# APPENDIX A: Sample Freeway Analysis Tables

**TABLE A-1: SAMPLE OF FREEWAY ANALYSIS REQUIREMENT DETERMINATION**

| Freeway | Segment | Direction | Peak Hour | Lanes | Capacity | Project Trips | < 1% |
|---|---|---|---|---|---|---|---|
| 101 | Capitol to Tully | NB | AM | 3 | 6600 | 45 | yes |
| 101 | Capitol to Tully | NB | PM | 3 | 6600 | 40 | yes |
| | | | AM | | | | |
| | | | PM | | | | |
| | | | AM | | | | |
| | | | PM | | | | |
| | | | AM | | | | |
| | | | PM | | | | |
| | | | AM | | | | |
| | | | PM | | | | |
| | | | AM | | | | |
| | | | PM | | | | |
| | | | AM | | | | |
| | | | PM | | | | |
| | | | AM | | | | |
| | | | PM | | | | |
| | | | AM | | | | |
| | | | PM | | | | |

**TABLE A-2: SAMPLE OF FREEWAY ANALYSIS SUMMARY**

| Freeway | Segment | Direction | Peak Hour | EXISTING | | | | | PROJECT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lanes | Average Speed | Volume | Density | LOS | Project Trips | Density | LOS | % Impact |
| 101 | Capitol to Tully | SB | AM | 2 | 45 | 2500 | 45.5 | D | 68 | 46.5 | D | ---- |
| 101 | Capitol to Tully | SB | PM | 3 | 25 | 4500 | 65.0 | F | 85 | ---- | F | 1.8% |
| 101 | Capitol to Tully | NB | AM | | | | | | | | | |
| 101 | Capitol to Tully | NB | PM | | | | | | | | | |
| 101 | Capitol to Tully | SB HOV | AM | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | |
| 101 | Capitol to Tully | SB HOV | PM | 0 | | | | | | | | |
| 101 | Capitol to Tully | NB HOV | AM | 0 | | | | | | | | |
| 101 | Capitol to Tully | NB HOV | PM | 1 | | | | | | | | |
| | | | AM | | | | | | | | | |
| | | | PM | | | | | | | | | |
| | | | AM | | | | | | | | | |
| | | | PM | | | | | | | | | |
| | | | AM | | | | | | | | | |
| | | | PM | | | | | | | | | |
| | | | AM | | | | | | | | | |
| | | | PM | | | | | | | | | |
| | | | AM | | | | | | | | | |
| | | | PM | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

Note: HOV lanes shall be analyzed if project trips are assigned to the HOV lane. See *TIA Guidelines* for details.

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# APPENDIX B: TIA Notification Form

CMP ID: _____

**Congestion Management Program**
**Transportation Impact Analysis (TIA) NOTIFICATION FORM**

Lead Agency: _____

Lead Agency File Number: _____

Project: _____

Project Size (SF or DU): _____

Net New Trips: _____

Project Address: _____

Analysis Periods: _____

Analysis Scenarios: _____

Study Intersections: *(continue in attachment if necessary)* _____

Study Freeway Segments: *(continue in attachment if necessary)* _____

Agency Contact: _____

Telephone: _____

E-mail: _____

Developer: _____

Transportation Consultant: _____

Form Prepared By: _____

Date: _____

***This form sent to:***

| **Agency** | **Name of Person(s)** |
|---|---|
| ☐ City of Campbell | |
| ☐ City of Cupertino | |
| ☐ City of Gilroy | |
| ☐ City of Los Altos | |
| ☐ Town of Los Altos Hills | |
| ☐ Town of Los Gatos | |
| ☐ City of Milpitas | |
| ☐ City of Monte Sereno | |
| ☐ City of Morgan Hill | |
| ☐ City of Mountain View | |
| ☐ City of Palo Alto | |
| ☐ City of San Jose | |
| ☐ City of Santa Clara | |
| ☐ City of Saratoga | |
| ☐ City of Sunnyvale | |
| ☐ County of Santa Clara | |
| ☐ Caltrans | |
| ☐ VTA | |

* SF=square feet; DU=dwelling units

**Note: The Lead Agency is encouraged to submit the draft TIA work scope along with this form when circulating it to other agencies. Comments from interested agencies on the TIA scoping must be received by the Lead Agency within 15 calendar days of the mailing of this TIA Notification Form.**

# APPENDIX C: Auto Trip Reduction Statement

## Introduction

The Auto Trip Reduction Statement is intended to provide a concise summary of automobile trip reduction efforts made by a project. It is intended only as a summary; any automobile trip reductions claimed for the development must be fully documented and justified in the TIA. Lead Agencies must complete an Auto Trip Reduction Statement for all TIAs and include the Statement in the TIA Executive Summary, whether or not trip reductions are claimed. ***Section 8.2*** of the VTA *TIA Guidelines* describes three different approaches to auto trip reduction in TIAs.

The Auto Trip Reduction Statement must describe trip reductions claimed in the trip generation section of the TIA. It may also be used to describe additional trip reduction efforts undertaken in order to mitigate project impacts. A Lead Agency may choose to provide an initial Statement with the reductions that are used in the Project Conditions analysis, and a revised statement with the final reductions reflecting mitigation measures. Examples have been provided of Auto Trip Reduction Statements for typical projects using the Standard, Peer/Study-Based and Target-Based trip reduction approaches.

## Brief Guidelines for filling out the Auto Trip Reduction Statement

**Project Auto Trip Generation –** Specify trip generation methodology (ITE or Other). If "Other" is selected, briefly describe methodology used. Refer to ***Section 8.1*** for more information about trip generation methodologies.

**Auto Trip Reduction Approach –** Specify the approach taken in the TIA. See section 8.2 for further information about the three approaches.

**Standard Approach –** List any reductions claimed based on the Standard Reductions described in ***Table 1*** of the *TIA Guidelines*. See ***Section 8.2.1*** for further information.

**Peer/Study-Based Approach –** Document the project's Peer/Study-Based approach to trip reduction, if applicable (see ***Section 8.2.3***). This approach may be used to justify a trip reduction based on a project's similarity to other projects with demonstrated trip reductions or a project occupant's track record of reducing trips at other sites, or to provide additional justification for trip rates based on local data collection efforts. The "Basis of Reduction" box should note the starting point for the trip reduction claimed, whether starting from ITE auto trip generation rates based on square footage or number of units, or total person-trips based on employee/resident count. The "Total Reduction Claimed" box should also reference the starting point. Note that in some cases the "Total Reduction Claimed" box may not be applicable, depending on the methodology.

**Target-Based Approach –** Document the project's Target-Based approach, if applicable (see ***Section 8.2.2***). This approach may be taken when the project applicant has entered into an enforceable agreement with the Lead Agency that limits the number of automobile trips traveling to and from the project site. The "Description" should note the starting point for the trip reduction claimed, whether starting from ITE auto trip generation rates based on square footage or number of units, or total person-trips based on employee/resident count. The "Total Reduction Claimed" box should also reference the starting point. Note that in some cases the "Total Reduction Claimed" box may not be applicable, depending on the methodology.

# AUTO TRIP REDUCTION STATEMENT

**UPDATED: October 2014**

SANTA CLARA Valley Transportation Authority

| PROJECT INFORMATION | *Relevant TIA Section:* | | |
|---|---|---|---|
| **Project Name:** | | | |
| **Location:** | | | |
| **Description:** | | | |
| **Size (net new):** | *D.U. Residential* | *Sq. Ft. Comm.* | *Acres (Gr.)* |
| **Density:** | *D.U. / Acre* | | *Floor Area Ratio (FAR)* |
| **Located within 2000 feet walking distance of an LRT, BRT, BART or Caltrain station or major bus stop?** Yes/No | | | |

| PROJECT AUTO TRIP GENERATION | *Relevant TIA Section:* | | |
|---|---|---|---|
| **Auto Trips Generated:** | *AM Pk Hr* | *PM Pk Hr* | *Total Weekday* |
| **Methodology (check one)** | ☐ **ITE** | ☐ **Other** *(Please describe below)* | |
| Describe alternative trip generation methodology, if applicable | | | |

| AUTO TRIP REDUCTION APPROACH | *Relevant TIA Section:* | | |
|---|---|---|---|
| ☐ **Standard** *Complete Table A below* | ☐ **Peer/Study-Based** *Complete Table B below* | ☐ **Target-Based** *Complete Table C below* | ☐ **None Taken** |

| TRIP REDUCTION REQUIREMENTS | *Relevant TIA Section:* | |
|---|---|---|
| **Is the project required to meet any trip reduction requirements or targets?** Yes/No | | **If so, specify percent:** |
| **Reference code or requirement:** | | |

## TRIP REDUCTION APPROACHES

| A. STANDARD APPROACH | *Relevant TIA Section:* | | | |
|---|---|---|---|---|
| **Type of Reduction** *Specify reduction. See Table 2 in TIA Guidelines* | | **% Reduction from ITE Rates** | **Total Trips Reduced (AM/PM/Daily)** | **TOTAL REDUCTION CLAIMED** |
| | | | | **%** / **Trips** |
| **Transit** | | | | Specify AM, PM, and/or Daily reduction / Specify AM, PM, and/or Daily reduction |
| **Mixed-Use** | | | | |
| **Financial Incentives** | | | | |
| **Shuttle** | | | | |

| B. PEER/STUDY-BASED APPROACH | *Relevant TIA Section:* | |
|---|---|---|
| **Basis of Reduction** | **TOTAL REDUCTION CLAIMED** | |
| | **%** | **Trips** |
| Summarize basis of reduction, addressing:<br>-Data used to justify trip reduction rate<br>-Source(s) referenced<br>-Assumptions and methodologies used to develop the trip reduction<br>-How the trip reduction rate is appropriate for the proposed development | Specify AM, PM, and/or Daily reduction | Specify AM, PM, and/or Daily reduction |

| C. TARGET-BASED APPROACH | | | Relevant TIA Section: | | | |
|---|---|---|---|---|---|---|
| Type of Reduction (check all that apply) | | | | | TOTAL REDUCTION CLAIMED | |
| ❒ % Trip Reduction | ❒ % SOV mode share | | ❒ Trip Cap | | % | Trips |
| If checked, state reduction here | If checked, state reduction here | | If checked, state cap here | | Specify AM, PM, and/or Daily reduction | Specify AM, PM, and/or Daily reduction |
| Description | e.g., ITE auto trip generation rates based on square footage or number of units, total person-trips based on employee/resident count | | | | | |
| Time period for reduction | Peak Hour | | Peak Period | Full Day | | |
| | ❒ AM/PM | | ❒ AM/PM | ❒ | | |

| OTHER TDM/REDUCTION MEASURES | | | |
|---|---|---|---|
| Bicycle/Pedestrian | Yes/No | Relevant TIA Section: | |
| Describe any bicycle/pedestrian improvements related to the project. Note both infrastructure (improvements to sidewalks, bicycle facilities, etc.) and programs (subsidies, bike share, etc.) | | | |
| Parking Management | Yes/No | Relevant TIA Section: | |
| Describe any parking management strategies that would lead to reduced auto trips, such as parking pricing, parking cash-out, unbundled parking, etc. | | | |
| Transit | Yes/No | Relevant TIA Section: | |
| Describe any transit service or access improvements that would lead to reduced auto trips, such as improved pedestrian connections to transit, added shuttle service, etc. | | | |
| Site Planning and Design | Yes/No | Relevant TIA Section: | |
| Describe features of the site plan and design of the project that encourage walking, biking, and transit use, while discouraging solo automobile trips. | | | |
| TDM Program | Yes/No | Relevant TIA Section: | |
| Describe any other TDM program elements at the site, such as: carpool/vanpool programs, emergency ride home service, trip planning, on- site mobile services, etc. | | | |

| IMPLEMENTATION | | Relevant TIA Section: | |
|---|---|---|---|
| Have the project sponsor and Lead Agency agreed to any of the following measures? | | | |
| ❒ Monitoring | Describe. | | |
| ❒ Enforcement | Describe. | | |
| ❒ Data Sharing | Describe. | | |

# *Example: Standard Reduction Approach*

## AUTO TRIP REDUCTION STATEMENT

**UPDATED: October 2014**

SANTA CLARA Valley Transportation Authority

| PROJECT INFORMATION | *Relevant TIA Section:* | Chapter 2: Project Description |
|---|---|---|
| **Project Name:** Baytown Apartment Complex | | |
| **Location:** Baytown, CA | | |
| **Description:** Construct 250 apartment units on a 5-acre vacant site. Main complex entrance located 1,250 feet walking distance from Baytown Light Rail Station. | | |

| | | | |
|---|---|---|---|
| **Size (net new):** | 250 *D.U. Residential* | *Sq. Ft. Comm.* | *Acres (Gr.)* |
| **Density:** | 50 *D.U. / Acre* | | *Floor Area Ratio (FAR)* |
| **Located within 2000 feet walking distance of an LRT, BRT, BART or Caltrain station or major bus stop?** | | | Y |

| PROJECT AUTO TRIP GENERATION | *Relevant TIA Section:* | Chapter 2: Project Description | |
|---|---|---|---|
| **Auto Trips Generated:** | 126 *AM Pk Hr* | 155 *PM Pk Hr* | 1639 *Total Weekday* |
| **Methodology (check one)** | ✓ **ITE** | ❒ **Other** *(Please describe below)* | |
| *Describe alternative trip generation methodology, if applicable* | | | |

| AUTO TRIP REDUCTION APPROACH | *Relevant TIA Section:* | Chapter 2: Project Description | |
|---|---|---|---|
| ✓ **Standard** *Complete Table A below* | ❒ **Peer/Study-Based** *Complete Table B below* | ❒ **Target-Based** *Complete Table C below* | ❒ **None Taken** |

| TRIP REDUCTION REQUIREMENTS | *Relevant TIA Section:* | |
|---|---|---|
| **Is the project required to meet any trip reduction requirements or targets?** | | N |
| **If so, specify percent:** | **Reference code or requirement:** | |

