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Detailed Methodology: Equity Analysis Transportation 2030

There are three principal methodology components to the equity analysis for Transportation 2030, the 2005 update of the regional transportation plan (RTP):

I. Define the Minority and Low-Income Communities of Concern, using available census data
II. Extract indicator variables from the MTC travel forecasting system
III. Prepare other information to complement the analysis.

I. Define the Minority and Low Income Communities of Concern

MTC staff worked with the MTC Minority Citizens Advisory Committee (MCAC) and its subcommittee to analyze options for defining minority and low-income communities. Two options were analyzed, and mapped:

- Option "A" defined minority neighborhoods as areas with 70 percent or greater minority share of Census 2000 population. Low-income neighborhoods are defined as areas with 30 percent or greater share of population less than the 200 percent poverty level.
- Option "B" defined minority neighborhoods as areas with 50 percent or greater minority share of Census 2000 population. Low-income neighborhoods are defined as areas with 20 percent or greater share of population less than the 200 percent poverty level.

The following table summarizes the characteristics of the two options.

	Regional	Option "A" >= 70% Minority >= 30% Low Income		Option "B" >= 50% Minority >= 20% Low Income	
	Total	Number	% of Region	Number	% of Region
Number of Zones	1,454	491	34%	834	57%
Total Population	6,783,800	2,253,700	33%	3,934,100	58%
Minority Population	3,401,000	1,733,900	51%	2,592,000	76%
Low Income Population	1,374,200	761,200	55%	1,076,600	78%
% Minority	50%	77%		66%	
% Low Income	20%	34%		27%	

After discussion, the MCAC advised MTC staff to use the Option "A" definition of minority and low-income neighborhoods.

The next step in this portion of the analysis is to collapse the detailed 491 travel analysis zones into approximately 40 to 50 communities[1]. Once these 40 to 50 communities are defined, then other descriptive statistics from Census 2000, ABAG's Projections 2003, and MTC travel forecasts, can be prepared. Some of the descriptive statistics that can be assembled include:

- Total population, 2000 & 2030 (ABAG Projections 2003)
- Total employment, 2000 & 2030 (ABAG Projections 2003)
- Mean Household Income, 2000 & 2030 (ABAG Projections 2003)
- Low Income Households, 2000 & 2030 (ABAG Projections 2003)
- Zero Vehicle Households, 2000 & 2030 (MTC forecasts)
- Population by race/ethnicity, Census 2000
- Population by poverty status, Census 2000
- Vehicle availability by race/ethnicity, Census 2000
- Workers by Means of Transportation to Work, Census 2000

II. Extract Indicator Variables from MTC Travel Forecasting System

There are five categories of indicator variables that are proposed for the Transportation 2030 equity analysis.

1. Accessibility to Jobs
2. Accessibility to Essential Destinations
3. Average and Aggregate Travel Time
4. User Benefits
5. Vehicle Travel and Emissions

A. Accessibility to Jobs

The purpose of these indicators is to assess the accessibility of neighborhoods to employment, shopping, and service activities. This is not just a measure to assess accessibility to employment for residents of a particular neighborhood. The intent is to measure accessibility to all forms of activities that residents of a neighborhood would be interested in: retail, social, recreation, and other services.

The methodology is to use the travel model system to extract, by each zone-of-residence, a set of travel analysis zones that are within 15, 30 and 45 minutes, door-to-door A.M. peak period travel time for auto and transit. The employment for the accessible zones is then tallied by each zone-of-residence. Data on accessible jobs from each zone-of-residence are then summarized to the community level (40 to 50 communities); and to either or both the "minority / non-minority" and "low income / non-low income" areas. The total population in the zone-of-residence (2000 or 2030) is used to weight each travel analysis zone when summarizing to community or region.

[1] The 491 TAZs that make up the 40 to 50 communities of concern each meet the minority and/or low income thresholds. When these 491 TAZs are consolidated into 40 or 50 communities, minority and low income shares will be averaged; this process may result in some communities appearing not to meet the 30/70 threshold.

