## CITY OF ALAMEDA TRANSPORTATION CHOICES PLAN
# Evaluation Methodology and Results

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Projects and programs were evaluated based on their relative effectiveness related to mode shift, climate change, equity, and safety. Transit, bicycle, pedestrian, carpool, and TDM improvements were evaluated using the evaluation criteria to gauge if proposed improvements and strategies meet the goals and objectives.

- Mode Shift: Measure shift from drive alone to other modes
- Climate Change: Assess the ability to reduce greenhouse gas emissions
- Equity: Assess the impact on ADA compliance, low-income and minority populations
- Safety: Assess the impact on safety for all street users

## Mode Shift Assessment

A network level evaluation is provided to give insight into the combined effect on mode shift of implementing the proposed projects. This evaluation is based on 2015 baseline conditions with estimates of future 2030 conditions, which includes expected population and job growth. The baseline year of 2015 was selected because it is the year the project team acquired StreetLight InSight[1] data and collected and analyzed transit ridership data. Mode share assignments for 2015 were made based on the following:

- Auto Trips
    - Estuary Crossing trips: Webster Posey tube data uses 2015/2016 average daily traffic data collected by the City of Alameda Public Works Department. Park Street Bridge, Miller-Sweeney Bridge, High Street Bridge, and Bay Farm Island Bridge use 2011 and 2017 counts to determine 2015 baseline conditions. Data was confirmed with 2015 StreetLight InSight data. Future trips are confirmed by the Alameda Point Environmental Impact Report forecasts.  The relationship between the peak hour and the daily traffic was determined using the traffic counts for the bridges and the tubes.   The AM peak hour traffic was calculated as 7.4 percent of the daily traffic.
    - Within Alameda: Daily trips based on StreetLight InSight data.
- Carpool Trips
    - Estuary Crossing Trips: Existing carpool trips assigned based on percentage of carpool commute trips from the U.S. Census American Community Survey (2015) and the Census Transportation Planning Products (2010), which was 11 percent.
    - Within Alameda Trips: Existing carpool trips assigned based on National Household Travel Survey average weekday persons per vehicle (2009) and the American Community Survey (2015), which was 2.3 persons per vehicle.

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[1] StreetLight is a private company that provides aggregated trip origin-destination data gathered from cellular devices such as smartphones and GPS guidance systems in vehicles.

- Bicycle and Pedestrian Trips
    - Estuary Crossing Trips: Estimated 1.5 percent of trips are walk/bike based on Census Transportation Planning Products (2010) and data from the Public Opinion Survey.
    - Within Alameda Trips: Estimated 18 percent of trips are walk/bike based on Census Transportation Planning Products (2010).
- Transit Trips:
    - Estimated based on boardings and alightings weekday average data from AC Transit and WETA.

The best data available was used to make these estimates; however, the estimates for bicycle, pedestrian, and carpool trips and not based on actual counts. Table 1 shows the 2015 baseline assumptions and actual daily trip estimates for estuary crossings.

**Table 1: Estimated 2015 Daily Estuary Crossing Trips**

| | Person Trips | Percent |
|---|---|---|
| **SOV** | 173,500 | 81% |
| **Carpool** | 23,250 | 11% |
| **Bike/Walk** | 1,150 | 1% |
| **Transit (includes ferry, bus, shuttles, etc)** | 15,250 | 7% |
| **Total EC Trips** | **213,150** | |
| *Note: Uses traffic data from 2011 for bridges escalated for 2016; and 2016 data for Webster/Posey Tubes.* | | |

Table 2 shows the same information for the within Alameda Trips.

**Table 2: Estimated 2015 Daily Within Alameda Trips**

| | Person Trips | Percent |
|---|---|---|
| **SOV** | 36,100 | 63% |
| **Carpool** | 10,190 | 18% |
| **Bike/Walk** | 8,765 | 15% |
| **Transit (includes ferry, bus, shuttles, etc)** | 2,355 | 4% |
| **Total EC Trips** | **57,410** | |

Future 2030 conditions are based on Association of Bay Area Governments projected growth in 2040 and adjusted to 2030. This estimates relates to 4,440 new households and 7,760 jobs by 2030 and mainly includes proposed new developments in Alameda Point, Alameda Landing and Northern Waterfront. Growth in the number of estuary crossing trips assumes the same number of trips per household and jobs that exists today. 2030 future baseline figures used the same mode split percentages as the 2015 baseline conditions.