## TRIP REDUCTION APPROACHES

| A. STANDARD APPROACH | | *Relevant TIA Section:* | Chapter 2: Project Description | | |
|---|---|---|---|---|---|
| **Type of Reduction** *Specify reduction. See Table 2 in TIA Guidelines* | | **% Reduction from ITE Rates** | **Total Trips Reduced (AM/PM/Daily)** | **TOTAL REDUCTION CLAIMED** | |
| | | | | **%** | **Trips** |
| **Transit** | *Proximity to LRT (within 2000 ft walk)* | 9.0% | 11/14/148 | 9.5% | AM - 12<br>PM - 15<br>Daily - 156 |
| **Mixed-Use** | | | | | |
| **Financial Incentives** | *Unbundled Parking* | 0.50% | 1/1/8 | | |
| **Shuttle** | | | | | |

| B. PEER/STUDY-BASED APPROACH | *Relevant TIA Section:* | | |
|---|---|---|---|
| **Basis of Reduction** | | **TOTAL REDUCTION CLAIMED** | |
| *Summarize basis of reduction, addressing:* | | **%** | **Trips** |
| • *Data used to justify trip reduction rate*<br>• *Source(s) referenced*<br>• *Assumptions and methodologies used to develop the trip reduction*<br>• *How the trip reduction rate is appropriate for the proposed development* | | *Specify AM, PM and/or Daily reduction* | *Specify AM, PM and/or Daily reduction* |

# *Example: Standard Reduction Approach*

| C. TARGET-BASED APPROACH | | Relevant TIA Section: | | | |
|---|---|---|---|---|---|
| **Type of Reduction (check all that apply)** | | | | **TOTAL REDUCTION CLAIMED** | |
| ❒ **% Trip Reduction** | ❒ **% SOV mode share** | ❒ **Trip Cap** | | **%** | **Trips** |
| *If checked, state % reduction here* | *If checked, state % reduction here* | *If checked, state cap here* | | *Specify AM, PM and/or Daily reduction* | *Specify AM, PM and/or Daily reduction* |
| **Description** | *e.g., ITE auto trip generation rates based on square footage or number of units, total person-trips based on employee/resident count* | | | | |
| **Time period for reduction** | **Peak Hour** | **Peak Period** | **Full Day** | | |
| | ❒ *Specify AM, PM or both* | ❒ *Specify AM, PM or both* | ❒ | | |

| OTHER TDM/REDUCTION MEASURES | | | |
|---|---|---|---|
| **Bicycle/Pedestrian** | Y | ***Relevant TIA Section:*** | Chapter 7: Multimodal Evaluation |
| - Fill sidewalk gaps on south side of project site<br>- Pedestrian and bicycle crossing improvements at adjacent intersections: bicycle detector loops, high-visibility ladder crosswalks<br>- Bicycle parking: 85 spaces in locked section of garage, 20 outdoor spaces near building entrances | | | |
| **Parking Management** | Y | ***Relevant TIA Section:*** | Chapter 9: TDM Plan |
| - Unbundled parking: First parking space included in rent, $300/month for second parking space | | | |
| **Transit** | N | ***Relevant TIA Section:*** | |
| | | | |
| **Site Planning and Design** | Y | ***Relevant TIA Section:*** | Chapter 8: Site Access and Circulation |
| - Building entrance oriented to face street, with small public plaza<br>- Mixed use pedestrian and bicycle paths within site to connect buildings | | | |
| **TDM Program** | Y | ***Relevant TIA Section:*** | Chapter 9: TDM Plan |
| - On-site transit and alternative travel information kiosk<br>- Unbundled parking as noted above | | | |

| IMPLEMENTATION | Relevant TIA Section: | |
|---|---|---|
| **Have the project sponsor and Lead Agency agreed to any of the following measures?** | | |
| ❒ **Monitoring** | *Describe.* | |
| ❒ **Enforcement** | *Describe.* | |
| ❒ **Data Sharing** | *Describe.* | |

# *Example: Peer/Study-Based Reduction Approach*

## AUTO TRIP REDUCTION STATEMENT

**UPDATED: October 2014**

SANTA CLARA Valley Transportation Authority

| PROJECT INFORMATION | *Relevant TIA Section:* | Chapter 2: Project Description |
|---|---|---|
| **Project Name:** Technology Office Expansion | | |
| **Location:** Techville, CA | | |
| **Description:** Replace 1.4 Million SF of office space in one building with 1.5 Million SF of office in one building and 620 KSF of R&D space in another building, on a 49-acre site. | | |

| | | | |
|---|---|---|---|
| **Size (net new):** | *D.U. Residential* | 720,000 *Sq. Ft. Comm.* | *Acres (Gr.)* |
| **Density:** | *D.U. / Acre* | 1.0 *Floor Area Ratio (FAR)* | |
| **Located within 2000 feet walking distance of an LRT, BRT, BART or Caltrain station or major bus stop?** | | | N |

| PROJECT AUTO TRIP GENERATION | *Relevant TIA Section:* | Chapter 3: Trip Generation and Distribution | |
|---|---|---|---|
| **Auto Trips Generated:** | 1,316 *AM Pk Hr* | 1,358 *PM Pk Hr* | 14,769 *Total Weekday* |
| **Methodology (check one)** | ❒ **ITE** | ✓ **Other** *(Please describe below)* | |
| *Driveway counts at existing 1.4 Million sf office space were used to calculate per-employee trip rates. These rates were multiplied by net new employees projected for the new office space.* | | | |

| AUTO TRIP REDUCTION APPROACH | *Relevant TIA Section:* | Chapter 3: Trip Generation and Distribution | |
|---|---|---|---|
| ❒ **Standard** *Complete Table A below* | ✓ **Peer/Study-Based** *Complete Table B below* | ❒ **Target-Based** *Complete Table C below* | ❒ **None Taken** |

| TRIP REDUCTION REQUIREMENTS | *Relevant TIA Section:* | |
|---|---|---|
| **Is the project required to meet any trip reduction requirements or targets?** | | N |
| **If so, specify percent:** | **Reference code or requirement:** | |

### TRIP REDUCTION APPROACHES

| A. STANDARD APPROACH | *Relevant TIA Section:* | | | |
|---|---|---|---|---|
| **Type of Reduction** *Specify reduction. See Table 2 in TIA Guidelines* | | **% Reduction from ITE Rates** | **Total Trips Reduced (AM/PM/Daily)** | **TOTAL REDUCTION CLAIMED** |
| | | | | **%** / **Trips** |
| **Transit** | | | | *Specify AM, PM and/or Daily reduction* / *Specify AM, PM and/or Daily reduction* |
| **Mixed-Use** | | | | |
| **Financial Incentives** | | | | |
| **Shuttle** | | | | |

| B. PEER/STUDY-BASED APPROACH | *Relevant TIA Section:* | Chapter 3: Trip Generation and Distribution | |
|---|---|---|---|
| **Basis of Reduction** | | | **TOTAL REDUCTION CLAIMED** |
| | | | **%** / **Trips** |
| Trip generation studies were conducted at the existing campus. The rates used in the TIA are based on number of employees rather than building square footage and assume that Technology Employer's existing TDM program will be expanded to the expanded campus. | | | 30% non-SOV mode share for all AM and PM peak hour trips / |

# *Example: Peer/Study-Based Reduction Approach*

| C. TARGET-BASED APPROACH | | | *Relevant TIA Section:* | | |
|---|---|---|---|---|---|
| **Type of Reduction (check all that apply)** | | | | **TOTAL REDUCTION CLAIMED** | |
| ❒ **% Trip Reduction** | ❒ **% SOV mode share** | ❒ **Trip Cap** | | **%** | **Trips** |
| *If checked, state % reduction here* | *If checked, state % reduction here* | *If checked, state cap here* | | *Specify AM, PM and/or Daily reduction* | *Specify AM, PM and/or Daily reduction* |
| **Description** | *e.g., ITE auto trip generation rates based on square footage or number of units, total person-trips based on employee/resident count* | | | | |
| **Time period for reduction** | **Peak Hour** | **Peak Period** | **Full Day** | | |
| | ❒ *Specify AM, PM or both* | ❒ *Specify AM, PM or both* | ❒ | | |

| OTHER TDM/REDUCTION MEASURES | | | |
|---|---|---|---|
| **Bicycle/Pedestrian** | Y | ***Relevant TIA Section:*** | Chapter 9: Multimodal Evaluation |
| - Improve off-campus bicycle facilities: Connect bicycle lanes on Woodland Lane to campus main entrance<br>- Construct curb extensions at intersection of Woodland Lane and Techville Avenue (at corner of site) to shorten pedestrian crossing distance<br>- Bike lockers (275) in parking garage, 75 short-term bicycle parking spaces outside main entrance | | | |
| **Parking Management** | N | ***Relevant TIA Section:*** | |
| *Describe any parking management strategies that would lead to reduced auto trips, such as parking pricing, parking cash-out, unbundled parking, etc.* | | | |
| **Transit** | Y | ***Relevant TIA Section:*** | Chapter 9: Multimodal Evaluation |
| - Long-distance private commuter shuttles<br>- Financial contribution to shuttle service to nearest Caltrain station (Downtown Techville)<br>- Transit subsidy for commuters: VTA Eco Pass and Caltrain Go Pass provided at no cost on ongoing basis | | | |
| **Site Planning and Design** | Y | ***Relevant TIA Section:*** | Chapter 10: Site Access and Circulation |
| - Parking located far from work areas to discourage driving for commuting<br>- Long-distance commuter shuttle and Caltrain shuttle pick-up and drop-off at main building entrance | | | |
| **TDM Program** | Y | ***Relevant TIA Section:*** | Chapter 11: TDM Plan |
| - Carpool matching service provided to all employees<br>- Flexible work schedules and telecommuting encouraged as company policy<br>- On-site amenities (free cafeteria, coffee stand, dry cleaning pick-up and drop-off) | | | |

| IMPLEMENTATION | | ***Relevant TIA Section:*** | Chapter 11: TDM Plan |
|---|---|---|---|
| **Have the project sponsor and Lead Agency agreed to any of the following measures?** | | | |
| ✓ **Monitoring** | Annual monitoring via driveway surveys and employee TDM surveys will be conducted by outside consultants and reported to City of Techville. | | |
| ❒ **Enforcement** | | | |
| ✓ **Data Sharing** | City of Techville will share annual monitoring reports with VTA after staff approval of reports. | | |

# *Example: Target-Based Reduction Approach*

## AUTO TRIP REDUCTION STATEMENT

**UPDATED: October 2014**

SANTA CLARA Valley Transportation Authority

| PROJECT INFORMATION | *Relevant TIA Section:* | Chapter 3: Project Description |
|---|---|---|
| **Project Name:** Large Company Campus Expansion | | |
| **Location:** Treeview, CA | | |
| **Description:** Redevelop 9 acre site into two office buildings totalling 470,000 sf of office with structured parking, to replace four existing buildings totalling 123,000 sf of office space and surface parking, resulting in 347,000 sf of net new growth. | | |

| | | | |
|---|---|---|---|
| **Size (net new):** | *D.U. Residential* | 347,000 *Sq. Ft. Comm.* | *Acres (Gr.)* |
| **Density:** | *D.U. / Acre* | 1.2 *Floor Area Ratio (FAR)* | |
| **Located within 2000 feet walking distance of an LRT, BRT, BART or Caltrain station or major bus stop?** | | | Y |

| PROJECT AUTO TRIP GENERATION | *Relevant TIA Section:* | Chapter 3: Project Description | |
|---|---|---|---|
| **Auto Trips Generated:** | 507 *AM Pk Hr* | 467 *PM Pk Hr* | 3,477 *Total Weekday* |
| **Methodology (check one)** | ✓ **ITE** | ❐ **Other** *(Please describe below)* | |
| *Describe alternative trip generation methodology, if applicable* | | | |

| AUTO TRIP REDUCTION APPROACH | *Relevant TIA Section:* | Chapter 3: Project Description | |
|---|---|---|---|
| ❐ **Standard** *Complete Table A below* | ❐ **Peer/Study-Based** *Complete Table B below* | ✓ **Target-Based** *Complete Table C below* | ❐ **None Taken** |

| TRIP REDUCTION REQUIREMENTS | *Relevant TIA Section:* | Chapter 2: Existing Conditions |
|---|---|---|
| **Is the project required to meet any trip reduction requirements or targets?** | | Y |
| **If so, specify percent:** Daily - 20%, Peak Hour - 30% | **Reference code or requirement:** Treeview Business Park Specific Plan (2013) | |

## TRIP REDUCTION APPROACHES

| A. STANDARD APPROACH | *Relevant TIA Section:* | | | |
|---|---|---|---|---|
| **Type of Reduction** *Specify reduction. See Table 2 in TIA Guidelines* | | **% Reduction from ITE Rates** | **Total Trips Reduced (AM/PM/Daily)** | **TOTAL REDUCTION CLAIMED** |
| | | | | **%** / **Trips** |
| **Transit** | | | | *Specify AM, PM and/or Daily reduction* / *Specify AM, PM and/or Daily reduction* |
| **Mixed-Use** | | | | |
| **Financial Incentives** | | | | |
| **Shuttle** | | | | |

| B. PEER/STUDY-BASED APPROACH | *Relevant TIA Section:* | |
|---|---|---|
| **Basis of Reduction** | | **TOTAL REDUCTION CLAIMED** |
| | | **%** / **Trips** |
| *Summarize basis of reduction, addressing:*<br>• *Data used to justify trip reduction rate*<br>• *Source(s) referenced*<br>• *Assumptions and methodologies used to develop the trip reduction*<br>• *How the trip reduction rate is appropriate for the proposed development* | | *Specify AM, PM and/or Daily reduction* / *Specify AM, PM and/or Daily reduction* |