Six indicators are to be evaluated for the "accessibility to jobs" measure:

1. Total jobs within 15 minutes travel time, auto
2. Total jobs within 30 minutes travel time, auto
3. Total jobs within 45 minutes travel time, auto
4. Total jobs within 15 minutes travel time, transit
5. Total jobs within 30 minutes travel time, transit
6. Total jobs within 45 minutes travel time, transit

This is also known as an "isochronal" analysis, which means a "line of equal time."

Data will be extracted for the 2000 base year, and for four Transportation 2030 alternatives.

In addition to the regional summary table, MTC staff will extract and summarize these six indicators for the 40 to 50 communities of concern. It is expected that each of these six indicators can be summarized in a one to two page table.

B. Accessibility to Essential Destinations

The purpose of these indicators is to assess the accessibility of neighborhoods to essential destinations such as elementary and high schools, colleges and universities, grocery stores, medical facilities, and social services.

Establishment datasets from a private data vendor will be acquired for this analysis. This data will include detailed information on the name, address, industry, detailed industry code, and number of employees at each establishment. Since the Transportation 2030 forecasts will be prepared using MTC's 1454-zone system, the establishment dataset will be aggregated to the MTC zone level, retaining data on the industry codes, number of establishments, and number of employees. This information can then be reported at the regional, county, and 40-50 community levels. It may make sense to report other statistics, including:

- Ratio of Total Population to Number of Grocery Stores, by each community/county;
- Ratio of Total Population to Employees in Medical Facilities, by each community/county;
- Ratio of Total Population to Employees in Social Services, by each community/county; etc.

These ratios may be useful in describing minority and low-income neighborhoods that are either well-served or under-served in terms of local schools, grocery stores, medical facilities and social services located *within* the community. This means that neighborhoods that are under-served *within* the community may also show that they are under-served when analyzing the *accessibility* of the community to these services and facilities.

Twelve indicator variables are to be evaluated for the "accessibility to essential destinations" measure:

1. Number of K-8 Schools within 30 minutes, door-to-door transit
2. Number of High Schools within 30 minutes, door-to-door transit

3. Number of Colleges within 30 minutes, door-to-door transit
4. Number of Grocery Stores (or employees) within 30 minutes, door-to-door transit
5. Number of Medical Facilities (or employees) within 30 minutes, door-to-door transit
6. Social services (employees) within 30 minutes, door-to-door transit
7. Number of K-8 Schools within 30 minutes, door-to-door auto
8. Number of High Schools within 30 minutes, door-to-door auto
9. Number of Colleges within 30 minutes, door-to-door auto
10. Number of Grocery Stores (or employees) within 30 minutes, door-to-door auto
11. Number of Medical Facilities (or employees) within 30 minutes, door-to-door auto
12. Social services (employees) within 30 minutes, door-to-door auto

MTC staff may need to test both employees as well as the number of establishments to examine which makes more sense. In addition, the travel time threshold of 30 minutes may be increased to 45 minutes if that makes more sense in comparing the alternatives. All of these indicators would be evaluated using the 2000 base year forecasts as well as four Transportation 2030 alternatives.

In addition to the regional summary table, MTC staff will extract and summarize these twelve indicators for the 40 to 50 communities of concern. It is expected that each of these twelve indicators can be summarized in a one to two page table.

C. Average and Aggregate Travel Time

The purpose of these indicators is to provide summary statistics on predicted travel by trip purpose and travel mode. Indicator variables include: trips, aggregate travel time, and average travel time. Data is provided for work, non-work, truck travel and total personal trips, by means of transportation.

Thirty-nine indicators are proposed: trips by trip purpose and travel mode (13); aggregate travel time (13); and average travel time (13). Regional forecasts for base year 2000 and four Transportation 2030 alternatives would be reported.

