MEMORANDUM - CITY OF PASADENA
DEPARTMENT of TRANSPORTATION

DATE: June 12, 2014

TO: Transportation Advisory Commission

FROM: Frederick C. Dock, Director of Transportation

RE: NEW TRANSPORTATION PERFORMANCE MEASURES FOR TRANSPORTATION IMPACT ANALYSIS AND THRESHOLDS FOR CEQA

RECOMMENDATION:

It is recommended that the Transportation Advisory Commission provide comments to the City Council on the Transportation Performance Measures and Thresholds for CEQA.

BACKGROUND:

At the May 22, 2014 Transportation Advisory Commission meeting staff presented an overview of the purpose and need for the development of new mobility measures. At that meeting the Commission reviewed the proposed measures and how they would be applied to the analysis of the General Plan Land Use and Mobility Element Updates. This memo responds to Transportation Advisory Commission comments from their previous meetings and detail how staff is proposing to apply the proposed performance measures along with proposed thresholds for CEQA to the analysis of mobility impacts associated with land use changes at the project level.

This memo describes seven proposed transportation performance measures that collectively assess the quality of walking, biking, transit, and vehicular travel in the City of Pasadena. The proposed update of the City's performance metrics and thresholds addresses the new LOS policy in transportation studies, and defines how to analyze the quality of bicycle, pedestrian, and transit facilities and services. To better align transportation system and network analysis with community values as expressed in the general plan, the performance measures and methods presented in this memorandum are recommended for use in transportation analysis.

Overview of CEQA Approach to the Transportation Analysis

The following discussion provides a summary of CEQA-recommended practices related to transportation impact analysis as well as specific details related to performing this type of analysis for development projects such as specific plans. To start this discussion, the lead agency needs to have a clear philosophy about what constitutes an adequate level of analysis. Agency interpretations of CEQA requirements differ, so we

reflect on the statutes, guidelines, and case law to provide a recommended approach that achieves the following primary objectives:

- Accurately describe transportation conditions for the baseline, project, and cumulative conditions.
- Comply with regulatory guidelines and state-of-the-practice techniques when preparing technical analysis.
- Disclose limitations of the data, analysis methodology, and models used in the impact and mitigation analysis.
- Address competing objectives between travel modes (and other community objectives) when recommending mitigation.
- Include sufficient information to allow for general plan consistency to be evaluated.

While the CEQA guidelines in particular are clear about the general expectations for environmental analysis as noted below, they are silent about what data, analysis methods, models, and mitigation approaches are adequate for transportation impacts.

Policy Considerations

Pasadena currently employs a combination of vehicular performance measures and emerging multimodal measures for evaluating system performance and in reviewing the impacts of new development.

However, CEQA significance thresholds are only identified for the vehicular measures. Intersection vehicular volume-to-capacity (V/C) ratios and auto Level of Service (LOS) are the primary measures used in project level mitigation recommendations. The city also uses a vehicular volume-based analysis of change in traffic on street segments to assess impacts. Both methods result in recommended mitigations that have potential to conflict with other General Plan objectives and the intersection analysis method (ICU) is no longer considered state of the practice for LOS analysis.

The current significance thresholds are silent with regard to system performance of non-auto modes and tend to generate mitigation solutions that encourage widening of intersections and streets, which may compromise the performance of non-auto modes and are increasingly contrary to community values.

Transportation staff, understanding that the revised goals and objectives of the General Plan are not in accordance with the performance measures being used to evaluate development projects, has invested time to explore new methodologies and tools to better measure and manage multi-modal networks. In addition, the department has built sophisticated models, such as a Travel Demand Forecasting model and a DTA model, to better estimate vehicle miles of travel (VMT), travel times over typical routes, speed suitability by street type, and tools with the ability to forecast traffic at the intersection level. Each of these approaches is more consistent with General Plan goals and objectives than the current ICU and V/C methods. Moreover, the 2010 *Highway*

Capacity Manual is widely accepted as standard practice for analyzing auto LOS, and consistency with these methods is recommended.

In addition, emerging methodologies that evaluate quality of service for active transportation modes, such as the Pedestrian Environmental Quality Index (PEQI), the Bicycle Environmental Quality index (BEQI) and Multi-Modal LOS (MMLOS) have been developed by various jurisdictions across the USA, and Pasadena Department of Transportation has studied and used them over the past year. Unlike the vehicular LOS methods, none of the emerging MMLOS approaches has proven effective enough to achieve this status among practitioners.