# *Example: Target-Based Reduction Approach*

| C. TARGET-BASED APPROACH | | | Relevant TIA Section: | Chapter 3: Project Description | |
|---|---|---|---|---|---|
| Type of Reduction (check all that apply) | | | | TOTAL REDUCTION CLAIMED | |
| ✓ % Trip Reduction | ❒ % SOV mode share | | ❒ Trip Cap | % | Trips |
| *Daily - 20%, Peak Hour - 30%* | *If checked, state % reduction here* | | *If checked, state % reduction here* | AM: -30%<br>PM: - 30%<br>Daily: -20% | AM: - 152<br>PM: - 467<br>Daily: - 695 |
| **Description** | Target reduction based on ITE trip generation estimates for Large Company site. Reduction taken in compliance with Treeview Business Park Specific Plan (2013). | | | | |
| **Time period for reduction** | **Peak Hour** | **Peak Period** | **Full Day** | | |
| | Both | | Yes | | |

| OTHER TDM/REDUCTION MEASURES | | | |
|---|---|---|---|
| **Bicycle/Pedestrian** | Y | ***Relevant TIA Section:*** | Chapter 8: Multimodal Evaluation |
| - Improving project's street frontage with wider sidewalks and landscape buffer with street trees to help offset effect of increased auto traffic<br>- Bike lockers (58), showers (2), pumps and tools provided in bicycle center (Building A), plus mobile bicycle repair services 1x/week<br>- Free bike share program for employees traveling between buildings and within Treeview Business Park | | | |
| **Parking Management** | N | ***Relevant TIA Section:*** | |
| *Describe any parking management strategies that would lead to reduced auto trips, such as parking pricing, parking cash-out, unbundled parking, etc.* | | | |
| **Transit** | Y | ***Relevant TIA Section:*** | Chapter 8: Multimodal Evaluation |
| - Vanpool service provided to all employees<br>- FreeCaltrain and VTA passes provided to employees on an ongoing basis | | | |
| **Site Planning and Design** | Y | ***Relevant TIA Section:*** | Chapter 7: Site Circulation and Access |
| - Multi-use paths between buildings designed to encourage bicycle and pedestrian travel on campus | | | |
| **TDM Program** | Y | ***Relevant TIA Section:*** | Chapter 8: TDM Program |
| - Carpool matching provided for all employees<br>- Telecommuting encouraged<br>- Guaranteed ride home program | | | |

| IMPLEMENTATION | | Relevant TIA Section: | Chapter 8: TDM Program |
|---|---|---|---|
| **Have the project sponsor and Lead Agency agreed to any of the following measures?** | | | |
| ✓ **Monitoring** | Monitoring agreement with City of Treeview: quarterly trip generation monitoring via driveway counts for first two years of full occupancy; annual monitoring thereafter. | | |
| ✓ **Enforcement** | City of Treeview will assess a $1000 per-trip fee for vehicle trips that exceed peak hour or daily trip generation estimated in TIA. | | |
| ✓ **Data Sharing** | Monitoring reports will be made available to VTA after City of Treeview staff approval. | | |

# APPENDIX D: Alternative Trip Generation Resources

## Introduction

***Chapter 8*** of the *TIA Guidelines* presents several trip generation methodologies that may be appropriate for development projects in Santa Clara County. Typically, Lead Agencies rely on trip generation rates published by the Institute of Transportation Engineers (ITE). In some cases, however, the published ITE trip generation rates are based on very limited data. There are at least four cases in which the Lead Agency should consider using use alternative sources for trip generation rates:

- When ***ITE data is insufficient*** (e.g. small sample size, not statistically valid);
- When a project's ***specific land use*** is not covered by the ITE manual or is known to show trip generation characteristics that differ from the categories covered in the ITE manual;
- When the ***land use context***, such as high-density infill or development adjacent to transit, is not addressed by the ITE manual;
- When the project includes a mix of land uses (***mixed-use development*** type).

Professional judgment should always be used when selecting a trip generation methodology. When using trip rates from any of the alternate trip generation methodologies identified in ***Chapter 8*** and in this appendix, the Lead Agency shall include in the TIA Report a full description of the trip generation methodology used and a summary of all inputs and assumptions.

This appendix includes information on the research and practice basis of several alternative trip generation methodologies identified in the *TIA Guidelines*. ***Table D-1***, next page, provides an overview of trip generation methods and tools identified in the *TIA Guidelines.* The following pages present profiles that may be helpful to Lead Agencies selecting between methodologies.

**TABLE D-1: SUMMARY OF TRIP GENERATION METHODOLOGIES AND TOOLS**

| Tool/ Method | Tool Type | Project Type/ Context | Validation Locations | Level of Effort | Outputs | Notes |
|---|---|---|---|---|---|---|
| City of San José | Rate Table and Guidelines | Typically used for projects in San Jose | National, San Diego, Other | Low | N/A | For alternative rates, seek approval from City of San Jose staff |
| NCHRP 684 | Spreadsheet tool | Mixed use developments | Georgia and Texas | High | • Internal trip capture<br>• External trip mode split<br>• AM peak, PM peak, and Daily periods | Recommended for developments of up to 300 acres; not recommended for larger developments, suburban activity centers or new towns |
| EPA MXD | Spreadsheet tool | Mixed use developments | National with a California emphasis | High | • Internal trip capture<br>• External trip mode split<br>• AM peak, PM peak, and Daily periods | Sensitive to 7D's (land use characteristics); combined MXD/NCHRP 684 model has been adapted for use in several TIAs in Santa Clara County |
| SANDAG MXD | Trip Generation table with Spreadsheet tool | Site within a Priority Development Area | San Diego | High | • Internal trip capture<br>• External trip mode split<br>• AM peak, PM peak, and Daily periods | This was developed for "Smart Growth Opportunity Areas" in San Diego, but may be appropriate for use in the Priority Development Areas in Santa Clara County. |
| CalEEMod | Model with option to adjust rates | Air quality analysis for any site | California | Med. | • Criteria pollutant and greenhouse gas (GHG) emissions | Required by BAAQMD for air quality analysis. Not recommended as primary source for trip generation, but may be useful as supplemental resource for justification of trip reductions. |

**TABLE D-1: SUMMARY OF TRIP GENERATION METHODOLOGIES AND TOOLS**

| Tool/ Method | Tool Type | Project Type/ Context | Validation Locations | Level of Effort | Outputs | Notes |
|---|---|---|---|---|---|---|
| MTC STARS | Mode share tables | Site within 1/2 to 1 mile of rail or ferry stops | San Francisco Bay Area | Low | N/A | May be a resource to help justify a reduction in trip generation rates based on non-auto mode share data. |
| Caltrans/ UC Davis | Spreadsheet tool | Single use sites within smart growth areas | California | Low | • Reduction to ITE rate<br>• Adjustment can be applied to AM peak, PM peak, and Daily rates | For use only with a single land use that is part of a multi-use site, and only at sites located in smart-growth areas. Other limitations may apply – see documentation. |

## Methodology Profiles

### City of San José Trip Generation Rates

The City of San Jose maintains a *Traffic Impact Analysis Handbook* which includes a set of trip generation rates based on the Institute of Transportation Engineers (ITE) *Trip Generation* report, San Diego *Traffic Generators*, data from other agencies and publications, reports and estimates. ITE rates and rates obtained through surveys of similar land uses may also be used when appropriate. The trip generation rates provided in the tables do not account for mixed use environments or proximity to transit, however the City of San Jose *TIA Handbook* allows for standard reductions to trip generation using the VTA methodology included in VTA *TIA Guidelines.* The City of San Jose has final authority to approve the trip generation rates used in the TIA analysis.

- City of San Jose. *Traffic Impact Analysis Handbook. 2009.* San Jose, California: Author. *https://www.sanjoseca.gov/DocumentCenter/View/4366*

### NCHRP 684 – Enhancing Internal Trip Capture Rate for Mixed-Use Development

The National Cooperative Highway Research Program (NCHRP) Report 684, *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*, analyzed the internal-capture relationships of mixed use sites and examined the travel interactions among six individual types of land uses: office, retail, restaurant, residential, cinema, and hotel. The study looked at three master-planned developments in Georgia and Texas to ascertain the interactions among these six land use types within each of the sites. The study considered site context factors and described percentage reductions in site-wide traffic generation that might result from the availability of transit service and other factors. Researchers then verified analysis results by comparing them to trip generation for three earlier ITE studies at Florida mixed use sites. The validation confirmed that the estimated values were a reasonable match for observed traffic. The interaction percentages among the land use types are then used to discount ITE trip-generation rates by the number of trips that would remain internal to the project site due to the presence of multiple land uses.

The tool provides peak period trips and requires the user to input mode split, vehicle occupancy by land use, and distance between land uses. Researchers recommend its use for developments of up to 300 acres, but do not recommend use of this method for larger developments, suburban activity centers or new town types of development. This method could be used for mixed-use developments in an urban context, including station area plans or transit oriented developments. Recently findings from this study and the MXD tool developed by EPA were combined into one comprehensive tool – MXD+. (See below.)

- National Cooperative Highway Research Program. (2011). *NCHRP Report 684: Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*. 2011. Washington, D.C.: Transportation Research Board, National Research Council. *http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_684.pdf*
- Walters, J., B. Bochner, R. Ewing. (2013). Getting Trip Generation Right: Eliminating the Bias Against Mixed Use Development. *American Planning Association: Planning Advisory Service Report, May 2013.* Chicago, Illinois: American Planning Association. *http://asap.fehrandpeers.com/wp-content/uploads/2012/05/APA_PAS_May2013_GettingTripGenRight.pdf*

### MXD Model – US EPA

This spreadsheet tool is based on a robust national sample of 239 mixed-use developments in six metro areas and has been validated at 40 sites, mostly in California. The tool applies elasticities for transportation behavior response to land-use variables from peer-reviewed literature. It is sensitive to 7 "D's" factors: density, diversity, design, distance from transit, destination accessibility, development scale, and demographics. More recently, a tool has been developed that combines the EPA MXD model with the National Cooperative Highway Research Program Report 684 (see above). The combined EPA/NCHRP MXD model has been adapted for use in several transportation impact analysis studies in Santa Clara County, including the Apple Campus II EIR, the Lawrence Station Area Plan for the City of Sunnyvale, as well as a number of impact analysis projects in other Bay Area counties.

- Ewing, et al. (2011). Traffic Generated by Mixed-Use Developments – A Six Region Study Using Consistent Built Environment Measures. Washington, D.C.: United States Environmental Protection Agency. *http://www.epa.gov/dced/mxd_tripgeneration.html*
- Walters, J., B. Bochner, R. Ewing. (2013). Getting Trip Generation Right: Eliminating the Bias Against Mixed Use Development. *American Planning Association: Planning Advisory Service Report, May 2013.* Chicago, Illinois: American Planning Association. *http://asap.fehrandpeers.com/wp-content/uploads/2012/05/APA_PAS_May2013_GettingTripGenRight.pdf*
- Alameda County Transportation Commission. (2013). *2013 Congestion Management Program Update. Appendix K.* Oakland, California: Author. *http://www.alamedactc.org/app_pages/view/5224*

### SANDAG Traffic Generation Manual & Trip Generation for Smart Growth

The San Diego Association of Governments (SANDAG) published the *San Diego Traffic Generators Manual* in 2000, which includes trip generation rates based on traffic counts collected at four to seven sites for each land use category provided within the manual. In 2010, SANDAG released *Trip Generation for Smart Growth: Planning Tools for the San Diego Region* as a supplement to the manual in order to provided reductions for mixed use that accounted for the specific context of a site.

The study resulted in a spreadsheet tool which is based on the MXD tool developed for EPA (see above), but modified for use by SANDAG. The study validated the MXD tool for use within the San Diego region by comparing the method's trip generation estimates to actual travel data from twenty of the region's Smart Growth Opportunity Areas (SGOAs) and six smaller mixed-use/transit-oriented development (TOD) sites. Travel data for a representative group of SGOAs was compiled from the SANDAG 2006 Regional Household Travel Behavior Survey and 24 hour counts were conducted for use in the study. Based on observed data, the MXD tool was an excellent predictor of external vehicle trips generated by smart growth development. SANDAG's SGOAs are similar to Priority Development Areas (PDAs) as planned for in the San Francisco Bay Area's Regional Transportation Plan and Sustainable Communities Strategy, or *One Bay Area* Plan. This tool could be useful for developments within PDAs as it has been refined for this type of focused growth.

- San Diego Association of Governments. (2010). *Trip Generation for Smart Growth: Planning Tools for the San Diego Region.* San Diego, California: Author. *http://www.sandag.org/index.asp?projectid=334&fuseaction=projects.detail*

### CalEEMod – CAPCOA/BAAQMD

The California Emissions Estimator Model (CalEEMod) was released by the California Air Pollution Control Officers Association (CAPCOA) and is used by the Bay Area Air Quality Management District (BAAQMD) for determining air quality conformity. The tool calculates vehicle trips and vehicle miles traveled (VMT) in order to estimate air pollution and greenhouse gas emissions arising from development. ITE *Trip Generation* (8th Edition) trip generation rates are used as default in the program, although users have the option to manually add rates. Trip types are broken down by residential and commercial trips. Residential trips include home-work, home-shopping and home-other trips. The trip type breakdown is from the 1999 Caltrans Statewide Travel Survey; however, users can overwrite these inputs if sufficient justification for alternative sources of data (e.g., project-specific traffic study) can be provided. The tool also identifies a number of mitigation measures that can be chosen by the user, such as changes to land use, parking policies, transportation systems management and transportation demand management that can be used to reduce the resulting VMT. It should be noted, however, that the CalEEMod trip model does not produce detailed trip generation estimates or output reductions to vehicle trips, but rather reductions to VMT. The tool may be therefore be most appropriate for analyses that primarily examine VMT rather than peak-hour trip generation.

