

Multimodal Performance Element

4



State law requires CMAs to evaluate their current and future multimodal transportation system performance for the movement of people and goods.¹¹ Specifically, the CMP must contain performance measures that evaluate how highways and roads function, as well as the frequency, routing, and coordination of transit services. The performance measures should support mobility, air quality, land use, and economic objectives and be used in various components of the CMP.

Combined with LOS standards, the performance element provides a basis for evaluating whether the transportation network is achieving the broad mobility goals in the CMP. These include developing the Capital Improvement Program, analyzing land use impacts, and preparing deficiency plans to address congestion issues. The legislation intends for the performance element to include multimodal performance measures in addition to the required roadway and transit measures. However, only the roadway LOS standards are used to trigger the need for a deficiency plan in Alameda County, as required by the CMP legislation.

The CMP statute outlines minimum requirements in terms of 1) the modes that should be covered by the performance element, 2) the types of applications that performance measures should be used for, and 3) the

goals/objectives with which the performance measures should align. Alameda CTC meets and exceeds the statutory minimums in terms of modes of transportation, range of applications, and goals/objectives:

- **Modes of transportation:** Alameda CTC uses performance measures for five major transportation modes including auto (highway and arterial/local roads), transit, bicycle, pedestrian, and goods movement. In addition, Alameda CTC uses performance measures that capture cross-cutting issues such as environmental, economic, and equity objectives.
- **Types of applications:** Alameda CTC uses performance measures in six distinct types of applications, as summarized in Table 4.1. These applications are distinct in the scales of analysis, data sources/considerations, and frequency of reporting. Three are CMP-required uses of performance measures (refer to Table 4.1 for these application types).
- **Goals and objectives:** Alameda CTC identifies goals and objectives as part of its Countywide Transportation Plan (CTP) and as part of countywide modal plans. The countywide modal plans take a focused look at goods movement, transit, arterial,

¹¹ California Government Code Section 65089(b)(2).

bicycle, and pedestrian systems that together feed into the CTP. The goals and objectives of all Alameda CTC plans are designed to align with the CTP, and the CTP goals encompass all CMP statutory goals (as well as other countywide goals such as state of good repair, equity, and health).

Principles for Selecting Performance Measures

Alameda CTC follows the principles below when identifying different performance measures for different applications:

- **Aligned with goals and objectives:** Performance measures should relate back to a goal from the CTP or CMP statute;
- **Presented in easy-to-understand and consumer/user-oriented terms:** Performance measures should be readily understandable by members of the public. Measures should also strive to capture important aspects of the user experience;
- **Data availability, “dynamism” of measure, and level of effort to compute measure matched to reporting frequency:** Performance measures that require household travel survey data, applying a travel model, or performing complex mapping analysis are not feasible for annual reporting. Similarly, measures that are not expected to change significantly year-to-year warrant less frequent reporting (for example, the percent of households living within a 20-minute walk of an elementary school is a critical accessibility measure; however, it depends greatly on land-use patterns that change over long time horizons and is not appropriate for annual monitoring; a measure such as percent of new development within a half-mile of transit is more dynamic and more appropriate for annual monitoring);
- **Scale of analysis matched to application type:** For instance, a performance measure that relies on

a travel model for computation will generally not be well-matched to a highly-localized application (such as evaluating a signal timing project or a bicycle lane project), as model accuracy declines with finer geographic scale. Similarly, a measure that requires field data collection is not suitable for countywide analysis; and

- **Consideration of an array of measures:** Since one performance measure will not serve all needs, Alameda CTC considers an array of measures.

Table 4.1 on the next page describes Alameda CTC's use of performance measures for different applications.