As part of the General Plan update transportation staff is proposing that the City Council adopt a new set of transportation performance measures and thresholds that help meet its objectives for transportation and mobility. With the expanded emphasis on sustainability and a continued focus on livability, the newly adopted performance measures will have the ability to assist in determining how to balance trade-offs among travel modes and among the mobility needs of different members of the community.

Traffic impact studies must serve the dual purpose of General Plan consistency and compliance with CEQA; therefore, consistent performance measures and thresholds of significance must be established. Thus, any inconsistencies in performance measures and thresholds of significance between the General Plan and the development review analysis would be resolved. Both the General Plan and the traffic study guidelines should identify the desired resolution between conflicting modal impact analysis findings. A context sensitive approach to resolution of conflicts is recommended, along with explicit guidance for modal priority, and a policy-based exemption framework. The City's street typologies and/or land use planning areas could inform a context sensitive approach. Having consistent performance measure promotes a defensible and harmonious framework for the transportation analysis the City will undertake in the future; first in the General Plan EIR, and then in the development review process.

The changes recommended here are not monumental, but instead they seek to effectively and efficiently align the revised mobility policies to the transportation performance measures and thresholds of significance used to serve everyone using Pasadena's transportation system.

New Transportation Performance Measures

A key challenge facing the City is the current set of Performance Measure and Metrics, used in the 2004 General Plan and the Transportation Impact Review Current Practice and Guidelines, place a considerable emphasis on the automobile operations. If these measures continue to be used in their current form, it would present a conflict with the proposed Mobility Element objectives.

Pasadena is currently using a conventional set of performance measures for evaluating system performance and in reviewing the impacts of new development. Intersection

volume to capacity ratios and Level of Service (LOS) are the primary measures. The city also uses a volume-based analysis of change in traffic on street segments to assess impact. The 1994 General Plan update went as far as to include a measure of the environmental capacity of residential streets, essentially an estimate of the level of traffic volume that would be acceptable on residential streets as opposed to the operational capacity. This measure was replaced in the 2004 update by the street segment analysis. A explanation of why Street Segment Analysis is not recommended by staff to be continued as a transportation performance measure is included later in this report.

When looked at in the above context, the current measures are silent with regard to system performance of non-auto modes and tend to generate mitigation solutions that encourage widening of intersections and streets, which may compromise the performance of non-auto modes and are increasingly contrary to community values. Consequently, a more robust set of measures has been developed that decreases the emphasis on additional vehicle capacity and on reducing individual intersection delay in favor of increasing the emphasis on the "efficiency" of travel by analyzing the per capita length and number of trips associated with changes in land use.

Of the seven transportation measures developed staff is proposing that three would be set as thresholds to determine significant impacts under California Environmental Quality Act (CEQA) analysis at both the General Plan and project analysis level. These are:

- Vehicle Miles Traveled Per Capita
- Vehicle Trips Per Capita
- Auto Level of Service.

The other four measures would be used to determine impacts under CEQA only at the General Plan/Specific Plan level but would not be used to determine impacts at the project level. These are:

- Proximity and Quality of the Bicycle Network
- Proximity and Quality of the Transit Network
- Pedestrian Accessibility
- Corridor Travel Times

These thresholds would guide system-wide bike and local transit improvements in the General Plan and guide pedestrian improvements in Specific Plan Updates. The bike and transit improvements identified would be included in a nexus study to the update of the Traffic Reduction and Transportation Improvement Fee (TRTIF) following the adoption of the Land Use and Mobility Element updates. An analysis at the project level impacts to the various citywide network is not necessary because projects would address their proportionate impacts in these areas by paying their fees.

The table below summarizes the metrics and the proposed CEQA thresholds for determining an impact. See Appendix A for detailed descriptions and existing values for each metric.