- California Air Pollution Control Officers Association (CAPCOA). (2013). *California Emissions Estimator Model Users Guide.* http://www.caleemod.com/

### Station Area Resident Survey – MTC

The Metropolitan Transportation Commission (MTC) Station Area Residents Survey (STARS) was conducted in 2006. It characterizes the demographic and travel characteristics of transit station area residents in the San Francisco Bay Area. A GIS analysis was conducted using county-level results from the 2000 *Bay Area Travel Survey* to group residents based on population density and their proximity to rail or ferry stations. MTC's website provides tables showing mode split by population densities and proximity to rail and ferry stops. The STARS tables can be used to help justify a reduction in trip generation rates based on actual survey data for Santa Clara County that shows residents near transit have higher non-auto mode shares.

- Metropolitan Transportation Commission (MTC). (2006). *Characteristics of Rail and Ferry Station Area Residents in the San Francisco Bay Area: Evidence from the 200 Bay Area Travel Survey.* Oakland, California: Author. http://www.mtc.ca.gov/planning/smart_growth/stars/
- Alameda County Transportation Commission. (2013). *2013 Congestion Management Program Update. Appendix K.* Oakland, California: Author. http://www.alamedactc.org/app_pages/view/5224

### California Smart Growth Trip Generation Tool – Caltrans/UC Davis

This spreadsheet tool provides ITE rate adjustment factors based on a database of vehicle trip counts and site/context data for a sample of 50 smart growth sites in California. The tool can be used for daily or peak rates. The tool was validated at 11 mixed-use sites for the AM peak period and 13 mixed-use sites for the PM peak period. Rates are based on density, land use mixture, regional location, transit service, and parking. The research team defined specific criteria that should be met in order to apply the model, which can be found in the *California Smart-Growth Trip Generation Rates Study* report cited below. Resulting models are only appropriate for

analysis for a single land use that is part of a multi-use site, and only at sites located in smart-growth areas. (UCSD, 2013 p. 10) For example, for residential development analysis, the input for the tool is the number of dwelling units for an entire residential-only site or targeted residential use within a multi-use building or multi-use site.

- University of California, Davis for the California Department of Transportation. (2013). *California Smart-Growth Trip Generation Rates Study.* *http://ultrans.its.ucdavis.edu/projects/smart-growth-trip-generation*
- Alameda County Transportation Commission. (2013). *2013 Congestion Management Program Update. Appendix K.* *http://www.alamedactc.org/app_pages/view/5*

# APPENDIX E: ITE Methodology for Applying Pass-By and Diverted Linked Trip Reductions

## ITE Methodology for Applying Pass-by and Diverted Linked Trip Reductions

The Institute of Transportation Engineers methodology for applying pass-by and diverted linked trip reductions should be used in TIAs and is summarized below.[1]

1. Obtain peak hour traffic volumes passing the project site driveway(s) in both directions for a two-way street or the travel direction on a one-way street.

2. Obtain driveway volumes entering and exiting the site. The driveway volumes are determined from the project size and trip rates.

3. For each driveway, calculate the number of pass-by and diverted linked trips by multiplying the total number of project trips by the appropriate reduction percentage. (Other methods may be used to determine the reduction. See Chapter VII of ITE's *Trip Generation* report.) *Note that reductions for pass-by trips often differ from those for diverted linked trips*.

4. Determine the trip distribution on roadways adjacent to the site for pass-by trips, and determine the trip distribution on roadways that would be used by diverted linked trips.

5. Determine pass-by and diverted linked trip distribution based on the volume of traffic passing the driveway in both directions.

6. Assign pass-by and diverted linked trip volumes to the driveway based on the distributions calculated in Step 5 above. These trips should also be analyzed on the street system to accurately reflect the turning movements necessary to access the site.

***Figure C-1*** illustrates the application of the pass-by trip methodology. Diverted linked trips are not included in this example but should be analyzed in TIAs. In ***Figure C-1***, the 50 pass-by trips should be examined in the context of the turning movements already handled by existing facilities. For example, can the existing left turn pockets and/or signal timing accommodate the eight additional U-turns added by the project?

[1] Institute of Transportation Engineers, *Trip Generation Handbook*, 2nd Edition, 2004, Chapter 5, pp. 29-82.

**Figure C-1: Application of Pass-by Trips**

*(Note: Diverted linked trips are not included in this example but should be analyzed in TIAs.)*

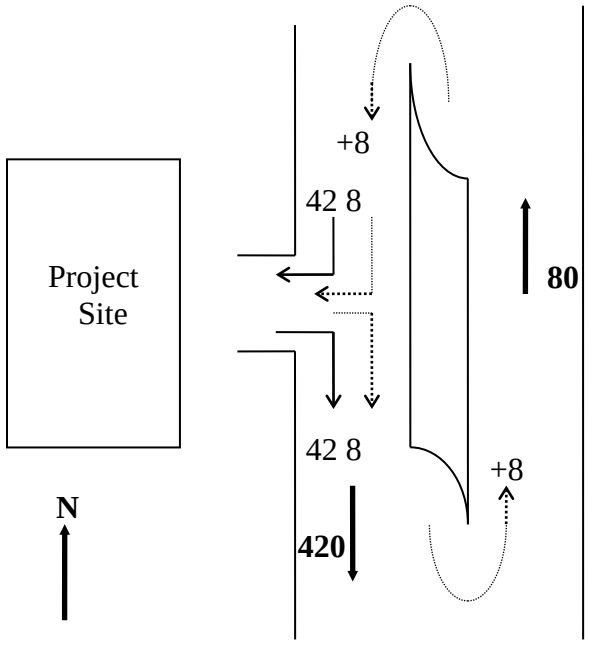
Base Peak Hour Traffic Volumes on Street
420 VPH Southbound
80 VPH Northbound

Total Project Trips
200 VPH In
200 VPH Out

Pass-by Trips = 25%
50 VPH In
50 VPH Out

Based on Base Volumes (84% SB, 16% NB)
Southbound Pass-by Trips = 42 VPH
Northbound Pass-by Trips = 8 VPH

KEY
____ Southbound Pass-by Trips
____ Northbound Pass-by Trips



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# APPENDIX F: Transit Delay Analysis Resources

## Introduction

To provide a more meaningful and relevant analysis of project effects on transit service, the 2014 *TIA Guidelines* shifted a portion of the transit analysis requirements from a capacity-based to a delay-based approach for most projects. The *TIA Guidelines* require basic analysis of project effects on transit vehicle delay and on transit access and facilities near the project site. For large or unique projects that are likely to generate high numbers of transit trips, the *Guidelines* recommend a transit capacity analysis as well as the delay analysis. The following section provides additional information on the research and professional practice basis of the transit delay analysis requirement.

## Transit Delay Analysis Overview and Methodology

Current research thoroughly documents the impacts of roadway congestion on transit performance. Traffic congestion has negative impacts on bus travel time and service reliability (McKnight et al. 2003) (Perk et al. 2008).This congestion also leads to higher operational costs for the transit provider due to more vehicle hours in service for the transit vehicle (McKnight et al. 2003).

To date, some Transportation Impact Analysis (TIA) reports in Santa Clara County have examined transit delay as part of the analysis of a proposed land use development or general planning effort.

The Apple Campus II TIA (2013) examines transit delay due to increased traffic from the proposed development. The TIA found that project traffic will result in increased congestion at intersections, which will increase travel time for transit vehicles. The project is also likely to indirectly increase transit ridership. This is due to the conversion of current auto trips in the project area to transit trips to avoid increased roadway congestion. Near the project site, this will affect bus routes traveling in the vicinity. To mitigate this impact, the TIA proposed improving amenities at bus stops near the project site by adding elements such as shelters, benches, and lighting.

The San Antonio Village Phase II TIA (2014) also examines transit delay due to increased traffic from future development. The TIA found that the project will increase congestion on the surrounding roadway network, which will also increase travel time for transit vehicles. Intersection capacity improvements are proposed to mitigate impacts due to project traffic; these capacity improvements will also benefit transit vehicles. Transportation Demand Management (TDM) policies for the project will also reduce the number of trips during the peak hour, which will further reduce impacts due to project traffic on the roadway network used by transit.

In addition to being evaluated in published TIA Reports, transit delay analysis is required or encouraged in several technical guidelines and policy documents in the San Francisco Bay Area, notably Alameda County *TIA Technical Guidelines* and the City of San Jose's General Plan.
The Alameda County Transportation Commission has a requirement for analyzing transit delay as part of its *2013 Congestion Management Program TIA Technical Guidelines*. This requirement states that "The analysis should evaluate if vehicle trips generated by the project will

cause congestion that degrades transit vehicle operations. Analysis may be qualitative and may be based on auto traffic circulation analysis."

The *Envision San Jose 2040 Plan*, published by the City of San Jose in 2011, is a General Plan for development and smart growth in the City. The plan provides goals and policies for many different aspects of development, including land use and transportation. In the Environmental Impact Report for the plan, the City analyzed the effects of future proposed growth in the plan on transit travel times and speeds along 14 key corridors, referred to as "Grand Boulevards." These key corridors connect city neighborhoods and serve as primary routes for public transit vehicles. Transit vehicles are given priority in the roadway design over automobiles, trucks, and other vehicles. The plan also details what transit impacts would be considered significant, including when they would:

- Disrupt existing, or interfere with planned transit services or facilities;
- Cause the average speed on a transit priority corridor (referred to as a Grand Boulevard in the General Plan Update's Draft Circulation Element) to drop below 15 mph or decrease by 25% or more during the AM peak hour; or.
- Cause a transit priority corridor with an existing average speed below 15 mph to decrease by one mph or more during the AM peak hour.

A TIA in the City of San Jose could implement these policies by evaluating delay to transit vehicles as a result of project-related congestion.

## References


- Alameda County Transportation Commission. (2013). *Congestion Management Program 2013.* Oakland, California: Author.
- City of San Jose. (2011). *Program Environmental Impact Report for the Envision San Jose 2040 General Plan.* San Jose, California: Author.
- McKnight, C. E., H. S. Levinson, K.. Ozbay, C. Kamga, R. E. Paaswell. (2003). *Impact of Congestion on Bus Operations and Costs.* New York City: Region 2 University Transportation Research Center.
- Perk, V., J. Flynn, J. Volinski. (2008). *Transit Ridership, Reliability, and Retention.* Tampa, Florida: National Center for Transit Research.

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# APPENDIX G: Pedestrian and Bicycle Quality of Service Analysis Resources

## Introduction

To provide a more meaningful and relevant analysis of project effects on pedestrian and bicycle conditions, the 2014 *TIA Guidelines* shifted a portion of the pedestrian and bicycle analysis requirements from a capacity-based to a Quality of Service (QOS)-based approach for most projects. For large or unique projects that are likely to generate high numbers of pedestrian or bicycle trips, the *Guidelines* recommend a capacity analysis as well as the QOS analysis.

For additional detail on bicycle and pedestrian analysis, refer to ***Chapter 5***, ***Section 9.3*** and ***Chapter 12*** of the *TIA Guidelines*. The following section provides additional information on the research and professional practice basis of the pedestrian and bicycle QOS analysis requirement.

This appendix provides selected QOS methodologies that TIA preparers may find useful for evaluating bicycle and pedestrian conditions. This summary is adapted from materials prepared by Fehr & Peers in their *MMLOS Toolkit*.

At a minimum, methodologies used to evaluate bicycle and pedestrian QOS should:

- Directly address bicycling and/or walking
- Measure factors that can be addressed by project sponsors and/or Lead Agencies (such as sidewalk widths, presence of bicycle lanes, signal operations, etc.)
- Be readily adaptable for use in Santa Clara County

VTA has not evaluated all of these methodologies in depth and does not recommend one methodology over another. The methodologies described below address different priorities and some may be more appropriate than others for specific projects. In some cases, the TIA preparer may need to calibrate or otherwise adapt a methodology to better reflect local conditions. Quality of Service methodologies continue to be developed, and other methodologies not included in this appendix may be more appropriate than those presented here, depending on the nature of the project. Over time, VTA and its Member Agencies may revisit these methodologies and provide further guidelines for TIA preparers. Therefore, professional judgment should be applied when selecting a QOS methodology for TIAs.

***Table G-1***, next page, summarizes major features of the methodologies presented in this appendix.

**TABLE G-1: QOS METHODOLOGIES COMPARISON**

| Methodology | Analysis Level | | Project Type | | Mode | | Data Required | Reference |
|---|---|---|---|---|---|---|---|---|
| | Intersection | Street Segment | Development | General Plan | Pedestrian | Bicycle | | |
| Charlotte Bicycle and Pedestrian LOS | X | | X | * | X | X | Medium | City of Charlotte *Urban Street Design Guidelines*, Appendix B |
| Pedestrian/Bicycle Environmental Quality Index | X | X | X | * | X | X | High | San Francisco Dept of Public Health, *Bicycle* and *Pedestrian Environmental Quality Index* |
| HCM 2010 Bicycle and Pedestrian LOS | X | X | X | * | X | X | High | *HCM 2010: Highway Capacity Manual* |
| Layered Network Approach | | X | | X | X | X | Varies | *LA Street Classification and Benchmarking System*, 2010. |
| Level of Traffic Stress | X | X | X | X | | X | Medium | Mekuria, Furth and Nixon, 2012. *Low-Stress Bicycling and Network Connectivity* |
| Built Environment Factors | X | X | X | X | X | X | Varies | - Fort Collins, Colorado, *Pedestrian Plan*, 2011. Level of Service<br>- Burien, Washington, *Transportation Master Plan, 2012*. Table 4, Pedestrian LOS Checklist. |
| * This methodology is appropriate for General Plan-level goal setting, but evaluating an entire street network would involve a substantial effort. | | | | | | | | |

## Research and Practice Basis of QOS Methodologies

Several bicycle and pedestrian quality of service (QOS) methodologies have been developed to measure how well transportation infrastructure and streetscape features support bicycling and walking. The VTA *TIA Guidelines* identify several QOS methodologies that could be used in TIAs in Santa Clara County. This section describes the research and professional practice basis for these methodologies. Summaries of each methodology, with links to web-based resources for applying them, are presented on pages G-6 through G-11 of this appendix.