Table 4.1—Alameda CTC Uses of Performance Measures

Application Type	Question Answered	Geographic Scale	Temporal Scale	Reporting Documents
Evaluate Scenarios	<ul style="list-style-type: none"> • How much should be invested in different modes over a 30-year horizon? • How do different land use patterns affect transportation system outcomes? 	County-level analysis	Long-range projections	<ul style="list-style-type: none"> • Countywide Transportation Plan (every 4 years) • Countywide Modal Plans
Diagnose System Deficiencies*	<ul style="list-style-type: none"> • Which particular parts of the transportation system have needs/issues? • Where are new projects or programs needed? 	Facility-level analysis	Regular monitoring cycles, existing conditions	<ul style="list-style-type: none"> • Multimodal Level of Service Monitoring (biennial), including speed/reliability analysis for key bus routes • Multimodal Corridor Studies
Prioritize Projects and Programs*	Which projects or programs should be funded in the short-, mid-, and long-term?	Facility- or project-level analysis	Existing conditions and “with project” conditions	<ul style="list-style-type: none"> • Comprehensive Investment Plan (biennial) • Countywide Modal Plans • Multimodal Corridor Studies
Track Trends and Progress Toward Goals	Is Alameda County making progress toward transportation goals?	County-level analysis	Regular monitoring cycles, existing conditions	<ul style="list-style-type: none"> • Performance Report (annual) • PDA Investment & Growth Strategy (annual) • Safe Routes to Schools and Paratransit Annual Reports
Perform Project/Program Before/After Analysis	Did a particular project or program achieve its desired outcomes?	Project-level analysis	Short-term without and with project	<ul style="list-style-type: none"> • Grant agreements • Before/after studies
Analyze Transportation Impacts*	How will a development project affect the transportation system and what mitigations are needed?	Project-level analysis	Existing conditions and long-range projections	<ul style="list-style-type: none"> • Transportation Impact Analyses prepared pursuant to Land Use Analysis Element

* Indicates CMP statute specifically refers to use of performance measures in this type of application.

Relationships of Performance-Based Planning Activities

Broadly, the use of performance-based analysis allows Alameda CTC to set high-level policy, to make smart investment decisions, and to monitor and react to transportation system outcomes. Figure 4.1 conceptually illustrates how these functions are interrelated.

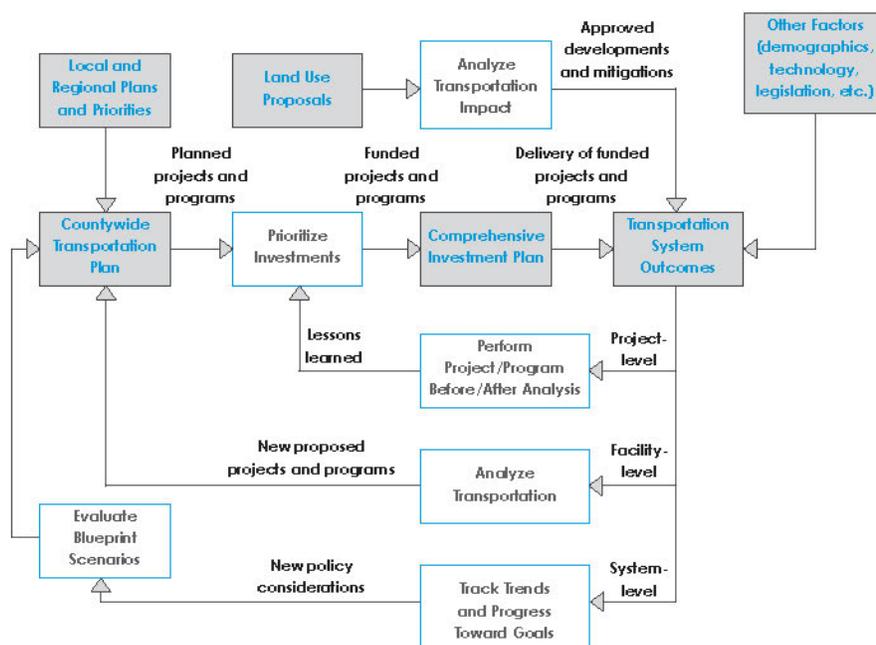
Key points of interface between activities include the following:

- Projects and programs from the Countywide Transportation Plan (a 25-year document) are prioritized for short-term funding decisions (2- to 5-year timeframe) in the Comprehensive Investment Plan.
- Facility-level performance monitoring can help identify specific parts of the transportation system as underperforming, leading to the inclusion of new projects and programs in future Countywide

Transportation Plans to improve these facilities. For instance, performance analysis may indicate that bus operations on a particular corridor are unacceptably slow, leading to a new project for bus signal priority.

- Project-level before/after analysis can provide information as to the effectiveness of specific types of projects in specific contexts, which can help determine which projects should receive limited funding. For instance, counts taken before and after the installation of a bike lane may suggest that the bike lane led to an increase in levels of bicycling, which assists in the future evaluation of similar types of projects in similar contexts.
- Progress (or lack of progress) in achieving a goal, as illuminated through system-level trend analysis can give rise to new policy ideas for inclusion in future Countywide Transportation Plans. For instance, persistent congestion could lead to consideration of new demand management strategies as part of a future Countywide Transportation Plan.