METRIC		DESCRIPTION	IMPACT THRESHOLD (GENERAL PLAN)	IMPACT THRESHOLD (PROJECT LEVEL)
1.	VMT Per Capita	Vehicle Miles Traveled (VMT) in the City of Pasadena per service population (population + jobs).	CEQA Threshold: An increase over existing VMT per Capita.	CEQA Threshold: An increase over existing VMT per Capita
2.	VT Per Capita	Vehicle Trips (VT) in the City of Pasadena per service population (population + jobs).	CEQA Threshold: An increase over existing VT per Capita.	CEQA Threshold: An increase over existing VT per Capita
3.	Auto Level of Service	Level of Service (LOS) as defined by the Transportation Research Board's *Highway Capacity Manual (HCM) 2010.* Uses intersection control delay to evaluate auto congestion	CEQA Threshold: A decrease beyond the LOS D Threshold outside designated High Pedestrian Activity Areas Up to and including LOS F will be accepted inside designated HPA	CEQA Threshold: A decrease beyond the LOS D Threshold outside designated High Pedestrian Activity Areas. Up to and including LOS F will be accepted inside designated HPA.
4.	Proximity and Quality of Bicycle Network	Percent of dwelling units and jobs within a quarter mile of each of three bicycle facility types	CEQA Threshold Any decrease in % of units or employment within a ¼ mile of Level 1 or 2 Bike Facility	Not a CEQA measure of significance. However project analysis of adjacent effects to the bike system will be included in a CEQA Document.
5.	Proximity and Quality of Transit Network	Percent of dwelling units and jobs located within a quarter mile of each of three transit facility types.	CEQA Threshold Any decrease in % of units or employment within a ¼ mile of Level 1 or 2 Transit Facility	Not a CEQA measure of significance. However project analysis of adjacent effects to the transit service will be included in a CEQA Document.
6.	Pedestrian Accessibility	The Pedestrian Accessibility Score uses the mix of destinations, and a network-based walk shed to evaluate walkability	CEQA Threshold Any decrease in the Citywide Pedestrian Accessibility Score	Not a CEQA measure of significance. However project analysis of adjacent effects to the pedestrian system will be included in a CEQA Document.
7.	Corridor Travel Times	Auto Travel Times for significant arterials in the City will be determined and forecasted using the Dynamic Traffic Assignment (DTA) Model.	CEQA Threshold Any increase > 20% in auto travel times for significant origin/destination pairs	Not applicable at the project analysis level. Not a CEQA measure of significance.

1. VMT PER CAPITA

The Vehicle Miles Traveled (VMT) per Capita measure sums the miles traveled for trips within the City of Pasadena citywide model. The Citywide VMT is calculated by adding: 1) 100% of VMT associated with trips traveling within the City of Pasadena boundaries that are generated or attracted by the City, and 2) 50% of VMT associated with trips with an end or origin outside of the City. The City's VMT is then divided by the City's total service population, defined as the population plus the number of jobs, per Capita.

Although VMT itself will likely increase with the addition of new residents, the City can reduce VMT on a per-capita basis with land use policies that help Pasadena residents meet their daily needs within a short distance of home, reducing trip lengths, and by encouraging development in areas with access to various modes of transportation other than auto.

Proposed Threshold

The proposed threshold of significance for the VMT/Capita metric when applied to the General Plan (or a Specific Plan) or project level analysis would be an increase over the existing (2013) Citywide VMT/Capita.

2. VT PER CAPITA

Vehicle Trips (VT) per Capita is a measure of motor vehicle trips associated with the City. The measure sums the trips with origins and destinations within the City of Pasadena, as generated by the Trip-Based citywide model. The regional VT is calculated by adding the VT associated with trips generated and attracted within the City of Pasadena boundaries, and 50 percent of the VT associated with trips that either begin or end in the City, but have one trip end outside of the City. The City's VT is then divided by the City's total service population, defined as the population plus the number of jobs, to calculate VT per Capita.

As with VMT, VT itself will likely increase with the addition of new residents, but the City can reduce VT on a per-capita basis with land use policies that help Pasadena residents meet their daily needs within a short distance of home, reducing trip lengths, and by encouraging development in areas with access to various modes of transportation other than auto.

Proposed Threshold

The proposed threshold of significance for the VT/Capita metric when applied to the General Plan (or a Specific Plan) or project level analysis would be an increase over the existing (2013) Citywide VT/Capita.

AUTO LEVEL OF SERVICE (LOS)

Auto LOS is a qualitative description of traffic flow from a vehicle driver's perspective based on factors such as speed, travel time, delay, and freedom to maneuver. Six

levels of service are defined, ranging from LOS A (best operating conditions) to LOS F (operating conditions with delays for motorists). LOS E corresponds to operations "at capacity." When volumes exceed capacity, stop-and-go conditions result and operations are designated to LOS F.

Traffic conditions at signalized intersections are evaluated using methodologies proposed by the Transportation Research Board (TRB), as documented in the 2010 Highway Capacity Manual (HCM 2010). The 2010 HCM method calculates control delay at an intersection based on inputs such as traffic volumes, lane geometry, signal phasing and timing, pedestrian crossing times, and peak hour factors and is currently state of the practice for analyzing LOS. Control delay is defined as the delay directly associated with the traffic control device (i.e., a stop sign or a traffic signal) and specifically includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. These delay estimates are considered meaningful indicators of driver discomfort and frustration, fuel consumption, and lost travel time.