Numerous recent research studies have shown that the built environment has a substantial effect on travel behavior, particularly walking and bicycling. Access to destinations and a well-connected street network correlate to higher levels of walking and bicycling (Ewing and Cervero 2010; Saelens et al. 2003). Infrastructure design is also tied to walking and bicycling. People are more likely to walk where sidewalks are present (Saelens and Handy 2008), to prefer walking on wide sidewalks with landscaping separating them from vehicle traffic, and to feel more comfortable at intersections with short crossing distances (Transportation Research Board, 2008). People also prefer to ride bicycles in dedicated lanes and on low-traffic streets (Buehler and Pucher 2012; Broach et al. 2012).


- Buehler, R. and J. Pucher. (2012). Cycling to Work in 90 Large American Cities: New Evidence on the Role of Bike Paths and Lanes. *Transportation 39 (2),* 409-432.
- Broach, J., J. Dill, J. Gliebe. (2012). Where do cyclists ride? A route choice model developed with revealed preference GPS data. *Transportation Research Part A: Policy and Practice. 46 (10),* 1730-1740.
- Ewing, R. and R. Cervero. (2010). Travel and the Built Environment. A Meta-Analysis. *Journal of the American Planning Association.* 76 (3, 265-294.
- Ewing, R., A. Hajrasouliha, K. Neckerman, M. Purciel, A. C. Nelson. (2014). Streetscape Features Related to Pedestrian Activity. *TRB 93rd Annual Meeting Compendium of Papers.* Washington, D.C.: Transportation Research Board, National Research Council.
- Saelens, B. and S. Handy. (2008). Built Environment Correlates of Walking: A Review. *Medicine & Science in Sports & Exercise.* 40 (7 Suppl): S550–S566.
- Saelens, B., J.F. Sallis, L.D. Frank. (2003). Environmental correlates of walking and cycling: findings from the transportation, urban design, and planning literatures. *Annals of Behavioral Medicine, 25(2),* 80–91.
- Transportation Research Board. *NCHRP Report 616: Multimodal Level of Service Analysis for Urban Streets. (*2008). Washington, D.C.: Transportation Research Board, National Research Council.


## Pedestrian and Bicycle Environmental Quality Indices (PEQI and BEQI)

The San Francisco Department of Public Health developed the Pedestrian Environmental Quality Index (PEQI) and Bicycle Environmental Quality Index (BEQI) based on reviews of existing literature and with input from bicycle and pedestrian experts, advocates and facility users. To develop the PEQI, researchers conducted a literature review to identify specific indicators of pedestrian quality of service, such as vehicle speeds and sidewalk widths. These indicators were then assigned weights based on results from surveys of transportation experts and pedestrian advocates. The BEQI was developed using a similar two-part process: first identifying indicators of bicycle quality of service, such as bicycle lane width and pavement quality, and then weighting those indicators based on surveys of experts, advocates and local bicyclists. Site

assessments are conducted via a walking audit and checklist; this data can be collected using an Android smart phone application and integrated into a GIS database. The PEQI has been used for community planning and health assessment projects in San Francisco, Los Angeles, Denver and Massachusetts. The BEQI has been used primarily in San Francisco.

- San Francisco Department of Public Health. *The Pedestrian Environmental Quality Index (PEQI)*. (2008). San Francisco, California: Program on Health, Equity and the Environment, San Francisco Department of Public Health.
- San Francisco Department of Public Health. *The Bicycle Environmental Quality Index (BEQI)*. 2007. Program on Health, Equity and the Environment, San Francisco Department of Public Health.

### Charlotte Pedestrian and Bicycle LOS

In 2007 the City of Charlotte, North Carolina, developed a methodology to assess design features that impact pedestrians and bicyclists crossing signalized intersections. The methodology was developed with input from several professional standards documents published by the Federal Highway Administration, the Institute of Transportation Engineers, Florida DOT and the City of Portland. Developers also consulted with local government staff and transportation consultants when identifying and ranking variables. These variables were compiled into two intersection scoring tools that grade intersections from A to F for pedestrian and bicycle travel. The City of Charlotte uses these tools to evaluate proposed intersection improvements. If automobile-oriented improvements would degrade pedestrian and bicycle conditions, alternative improvements or capacity enhancements are considered.

- Steinman, N. K. Hines. (2003). A Methodology to Assess Design Features for Pedestrian and Bicyclist Crossings at Signalized Intersections. Presented at the 2nd Urban Street Symposium, Anaheim, California.
- Charlotte Department of Transportation. 2007. Pedestrian & Bicycle Level of Service Methodology for Crossings at Signalized Intersections. Charlotte, North Carolina: Author.

### HCM 2010 Bicycle and Pedestrian Level of Service

The Highway Capacity Manual 2010 (HCM 2010) is published by the Transportation Research Board (TRB) of the National Research Council, the preeminent transportation research organization in the United States. HCM 2010 bicycle and pedestrian evaluation methodologies were developed via a user-focused research effort that built on two decades of prior research on bicycle and pedestrian level of service. Researchers conducted a literature review and pilot tests to determine which factors in the bicycling and pedestrian environments are most important to street users. Locations that represented a mix of these factors were identified in Tampa, Florida (bicycle and pedestrian modes) and San Francisco (pedestrian only). At these locations, video footage was collected showing street segments and intersections from bicyclist and pedestrian points of view. Over one hundred survey participants in four cities around the United States then ranked video clips from A (excellent quality of service) to F (extremely poor quality of service). Regression models were developed to determine which variables had the greatest influence on user ratings of street segments, and equations were created to evaluate pedestrian and bicycle quality of service on street segments and at intersections.

- Transportation Research Board. *NCHRP Report 616: Multimodal Level of Service Analysis for Urban Streets. (*2008). Washington, D.C.: Transportation Research Board, National Research Council.

### Layered Network Approach

The Layered Network Approach is a planning-level evaluation of a local area's transportation network. The approach was articulated in a white paper developed for the City of Los Angeles in its most recent update of the Transportation Element of its General Plan. The methodology is based on planning practice in cities that have assigned travel mode priorities to streets in order to create a complete streets network. Several cities have adopted this method, including Seattle, Austin, Denver, Alameda, CA and Glendale, CA. In cities that have identified the creation of layered networks as transportation planning priorities, the TIA can identify how a proposed project would contribute to or detract from that network.

- Fehr & Peers, Rifkin Transportation Group and Nelson\Nygaard Consulting. (2010). *LA Street Classification and Benchmarking System.*

### Level of Traffic Stress

Researchers at the Mineta Transportation Institute developed the Level of Traffic Stress methodology to evaluate level of service for bicycle travel. Based on Dutch design standards for bicycle facilities and resident surveys from Portland, Oregon, the method classifies bicycle facilities on a scale from one to four. Lower numbers are assigned to facilities with low exposure to auto traffic and easy crossings at intersections, indicating low-stress environments attractive to many types of cyclists. The researchers piloted a network-wide analysis of San Jose, California using the Level of Traffic Stress model. They analysis measured the street network's connectivity for each of the four levels of traffic stress. Researchers then identified and tested intersection improvements that could increase the low-stress connectivity throughout the city.

- CROW (The National Information and Technology Centre for Transport and Infrastructure). (1994.) *Sign Up for the Bike: Design Manual for a Cycle-friendly Infrastructure.* Ede, The Netherlands: CROW.
- Geller, R. (c. 2007). *Four Types of Cyclists*. Portland, Oregon: City of Portland Office of Transportation.
- Mekuria, M.C., P.G. Furth., H. Nixon. (2012). *Low-Stress Bicycling and Network Connectivity.* San Jose, California: Mineta Transportation Institute.

### Built Environment Factors

As described in the introduction to this section, many variables in the built environment affect whether a street or intersection supports walking and bicycling. QOS methodologies measuring these built environment factors have been customized for specific urban contexts, notably San Francisco, California, Charlotte, North Carolina (as described above) and Fort Collins, Colorado. Similar methodologies could be developed for other local areas, relying on existing research, professional judgment and local knowledge. The papers cited below and under the introduction to this section provide a starting point for developing such a methodology.

- Dill, J., S. Handy, J. Pucher. (2013). How to Increase Bicycling for Daily Travel. A Research Brief. Princeton, NJ: Active Living Research, a National Program of the Robert Wood Johnson Foundation.
- Ewing, R., S. Handy, R. Brownson, O. Clemente, E. Winston. (2006). Identifying and Measuring Urban Design Qualities Relating to Walkability. *Journal of Physical Activity and Health, 3, Suppl 1*, S223-S240.

# CHARLOTTE BICYCLE AND PEDESTRIAN LOS

## Summary

The City of Charlotte, North Carolina, developed a methodology to assess bicyclist and pedestrian safety and comfort at intersections. Quality of service is calculated based on a point system, with points awarded for design and operational features that improve or worsen conditions for bicyclists or pedestrians. The sum of the points accumulated for each mode establishes the LOS, with LOS A receiving the highest points and LOS F receiving the lowest points.

For pedestrian LOS, key characteristics include crossing distance, signal phasing and timing, corner radius, right-turn on red, crosswalk treatment, and adjustment for one-way street crossings. For bicycle LOS, key characteristics include width of bicycle travel way, speed of adjacent traffic, signal features, right-turning vehicle conflicts, right-turn on red, and crossing distance.

## Reference

City of Charlotte, North Carolina. 2007. Appendix B of Urban Street Design Guidelines.

http://charmeck.org/city/charlotte/transportation/planprojects/pages/urban%20street%20design%20guidelines.aspx

## Advantages

- Medium level of data input required
- Focused on factors within the public right-of-way, which can be addressed through planning and engineering
- Intersection-level analysis allows straightforward comparison with auto LOS

## Disadvantages

- Does not address bicycle and pedestrian QOS between intersections

## Data Requirements

- Signal phasing
  - RTOR
  - Left-turn conflicts
  - Pedestrian phasing
  - Countdown timer
- Intersection measurements:
  - Crosswalk type
  - Crossing distances
  - Lane widths
  - Curb radii
  - Presence and width of bicycle lanes
- Motorized traffic speeds

# PEDESTRIAN/BICYCLE ENVIRONMENTAL QUALITY INDEX (PEQI & BEQI)

## Summary

The San Francisco Department of Public Health developed the Pedestrian Environmental Quality Index (PEQI) and Bicycle Environmental Quality Index (BEQI) to measure the effects of built environment factors on bicycle and pedestrian environmental quality, activity and safety.

The PEQI and BEQI evaluate QOS for pedestrians and bicyclists at the intersection and street segment levels. The intersection-level assessment looks only at safety features that aim to protect pedestrians and bicyclists from vehicle traffic, while the segment-level assessment looks at land use, traffic and design features as well as perceived safety from crime and safety measures to increase cyclist visibility.

## Reference

San Francisco Department of Public Health Program on Health, Equity and Sustainability. 2010.

*Bicycle Environmental Quality Index*.
http://www.sfhealthequity.org/component/jdownloads/viewcategory/19-beqi?Itemid=62

*Pedestrian Environmental Quality Index*.
http://www.sfhealthequity.org/component/jdownloads/viewcategory/20-peqi?Itemid=62

## Advantages

- Straightforward application: checklist and index
- Basic software requirements (Microsoft Access, ArcGIS) for network analysis

## Disadvantages

- Does not address street connectivity and presence of pedestrian attractors
- May not address all relevant design factors
- Not designed for use outside urban areas
- Requires extensive data inputs, many of which must be measured in the field

## Data Requirements

Substantial data requirements for:

- Intersection safety features (e.g. pedestrian crossing treatments, signal operations)
- Auto speeds and volumes
- Street design (e.g. sidewalks, bicycle facilities, landscaping signage)
- Land use (e.g. street-fronting retail, bicycle parking)
- Perception of safety (e.g. lighting, litter, abandoned buildings)

# HCM 2010 BICYCLE AND PEDESTRIAN LOS

## Summary

The 2010 Highway Capacity Manual (HCM 2010) provides detailed instructions on calculating QOS for bicycles and pedestrians on urban streets (at the link, segment and facility levels) and at signalized and 2-way stop intersections. QOS scores are based on pedestrian or cyclist perception of their travel experience, taking into account dedicated facilities, accommodation at intersections, and exposure to automobiles.

Note that early testing in Santa Clara and Los Angeles Counties has indicated that this methodology is not fully sensitive to all input changes; in some cases (e.g. road diets) it produces results that are inconsistent with expectations or typical professional judgment. Further information on VTA's evaluation of HCM 2010 methodology is available on request from VTA staff.

## Reference

National Research Council (U.S.). 2010. *HCM 2010: Highway Capacity Manual.* Washington, D.C: Transportation Research Board.

## Advantages

- Provides a comprehensive evaluation of bicycle and pedestrian QOS at different scales
- Focused on factors within the public right-of-way, which can be addressed through planning and engineering
- Letter scoring enables straightforward comparison to auto LOS

## Disadvantages

- Requires extensive data inputs
- Scores are heavily influenced by automobile volumes, which are difficult to mitigate in a planning or engineering context
- May not address all relevant design factors
- Can be insensitive to some input changes; some scenarios (e.g. road diets) produce inconsistent results

## Data Requirements

Substantial data requirements for:

- Street segment and intersection geometry
- Intersection operations
- Automobile traffic speed and volumes
- Locations of landscaping, parking and sidewalk obstructions

# LAYERED NETWORK APPROACH

## Summary

This approach, which is suitable for General Plan-level analysis, designates travel mode priority by street to create a complete streets network. Layered networks recognize that while all travel modes need to be accommodated within a community, no single street can accommodate all transportation users at all times.

