td>23. Racial makeup of LA County</td>
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<tr>
<td>24. Access riders using transit</td>
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### Metro QoL Metric Update Frequency Table

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<td>Peak hour travel speeds in general purpose lanes on Los Angeles County freeways</td>
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<td>Comparison of average travel speeds in HOV and HOT lanes to general purpose lanes</td>
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<td>Annual vanpool trips</td>
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<td>CalEnviroScreen 2.0 disadvantaged communities</td>
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<td>Population near bus stops</td>
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<td>Population near frequent service bus stops</td>
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