The proposed Auto LOS threshold is set at different grades based on the geographical location of the intersection. Consistent with policies adopted in several cities in California the two tier LOS threshold supports the General Plan policies of creating more walkable areas by not prioritizing improvements to reduce vehicle delays at the detriment to the pedestrian environment while acknowledging that adding vehicle capacity to intersections is not an option due to the mature and often historic urban environment surrounding the intersections.

Proposed Threshold

The proposed threshold of significance for the Auto Level of Service (LOS) would be applied the same way to both the General Plan, or a Specific Plan, and a project requiring an EIR. As proposed, the number of intersections analyzed as part of a traffic study would not change from current guidelines. For the General Plan Update 61 intersections citywide would be analyzed and assigned LOS letter grades for both existing and 2035 conditions. For intersections outside of the designated High Pedestrian Activity (HPA) areas the default minimum Level of Service to maintain in the City is LOS D. For intersections within the HPA areas any LOS up to and including LOS F would not be a significant impact. Figure 1 in the attached appendix identifies the HPPAs and the intersections to be analyzed as part of the General Plan Update EIR.

4. PROXIMITY AND QUALITY OF BICYCLE NETWORK

The Proximity and Quality of Bicycle Network provides a measure of the percent of the City's dwelling units and work places within a quarter mile of each of three bicycle facility types. The facility types are aggregated into three hierarchy levels, obtained from the City's 2012 (Draft) Bicycle Transportation Plan. For each bike facility level, a quarter-mile network distance buffer is calculated and the total dwelling units and work places within the buffer are added. The City can improve measures of Bike Facility Access by improving and expanding existing bike facilities and by encouraging residential and commercial development in areas with high-quality bike facilities.

Proposed Threshold
At the General Plan level the threshold of significance is any decrease in the percent of dwelling units or employment within a quarter mile of Level 1 or 2 Bike Facility (See Appendix A for Bike Facility Definitions).

5. PROXIMITY AND QUALITY OF TRANSIT NETWORK

The Proximity and Quality of Transit Network provides a measure of the percent of the City's dwelling units and work places within a quarter mile of each of each of three transit facility types, as defined in the *Draft Streets Types Plan.* For each facility level, a quarter-mile network distance buffer is calculated and the total dwelling units and work places within the buffer are added.

The City can improve the measures of Transit Proximity and Quality by reducing headways on existing transit routes, by expanding transit routes to cover new areas, and by encouraging residential and commercial development to occur in areas with an already high-quality transit service.

Proposed Threshold
At the General Plan level the threshold of significance is any decrease in the percent of dwelling units or employment within a quarter mile of Level 1 or 2 Transit Facility (See Appendix A for Transit Facility Definitions).

6. PEDESTRIAN ACCESIBILITY

The Proximity and Quality of Pedestrian Environment provides a measure of the average walkability in the Traffic Analysis Zone (TAZ) surrounding Pasadena residents, based on a Pedestrian Accessibility metric. The Pedestrian proximity metric is a simple count of the number of land use types accessible to a Pasadena resident or employee in a given TAZ within a 5-minute walk. The City can improve the Resident and Employment Pedestrian Accessibility Scores by:

- Encouraging residential development in areas with high existing Pedestrian Accessibility Scores;
- Encouraging commercial development in areas with high existing Pedestrian Accessibility Scores; and
- Attracting mixed development and new land use types to increase the Pedestrian Accessibility metric values of other areas.

Proposed Threshold
At the General Plan level the threshold of significance is any decrease in the Citywide Pedestrian Accessibility Score (See Appendix A for Land Uses which influence this metric).

7. CORRIDOR TRAVEL TIME

Auto Travel Time for significant corridors in the City was determined and forecasted using the City's Dynamic Traffic Assignment (DTA) model which can estimate future

travel times along corridors in the City. The City has collected travel time runs for 16 significant arterials, and this travel time information was used to evaluate auto operation in the General Plan context. Travel Times along a set of 16 origin-destination pairs were determined, and forecast travel times were prepared using the City's DTA model.

Proposed Threshold
At the General Plan level the threshold of significance is any forecast auto travel times increase between significant origin and destination pair by 20% over exiting travel times.