The projects and programs were grouped based on their type so that cumulative impacts could be assessed as shown in Table 9.  The "project type" column in Table 9 reflects the project grouping. The groups of projects and programs include the following:

- Transit (includes projects 2, 6, 11, 12, 15, 18, 19, 20, 21, 22, 23, 24, 25, 30, 31, 32)[2]
- Bicycle, Pedestrian, and Carpooling (includes projects 3, 8, 9, 10, 13, 16, 17, 23, 27, 28)
- TDM/Private Sector Participation Projects (includes projects 4, 7, 14, 26, 29, 33)

Each group of projects was analyzed to determine the potential range of mode shift from drive alone to other modes. The following assumptions and sources were used for analyzing mode shift:
- Transit: Applied to existing transit ridership
    - Travel Time: -0.6 elasticity[3,4]
    - Route Miles: 0.7 elasticity[5]
    - Frequency: 0.5 elasticity[6]
    - Incentives/Discounts: Up to 50 percent increase in ridership[7]
    - Real time information: 1 to 2 percent
- Bicycle and Pedestrian:
    - New/improved bicycle and pedestrian facilities: 5 to 10 percent increase[8]
- Carpooling
    - HOV lane: 1 to 10 percent increase in carpooling[9]
- TDM/Private Sector Participation (applied to expanded TDM activities) [10,11]
    - Limit parking supply: 3 to 13 percent
    - Charge for parking at work sites: 5 to 20 percent
    - Carshare, subsidizing carshare memberships: 1 to 4 percent
    - Rideshare programs: 1 to 8 percent
    - Marketing: 1 to 4 percent
    - Employee Transportation Coordinator: 1 to 4 percent

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[2] See Table 7 for list of projects and programs.

[3] Kain, John F. and Zvi Liu. "Secrets of Success," Transportation Research A, Vol. 33, No. 7/8, Sept./Nov. 1999, pp. 601-624.

[4] Elasticity is the change in transit rider that would occur given a certain percentage change in travel time, route miles or frequency.  For example, a 50% reduction in travel time should result in a 30% increase in ridership (-50%x-0.6=30%)

[5] Litman, Todd. "Transit Price Elasticities and Cross-Elasticities." February 2017. Victoria Transport Policy Institute. http://www.vtpi.org/tranelas.pdf.

[6] Litman, Todd.  "Understanding Transport Demands and Elasticities: How Prices and Other Factors Affect Travel Behavior." Victoria Transport Policy Institute, 2013. page 52; at www.vpti.org/elasticities.pdf.

[7] Litman, Todd. "Online TDM encyclopedia trip reduction tables." Victoria Transport Policy Institute. http://www.vtpi.org/tdm/

[8] "Non-Motorized Transportation Planning: Identifying Ways to Improve Pedestrian and Bicycle Transport." Victoria Transport Policy Institute. http://www.vtpi.org/tdm/tdm25.htm

[9] "HOV Priority: Strategies to Improve Transit and Ridesharing Speed and Convenience." Victoria Transport Policy Institute.  https://www.vtpi.org/tdm/tdm19.htm

[10] Litman, Todd. "Online TDM encyclopedia trip reduction tables." Victoria Transport Policy Institute. http://www.vtpi.org/tdm/

[11] Litman, Todd. "Understanding Transport Demands and Elasticities: How Prices and Other Factors Affect Travel Behavior." Victoria Transport Policy Institute, 2013. www.vpti.org/elasticities.pdf.

### Transit Projects and Programs Mode Shift

The recommended transit projects and programs are estimated to shift the following number of solo drivers to transit on a typical weekday: between 630 and 940 for AM Peak estuary crossings and between 940 and 1,410 for trips within Alameda (Table 3). This estimate is based on travel time savings of 10 percent, increases in service by 40 percent, and increased transit frequency during the peak by 25 percent. Corresponding increases in ridership were forecasted by applying demand elasticities to the type of change that is being made. A range of potential impacts is provided because the EasyPass Program Expansion has a wide-ranging potential for mode shift. Long-term projects such as BART to Alameda and maximum 15-minute frequency for local buses with low project readiness were not included, but would have an even greater ability to increase transit ridership.