The layered network concept envisions streets as systems, with each street type designed to create a high quality experience for its intended users. A layered network approach can also use context-sensitive land use and mode overlays to enhance additional transportation modes. This approach can also be integrated with methodologies that measure quality of service for bicyclists and pedestrians at the intersection and corridor level. Implementing this methodology may require a commitment to rethinking the transportation network of an entire city or plan area.

## Reference

Fehr & Peers, Rifkin Transportation Group and Nelson\Nygaard Consulting. 2010.

*LA Street Classification and Benchmarking System.* http://planning.lacity.org/PolicyInitiatives/Mobility%20and%20Transportation/LA%20Street%20Classification%20Final%20Report%20October%202010.pdf

## Advantages

- Helps mitigate the challenge of accommodating all users on every roadway
- Creates flexibility and options with multiple travel routes, accommodating different travel modes on different streets
- Allows network layout and roadway design for ideal bicycle or transit networks
- Works well with other QOS methodologies

## Disadvantages

- May require additional street connectivity and redundancy to create the multi-modal network
- Less effective if land uses do not support design of layered networks

## Data Requirements

Data requirements vary, depending on whether the approach includes QOS methodologies and on which methodologies are used.

# LEVEL OF TRAFFIC STRESS

## Summary

The Level of Traffic Stress (LTS) method evaluates bicycle QOS by measuring low-stress connectivity, defined as "the ability of a network to connect traveler' origins to their destinations without subjecting them to unacceptably stressful links."

Based on Dutch standards for bicycle facility design, the method classifies bicycle facilities on a scale from one to four. Better scores are assigned to facilities with low exposure to auto traffic and easy crossings at intersections, indicating low-stress environments which are attractive to many types of cyclists.

Level of traffic stress can be mapped onto an entire transportation network, producing stress maps and making it possible to evaluate how well an entire network serves bicyclists.

## Reference

Mekuria, M.C., Furth, P.G., Nixon, H. 2012.
Low-Stress Bicycling and Network Connectivity.
Mineta Transportation Institute, San José State University; San Jose, California.
http://transweb.sjsu.edu/project/1005.html

## Advantages

- Focuses on factors that government planners and engineers can control
- Most data are readily available in public records

## Disadvantages

- May require further adaptation to be used outside San José
- Stress mapping requires GIS extensions developed specifically for LTS evaluation
- Does not address pedestrian QOS

## Data Requirements

- Street geometry: width, number of lanes, bicycle lane widths, presence of parking and width of parking lanes
- Other data: intersection control type, functional street classification or average daily traffic, percent of time bicycle lane is blocked

# BUILT ENVIRONMENT FACTORS

## Summary

An inventory of each category of physical features translates to a facility's perceived quality of service based on the elements of the built environment. This QOS approach evaluates two levels of physical features: basic (key) elements and enhancement elements.

For example, when assessing the pedestrian experience, key features would include: travel and crossing lane widths and presence of sidewalks, crosswalks and pedestrian signals. Enhancement features would include: pedestrian refuges, curb extensions, landscape buffers and pedestrian-oriented lighting. A similar approach could be used to evaluate bicycle QOS. Use of this methodology should involve a rating system with weights assigned to key and enhancement features, which would then be translated into a QOS score for the facility.

To adapt this methodology for use in TIAs, the Lead Agency should identify sets of basic and enhanced features for bicycle and pedestrian facilities and consider adding a rating system, in consultation with VTA staff. The methodology should be documented in the TIA.

## Examples

Fort Collins, Colorado, *Pedestrian Plan,* 2011. Level of Service.
http://www.fcgov.com/transportationplanning/pedplan.php

Burien, Washington, *Transportation Master Plan, 2012.* Table 4, Pedestrian LOS Checklist.
http://www.burienwa.gov/index.aspx?NID=949

## Advantages

- Design and intervention-focused
- Straightforward measurement of variables
- Can readily be adapted to specific contexts

## Disadvantages

- Does not necessarily address presence of motor vehicles, which can have significant effect for bicycles and pedestrians
- Lead Agency must use discretion in determining relevant factors

## Data Requirements

Data requirements vary significantly based on what factors are considered. This method may require traffic volumes, posted speed limits, bicycle facility locations, transit system data, and measurements and inventory of streetscape amenities.

Most local governments do not collect detailed information about the built environment as it applies to pedestrians. Information on the presence and attributes of bicycle facilities are generally easier to obtain.

# APPENDIX H: Bicycle Parking Supply Recommendations

## (Table 10-3 of VTA *Bicycle Technical Guidelines)*

## Table 10-3
## Bicycle Parking Supply Recommendations

| Use | Required Number of Bicycle Spaces[1][2] |
|---|---|
| **Residential (such as apartments, condominiums & townhouses)** | |
| • General, multi-dwelling | 1 Class I per 3 units + 1 Class II per 15 units. |
| • Primarily for students & low-income families, multi-dwelling | 1 Class I per 2 units + 1 Class II per 15 units |
| • Primarily for residents 62 and older, multi-dwelling | 1 Class I per 30 units + 1 Class II per 30 units |
| **Schools** | 1 Class I per 30 employees[3] + 1 spot per 12 students (50% Class I and 50% Class II) |
| • Elementary, middle & high schools | |
| • Colleges - Student residences | 1 Class I per 4.5 beds + 1 Class I per 30 employees |
| • Academic buildings and other university facilities | 1 Class I per 30 employees + 1 spot per 9 student seats (25% Class I and 75% Class II) |
| **Park-and-Ride Lots/Parking Garages** | 7% of auto parking (75% Class I & 25% Class II) |
| **Transit Centers** | 2% of daily home-based boardings (75% Class I and 25% Class II) |
| **Cultural/Recreational** (includes libraries, theaters, museums, & religious institutions) | Class I per 30 employees + (Class II 1,500 sq. ft. or Class II per 60 seats (whichever is greater) |
| **Parks/Recreational Fields** | 1 Class I per 30 employees + Class II per 9 users During peak daylight times of peak season |
| **Retail Sales/Shopping Center/Financial Institutions/Supermarkets** | 1 Class I per 30 employees + Class II per 6,000 sq. ft. |
| **Office Buildings/Offices** | 1 per 6,000 sq. ft. (75% Class I & 25% Class II) |
| **Hotels/Motels/Bed-&-Breakfasts** | 1 Class I per 30 rooms + Class I per 30 employees |
| **Hospitals** | 1 Class I per 30 employees + 1 Class II per 45 beds |
| **Restaurants** | 1 Class I per 30 employees + 1 Class II per 3,000 sq. ft. |
| **Industrial** | 1 Class I per 30 employees or 1 Class I per 15,000 sq. ft. |
| **Day Care Facilities** | 1 Class I per 30 employees + 1 Class II per 75 children |
| **Auto-Oriented Services** | 1 Class I per 30 employees |
| **Other Uses** | Same as most similar use listed |

***Notes***

(1) For cities with less than 2% bicycle commuter rate. Cities with different bicycle commute rates should pro-rate these accordingly.

(2) The minimum number of required Class II Bicycle parking spaces is 4, except when the code would require 1 or less, in which case 2 bicycle spaces must be provided.

(3) Employees = maximum number of employees on duty at any one time.

*Source: League of American Bicyclists, 1994.*

# APPENDIX I: Board Memorandum: Update on Voluntary Contributions to Transportation Improvements (March 6, 2014)

6.18

SANTA CLARA
Valley Transportation Authority

Date: February 26, 2014
Current Meeting: March 6, 2014
Board Meeting: March 6, 2014

**BOARD MEMORANDUM**

**TO:** Santa Clara Valley Transportation Authority
Board of Directors

**THROUGH:** General Manager, Nuria I. Fernandez

**FROM:** Chief CMA Officer, John Ristow

**SUBJECT:** Update on Voluntary Contributions to Transportation Improvements

**FOR INFORMATION ONLY**

**BACKGROUND:**

Santa Clara County is projected to continue to add substantial population and jobs in the coming years, and travel demand for all freeway segments is projected to grow. Many development projects, especially those closest to freeway ramps, will likely have significant impacts on the already congested freeway segments. However, the ability to add freeway capacity is limited due to right of way, financial and environmental constraints, making traditional capacity increasing improvements no longer feasible. As a result, local agencies are increasingly turning to other approaches to mitigate impacts to freeways.

One approach taken by certain Member Agencies in Santa Clara County is to identify contributions to improvements of freeway, transit and other regional facilities as mitigation measures for significant freeway impacts resulting from proposed land development projects. Other Member Agencies are also recognizing the value and need of pursuing mitigation for freeway impacts even if the impacts are not fully mitigated, and some have had conversations with VTA on this topic.

**DISCUSSION:**

At the request of some Member Agencies, VTA developed a structure for a program of Voluntary Contributions to Transportation Improvements. This structure provides guidance for local agencies pursuing contributions and provides VTA staff a consistent approach to commenting on projects with significant transportation impacts. The structure is also designed for flexibility recognizing that different circumstances will present different opportunities to contribute. Local agencies can use this voluntary program structure in their "tool box" of measures to address freeway impacts as part of their project approval process. The proposed voluntary program includes the following process and responsibilities:

3331 North First Street · San Jose, CA 95134-1927 · Administration 408.321.5555 · Customer Service 408.321.2300

a. VTA, as the Congestion Management Agency, comments on projects with significant impacts on the Congestion Management Program (CMP) facilities, including freeways, County Expressways, CMP intersections, bicycle and pedestrian facilities, and the transit system;

b. The Member Agency (City or County) approving the project, in its role as the California Environmental Quality Act (CEQA) Lead Agency, could choose to request a voluntary contribution from the developer toward transportation improvements as a mitigation measure for impacts to freeways using one or more of the agreed upon formulas;

c. The local agency would subsequently condition the project to pay the determined voluntary contribution toward regional transportation projects, and may cite this contribution in their CEQA documentation;

d. VTA and the local jurisdiction would execute agreements that would provide for the transfer of funds to regional transportation projects.

Benefits for VTA and local jurisdictions:

- VTA can follow a consistent process to comment on development projects with significant impacts on CMP freeway facilities;
- VTA can collect funds for regional transportation improvements that are already planned or under development and would otherwise could take longer to implement;
- Member Agencies, in their role as CEQA Lead Agencies, may benefit from a streamlined and more predictable CEQA process, specifically related to freeway impacts;
- In some cases, the Lead Agency may not need to issue a Statement of Overriding Considerations for significant freeway impacts that are mitigated through this Program; In other cases, the Lead Agency may be able to present findings, including efforts to reduce impacts, when issuing the Statements of Overriding Considerations;
- The transportation projects that receive funding from voluntary contributions would improve overall mobility in Santa Clara County and thereby increase business competitiveness, economic vitality, and quality of life.

Voluntary Contribution Commitments to Date

As of January 2014, four projects in Santa Clara County, in the Cities of Cupertino and Sunnyvale, have included commitments to provide voluntary contributions to transportation improvements within CEQA documents (summarized in Table 1, below). These contributions will be executed by funding agreements between the City and VTA, triggered when the project applies for a building permit or other development agreements. Two additional projects in the City of San José include commitments to contribute to transportation improvements tied to the issuance of permits such as a Caltrans Encroachment Permit, building permit, or tract/parcel map.

In the City of Cupertino, the Draft Environmental Impact Report (DEIR) for Apple Campus 2 found significant impacts on I-280 and SR 85 and included a commitment of approximately $1.3 million to freeway and transit projects on these freeways and parallel corridors as mitigation. In the City of Sunnyvale, three projects, the NetApp Master Plan, Moffett Place and Moffett Gateway, found significant impacts on US 101 and SR 237 and identified contributions to Express Lanes projects on these facilities as mitigation. In the case of the Moffett Place project, the developer has applied for a building permit and the City has initiated a funding agreement to transfer the voluntary contributions to VTA to help fund the Express Lanes projects.

**Table 1: Summary of Projects Committing to Voluntary Contributions to VTA for Transportation Improvements**

| Lead Agency | Project | City Action / Date | Contribution Amount | Transportation Improvements Identified for Contributions |
|---|---|---|---|---|
| City of Cupertino | Apple Campus 2 | Certified DEIR - 10/15/2013 | $1,292,215 | SR 85 Express Lanes Project, improvements on SB I-280 between El Monte Rd. and Magdalena Ave., BRT stations, or an alternative improvement or study towards on the impacted I-280 corridor |
| City of Sunnyvale | NetApp Master Plan | Certified MND - 2/29/2012 | Not yet identified | US 101 Auxiliary Lanes, US 101 Express Lanes Project, SR 237 Express Lanes Project Phase II |
| City of Sunnyvale | Moffett Place | Certified DEIR, - 12/3/2-13, Issued building permit and initiated agreement with VTA - Dec. 2013 | $577,062 | US 101 Express Lanes Project, SR 237 Express Lanes Project Phase II |
| City of Sunnyvale | Moffett Gateway | Certified MND - 8/26/2013 | $1,162,042 | US 101 Express Lanes Project, SR 237 Express Lanes Project Phase II |
| City of San José | America Center (Legacy Partners) | Approved March 2000, Contribution tied to Caltrans Encroachment Permit | $1,000,000 | SR 237 corridor improvements |
| City of San José | Valley Fair Expansion | Approved April 2007, Contribution tied to Tract/Parcel Map or Building Permit | $2,500,000 | I-800/Stevens Creek Boulevard Interchange Project |

Notes:
DEIR - Draft Environmental Impact Report
MND - Mitigated Negative Declaration

Outreach Summary and Committee Comments

Staff previously brought an item on voluntary contributions to the March 2013 of the Technical Advisory Committee (TAC) and brought a follow-up item to the August 2013 meetings of the TAC, Citizens Advisory Committee (CAC) and Policy Advisory Committee (PAC), and the September 2013 meeting of the Board of Directors as an information item. Staff also presented the item to the Systems Operations and Management (SOM) Working Group and the Land Use /Transportation Integration (LUTI) Working Group, two of TAC's working groups.

