MEMORANDUM - CITY OF PASADENA
DEPARTMENT of TRANSPORTATION

DATE: **February 27, 2014**

TO: **Transportation Advisory Commission**

FROM: **Frederic C. Dock, Director of Transportation**

SUBJECT: **NEW TRANSPORTATION PERFORMANCE MEASURES FOR TRANSPORTATION IMPACT ANALYSIS**

RECOMMENDATION:

It is recommended that the Transportation Advisory Commission review the proposed New Transportation Performance Measures and provide comments to staff on how to best refine the measures.

BACKGROUND:

Over the last three years Department of Transportation staff has presented and discussed the concept of developing new mobility performance measures with both the Transportation Advisory Commission (TAC) (Attachment A) and the City Council (Attachment B). On August 2, 2010 staff held a City Council workshop on "New Transportation Performance Measures." The following was included in that presentation:

> "The new measures need to decrease the emphasis on the efficiency of auto travel relative to other modes and they need to address the manner in which people use and experience the transportation system. This is being accomplished by subscribing to the use of Multi-modal Level of Service (MMLOS) analysis that emphasizes quality of travel experience by walk, bike, transit, and car. *For the current General Plan update, the city is reevaluating the current transportation performance measures in the context of how well each helps Pasadena meet its objectives for transportation and mobility. With the expanded emphasis on sustainability and a continued focus on livability, the performance measures are also being evaluated for their ability to assist with determining how to balance trade-offs among travel modes and among the mobility needs of different members of the community.*" (emphasis added)

As Pasadena updates its General Plan, the City is using this opportunity to redefine critical aspects of its transportation policy. In addition to sustainability, the City's transportation system is expected to support the goals of livability, neighborhood protection and mobility. As a city whose street network developed in the first quarter of the 20th century and which has been fully urbanized for many years, Pasadena is rarely in a position to add new streets or to widen existing ones. As a result, the City is electing to reinforce transportation policies that embrace a system management concept using improved operations strategies, expanded transit, bicycle and pedestrian systems coupled with transportation demand management and traffic calming to manage vehicular speeds at the neighborhood level.

The Mobility Element is focused on three main policy objectives, as refined from the 2004 General Plan and extensive community input:

- Enhance livability
- Encourage walking, biking, transit, and other alternatives to motor vehicles
- Create a supportive climate for economic viability

The Mobility Element places an emphasis on multi-modal mobility and livability, prompting the use of applicable transportation performance measures to judge progress towards these objectives, as well as providing the necessary input to the General Plan EIR and development review transportation impact analysis (TIA). A key challenge facing the City is the current set of Performance Measures and Metrics, used in the 2004 General Plan and the Transportation Impact Review Current Practice and Guidelines, which place a considerable emphasis on the automobile. If these measures continue to be used in their current form, it would present a conflict with the revised Mobility Element objectives. Recent case law related to project-level transportation analysis emphasizes the need for General Plan consistency, use of state of the practice methods, and explicit guidance for resolving conflicting mitigation actions. In order to address this, our recommend practice is to revise and adopt transportation performance measures and TIA analysis procedures that ensure both legal defensibility and consistency with the General Plan.

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, which place a considerable emphasis on the automobile. If these measures continue to be used in their current form, it would present a conflict with the revised 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 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.

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 network management and travel time reliability. To achieve this shift in emphasis, the metrics shift in scale, away from individual location specific measures to corridor or area wide measures.

<u>SB-743 – Auto Level of Service under CEQA</u>

On September 27, 2013, Governor Brown signed Senate Bill 743. Among other things, SB 743 creates a process to change analysis of transportation impacts under the California Environmental Quality Act (CEQA). Currently, environmental review of transportation impacts focuses on the delay that vehicles experience at intersections and on roadway segments. That delay is measured using a metric known as “level of service,” or LOS. Mitigation for increased delay often involves increasing capacity (i.e. the width of a roadway or size of an intersection), which may increase auto use and emissions and discourage alternative forms of transportation.

Under SB 743, the focus of transportation analysis will shift from driver delay to reduction of greenhouse gas emissions, creation of multimodal networks and promotion of a mix of land uses.