**Table 3: Transit Projects and Programs Mode Shift**

|  | Low Mode Shift Estimate | High Mode Shift Estimate |
|---|---|---|
| **Estuary Crossing (AM Peak) Trips (2030)** | 630 | 940 |
| **Trips within Alameda (2030)** | 940 | 1,410 |

### Bicycle, Pedestrian and Carpooling Projects and Programs Mode Shift

Bicycle, pedestrian and carpooling projects and programs will increase access to safe and comfortable walking and bicycling routes, provide travel time savings for carpooling, and reduce incentives to driving by instituting demand-based parking pricing. These multimodal projects are estimated to shift modes from drive alone to non-drive alone trips by between 140 and 210 for AM Peak estuary crossings and between 280 and 690 for trips within Alameda (Table 4). Since the impacts of walking and bicycling improvements can vary, a range is provided for estimating the impact of the projects and programs. Long-term projects with low project readiness such as the west end bicycle/pedestrian bridge and planning projects such as the bicycle and pedestrian plan updates were not included in the evaluation.

**Table 4: Bicycle, Pedestrian and Carpooling Projects and Programs Mode Shift**

|  | Low Mode Shift Estimate | High Mode Shift Estimate |
|---|---|---|
| **Estuary Crossing (AM Peak) Trips (2030)** | 140 | 210 |
| **Trips within Alameda (2030)** | 280 | 690 |

### TDM/Private Sector Participation Projects and Programs Mode Shift

TDM and private sector participation projects and programs were analyzed to determine their impact based on the success of example projects. A range of potential mode shift from drive alone to non-drive alone trips were assigned to the TDM/public sector participation projects and programs. Based on the scope and reach of strategies described in the projects and programs, each strategy was assessed to determine who it would impact (existing, future, residential or commercial development) and the number of likely program participants. All future developments within Alameda Point, Alameda Landing and Northern Waterfront areas are expected to take part in TDM programs. Expanding TDM programs to existing development, specifically to

residences in homeowner associations and commercial development in business parks and districts, is one of the recommendations of this plan. Therefore, existing developments within homeowner associations and in business parks and districts are included in this analysis, which accounts for approximately 6,000 households and 22,000 jobs. Since programing is not expected to reach all these households and jobs, it is assumed that by 2030 one-half are included in a TDM program. TDM and private sector participation projects and programs are estimated to shift modes from drive alone to non-drive alone trips by between 290 and 1,340 for AM Peak estuary crossings and between 630 and 2,940 for trips within Alameda (Table 5).

**Table 5: TDM/Private Sector Participation Project and Programs Mode Shift**

|  | Low Mode Shift Estimate | High Mode Shift Estimate |
|---|---|---|
| **Estuary Crossing (AM Peak) Trips (2030)** | 290 | 1,340 |
| **Trips within Alameda (2030)** | 630 | 2,940 |

## Mode Shift Summary

Table 6 provides a summary of mode shift for all improvements compared with the 2030 future baseline and the mode share targets identified in the Transportation Choices Plan.  The first column shows baseline conditions for 2030 where baseline means the existing mode split percentages are carried forward into the future.  The second column shows the mode shift estimate that results if the low end of the estimated growth in non-drive alone trips were achieved.  The third column is similar, except using the high end of the estimated growth in non-drive alone trips.  The final column shows the growth in drive-alone trips that would be needed to meet the goal of no increase in drive alone trips.  It falls almost midway between the high and the low estimates.

**Table 6: Mode Shift Summary**

| | 2030 Future Baseline Conditions | 2030 Future Baseline Low Mode Shift Estimate | 2030 Future Baseline High Mode Shift Estimate | Shift Required to Meet Goal by 2030 |
|---|---|---|---|---|
| **AM Peak Hour Estuary Crossing Person Trips** | | | | |
| **Drive Alone** | 14,400 | 13,300 | 11,900 | 12,700 |
| **Non-Drive Alone (Carpool, Bike, Walk, Transit)** | 5,200 | 6,300 | 7,700 | 6,900 |
| **Total Estuary Crossing Trips** | 19,600 | 19,600 | 19,600 | 19,600 |
| **Non-Drive Alone Mode Share** | 27% | 32% | 39% | 35% |
| **Weekday Daily Person Trips within Alameda** | | | | |
| **Drive Alone** | 41,000 | 39,100 | 36,000 | 37,700 |
| **Non-Drive Alone (Carpool, Bike, Walk, Transit)** | 24,200 | 26,100 | 29,200 | 27,500 |
| **Total Within Alameda Trips** | 65,200 | 65,200 | 65,200 | 65,200 |
| **Non-Drive Alone Mode Share** | 37% | 40% | 45% | 42% |
| **Cumulative** *(Cumulative baseline conditions and mode share target not evaluated as part of this analysis)* | | | | |
| **Non-Drive Alone Mode Shift** | | 12,500 | 29,900 | |