Street Segment Analysis

At the April 9 and May 28 Planning Commission meetings, the Commission expressed interest in retaining the use of Street Segment Analysis as one as a transportation performance measure.

Pasadena currently employs a Street Segment Analysis metric to identify the amount of new auto trips a development project will add to adjacent streets.

The traffic growth on a street segment is calculates as follows:
Percentage of Traffic Growth on Street Segment = Net New Project Trips/ Existing Daily Traffic

The table below is from adopted Traffic Impact Guidelines and shows the adopted thresholds for varying levels of traffic growth on a street segment.

Traffic Growth on Street Segment	**Required Multi-Modal Measures** (Please refer to pages 16-18 of the *Guidelines for Transportation Review of Projects* provided in Section 5)
0.0 - 2.4% Daily Traffic Growth	Staff review and conditions
2.5% - 4.9% Daily Traffic Growth	• Initial study required if existing count is greater than 2,000 VPD • Soft measures required
5.0% - 7.4 % Daily Traffic Growth	• Initial study required • Soft measures required • Physical improvements may be required
7.5% + Daily Traffic Growth	• Initial study required • Soft measures required • Extensive physical improvements may be required • Project alternatives may be considered

Pros

- Identifies changes to vehicle volumes on all streets including residential streets.

Cons

- No minimum threshold for street Average Daily Traffic (ADT) to establish impacts. A few cars added to a street with low ADT shows as an impact.
- Impact tied to a percentage increase in traffic resulting in small increases in traffic triggering impacts on streets with low ADTs.
- Does not accurately reflect perceptible changes to traffic volume on street with low ADT
- Metric is not consistent with the land use densities identified in the adopted General Plan and can cause project alternatives at densities lower than adopted General Plan land use.
- Forces projects to place new driveways on streets with higher vehicular traffic and pedestrian and bike volumes. Introductions of new driveways negatively impacts pedestrian and bicycle environments, and increases congestion on major travel corridors leading to potential cut-through traffic on residential streets.
- Mitigation measures proposed in 2005 for Street Segment impacts are no longer adequate under current CEQA Guidelines.
- Segment metric and impact threshold applies to both residential and commercial projects. Trips associated with residential projects in residential neighborhoods are not cut through traffic *per se*.

Examples of projects with Street Segment Impacts which could not be mitigated are included in Attachment 1.

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Frederick C. Dock, PE AICP
Director of Transportation

APPENDIX

A. Descriptions of the Proposed Transportation Performance Metrics

ATTACHMENTS:

1. Examples of Projects with Street Segment Impacts That Could Not Be Mitigated
2. Summary of the City of Los Angeles Street Segment Impact Analysis

APPENDIX A - DESCRIPTIONS OF NEW TRANSPORTATION PERFORMANCE METRICS

1. VMT PER CAPITA

The Vehicle Miles Traveled (VMT) per Capita measure sums the miles traveled for trips within the City of Pasadena citywide model. The Citywide VMT is calculated by adding: 1) 100% of VMT associated with trips traveling within the City of Pasadena boundaries that are generated or attracted by the City, and 2) 50% of VMT associated with trips with an end or origin outside of the City. The City's VMT is then divided by the City's total service population, defined as the population plus the number of jobs, per Capita.

Although VMT itself will likely increase with the addition of new residents, the City can reduce VMT on a per-capita basis with land use policies that help Pasadena residents meet their daily needs within a short distance of home, reducing trip lengths, and by encouraging development in areas with access to various modes of transportation other than auto.

2. VT PER CAPITA

Vehicle Trips (VT) per Capita is a measure of motor vehicle trips associated with the City. The measure sums the trips with origins and destinations within the City of Pasadena, as generated by the Trip-Based citywide model. The regional VT is calculated by adding the VT associated with trips generated and attracted within the City of Pasadena boundaries, and 50 percent of the VT associated with trips that either begin or end in the City, but have one trip end outside of the City. The City's VT is then divided by the City's total service population, defined as the population plus the number of jobs, to calculate VT per Capita.

As with VMT, VT itself will likely increase with the addition of new residents, but the City can reduce VT on a per-capita basis with land use policies that help Pasadena residents meet their daily needs within a short distance of home, reducing trip lengths, and by encouraging development in areas with access to various modes of transportation other than auto.