Specifically, SB 743 requires the Governor's Office of Planning and Research (OPR) to amend the CEQA Guidelines (Title 14 of the California Code of Regulations sections and following) to provide an alternative to LOS for evaluating transportation impacts. Particularly within areas served by transit, those alternative criteria must "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." Measurements of transportation impacts may include "vehicle miles traveled, vehicle miles traveled per capita, automobile trip generation rates, or automobile trips generated." Attachment C, "*Preliminary Evaluation of Alternative Methods of Transportation Analysis*" which was circulated last year by the Governor's Office of Planning and Research contains a comprehensive discussion of the alternatives to LOS being considered under SB 743. The current schedule has the State adopting new CEQA guidelines related to Auto LOS in January 2015.

Of the 12 new Transportation Performance Measures discussed below all but the Auto LOS metric are consistent with SB 743. The Auto LOS metric included here would allow the City to use this metric in the interim period prior to the State adopting new CEQA guidelines but do so in a fashion that is consistent with the intent of SB 743.

<u>New Transportation Performance Measures</u>

This memo describes 12 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. Therefore, the performance measures and significant thresholds to be used seek to be internally consistent and legally defensible under the current state of the practice.

The memo also includes existing and future values for each performance measure to demonstrate their applicability and assist in the selection of appropriate thresholds. Each of the metrics corresponds to one of the following three key points:

1. Accessibility and environmental performance
2. Auto performance measures to reflect the state of the practice and tradeoffs between modes and other community values
3. Measures that promote pedestrian, bicycle, and transit mobility

Table 1 summarizes the metrics and the proposed thresholds for determining an impact. Detailed descriptions and existing and future values for each metric follow.

TABLE 1 – SUMMARY OF TRANSPORTATION PERFORMANCE MEASURES

METRIC	DESCRIPTION	IMPACT THRESHOLD (GENERAL PLAN)	IMPACT THRESHOLD (DEVELOPMENT REVIEW)
1. Accessibility and environmental performance			
VMT Per Capita	Vehicle Miles Traveled (VMT) in the City of Pasadena per service population (population + jobs).	Any increase in Citywide VMT per Capita	Any increase in Citywide VMT per Capita
VT Per Capita	Vehicle Trips (VT) in the City of Pasadena per service population (population + jobs).	Any increase in Citywide VT per Capita	Any increase in Citywide VT per Capita
Auto Access to Jobs	Average number of jobs accessible to a Pasadena resident within a 25-minute drive.	Any decrease in Citywide Auto Access to Jobs	Any decrease in Citywide Auto Access to Jobs
Transit Access to Jobs	Average number of jobs accessible to a Pasadena resident within 25 minutes by transit.	Any decrease in Citywide Transit Access to Jobs	Any decrease in Citywide Transit Access to Jobs
2. Auto performance measures to reflect the state of the practice and tradeoffs between modes and other community values			
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.	Any decrease beyond the established Minimum LOS Threshold, depending on street type and surrounding activity level. See Table 5.	Any decrease beyond the established Minimum LOS Threshold, depending on street type and surrounding activity level. See Table 5.
Auto Travel Times	Auto Travel Times for significant arterials in the City will be determined and forecasted using the Dynamic Traffic Assignment (DTA) Model.	Any increase in auto travel times for significant origin – destination pairs within +/- 20%.	Any increase in auto travel times for significant origin – destination pairs within +/- 20%.
3. Measures that promote pedestrian, bicycle, and transit mobility			
Resident Pedestrian Accessibility Score	A dwelling-unit weighted average of the Pedestrian Accessibility Score within each TAZ. The Pedestrian Accessibility Score uses the mix of destinations, and a network-based walk shed to evaluate walkability.	Any decrease in Citywide Resident Pedestrian Accessibility Score	Any decrease in Citywide Resident Pedestrian Accessibility Score