## Climate Change Assessment

The recommended improvements will contribute to reductions in CO2 emissions based on fewer drive alone trips and vehicle miles traveled (VMT) from individuals choosing to bicycle, walk, take transit, or carpool instead of driving alone. This analysis uses average trip distances and mode shift estimates to determine VMT and CO2 reductions:

- VMT: VMT was estimated by multiplying average trip lengths by number of trips converted from drive alone to other modes. Estuary crossing trips average 5.7 miles and the within Alameda trips average 2.5 miles. These estimates are based on data from StreetLight InSight data. Estuary crossing trip data used proportion of drive alone trips to San Francisco and Oakland to determine the average miles travelled per trip of 5.7 miles (based on the average trip length to San Francisco versus Oakland and the percentage of the trips going to either place).

- CO2: The Environmental Protection Agency (EPA) standard of metric tons per VMT was used to calculate CO2 emissions (.000386 metric tons per VMT). Data for estuary crossings assumed weekday daily average trips shifting from driving alone to other modes. Within Alameda trips were assumed to shift for weekdays and weekends.

**Table 7: CO2 Emission Reductions**

| Evaluation Criteria | Daily VMT reduced – Low Estimate | Daily VMT reduced – High Estimate | CO2 Emission Reductions |
|---|---|---|---|
| **Daily Estuary Crossings (2030)** | 62,720 | 142,550 | Annual reduction of 5,800 to 13,500 metric tons of CO2 |
| **Within Alameda (2030)** | 4,280 | 11,250 | Annual reduction of 600 to 1,500 metric tons of CO2 |
| **Cumulative** | 67,000 | 153,800 | Annual reduction of 6,100 to 14,500 metric tons of CO2 |

## Equity Assessment

As part of the evaluation process, proposed projects were analyzed for their potential impact on minority and low-income Alameda residents. 14 of 27 projects (52 percent) improve access for areas with higher concentrations of minority populations or concentrations of low-income populations. For six projects, equity could not be assessed because specific improvement locations have not yet been determined.

- Minority Impact. To determine the potential impact on minority populations, 2014 US Census information by Block Group was analyzed (see Figure 1). Block Groups with higher than average minority population (greater than the citywide 55 percent average) are considered more sensitive to potential impacts. Fourteen of 27 projects (52 percent) are located in or intersect Block Groups with higher than average minority populations. If implemented, projects will have an equal or greater benefit to minority populations.

- Low-income Impact. To determine the potential impact on low-income populations, 2014 US Census information by Block Group was analyzed (see Figure 2). Low-income classification was defined using accepted Metropolitan Transportation Commission method of populations at 200 percent or below the poverty line. Block Groups with higher than average low-income populations (greater than the citywide 25 percent average) are considered more sensitive to potential impacts. Fourteen of 27

projects (52 percent) are located in or intersect Block Groups with higher than average rates of low-income populations. If implemented, projects will have an equal or greater benefit to low-income populations.

