Appendix C:
Regional Snapshot Analysis
Detailed Methodology

This appendix summarizes the methodologies used to produce each of the regional maps illustration the Snapshot metrics.

Map 0. Names and Locations of MTC's 44 communities of concern defined as of the 2000 Census

2000 Census data were used to define communities that had at least 70% minority or 30% low-income residents (defined as residents below 200% of the federal poverty level). Many communities meet both criteria.

Map 1. Transit Service Frequency, 2009

Rail, Ferry and Bus daily hourly service frequencies were calculated from the MTC Regional Transit Database which contains the route, stop and schedule information for all operators in the region. Frequencies are measured based upon the daily average number of times a vehicle picks up passengers at a stop each hour for each transit mode. In areas where there are transit stops on several corners of an intersection, the pick ups at all the stops are aggregated and assigned to the intersection.

In the map, average hourly frequencies are converted to headways, the average minutes between vehicles, by dividing the average stops per hour into 60.

These intersection-based frequency data are interpolated into a continuous surface using an inverse distance weighting technique. This method evaluates groups of intersections and derives a weighted average value based on the inverse of the distance from positions on the map to intersections within one-half mile.

These data are clipped to show values within urbanized areas.

Tabulation at the community of concern (COC) level was performed by calculating the average value of transit service frequency for intersections contained within each COC boundary.

Map 1A. Bus Transit Service Frequency, 2009

The same methodology as Map 2 was followed, except routes were limited to a mode of bus.

Map 1B. Rail & Ferry Transit Service Frequency, 2009

The same methodology as Map 2 was followed, except routes were limited to the modes of rail (including cable car, light rail, and heavy rail) and ferry.

Map 1C. Weekend Transit Service Frequency, 2009

Rail, Ferry and Bus weekend (Saturday and Sunday) hourly service frequencies were calculated from the MTC Regional Transit Database which contains the route, stop, and schedule information for all operators in the region. Frequencies are measured based on the weekend average number of times a vehicle picks up passengers each hour for each transit mode. In areas where there are transit stops on several corners of an intersection, the pick ups at all the stops are aggregated and assigned to the intersection.

In the map, average hourly frequencies are converted to headways, the average minutes between vehicles, by dividing the average stops per hour into 60.

These intersection-based frequency data are interpolated into a continuous surface using an inverse distance weighting technique. This method evaluates groups of intersections and derives a weighted average value based on the inverse of the distance from positions on the map to intersections within one-half mile.

These data are clipped to show values within urbanized areas.

Tabulation at the community of concern level was performed by calculating the average value of transit service frequency for intersections within each COC boundary.

Map 1D. Evening Transit Service Frequency, 2009

Rail, Ferry and Bus evening (7:00 pm – 1 am) hourly service frequencies were calculated from the MTC Regional Transit Database which contains the route, stop, and schedule information for all operators in the region. Frequencies are measured based on the evening average number of times a vehicle picks up passengers each hour for each transit mode. In areas where there are transit stops on several corners of an intersection, the pick ups at all the stops are aggregated and assigned to the intersection.

In the map, average hourly frequencies are converted to headways, the average minutes between vehicles, by dividing the average stops per hour into 60.

These intersection-based frequency data are interpolated into a continuous surface using an inverse distance weighting technique. This method evaluates groups of intersections and derives a weighted average value based on the inverse of the distance from positions on the map to intersections within one-half mile.

These data are clipped to show values within urbanized areas.

Tabulation at the community of concern level was performed by calculating the average value of transit service frequency for intersections within each COC boundary.

Map 2. Change in Transit Service 2006-2009

This map shows the delta between the headways for Rail, Ferry and Bus daily service. The 2006 headways were subtracted from the 2009 headways. A negative number indicates headways decreased and a positive number indicates headways increased. For example, an improvement in headways from 60 minutes to 30 minutes would be expressed as –30.

These data are clipped to show values within urbanized areas.

Tabulation at the community of concern level was performed by subtracting the 2006 headway by COC from the corresponding 2009 headway by COC.

Map 2A. Change in Bus Transit Service, 2006-2009

The same methodology as Map 3 was followed, except routes were limited to a mode of bus.

Map 2B. Change in Rail & Ferry Transit Service, 2006-2009

The same methodology as Map 3 was followed, except routes were limited to the modes of rail (including cable car, light rail, and heavy rail) and ferry.

Map 3. Walkable Destinations (destinations reachable by walking), 2006

This map shows the density of essential destinations in five categories:

1. Religious, Educational Institutions and Libraries
2. Health Services
3. Other Services
4. Parks
5. Retail, Dining, and Entertainment.

The categories were taken from the Transportation 2030 Equity Analysis report which compared the number of businesses by communities of concern against the remainder of Bay Area communities, among other variations of these data. The establishments within these categories were selected from the 2006 CA Employment Development Department database of all businesses, as well as TeleAtlas Parks, and Landmarks (Religious Institutions, Educational Institutions, and Libraries).

Each Bay Area intersection is ranked by the total number of destinations within a network distance of one mile. The number of destinations that are within one-half mile of an intersection is weighted more heavily than the number of destinations that are between one-half and one mile. Because people access different types of destinations with varied frequency, the types of destinations are also weighted by category: Parks 15%; Retail, Dining, and Entertainment 40%; Health Services 10%; Other Services 20%; Religious, Educational Institutions, and Libraries 15%.

These intersection-based data are interpolated into a continuous surface of 100m grid cells using an inverse distance weighting technique. This method evaluates groups of intersections and derives a weighted average value based on the inverse of the distance from grid cells on the map to intersections within one mile.

These data are clipped to show values within urbanized areas.

Tabulation at the community of concern level was performed by calculating the average value of walkability for grid cells within each COC boundary.