Figure 4.1—Relationship of Performance-based Planning Activities



Performance Measures

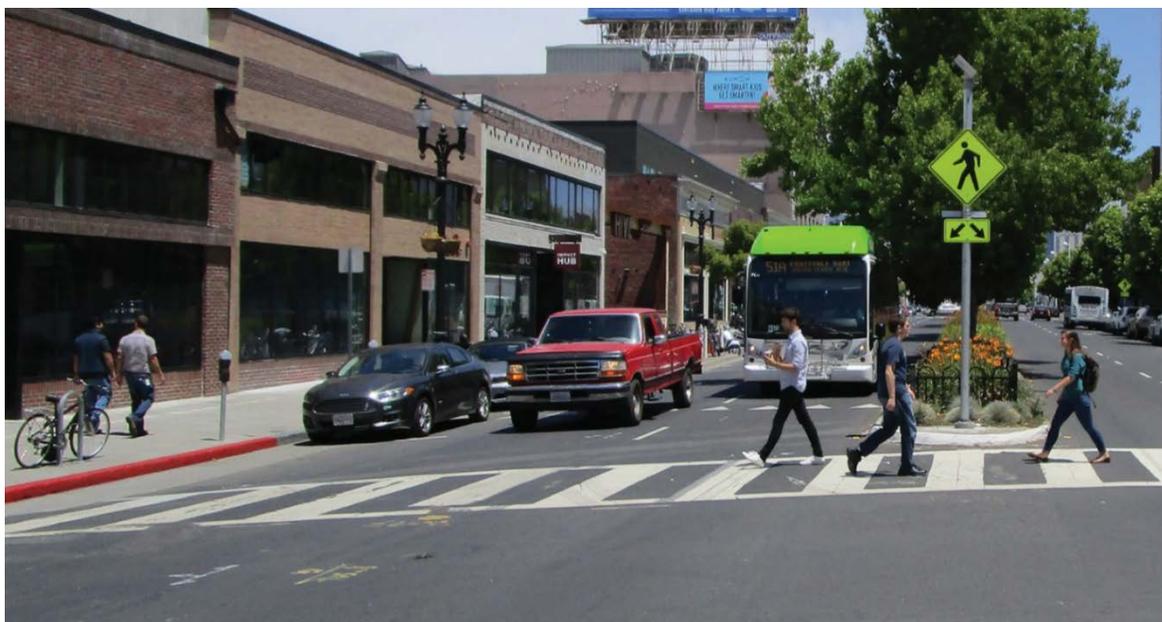
As described previously and in Table 4, Alameda CTC uses a variety of performance measures in various planning activities and reporting documents, and they are applied or monitored over different timelines. A comprehensive inventory of measures is presented in Appendix F3. The measures are organized as follows:

- Multimodal Accessibility and Transportation/
Land Use Integration
- Roadway
- Transit
- Bicycle
- Pedestrian
- Goods Movement
- Environment, Equity, and Health

As part of the 2017 CMP update, a list of additional performance measures for potential consideration in the

future has been identified based on the outcome of the three countywide modal plans completed in 2016. Further, Alameda CTC is evaluating the performance reporting format and timelines to better suit the changing needs of system performance monitoring and to seek new funding opportunities. The outcome will be incorporated in the 2019 CMP update.

Alameda CTC monitors a majority of these performance measures with data collection or by using the Countywide Travel Demand Model. The measures encompass all modes of transportation. Measurements of current conditions rely primarily on available data and established data collection processes. Peak and off-peak travel periods are considered for typical weekdays. Additional details for the legislatively required highway and roadway system and transit performance measures appear in a separate section of this chapter.



System Definition

While the statute clearly requires designation of a CMP-network for purposes of LOS monitoring, it provides no guidance for selecting a system for the performance element. In light of this, Alameda CTC uses the Metropolitan Transportation System (MTS) for the performance element. Alameda CTC also recognizes the MTS in the Land Use Analysis Program as the focus of transportation analyses.

Sources and Acceptability of Data

Alameda CTC uses a variety of data sources for its performance monitoring activities, as detailed in Appendix F3. General rules regarding data sources used include:

- Alameda CTC uses data sources that have industry acceptability.
- New data sources are validated against established data sources when possible.
- Performance measures generated from travel demand models are not appropriate for annual or bi-annual monitoring (due to model's horizon years) or for localized measures (due to accuracy issues with applying a countywide model at such scales).
- Data sources requiring original data collection (e.g., GPS floating car speed surveys, bicycle and pedestrian counts) are generally used for localized applications or on specifically defined networks due to cost of data collection.

by the CMP statute in its biannual LOS monitoring reports. Alameda CTC also reports on other highway and roadway performance measures such as pavement condition index, travel times, vehicle hours of delay, collisions, and gateway traffic volumes in its annual Performance Report.