There was general concurrence from all groups that a structure for voluntary contributions could offer a useful tool for jurisdictions to consider when reviewing development projects. VTA can provide a suite of common methodologies or approaches to estimating voluntary contributions that all jurisdictions can use, cautioning that flexibility should be retained to allow jurisdictions to respond as effectively as possible to individual projects. The TAC asked VTA to proceed with more detailed development of a concept Voluntary Contribution Program for consideration by the Board of Directors. By request, VTA also brought a follow-up item to the October 2013 meeting of the SOM Working Group providing examples of potential contribution formulas for city staff to consider when conditioning a project to provide contributions.

There was general concurrence from all groups that a structure for voluntary contributions could offer a useful tool for jurisdictions to consider when reviewing development projects. VTA can provide a suite of common methodologies or approaches to estimating voluntary contributions that all jurisdictions can use, cautioning that flexibility should be retained to allow jurisdictions to respond as effectively as possible to individual projects. The TAC asked VTA to proceed with more detailed development of a concept Voluntary Contribution Program for consideration by the Board of Directors. By request, VTA also brought a follow-up item to the October 2013 meeting of the SOM Working Group providing examples of potential contribution formulas for city staff to consider when conditioning a project to provide contributions.

Next Steps

VTA and City of Sunnyvale staff are working on finalizing the funding agreement for the voluntary contributions to Express Lanes projects included in Moffett Place project approval. Once the funding agreement is finalized, it will be brought before the Board of Directors as an Action Item for approval.

Voluntary contributions from the other projects listen in Table 1, as well as future projects that commit to contributions, will be executed by funding agreements between the Lead Agency and VTA and will be brought to the Board of Directors for approval.

**ADVISORY COMMITTEE DISCUSSION/RECOMMENDATION:**

This item was on the Regular Agenda at the February 2014 Citizens Advisory Committee (CAC), Technical Advisory Committee (TAC), and Policy Advisory Committee (PAC).

CAC Chairperson Hadaya asked how contribution amounts are determined and staff responded that they are determined by agreement between the City and the project applicant. He further

asked if the contributions are part of a City's Transportation Impact Fee program and staff responded that the contributions are separate from that program. Committee member Blaylock asked if this would supersede other approaches to transportation demand management and staff responded that the approaches could be used in tandem. Member Powers and Vice Chair Wadler asked why the program is voluntary and staff responded that it will continue to be a voluntary program unless staff is directed by the Board to adopt a mandatory program, such as a Countywide Traffic Impact Fee program. Member Rogers asked if County Expressways are included and staff responded that the County has separately been collecting contributions for Expressway improvements.

At TAC, staff gave a brief presentation. Member Salvano noted that the City of San Jose conditioned the Valley Faire Mall Expansion project to contribute $2.5 million to the I-880/Stevens Creek interchange and should be added to the list of projects. He also suggested a wording change to the America Center project. Committee member Saleh asked if there are any guidelines on calculating the contribution amount and staff responded that staff works with Cities to suggest contribution formulas but it is ultimately the City's decision which formula to use. Committee member Salvano asked about the time limit on the use of contributions. Committee member Batra commented that the time limit applies to the programming of funds and committee member Borden commented that the time limit does not apply when the contribution is part of a development agreement.

At PAC, staff gave a brief presentation. Member Jensen asked how a nexus is established between the contributions and the impacts and staff responded that the project's transportation analysis would establish the nexus by analyzing the impacts and their locations. Vice Chairperson Carr asked if there are transportation projects in every part of the County that developments could contribute to, and staff responded that in some cases there may not be an appropriate project for contributions. Committee member Abe-Koga asked if the purpose of the contribution is to fund a transportation improvement that would mitigate the level of service impact back to "less than significant" and staff responded that operational and efficiency improvements are acceptable even if they do not mitigate all the way to "less than significant." Member Allan asked staff to explain how contribution amounts are determined. Vice Chairperson Carr asked if the contributions would fully fund the transportation improvements and staff responded that the contributions would go towards project development and VTA would need to leverage other funds. He also asked if VTA would oppose an EIR if a project has significant impacts on the freeway. Staff responded that there is no action as "oppose" in the CEQA process. VTA's role is to comment on the transportation impacts and will continue to do so consistently. Committee members Kniss, Miller, Davis and Jensen questioned the use of the term "voluntary" and suggested changing the name of the program. Some of the members stated that if a City requires a contribution, it is not voluntary. Staff agreed and explained that the word "voluntary" distinguishes it from a mandatory regional impact fee program, as in some other Counties.

**STANDING COMMITTEE DISCUSSION/RECOMMENDATION:**

This item was on the Regular Agenda at the February 2014 Congestion Management Program & Planning Committee (CMPP). Staff gave a brief presentation, followed by questions from the committee. Committee Chairperson Pirzynski brought the committee's attention to the

comments made at the PAC meeting. He asked staff to explain how the program is voluntary when it is implemented through enforceable documents such as development agreements and Environmental Impact Reports. Staff responded that the program is voluntary on the part of the Cities because it is not part of a mandatory regional impact fee. Member Whittum expressed support for VTA's comments on development projects. He stated that the voluntary contribution doesn't necessarily have to be a CEQA mitigation, it could just be a condition for approval. Chairperson Pirzynski stated that the Silicon Valley continues to be a magnet for jobs and this could be a valuable tool to mitigate traffic impacts on the freeway system. Vice Chairperson Herrera stated that certainty in the development process is the key and this program is a "good carrot". She asked staff to confirm that contribution from the City of San Jose's Valley Fair Mall Expansion project would be added to the list of projects. She asked how this program relates to the Cities' own Traffic Impact Fees (TIF). Staff responded that Cities' own TIF programs don't include freeway improvements so this one would be in addition to the individual TIF programs. Committee Members had a discussion on how the contribution is calculated. Staff explained that VTA could provide some examples on how to calculate the contribution based on a percentage impact on specific freeway segments, but ultimately it is the City Council's decision to determine the amount through negotiation with the developer. Chairperson Pirzynski requested that staff continue to update the committee as future projects come forward with contributions. Member Whittum asked which Cities don't have TIF programs and staff responded that staff would provide the information separately. He also suggested VTA may facilitate a nexus study for several small Cities that don't have sufficient resource to conduct one.

Prepared By: Robert Cunningham
Memo No. 4473

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# APPENDIX J: CMP Multimodal Improvement Plan

## Action List

**Table 4-1**
**Deficiency Plan Action List**

**A. BICYCLE AND PEDESTRIAN MEASURES**

A1. Improved Roadway Bicycle Facilities and Bike Paths
A2. Transit and Bicycle Integration
A3. Bicycle Lockers and Racks at Park and Ride Lots
A4. Bicycle Facilities and Showers at Developments
A5. Improved Pedestrian Facilities
A6. Pedestrian Signals
A7. Lighting for Pedestrian Safety

**B. TRANSIT**

B1. Improvement of Bus, Rail, and Ferry Transit Service
B2. Expansion of Rail Transit Service
B3. Expansion of Ferry Services
B4. Preferential Treatment for Buses and In-Street Light Rail Vehicle (LRVs)
B5. Transit Information and Promotion
B6. Transit Pricing Strategies to Encourage Ridership and Reduce Transit Vehicle Crowding
B7. Transit Fare Subsidy Programs
B8. Transit Centers
B9. Improved and Expanded Timed Transfer Programs
B10. Improved and Expanded Fare Coordination
B11. Signal Preemption by Transit Vehicles
B12. Bus Stop Bulbs
B13. School Bus Transit Service

**C. CARPOOLING, BUSPOOLING, VANPOOLING, TAXIPOOLING, JITNEYS, CASUAL CARPOOLING AND OTHER SHARED RIDES (Ridesharing)**

C1. Preferential Treatment for Shared Ride Vehicles
C2. Increased Use of Commuter/Employer Services

**D. HIGH OCCUPANCY VEHICLE (HOV) FACILITIES**

D1. Preferential Treatment for HOVs
D2. Bus and Carpool/Buspool/Vanpool/Taxipool Priority Lanes on Local Arterials
D3. Accelerated Implementation of the 2005 HOV Master Plan
D4. HOV to HOV Facilities
D5. Direct HOV Lane Entrance/Exit Ramps to Arterials and Space Generators

**E. OTHER TCMs, RELATED MEASURES**

E1. Stricter Travel Demand Management/Trip Reduction Ordinance
E2. Expanded Public Education Programs
E3. Child Care Facilities at or close to Employment Sites, Transit Centers and Park and Ride Lots
E4. Retail Services at or close to Employment Sites, Transit Centers and Park and Ride Lots
E5. Telecommuting Centers and Work-at-Home Programs
E6. Parking Management

**F. TRAFFIC FLOW IMPROVEMENTS**

F1. Preferential Treatment of HOVs (See measures B4 and C1)
F2. Ramp Metering
F3. Auxiliary Lanes
F4. Signalization Improvements
F5. Computerized Traffic and Transit Control/Management on Arterials
F6. Turn Lanes at Intersections
F7. Turn Restrictions at intersections
F8. Reversible Lanes
F9. One-Way Streets
F10. Targeted Traffic Enforcement Programs
F11. Restrictions on Curb Side Deliveries and On-Street Parking

Source: Table 4-1, Santa Clara Valley Transportation Authority, *Deficiency Plan Requirements*, 2010. For more information, refer to Appendix C in the above document.

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# APPENDIX K: TIA Preparation Checklist

# TIA Preparation Checklist

This checklist is intended to provide a concise summary of the key items a Lead Agency must consider when preparing a TIA Report for CMP purposes. It is designed to serve as an aid to assist agency staff and consultants. However, it is not intended to replace the *TIA Guidelines* themselves, and does not provide the same level of detail or cover every required topic. Lead Agencies should still consult the main *TIA Guidelines* document to ensure that all requirements are being addressed.

**TIA Scoping, Notification and Preparation**

☐ 1) Determine if a TIA is required for CMP purposes (project generates > 100 net new trips without applying trip reductions), ***Section 2.1***;

☐ 2) Determine whether the project falls into any of the Special Project Types identified in the *TIA Guidelines* (Large or Unique Projects; Projects on a Jurisdiction Border; Multi-Agency Projects; Projects Generating Large Numbers of Pedestrian, Bicycle or Transit Trips; or Large Projects, General Plans or Areawide Plans where a more extensive transit delay analysis may be appropriate); If the project falls into any of these Types, refer to ***Chapter 12*** for more guidance;

☐ 3) Notify all appropriate jurisdictions that a TIA is being prepared using the TIA Notification Form, see ***Section 3.1*** and ***Appendix B***;

☐ 4) Provide guidance to TIA preparer/consultant on TIA study scope, considering both Lead Agency direction and other agency input from the TIA Notification process. This guidance will include:
- Determination of roadway facilities that should be included in analysis, ***Section 2.2***;
- Determination of other transportation issues to address, ***Section 2.3***;
- Identification of the appropriate study scenarios, See ***Chapter 4, Recommended TIA Table of Contents***, and ***Chapter 11, Future Year Scenarios (Cumulative Conditions)***;

☐ 5) Prepare and submit a draft TIA Report to VTA and other agencies within the time frame outlined in ***Section 3.1***, Item 2;

☐ 6) Address comments received on the draft TIA Report, ***Section 3.1***, Item 4;

☐ 7) Send adopted conditions for approved projects that relate to the CMP Transportation System and the promotion of alternative transportation modes to VTA, ***Section 3.1***, Item 5 *(Encouraged)*.