3. AUTO LEVEL OF SERVICE (LOS)

Auto LOS is a qualitative description of traffic flow from a vehicle driver's perspective based on factors such as speed, travel time, delay, and freedom to maneuver. Six levels of service are defined, ranging from LOS A (best operating conditions) to LOS F (operating conditions with delays for motorists). LOS E corresponds to operations "at capacity." When volumes exceed capacity, stop-and-go conditions result and operations are designated to LOS F.

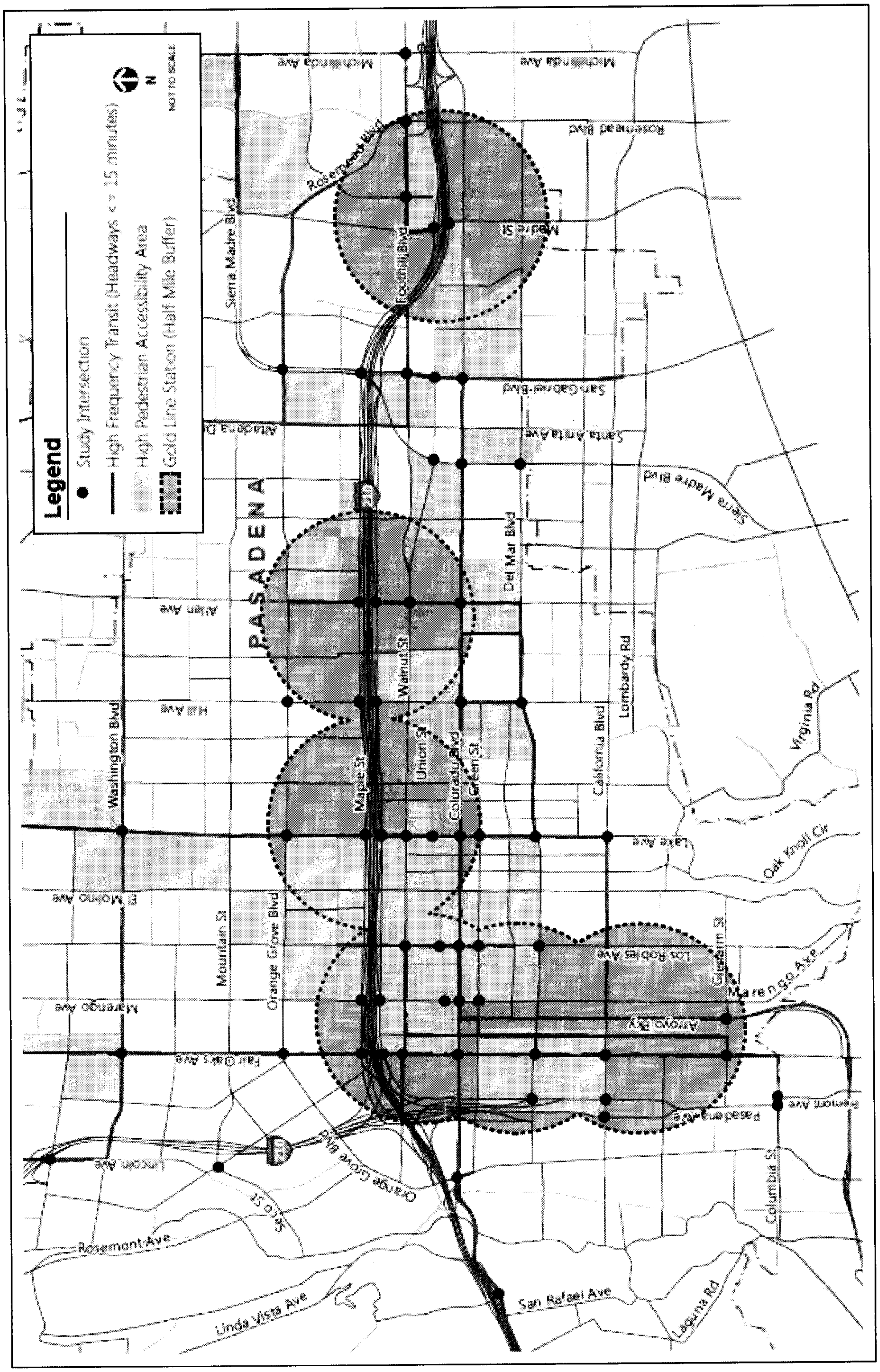
Signalized Intersections

Traffic conditions at signalized intersections are evaluated using methodologies proposed by the Transportation Research Board (TRB), as documented in the 2010 Highway Capacity Manual (HCM 2010). The 2010 HCM method calculates control delay at an intersection based on inputs such as traffic volumes, lane geometry, signal phasing and timing, pedestrian crossing times, and peak hour factors and is currently state of the practice for analyzing LOS. Control delay is defined as the delay directly associated with the traffic control device (i.e., a stop sign or a traffic signal) and specifically includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. These delay estimates are considered meaningful indicators of driver discomfort and frustration, fuel consumption, and lost travel time.