Transit Service Performance Measures

The following transit service performance measures are legislatively required measures, and detailed information for these measures are provided by the transit operators in the county based on their service standards as explained in their short-range transit plans or other policy documents.

Table 4.2 on the next page shows performance measures for bus and rail transit in Alameda County. These measures apply to both existing services and future year (proposed) services.

For ferry services from Alameda and Oakland to San Francisco, the frequency measure is one vessel per half-hour during the a.m. and p.m. peak periods.

Legislatively Required Performance Measures

Highway and Roadway

System Performance

Alameda CTC reports on level of service on the Congestion Management Program network as required

Table 4.2—Performance Measures for Frequency of Transit Service (time of day)

Service Type	Peak	Midday	Night	Owl	Sat/Sun/ Holiday
Bus (minutes between services)					
Primary Trunk	12	15	30	60	20
Major Corridor	15	30	60	N/A	30
Local/Crosstown	30	30	60	N/A	60
Suburban Local/ Crosstown	30-60	30-45	N/A	N/A	N/A
Transbay Basic	15	30	60	N/A	N/A
Transbay Express	15-30	N/A	N/A	N/A	N/A
Transbay Owl	N/A	N/A	N/A	60	N/A
Rail (minutes between services)					
BART	3.75-15	up to 20 (off-peak)			
Ferries	30	Varies	N/A	N/A	Varies

Note: Overlapping bus routes provide more frequent service on some corridors.

Routing

Performance measures for routing and area coverage vary by transit operator.

AC Transit has guidelines for route spacing. In the densest areas, with a population of more than 20,000 people per square mile, routes should be only one-quarter mile apart. In medium-density areas with 10,000-20,000 people per square mile, such as many of the grid sections of Oakland and Berkeley, routes should be between one-quarter and one-half mile apart. In low-density areas with 5,000-10,000 people per square mile, typical of sections in Castro Valley, Fremont, and Hayward, route spacing should be between one-half and three-quarters of a mile. For very low-density areas with less than 5,000 people per square mile, route spacing can be one mile or more.

In making specific route decisions, AC Transit uses these guidelines but also bases current- and future-year bus route spacing (the average distance between bus lines) on residential densities, the location of major activity centers, topography, and street patterns. Route spacing in commercial areas is determined by location, level of activity, and layout of the development, on a case-by-case basis.

BART passenger loads are measured at selected “screenlines”—imaginary lines between two stations. Generally, screenlines are chosen at the points where maximum loads in a given direction are sustained for a significant duration—often on the edge of a central business district.

Based on its experience, BART employs the following average loading goals, which it attempts to achieve whenever possible. Identical goals and standards are applied to all lines.

- Peak hour: 115 passengers per car
- Off-peak periods: 80 passengers per car

BART sets its one-hour Peak Vehicle Load Standard at 115 passengers per car. This equates to an average of 5.4 square feet of floor space for each of the standees in a car. This is the minimum area required for an individual passenger's standing comfort prescribed by the Transit Capacity and Quality of Service Manual, published by the Transit Cooperative Research Program (TCRP). The Transit Capacity and Quality of Service Manual recognizes this allowance as "a comfortable level without body contact, reasonably easy circulation, and similar space allocation as seated passengers. BART uses a floating peak-period calculation to determine daily peak periods. On average, the a.m. peak period runs between 6:41 a.m. and 9:41 a.m., and the p.m. peak period runs between 4:00 p.m. and 7:00 p.m.

LAVTA proposes the following performance measures for existing and future services:

- Expand routes and services to meet current and future demand for timely and reliable transit service.
- Provide service with a time span sufficient to effectively serve the primary target markets for each route:
 - 4:30 a.m.-1:00 a.m. or 24 hours in backbone corridor(s);
 - 5:00 a.m.-12:00 a.m. on primary feeder lines;
 - 6:00 a.m.-9:00 a.m. and 4:00 p.m.-7:00 p.m. on secondary feeder lines and regional routes; and
 - Bell time for supplemental school lines.
- Provide trip frequencies sufficient to effectively serve the primary target markets for each route:
 - 15-30 minutes on backbone lines, 30-minute peaks if demand warrants;

- 30-60 minutes on other primary lines;
- 60-minute peak service on neighborhood, local feeder, and regional express lines; and
- Single daily roundtrips for supplemental school lines.