**Project Description, Study Area and Existing Conditions**

☐ 8) Provide a description of the project and the transportation context surrounding it. Topics covered should include: Location of Proposed Project; Proposed Land Use and Project Size; and Site Plan, ***See Chapter 4, Recommended TIA Table of Contents***;

☐ 9) Provide information about the existing Project Area roadway system, ***Section 6.2***;

☐ 10) Use a table similar to ***Table A-1: Freeway Analysis Requirement Determination*** to assess whether freeway segment analysis is required; ***Section 5.2.8*** and ***Appendix A***;

☐ 11) Provide a description and map of the existing Project Area transit system, ***Section 6.3***;

☐ 12) Provide a description and map of the existing Project Area bicycle system, ***Section 6.4***;

☐ 13) Provide a description and map of the existing Project Area pedestrian system, ***Section 6.4***;

☐ 14) When applicable, provide information on Transportation Demand Management (TDM) or unique transportation or land use plans affecting the Project Area, ***Section 6.4***;

**Trip Generations and Trip Reductions**

☐ 15) Clearly identify the source of each trip generation rate used in the transportation analysis; Include in the TIA Report a full description of the trip generation methodology used and a summary of all inputs and assumptions, ***Section 8.1***;

☐ 16) Consider all available options to reduce project-generated automobile trips, including mixed-use development, a strong TDM program, project location, parking management, and development near frequent transit service. Clearly explain, document and justify all auto trip reductions claimed in the TIA Report; this includes stating which trip reduction approach (Standard, Peer/Study-Based, and/or Target-Based) is being used, ***Section 8.2***;

☐ 17) Provide a trip generation rate summary table, ***Section 8.1.2***; This table should show:
- Quantification (e.g. square feet, number of units, etc.) of trip generation for each land use type;
- Trip generation rates used;
- Resulting trips generated;
- If applicable, any trip reductions;

☐ 18) If the project is using parking management measures as part of its overall TDM/trip reduction strategy, document this in the TIA Report and note it in the Auto Trip Reduction Statement, ***Section 8.2.1.5*** and ***Appendix C***;

☐ 19) For all projects, summarize trip generation and any trip reductions, if applicable, in an Auto Trip Reduction Statement in the Executive Summary of the TIA Report, using the form provided in ***Appendix C***;

**Trip Distribution and Assignment**

☐ 20) Provide trip distribution percentages on an area map with transportation facilities and the project site, ***Section 8.3***;

☐ 21) Provide clear explanation with justification and documentation of pass-by and diverted trip reductions, ***Sections 8.3.1, 8.3.2*** and ***8.3.3***;

☐ 22) Provide trip assignments on a figure showing project trips at study intersections, ***Section 8.3***;

**Project Conditions**

☐ 23) Provide a Traffic Analysis of the "without project" scenario(s) (Existing, Background or Cumulative, as applicable); This analysis shall include, but not be limited to evaluation of Auto Level of Service and queuing impacts, ***Section 9.1***;

☐ 24) Provide a Traffic Analysis of Project Conditions compared to the "without project" scenarios(s) (Existing, Background or Cumulative, as applicable); This analysis shall include, but not be limited to evaluation of Auto Level of Service and queuing impacts, ***Section 9.1***;

☐ 25) Provide an analysis of project effects on the transit system; The evaluation shall consider transit vehicle delay, transit access and facilities, ***Section 9.2***;

☐ 26) Provide an analysis of bicycle and pedestrian modes under project conditions; This analysis shall address project effects on existing bicyclists and pedestrians as well as the effects and benefits of site development and associated roadway improvements on bicycle/pedestrian infrastructure, circulation, Quality of Service (QOS), and conformance to existing plans and policies, ***Section 9.3***;

☐ 27) Provide an analysis of site circulation and access, ***Section 9.4***;

**Mitigation Measures and Multimodal Improvements**

☐ 28) Discuss mitigation measures to address project impacts per CMP standards, and improvements to address other project-related effects on the transportation system; The discussion of mitigation measures and improvements shall take into account all the issues noted in ***Chapter 10*** of the *TIA Guidelines*, including consideration of all categories of mitigation measures and improvements (physical or capacity-enhancing improvements, operational and/or efficiency improvements, and projects and programs used to reduce project auto trip generation), identification of the feasibility of proposed measures, who is responsible for implementing each measure, when the measure will be implemented, and the cost of implementation, as appropriate;

☐ 29) If a project causes a transportation impact that cannot be mitigated to the CMP Auto Level of Service (LOS) standard, a Multimodal Improvement Plan must be provided along with the TIA, or the project applicant must agree in advance to participate in the implementation of a Multimodal Improvement Plan after project approval, ***Section 10.1***, Item 5;

☐ 30) If a project impacts a CMP System facility that has a Multimodal Improvement Plan, it is subject to the conditions of the Plan; The project's TIA Report shall identify what role the project will play in implementing the

Multimodal Improvement Plan Actions, ***Section 10.1***, Item 6;

☐ 31) Mitigation measures for Auto Level of Service (LOS) shall not unreasonably degrade bicycle, pedestrian or transit access, and circulation. If a project proposes mitigation for Auto LOS involving changes to roadway segment or intersection geometry, or changes to signal operations, the TIA shall analyze and disclose whether the mitigation would affect pedestrian or bicycle conditions or increase transit vehicle delay, ***Section 10.1***, Item 7;

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# APPENDIX L: Glossary of Terms

The following are definitions for terms used in the *TIA Guidelines*:

**Approved Project**: A specific project for which an entitlement to build has been granted.

**Auto Level of Service:** Auto Level of Service (LOS) describes the operations of roadway segments or intersections in terms of vehicle speed, volume and capacity, freedom of movement, traffic delay, comfort, convenience and safety. Auto LOS measurements are given by letter designations, from A (least congested) to F (most congested). Procedures to analyze Auto LOS are defined in the VTA Traffic LOS Analysis Guidelines. Auto LOS evaluates operations for all common motor vehicle types, including automobiles, light and heavy trucks, and motorcycles. In addition, although congestion also affects transit vehicles operating in general purpose lanes, transit operations are affected by additional factors and are typically evaluated separately from Auto LOS.

**Background Conditions:** The analysis scenario including Existing Conditions and approved projects.

**Carpooling:** Commuting in a privately-owned vehicle with at least two passengers. Carpooling can be arranged informally or with employer assistance.

**CDT Program:** VTA's Community Design & Transportation Program to integrate transportation and land us planning. The Program includes the Cores, Corridors and Station Areas framework, which shows VTA and local jurisdiction priorities for supporting concentrated development in the County.

**CEQA:** California Environmental Quality Act. This act requires that Lead Agencies disclose and evaluate the significant environmental impacts of proposed projects and adopt all feasible mitigation measures to reduce or eliminate those impacts. Although there is some overlap in the analysis of transportation impacts under CEQA and the CMP, it is not intended that TIAs following the VTA CMP *TIA Guidelines* will provide all information required for CEQA purposes.

**Changes to Roadway Segment or Intersection Geometry:** Changes to the geometry of existing roadway segments or intersections, including, but not limited to, adding travel lanes on roadway segments, adding turn lanes at intersections, and changing pedestrian and/or bicycle crossing distance.

**Changes to Signal Operations:** Substantive changes to traffic signal operations, including, but not limited to, changes to phasing or cycle length.

**CMA: Congestion Management Agency:** The CMA is a countywide organization responsible for preparing and implementing the county's Congestion Management Program. In Santa Clara County, VTA is the designated CMA.

**CMP: Congestion Management Program:** A comprehensive program designed to reduce traffic congestion, to enhance the effectiveness of land use decisions, and to improve air quality. Unless otherwise specified, CMP means Santa Clara County's Congestion Management Program.

**Cumulative Conditions:** The analysis scenario including Background Conditions (Existing Conditions plus Approved Projects) and expected growth, plus the project.

**Deficiency Plan:** See *Multimodal Improvement Plan*.

**Diverted Linked Trip**: Trips generated by the proposed project that would be attracted from roadways in the vicinity of a proposed project site. This type of trip requires a diversion from one roadway to another to gain access to the site.

**Effect:** Used to refer to project-related effects on elements of the transportation system for which no CMP standard or impact threshold has been established. Distinct from "impact," which refers to project effects on the CMP system as determined by the standards and impact thresholds established by VTA. The TIA should particularly focus on project-related effects that tend to degrade pedestrian, bicycle and transit conditions.

**Existing Conditions:** Roadway, transit, bicycle and pedestrian conditions at the time that the Lead Agency issues the TIA Notification Form.

**Express Lanes:** Express Lanes are HOV (high-occupancy vehicle) lanes which solo drivers can access by paying a toll. Tolls vary by congestion levels to keep the lanes operating at a minimum of 45 mph. In other areas outside Santa Clara County, Express Lanes may be called high-occupancy toll (HOT) or managed lanes.

**Facility:** A part of the transportation network, such as a roadway, intersection, bicycle lane, sidewalk or transit station. The word "facility" is used generally in this document to refer to CMP System roadway facilities, which include CMP intersections, freeways, and rural highways. CMP facilities also include the CMP Transit Network and the CMP Bicycle Network, but these are generally called out specifically in the text.

**Financial Incentives:** Transportation Demand Management (TDM) programs sometimes offer financial incentives to participants who choose to commute by carpooling, vanpooling, transit, bicycling or walking. Incentives can include: transportation allowances; parking cash-out; pre-tax commuter benefits; and subsidies such as free transit passes or transit fare incentives.

**General Planning Efforts**: General planning efforts are planning studies that are designed to provide basic guidelines for land uses, the transportation system, and design characteristics in a relatively large area. The key element of this definition is that these types of planning efforts do not confer, as a right, the ability to develop a specific project.

**HCM:** Highway Capacity Manual. A manual published by the Transportation Research Board (TRB) that contains concepts, guidelines, and equations to calculate the level of service on highways and intersections. In 2010 the manual was updated to include new level of service/quality of service measures for transit, pedestrians, and bicycles.

**HOV:** High Occupancy Vehicle Lane. A lane on a street or highway reserved for the use of high occupancy vehicles either all day or during specified periods (for example, during rush hours). Buses, carpools, and/or vanpools are allowed to use HOV lanes.

**ITE:** The Institute of Transportation Engineers is a professional organization that publishes technical guidelines for transportation engineering. ITE *Trip Generation* is a standard reference for estimating trips based on the type and size of proposed development.

**Impact:** Used to refer to project effects on the CMP system as determined by the standards and impact thresholds established by VTA. Distinct from "effect," which refers to project-related effects on elements of the transportation system for which no CMP standard or impact threshold has been established.

**Improvement:** A change that addresses the effects, particularly negative effects, of a development project on elements of the transportation system for which no CMP standard or impact threshold has been established.

**Lead Agency:** The agency responsible for preparing the Transportation Impact Analysis report.

**Level of Service (LOS):** This is a measure used by transportation professionals to grade performance of transportation facilities. LOS is graded on a scale of A (the best performance) to F (the worst performance).

**Long-Term Development Project**: A specific development project expected to be completed beyond five years from the date of approval. Most long-term development projects will also be phased-development projects.

**Member Agency:** A local jurisdiction that is a signatory of the CMA's Joint Powers Agreement. This includes all cities within the county, Santa Clara County, and the Santa Clara Valley Transportation Authority.

**Mitigation:** A change that addresses the impacts of a development project on elements of the transportation system for which a CMP standard or impact threshold has been established.

**Mixed-Use Development**: A project that combines one or more land uses. Depending on the land uses, the vehicle trips generated by the development may be fewer than if the uses were developed separately.

**Mode Split:** The share of all trips to and from a project site taken by each of the four major transportation modes (automobile, transit, bicycle and pedestrian).

**Multimodal Improvement Plan:** VTA terminology for "Deficiency Plan" as defined by CMA statute. Multimodal Improvement Plans are plans to identify offsetting measures to improve transportation conditions on CMP facilities in lieu of making physical traffic capacity improvements such as widening an intersection or roadway.

**Near-Term Development Project**: A near-term development project will be built and occupied within five years of project approval. Most near-term development projects will also be specific development projects.

**Net New Peak Hour Trip:** Proposed project trips which are not associated with an existing development on the site and not included in an approved project.

**Parking Management Program:** Parking policies that are designed to make the most efficient use of parking supply, and encourage alternatives to driving alone, such as parking charges, parking cash out, shared parking, or preferential parking for carpool or vanpool vehicles.

**Pass-By Trips**: Trips generated by the proposed project that would be attracted from traffic passing the proposed project site on an adjacent street that contains direct access to the generator.

**PDA:** Priority Development Area. These locations were identified for concentrated development as part of Plan Bay Area, the Metropolitan Transportation Commission's 2040 Regional Transportation Plan for the nine-county Bay Area.

**Peak Hour:** The highest morning or evening hour of travel reported on a transportation network or street.

**Peer/Study-Based Reduction:** Automobile trip reduction approach that may be used when studies of similar projects, or of other sites occupied by the project applicant, have demonstrated comparable trip reductions through survey results or other data.

**Phased-Development Project**: A project that will be completed in separate pieces over a period of time.

**Pre-Tax Commuter Benefit:** Federal tax code allows the use of tax-free dollars to pay for transit commuting and parking costs. The monthly benefit amount varies from year to year based on adopted legislation.

**Project Conditions:** A study scenario evaluating the addition of the project, along with estimated project generated trips, to the "without project" scenario (Existing, Background, or Cumulative Conditions, as appropriate).

**Quality of Service (QOS):** A metric used to evaluate how well a transportation facility serves its users. Several different QOS methodologies are currently used by transportation professionals, often with a focus on bicyclists, pedestrians or transit passengers.

**Queuing:** Formation of a line of vehicles at an intersection or driveway, when vehicle arrival rates are higher than departure rates.

**Specific Development Project**: A project that, when approved, grants an entitlement for construction of a particular size and type.

**Target-Based Reduction:** Automobile trip reduction approach that may be used when the project applicant has entered into an enforceable agreement with the Lead Agency that limits the number of automobile trips traveling to and from the project site.

**TDM:** Transportation Demand Management. This is a term used to describe policies and programs to reduce the number of cars on the road. Examples of transportation demand management include flextime, ridesharing, telecommuting, and financial incentives.

**Transit Fare Incentives:** Transit fare incentives are financial incentives offered to reduce drive-alone commuter trips, such as free transit passes or pre-paid fares.

**Transportation Demand Forecasting Model**: An analytical tool that predicts travel patterns based upon the spatial relationship between various types of land uses and connecting transportation facilities (e.g., roadways and transit).

**Trip Assignment:** The trip assignment step of a TIA consists of assigning trips to specific transportation facilities on the basis of the trip distribution percentages.

**Trip Distribution:** The trip distribution step of a TIA consists of forecasting the travel direction of project-generated trips to and from the project site.

**Trip Generation:** Trip generation predicts the total number of trips to and from a project site.

**Trip Reduction:** Similar to but broader than TDM, trip reduction refers to any effort to reduce the number of automobile trips generated by a development project. The VTA *TIA Guidelines* provide guidance on several approaches that encourage and document reductions in automobile trips generated by new development projects compared to standard automobile-trip rates.

**Trip Threshold:** A complete TIA for CMP Purposes shall be performed for any project in Santa Clara County expected to generate 100 or more net new weekday (AM or PM peak hour) or weekend peak hour trips, including both inbound and outbound trips.

**Vanpooling:** Commuting in a seven- to 15-passenger van, with driving undertaken by commuters. The riders usually pay for some portion of the van's ownership and operating cost. The van may be privately owned, employer-sponsored or provided through a private company that leases vehicles.