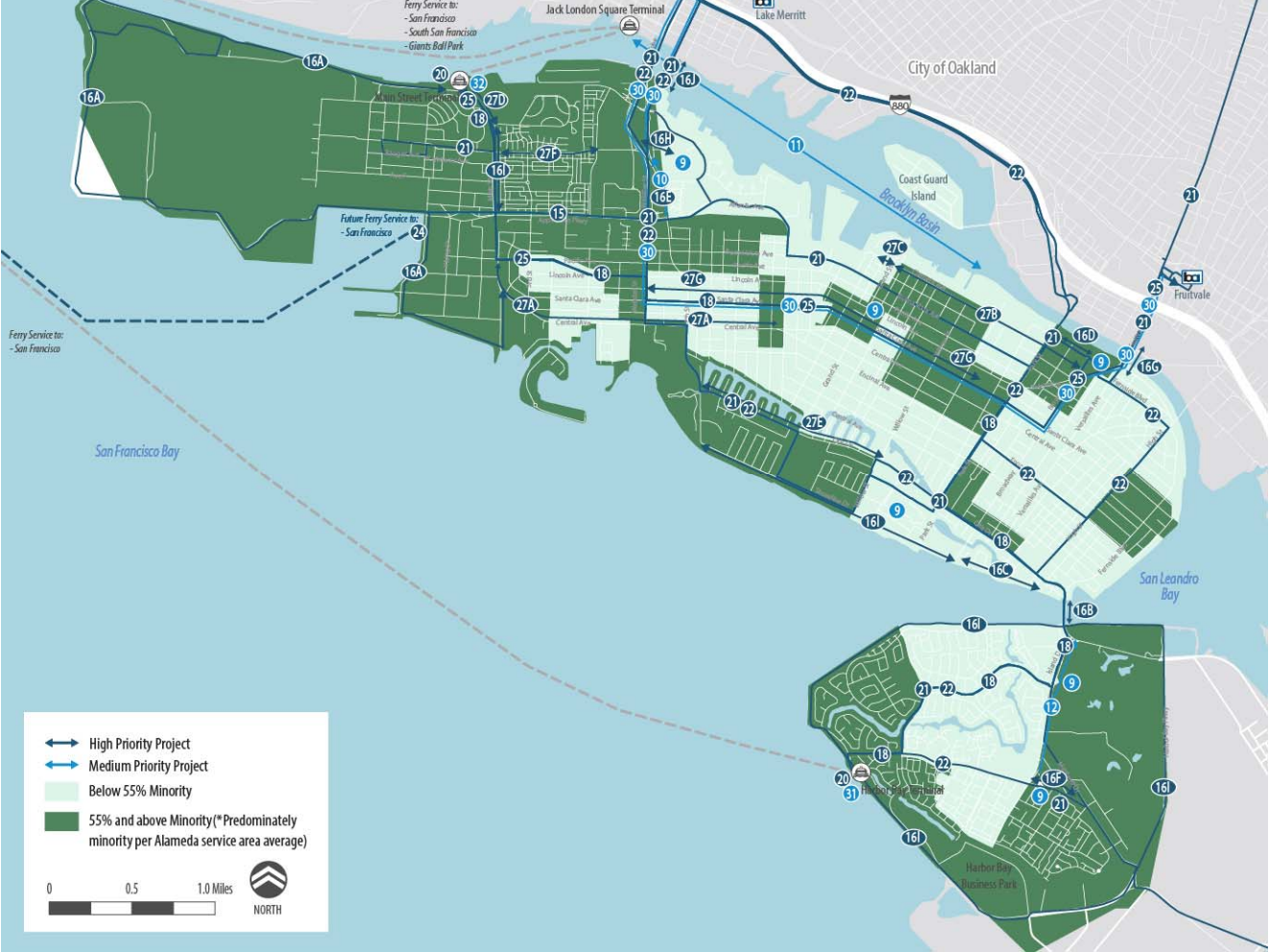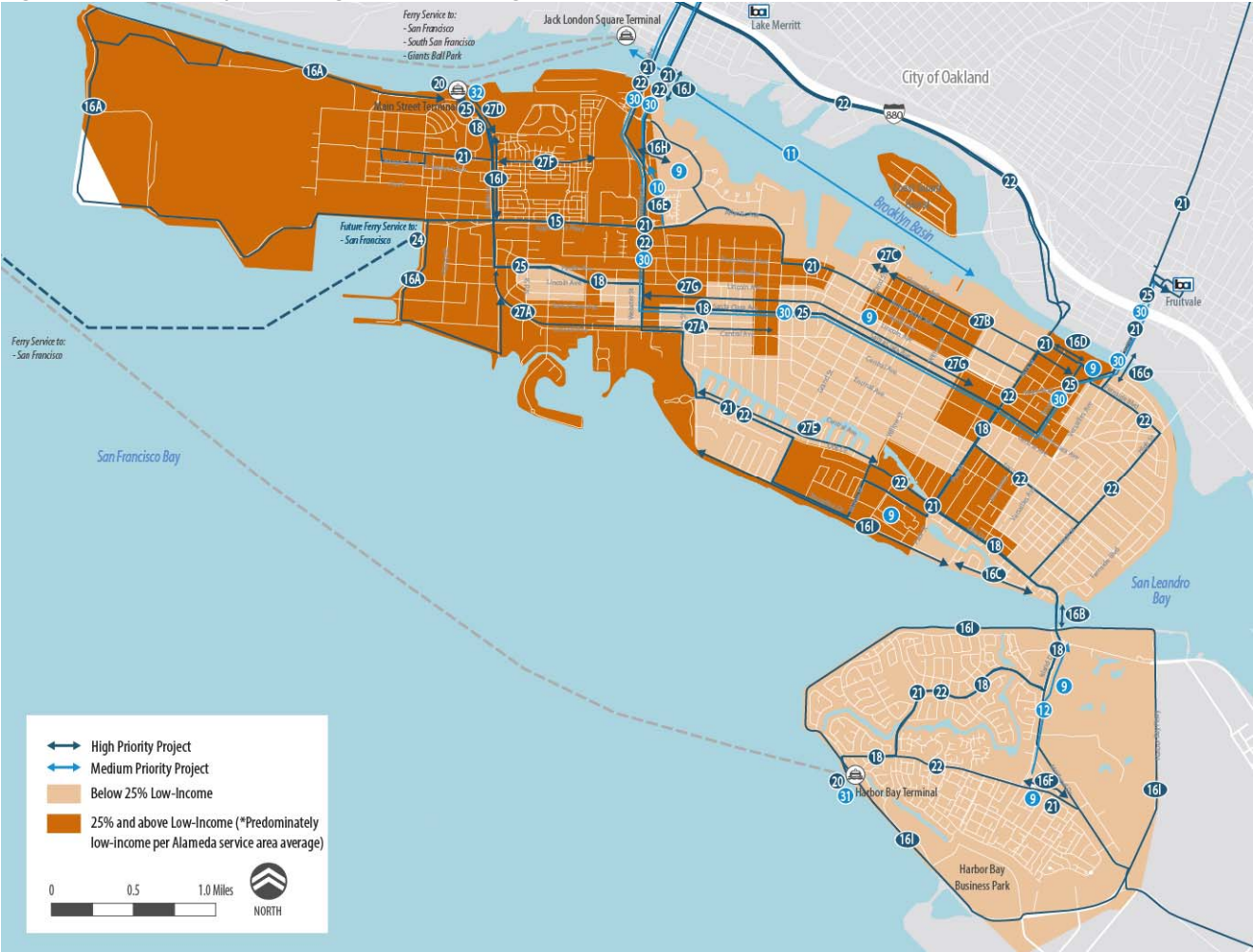**Figure 1: Block Groups with Higher than Average Percent Minority**