TABLE 1 – SUMMARY OF TRANSPORTATION PERFORMANCE MEASURES

METRIC	DESCRIPTION	IMPACT THRESHOLD (GENERAL PLAN)	IMPACT THRESHOLD (DEVELOPMENT REVIEW)
Employment Pedestrian Accessibility Score	An employment-weighted average of the Pedestrian Accessibility Score within each TAZ.	Any decrease in Citywide Employment Pedestrian Accessibility Score	Any decrease in Citywide Employment Pedestrian Accessibility Score
Resident Bike Facility Access	Percent of Pasadena dwelling units within a quarter mile of each of three bicycle facility types (see Table 6).	Any decrease in percent of dwelling units or employment within a quarter mile of Level 1 or Level 2 bike facilities.	Residential development without quarter-mile access to either a Level 1 or Level 2 facility (see Appendix G).
Employment Bike Facility Access	Percent of jobs located within a quarter mile of each of three bicycle facility types (see Table 6).		Employment area development without quarter-mile access to either a Level 1 or Level 2 facility (see Appendix H).
Resident Transit Access	Percent of dwelling units within a quarter mile of each of three transit facility types (see Table 7).	Any decrease in percent of dwelling units or employment within a quarter mile of Level 1 or Level 2 transit facilities.	Residential development without quarter-mile access to either a Level 1 or Level 2 facility (see Appendix I).
Employment Transit Access	Percent of jobs located within a quarter mile of each of three transit facility types (see Table 7).		Employment area development without quarter-mile access to either a Level 1 or Level 2 facility (see Appendix J).

Source: Fehr & Peers, 2014

Table 2 summarizes the value of each performance metric under existing conditions.

METRIC	VALUE UNDER EXISTING CONDITIONS	UNIT OF MEASUREMENT
VMT Per Capita	**22.5** VMT per capita	Vehicle miles traveled per service population (population + jobs)
VT Per Capita	**2.8** VT per capita	Vehicle trips per service population (population + jobs)
Auto Access to Jobs	**267,500** jobs	Jobs accessible to the average resident within a 25-minute, congested, peak-period drive

METRIC	VALUE UNDER EXISTING CONDITIONS	UNIT OF MEASUREMENT
Transit Access to Jobs	**70,200** jobs	Jobs accessible to the average resident within 25 minutes by transit during the peak period
Auto Level of Service	See Appendix A	See Tables 3 and 4.
Auto Travel Times	See Appendix B.	Minutes of travel time
Resident Pedestrian Accessibility Score	**C** (3.2 land use types)	Count of land use types accessible to the average resident within a 5-minute walk.
Employment Pedestrian Accessibility Score	**B** (5.0 land use types)	Count of land use types accessible to the average worker within a 5-minute walk.
Resident Bike Facility Access	A – **0%** B or better – **30%** C or better – **83%** D – **17%**	Percent of total City dwelling units or jobs by Accessibility Grade: • A – access to a Level 1 bike facility (bike path, multipurpose path or cycle track) within a quarter mile • B – access to a Level 2 facility (buffered bike lane or bike lane) within a quarter mile • C – access to a Level 3 facility (bike route, enhanced bike route, bike boulevard, or emphasized bikeway) within a quarter mile • D – no facility access within a quarter mile
Employment Bike Facility Access	A – **0%** B or better – **29%** C or better – **76%** D – **24%**	
Resident Transit Access	A – **21%** B or better – **56%** C or better – **82%** D – **18%**	Percent of total City dwelling units or jobs by Accessibility Grade: • A – access to a Level 1 transit facility (Metro Gold Line station or transit route with headway of 5 minutes or less) within a quarter mile • B – access to a Level 2 facility (transit corridor with headways of 6 to 15 minutes) within a quarter mile • C – access to a Level 3 facility (transit corridor with headways greater than 15 minutes) within a quarter mile • D – no facility access within a quarter mile
Employment Transit Access	A – **59%** B or better – **83%** C or better – **95%** D – **5%**	

Proposed Metric Definitions

VMT PER CAPITA
Vehicle Miles Traveled (VMT) per Capita measure sums the miles traveled for trips within the City of Pasadena citywide model. The regional VMT is calculated by adding the VMT associated with trips generated and attracted within the City of Pasadena boundaries, and 50 either begin or end in the City, but have one trip end 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.

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.

AUTO AND TRANSIT ACCESS TO JOBS
Auto Access to Jobs measures the average number of jobs accessible to a Pasadena resident within a 25-minute drive. First a 25-minute auto travel shed is calculated from each origin (residential location) TAZ to identify the available destination (job location) TAZs. For each origin TAZ, the employment in the corresponding destination TAZs is summed. A dwelling-unit weighted average of the number of jobs accessible within 25 minutes by car from each residential TAZ then gives a citywide measure of jobs accessibility.