Map 4. Auto Availability (households with at least one vehicle), 2000

This map shows the percentage of households with at least one vehicle available. These data are depicted at the US Census block group level and are clipped to show urbanized areas.

Tabulation at the community of concern level was performed by calculating the sum of total households and sum of households with at least one vehicle within each COC boundary. Then the sum of households with at least one vehicle was divided by the sum of the total households for each COC.

Map 5. Transportation availability index, 2009

This map shows a transportation availability index which is comprised of measures of Auto Availability in 2000, Transit Service Frequency in 2009, and Walkability in 2006 (the most recent years that data is available for each measure). Z-scores, or standard scores, were developed for each measure, by Census block. The z-score is expressed as the number of standard deviations away from the mean or average. The z-scores for each measure within a block are averaged to come up with the index value for the block. The range of index values for the region is from 2.20 standard deviations below the regional average to 5.89 standard deviations above.

Tabulation at the community of concern level was performed by calculating the average z-score for each measure for each COC, and then averaging the scores for all measures for each COC.

Map 6. Access to essential destinations by 30-minute transit trip, 2006

This map shows the number of Essential Destinations (Schools, Food Stores, Health Services, Social Services, Banks, and Places of Worship) accessible from a Traffic Analysis Zone (TAZ) within a 30-minute transit trip. "Food stores" exclude liquor and convenience stores. These data are depicted at the TAZ level and are clipped to show urbanized areas.

Establishments within these categories were selected from the 2006 CA Employment Development Department database of all businesses and aggregated to TAZ. These data were then analyzed using MTC travel demand modeling software to determine the total number of establishments within a 30-minute transit trip from each TAZ.

Tabulation at the community of concern level was performed by calculating a weighted average of essential destinations accessible from a COC using the percentage of low income households in the COC (income quartiles 1 and 2).

Map 7. Access to essential destinations by 30-minute auto trip, 2006

This map shows the number of Essential Destinations (Schools, Food Stores, Health Services, Social Services, Banks, and Places of Worship) accessible from a TAZ within a 30-minute auto trip. "Food stores" exclude liquor and convenience stores. These data are depicted at the TAZ level and are clipped to show urbanized areas.

Establishments within these categories were selected from the 2006 California Employment Development Department database of all businesses and aggregated to Traffic Analysis Zones (TAZ). These data were then analyzed using MTC travel demand modeling software to determine the total number of establishments within a 30-minute auto trip from each TAZ.

Tabulation at the community of concern level was performed by calculating a weighted average of essential destinations accessible from a COC using the percentage of low income households in the COC (income quartiles 1 and 2).

Map 8. Transportation costs as a percent of income for low-income households, 2000

This map shows the average annual estimated transportation costs per household divided by $35,000 to represent household income. Transportation costs are estimated by a model developed by the Center for Neighborhood Technology. These data are depicted at the US Census block group level and are clipped to show the urbanized areas.

Tabulation at the community of concern level was performed by calculating the average estimated household transportation cost within each COC boundary. Then the average of household transportation costs was divided by $35,000 for each COC.

Map 9. Housing + transportation costs as percent of income for low-income households, 2000

This map shows the average annual estimated housing and transportation costs per household divided by $35,000 to represent household income. Housing and transportation costs are estimated by a model developed by the Center for Neighborhood Technology based in part on Census data for housing costs by income group. These data are depicted at the US Census block group level and are clipped to show the urbanized areas.

Tabulation at the community of concern level was performed by calculating the average estimated household housing and transportation cost within each COC boundary. Then the average of household housing and transportation costs was divided by $35,000 for each COC.

Map 10. Total reported bicycle collisions, 2006

This map shows all bicycle collisions reported to California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) in 2006. These data are depicted at the TAZ level and are clipped to show urbanized areas.

Tabulation at the community of concern level was performed by calculating the sum of reported bicycle collisions within each COC boundary.

Map 11. Total reported pedestrian collisions, 2006

This map shows all pedestrian collisions reported to California Highway Patrol's Statewide Integrated Traffic Records System in 2006. These data are depicted at the TAZ level and are clipped to show urbanized areas.

Tabulation at the community of concern level was performed by calculating the sum of reported pedestrian collisions within each COC boundary.

Map 12. Fine diesel particulate emissions (diesel $PM_{2.5}$) from on-road mobile sources, 2005

This map shows the estimated quantity of diesel particulate matter of 2.5 microns or smaller (diesel $PM_{2.5}$) emitted by on-road sources as a percentage of the total diesel $PM_{2.5}$ emissions in the Bay Area. These data are depicted at a 1km grid cell level and were developed by the Bay Area Air Quality Management District as part of an emissions inventory in 2005.

Tabulation at the community of concern level was performed by first converting a polygon file consisting of 1km squares to a raster with 100m grid cells. Then, the average estimated diesel $PM_{2.5}$ emission from on-road sources within each COC boundary was calculated.

Map 13. Fine diesel particulate emissions (diesel PM2.5) from on-road mobile sources as a share of total from all sources, 2005

This map shows the estimated quantity of diesel particulate matter of 2.5 microns or smaller (diesel $PM_{2.5}$) emitted by on-road sources as a percentage of the total diesel $PM_{2.5}$ emissions in the Bay Area from all sources. These data are depicted at a 1km grid cell level and were developed by the Bay Area Air Quality Management District as part of an emissions inventory in 2005.

Tabulation at the community of concern level was performed by first converting a polygon file consisting of 1km squares to a raster with 100m grid cells. Then, the average estimated diesel $PM_{2.5}$ emission from on-road sources and the average estimated diesel $PM_{2.5}$ emission from all sources within each COC boundary were calculated. The average for on-road sources was divided by the average for all sources for each COC.