**Figure 2: Block Groups with Higher than Average Rates Percent Low-Income**

## Safety Assessment

All projects will adhere to standards and best practices for safety as well as ADA accessibility.

Projects and programs were assessed to determine if they contribute to safety improvements for walking, bicycling, carpooling, or taking transit.

- 11 of 32 projects (34 percent) will include safety improvements and 100 percent of projects will adhere to best practices for safety in design standards as well as ADA accessibility.
- There is one project – New Technologies and Innovations - for which safety improvements could not be assessed because specific improvements have not yet been determined.

## Summary of Project and Program Assessments

As shown in Table 8 performance measures were identified to support a comparative assessment of the projects using the assessment ranges defined for each type of performance measures. Table 9 provides a summary of project and program assessments based on the projects' ability to meet the following objectives: drive alone trips, greenhouse gas emissions reduced, equity, and safety. It is important to note that detailed individual project assessments were not completed as part of this plan and further analysis may be necessary to understand the full range of potential impacts of the projects and programs recommended in this plan.

**Table 8: Ranges Used in Project Assessments**

| Measure | Assessment Range | |
|---|---|---|
| Time Frame for Completion | Near-Term Completion: 1 to 3 Years <br> Mid-Term Completion: 3 to 8 Years <br> Long-Term Completion: 8 + Years | |
| Goals | ✓ | Goal 1 Estuary Crossings: Decrease drive alone trips at estuary crossings, especially in the peak period. |
| | ✓ | Goal 2 Alameda Trips: Increase the share of walking, bicycling, transit, and carpooling trips within Alameda. |
| New Access for Jobs and Population (2030) | + | Up to 2,000 population and jobs |
| | ++ | 2,000 to 4,000 population and jobs |
| | +++ | >4,000 population and jobs |
| 2030 Mode Shift (Drive Alone Trips Reduced) | + | Up to 100 trips per day (average weekday) |
| | ++ | 100 to 200 trips per day (average weekday) |
| | +++ | >200 trips per day (average weekday) |
| $CO_2$ Annual Reductions (metric tons) | + | Up to 44 metric tons |
| | ++ | 44 to 88 metric tons |
| | +++ | >88 metric tons |
| Equity | N/A | Does not improve conditions for areas with higher concentrations of low-income and minority populations |
| | ✓ | Improves conditions for areas with higher concentrations of low-income and minority populations |
| Safety | N/A | Does not improve safety |
| | ✓ | Improves safety |