The calculation methodology for Transit Access to Jobs is similar, using a 25-minute transit travel shed in place of the 25-minute auto travel shed. The Transit travel time skims are obtained from General Transit Feed Specification data within the City, and from the SCAG regional model beyond the City limits.

The City can improve Auto Access to Jobs by increasing the number of jobs within the 25-minute travel sheds, increasing the residential population in areas with high levels of employment within their travel sheds, or expanding the travel sheds through improved vehicle travel times.

Similarly, the City can improve Transit Access to Jobs by increasing the number of employment opportunities within the 25-minute transit travel sheds, increasing the residential population in areas with high levels of employment accessibility, or expanding the travel sheds through expanded transit service and improved travel time performance.

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 (worst operating conditions). 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 (2010 HCM). The HCM 2010 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 3 – 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 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 unacceptable with 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.*

Unsignalized Intersections
For unsignalized (all-way stop controlled and side-street stop controlled) intersections, the TRB 20010 HCM method for unsignalized intersections is used. With this method, operations are

defined by the average control delay per vehicle (measured in seconds). The control delay incorporates delay associated with deceleration, acceleration, stopping, and moving up in queue. At side-street stop-controlled intersections, the delay is calculated for each stop-controlled movement, the left-turn movement from the major street, as well as the intersection average. The intersection average delay and highest movement/approach delay are reported for side-street stop controlled intersections.

TABLE 4 – UNSIGNALIZED INTERSECTION LOS CRITERIA

LEVEL OF SERVICE	DESCRIPTION	DELAY IN SECONDS
A	Little or no delays	≤ 10.0
B	Short traffic delays	> 10.0 to 15.0
C	Average traffic delays	> 15.0 to 25.0
D	Long traffic delays	> 25.0 to 35.0
E	Very long traffic delays	> 35.0 to 50.0
F	Extreme traffic, delays where intersection capacity exceeded	> 50.0