TABLE A1 – SIGNALIZED INTERSECTION LOS CRITERIA		
LEVEL OF SERVICE	**DESCRIPTION**	**DELAY IN SECONDS**
A	Progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	< 10.0
B	Progression is good, cycle lengths are short, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10.0 to 20.0
C	Higher congestion may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, though many still pass through the intersection without stopping.	> 20.0 to 35.0
D	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	> 35.0 to 55.0
E	This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor (vehicle) progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	> 55.0 to 80.0
F	This level is considered oversaturation, which is when arrival flow rates exceed the capacity of the intersection. This level may also occur at high V/C ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to such delay levels.	> 80.0
Source: 2010 *Highway Capacity Manual.*		

As proposed, for intersections outside of the designated High Pedestrian Activity (HPA) areas the default minimum Level of Service to maintain in the City is LOS D. For intersections within the HPA areas there would be no minimum LOS.

Figure 1 illustrates the High Activity Areas (HAAs) and high-frequency transit segments used for determining the LOS threshold applicable to each intersection.



HIGH PEDESTRIAN ACCESSIBILITY AREAS, GOLD LINE STATIONS, HIGH FREQUENCY TRANSIT, AND STUDY INTERSECTIONS

FEHR & PEERS

4. PROXIMITY AND QUALITY OF BICYCLE NETWORK

The Proximity and Quality of Bicycle Network provides a measure of the percent of the City's dwelling units and work places within a quarter mile of each of three bicycle facility types. The facility types are aggregated into three hierarchy levels, obtained from the City's 2012 (Draft) Bicycle Transportation Plan categories as shown in Table A4.

TABLE A4 – BIKE FACILITIES HIERARCHY

LEVEL	DESCRIPTION	FACILITIES INCLUDED
1 (A)	Advanced Facilities	Bike Paths (P1) Multipurpose Paths (PP) Cycle Tracks/Protected Bike Lanes
2 (B)	Dedicated Facilities	Buffered Bike Lanes Bike Lanes (2, P2)
3 (C)	Basic Facilities	Bike Routes (3, P3) Enhanced Bike Routes (E3, PE3) Bike Boulevards (BB) Emphasized Bikeways (PEB)

Source: City of Pasadena Bicycle Transportation Plan, 2012.

For each bike facility level, a quarter-mile network distance buffer is calculated and the total dwelling units and work places within the buffer are added.

The City can improve measures of Bike Facility Access by improving and expanding existing bike facilities and by encouraging residential and commercial development in areas with high-quality bike facilities.

5. PROXIMITY AND QUALITY OF TRANSIT NETWORK

The Proximity and Quality of Transit Network provides a measure of the percent of the City's dwelling units and work places within a quarter mile of each of each of three transit facility types, as defined in the *Draft Streets Types Plan* and in Table A5.

TABLE A5 – TRANSIT FACILITIES HIERARCHY

LEVEL	FACILITIES INCLUDED
1 (A)	Includes all Gold Line stops as well as corridors with transit service, whether it be a single route or multiple routes combined, with headways of five minutes or less during the peak periods.
2 (B)	Includes corridors with transit headways of between six and 15 minutes in peak periods.
3 (C)	Includes corridors with transit headways of 16 minutes or more at peak periods.

Source: *Draft Streets Types Plan,* Pasadena Department of Transportation, March 2013.

For each facility level, a quarter-mile network distance buffer is calculated and the total dwelling units and work places within the buffer are added.

The City can improve the measures of Transit Proximity and Quality by reducing headways on existing transit routes, by expanding transit routes to cover new areas, and by encouraging residential and commercial development to occur in areas with an already high-quality transit service.