Predicted trips and travel time are aggregated from zone-of-residence to the community-of-residence, county-of-residence, and region-of-residence levels.

Currently MTC staff would not recommend that these 39 indicators be reported for each of the 40 to 50 communities.

D. User Benefits

The purpose of these indicators is to assess the distribution of benefits associated with the "build" alternatives compared to the "no-project" alternative. User benefit calculations are relative to the no-project alternative.

This "user benefit" measure was first used at MTC with the 2001 RTP Performance Measures Report. This is essentially a "consumer surplus" measure based on changes in travel time costs,

and out-of-pocket user costs. Out-of-pocket user costs include transit fares, auto operating costs, parking costs, and tolls. Travel time savings to existing users and new users are converted from hours of savings into dollar values using different "values of time." The following table summarizes the values of time used in the 2001 RTP analysis, and the proposed values of time for Transportation 2030. The basis for the values of time for Transportation 2030 is the average Bay Area wage rate reported by the Bureau of Labor Statistics. The value of $80 for truck trips was used in both 2001 and in the 2030 Plan and is an approximation reflecting driver wages and overhead costs.

Trip Type	2001$ per Hour	2004 $ per Hour
Auto Person Trips (In-Vehicle Time)	$17.03	$19.98
Transit Person Trips (In-Vehicle Time)	$17.03	$19.98
Transit Person Trips (Out-of-Vehicle Time)	$37.50	$43.99
Bicycle Trips	$17.03	$19.98
Walk-Only Trips	$17.03	$19.98
Truck Trips	$80.00	$80.00

User benefits are calculated at the zone-of-residence level. The user benefits are then aggregated to community and regional level.

There are three indicator variables proposed for the user benefit analysis:

1. Travel Time User Benefits
2. Out-of-Pocket Cost User Benefits
3. Total User Benefits

An appendix table showing the total user benefits for each of the 40-to-50 communities is proposed.

E. Vehicle Travel and Emissions

The purpose of these indicators is to summarize vehicle travel and mobile source emissions occurring within the communities of concern compared to the region as a whole.

These indicators would be derived from the daily and AM peak period (two-hour, 6:30-8:30 AM) MTC forecasts. Freeway and road segments in the MTC regional highway network would be associated with each of the communities of concern, or left alone as a "balance of county" road segment. The daily and peak period highway travel demand statistics would then be aggregated to the community-of-occurrence, and the balance-of-county. MTC staff would use the California Air Resources Board (CARB) "EMFAC2002" emissions factor model to estimate mobile source emissions within each community.

There are nine indicator variables proposed for the vehicle travel and emissions analysis:

1. Daily Vehicle Miles of Travel (VMT)
2. AM Peak Period Vehicle Miles of Travel (VMT)
3. AM Peak Period Vehicle Hours of Travel (VHT)

4. AM Peak Period Vehicle Hours of Delay (VHD)
5. Daily ROG (Reactive Organic Gases) Emissions (tons per day)
6. Daily NOX (Nitrogen Oxides) Emissions (tons per day)
7. Daily CO (Carbon Monoxide) Emission (tons per day)
8. PM_{10} (Coarse Particulate Matter) (tons per day)
9. $PM_{2.5}$ (Fine Particulate Matter) (tons per day)

AM peak period hours of travel and hours of delay are more robust and reliable than daily estimates of these variables. PM peak period travel forecasts will not be prepared for the Transportation 2030 update. The term "daily" means "average weekday daily" travel and emissions.

Data will be reported for the base year 2000 and for four Transportation 2030 alternatives.

Data will also be reported for these seven indicators for all of the 40-to-50 communities.

III. Prepare Other Materials to Complement the Analysis

This section is intended as a "catch-all" category to complement and provide context to the quantitative analysis discussed in Section II. Some of the complementary analysis (e.g., the demographic characteristics of the 40-to-50 communities of concern) has already been mentioned in this report.

Complementary analyses could include mapping of some of the various indicators proposed in the analysis.

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