Union City Transit uses the following performance measures for existing and future service:

- 90 percent of all land with three or more dwelling units per acre within one-quarter mile of a transit route; and
- 90 percent of major activity centers within one-eighth mile of a transit route.

Transit Service Coordination

A number of measures are in place to ensure coordination among transit operators, including Senate Bill 602 (Service/Fare Coordination, 1989), Senate Bill 1474 (Transit Coordination, 1996), Senate Bill 916 (RM2, including Transit Connectivity, 2003), MTC Resolution No. 3055 (Inter-operator Transit Coordination Implementation Plan), and others. All transit operators in Alameda County will continue to implement the coordination projects required under these guidelines. Annually, the projects are agreed on among the operators and MTC. They relate to coordinating the following:

- Fare
- Schedule
- Service
- Public information
- Marketing
- Administration

Review Process

Alameda CTC will report on the countywide multimodal transportation infrastructure annually either in a comprehensive Performance Report that has been traditionally prepared or in an alternative format that analyzes performance measures and documents



Alameda County multimodal transportation network performance for review by local agencies and transit operators prior to publication. The report will include the most current available data from various agencies. (Alameda CTC will accept performance data that is up to two years old.) The Performance Report includes estimates of population growth during the preceding year, available from the State Department of Finance. As mentioned previously, the LOS Monitoring Report documents roadway performance for the CMP roadway network.

Local Government and Transit Agency Responsibilities

To minimize cost, Alameda CTC relies on established data collection processes and regularly published reports for data. A list of established data collection efforts, by agency, is listed below. In 2011, the Alameda CTC Commission recommended that in odd-number years, depending on funding availability, efforts be made to augment the data collection for all modes, as needed, for improved analysis of performance of the countywide transportation system.

Cities and County

- Pavement Management System data for the MTS
- Countywide Bicycle and Pedestrian Plans (Alameda County and cities' public works departments)

Transit Agencies

- Service schedules (on-time performance)
- Transit ridership routing (percentage of major centers served within one-quarter mile of a transit stop)
- Frequency (number of lines operating at each frequency level)
- Service coordination (number of transfer centers)
- Average time between off-loads (BART)

- Miles between mechanical road calls (AC Transit, LAVTA, and Union City Transit)
- Mean time between service delays (BART and ACE)
- Transit availability (frequency of transit and population within one-half mile of rail station or bus and ferry stops and terminals)
- Transit capital needs and shortfall (for high-priority, Score 16 transit projects for Alameda County transit operators)
- Transit travel times for the Transit Major Corridors for CMP Transit Monitoring

MTC

- Roadway maintenance needs
- Freeway congestion monitoring data (if developed by MTC)

Caltrans

- Freeway speed runs, duration of freeway congestion (if developed by Caltrans)
- Accident rates on state freeways
- Roadway miles in need of rehabilitation

Alameda CTC

- Roadway speeds on CMP network
- Travel times for O-D pairs
- Countywide Bicycle and Pedestrian Plans
- Bicycle and Pedestrian Counts
- Countywide Travel Demand Model analysis for mode share, activity center accessibility, etc.

Local agencies are encouraged to provide maintenance data to MTC or maintain their own database of maintenance needs on the MTS. However, there are no compliance requirements for local agencies or transit operators related to the multimodal performance element.

Next Steps

The performance measures identified in the multimodal performance element are based on measures established in a variety of plans and documents including the Countywide Transportation Plan, countywide modal plans (bicycle, pedestrian, arterial, transit, and goods movement) and the CMP document.

Alameda CTC is currently evaluating the performance reporting format and timelines to better suit the changing needs of system performance monitoring. The outcome will be incorporated in the 2019 CMP update. Further, as part of the 2019 CMP update, Alameda CTC will reevaluate and identify multimodal performance measures in light of the anticipated changes to CEQA guidelines based on SB 743 that will replace the LOS metric by VMT for transportation impacts assessment under CEQA.

Additionally, the list of performance measures may be grouped appropriately, identifying the key measures that need to be tracked along with streamlining the list of supporting documents and timelines for reporting, as appropriate. The re-evaluation will ensure that the timeline for reporting on different measures is realistically aligned with data availability and potential changes in the measures. In addition, it will ensure that the various monitoring documents are complementary and non-duplicative. This will allow Alameda CTC to tailor its multimodal performance measures to project evaluation needs and inform programming decisions.