**Table 9: Summary of Project and Program Assessments**

| Project | Drive Alone Trip Reduction | CO2 Reductions | Equity Improvement | Safety Improvement |
|---|---|---|---|---|
| 1. Bicycle Master Plan and Design Guidelines Update and Vision Zero Safety Policy/Plan | *Specific improvements not yet identified* | | *Not yet determined, depends on populations served* | ✓ |
| 2. Bus Stop improvements | + | + | *Not yet determined, depends on populations served* | ✓ |
| 3. Parking Management & Demand Pricing | + | + | N/A | N/A |
| 4. Parking Policies for New Development | ++ | ++ | N/A | N/A |
| 5. Pedestrian Master Plan and Design Guidelines Update and Vision Zero Safety Policy/Plan | *Specific improvements not yet identified* | | *Not yet determined, depends on populations served* | ✓ |
| 6. Transit Signal Priority and Adaptive Traffic Signal Control | +++ | +++ | ✓ | N/A |
| 7. Transportation Partnerships with Existing Businesses and Residences | +++ | +++ | ✓ | N/A |
| 8. Bike Share | + | + | ✓ | N/A |
| 9. Casual Carpool Additional Pickup Locations | + | + | N/A | N/A |
| 10. Constitution Way Carpool Lane | + | + | N/A | N/A |
| 11. Estuary Water Shuttle Crossing or WETA Ferries to Oakland | + | + | N/A | ✓ |
| 12. Island Drive and Westline Drive Bus Lanes | + | + | N/A | N/A |
| 13. Shared Ride Service for Seniors and People with Disabilities | + | + | ✓ | ✓ |
| 14. Transportation Awareness Campaign | + | + | ✓ | ✓ |
| 15. Alameda Point Bus Rapid Transit Service | +++ | +++ | ✓ | N/A |
| 16. Bicycle and Pedestrian Corridor Improvements | + | + | ✓ | ✓ |
| 17. Citywide Safe Routes to School Audits and Improvements | ++ | ++ | *Not yet determined, depends on populations served* | ✓ |
| 18. Crosstown Express Bus Service | +++ | +++ | ✓ | N/A |
| 19. EasyPass Expansion | ++ | ++ | *Not yet determined, depends on populations served.* | N/A |
| 20. Increase Frequency and Span of Service for Ferry Service | ++ | ++ | N/A | N/A |
| 21. Increase Frequency and Span of Service for Local Bus Routes | +++ | +++ | ✓ | N/A |

| Project | Drive Alone Trip Reduction | CO2 Reductions | Equity Improvement | Safety Improvement |
|---|---|---|---|---|
| 22. Increase Frequency and Span of Service for Transbay Bus Service | ++ | ++ | ✓ | N/A |
| 23. Miller-Sweeney Multimodal Lifeline Bridge | +++ | +++ | N/A | ✓ |
| 24. New Seaplane Lagoon Ferry Terminal & Service | +++ | +++ | N/A | N/A |
| 25. Regional Transit Hub Connector Bus Service | +++ | +++ | ✓ | N/A |
| 26. TDM Ordinance Update | +++ | +++ | N/A | N/A |
| 27. Vision Zero Safety Improvements and Traffic Calming | + | + | ✓ | ✓ |
| 28. Bikes in Buses through Webster/Posey Tubes | + | + | ✓ | ✓ |
| 29. Citywide Transportation Management Association | +++ | +++ | N/A | N/A |
| 30. Faster Line 51A Bus Service | + | + | ✓ | N/A |
| 31. Harbor Bay Ferry Terminal Access and Parking Management Improvements | + | + | N/A | N/A |
| 32. Main Street Ferry Terminal Access and Parking Management Improvements | + | + | N/A | N/A |
| 33. New Technologies and Innovations | Assessment of these categories cannot be completed at this time, but a focus on improving safety and efficiency is at the center of this effort. | | | |