6. PEDESTRIAN ACCESIBILITY

The Proximity and Quality of Pedestrian Environment provides a measure of the average walkability in the TAZ surrounding Pasadena residents, based on a Pedestrian Accessibility metric. The Pedestrian proximity metric is a simple count of the number of land use types accessible to a Pasadena resident or employee in a given TAZ within a 5-minute walk. The ten categories of land uses are:

- Retail
- Personal Services
- Restaurant
- Entertainment
- Office (including private sector and government offices)
- Medical (including medical office and hospital uses)
- Culture (including churches, religious and other cultural uses)
- Park and Open Space
- School (including elementary and high schools)
- College

The resulting count of land use types is then assigned a letter grade from A to D based on the following structure:

- **A** – greater than or equal to 8 land use types
- **B** – greater than or equal to 5 land use types and less than 8 land use types
- **C** – greater than or equal to 2 land use types and less than 5 land use types
- **D** – greater than or equal to 0 land use types and less than 2 land use types

The City can improve the Resident and Employment Pedestrian Accessibility Scores by:

- Encouraging residential development in areas with high existing Pedestrian Accessibility Scores;
- Encouraging commercial development in areas with high existing Pedestrian Accessibility Scores; and
- Attracting mixed development and new land use types to increase the Pedestrian Accessibility metric values of other areas.

7. CORRIDOR TRAVEL TIME

Auto Travel Time for significant corridors in the City was determined and forecasted using the City's Dynamic Traffic Assignment (DTA) model which can estimate future travel times along corridors in the City. The City has collected travel time runs for 16 significant arterials, and this travel time information was used to evaluate auto operation in the General Plan context. Travel

Times along a set of 16 origin-destination pairs were determined, and forecast travel times were prepared using the City's DTA model.

The metric seeks to evaluate whether future condition auto travel times for significant arterials can be maintained within +/- 20% of exiting travel times. Travel time reliability, and the ability for the auto network to absorb new vehicle demand was evaluated with the DTA model.

Attachment 1

Examples of Projects with Street Segment Impacts That Could Not Be Mitigated

Project Address	Project Size	Percentage of ADT increase	Impacted Street ADT	Impacted Street
550 E. Colorado Bl	16,201 sf retail;96,051 sf med office	44.98%	1236	Oakland Ave n/o Colorado Blvd
680 E. Colorado Bl	159,971 sf general office	12.3%	6,528	El Molino Ave b/t Colorado Blvd and Playhouse Alley
880 E. Colorado Bl	156 room hotel; 5-unit condominium; 8,210 sf retail; 5,601 sf restaurant	8.9%	5,091	Mentor Ave b/t Green St and Cordova St
86 S. Fair Oaks Ave	64-res unit;5,000 sf retail	35.4%	883	Dayton Street b/t Fair Oaks Ave and Raymond Ave
158 S. Sierra Madre Bl*	60 Units	22.3%	330	Oswego Street b/t Sierra Madre Bl and Altadena Dr
612 S Fair Oaks Ave	113K Office	8.2%	1125	Pico Street b/t Raymond and Edmonson Alley
1700 Lida St	319 student increase	8.1%	585	Wellington Ave s/o Lida St

- Applicant resubmitted the project circulation with driveways on Del Mar and Sierra Madre Bl

Attachment 2

LADOT STREET SEGMENT IMPACT CRITERIA GUIDELINES

- Limited to commercial projects only
- Subjective- if major arterial is congested and there is potential for cut-through traffic.
- The following conditions must be present in order to analyze project-related impacts on residential streets:
    - the proposed project is a non-residential development and not a school
    - the arterial is sufficiently congested, such that motorists traveling on the arterial may opt to divert to a parallel route through a residential street; the congestion level of the arterial can be determined based on the estimated LOS under project conditions of the study intersection(s); LOS E and F are considered to represent congested conditions
    - the Project is projected to add a significant amount of traffic to the congested arterial that can potentially shift to an alternative route; Project traffic would need to exceed the daily minimum significance thresholds listed below under "Project-Related Increase in ADT"
    - the local residential street(s) provides motorists with a viable alternative route

- A local residential street shall be deemed significantly impacted based on an increase in the projected average daily traffic (ADT) volumes as follows:

Projected ADT with Project (Final ADT)	Project-Related Increase In ADT
0 to 999	120 or more
1,000 to 1,999	12 percent or more of final ADT
2,000 or 2,999	10 percent or more of final ADT
3,000 or more	8 percent or more of final ADT

- Mitigation Measure- If project results in significant impacts, the applicant must develop a NTMP plan with input from affected residents, council districts and LADOT
    - NTMP plan may only consider non-restrictive traffic calming measures such as:
        - Traffic circles
        - Speed hump
        - Raised median
        - Curb extensions (traffic chokers)
        - Stop sign patterns

    - Restrictive traffic calming measures are not allowed
        - Turn restrictions
        - Physical barriers
        - Signal metering