Source: 2010 *Highway Capacity Manual.*

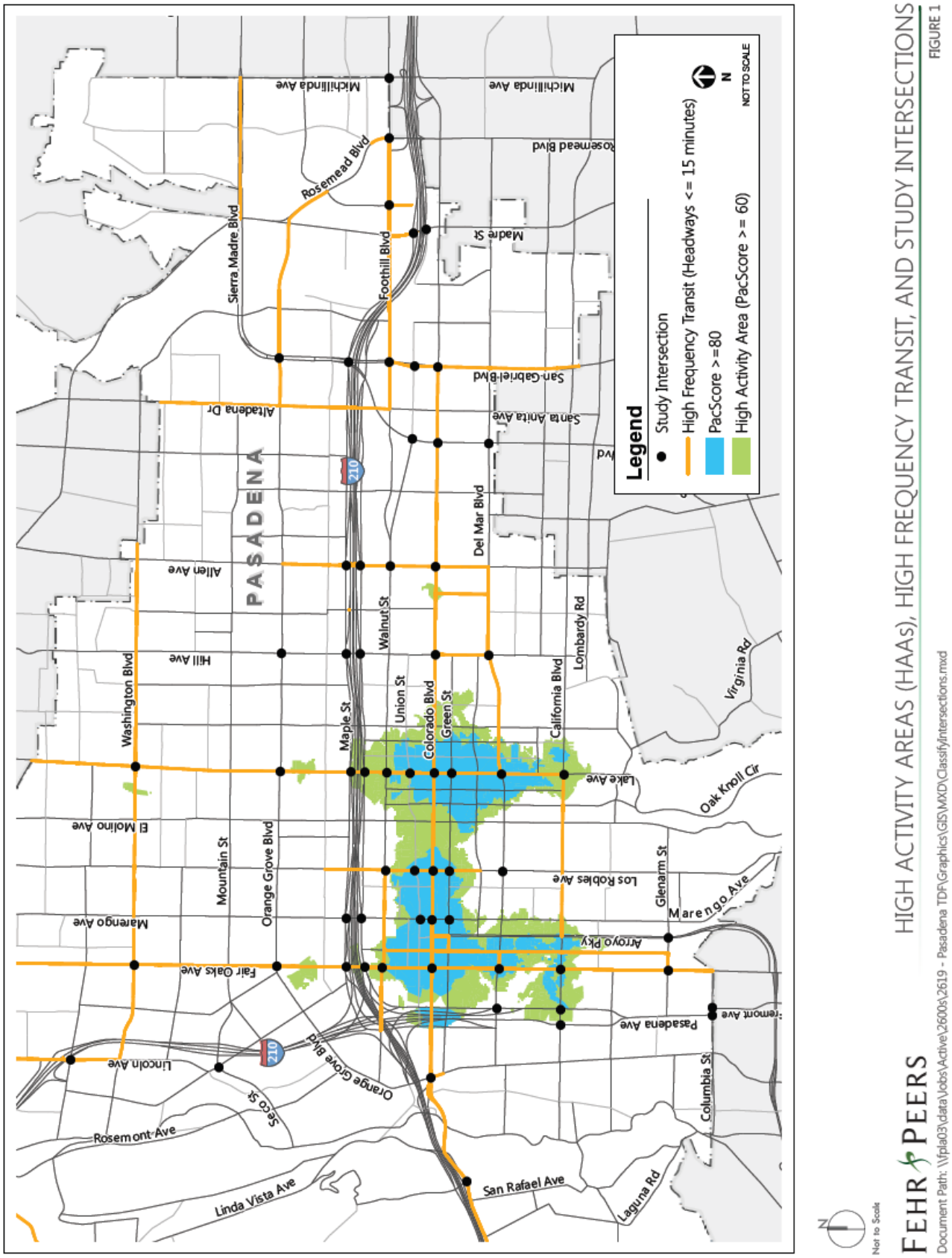
Rather than establish a single Auto LOS, applicable citywide, this new set of performance measures proposes LOS thresholds that vary according to pedestrian and economic activity context and the presence of high-frequency transit service. As shown on Table 5, the default minimum Level of Service to maintain in the City is LOS E. Study intersections along a high-frequency transit route, defined as a combined headway of 15 minutes or less, must maintain LOS D to facilitate efficient movement of transit vehicles. Regardless of the transit overlay, any study intersection in a High Activity Area (HAA) will allow LOS F. This performance measure defines High Activity Areas (HAAs) as areas scoring a PacScore of 60 or above, indicating that all or most destination types are within a quarter-mile walk from all parcels. In addition, High Activity Areas (HAAs) may also be identified based on safety merits, and special consideration may be given to locations where high-activity land uses are located. The use of LOS F as the criteria in HAAs will result in outcomes that are consistent with the direction of SB 743.

TABLE 5 – AUTO LEVEL OF SERVICE (LOS) THRESHOLDS BY CONTEXT

STREET OVERLAY	MINIMUM LEVEL OF SERVICE TO MAINTAIN FOR…	
	HIGH ACTIVITY AREAS (HAAs)	OTHER AREAS
High-Frequency Transit [a]	F	D
All other locations [b]	F	E

Note: [a] These are facilities with combined headways of 15 minutes or less in the peak periods.
[b] All other intersections in the City

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



Not to Scale

FEHR PEERS

HIGH ACTIVITY AREAS (HAAs), HIGH FREQUENCY TRANSIT, AND STUDY INTERSECTIONS

FIGURE 1

Document Path: \\fpla03\data\Jobs\Active\26000\26119 - Pasadena TDF\Graphics\GIS\MXD\ClassifyIntersections.mxd

AUTO TRAVEL TIME
Auto Travel Time for significant arterials in the City was determined and forecasted using the Dynamic Traffic Assignment (DTA) model. 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, which incorporates link outflow and inflow capacities to reflect intersection capacity.

RESIDENT AND EMPLOYMENT PEDESTRIAN ACCESSIBILITY SCORE
The Resident Pedestrian Environment Score provides a measure of the average walkability in the TAZ surrounding Pasadena residents, based on a Pedestrian Accessibility metric. The Pedestrian Accessibility metric is a simple count of the number of land use types accessible to a Pasadena resident 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 religious and other cultural uses)
- Park
- School (including elementary and high schools)
- College

For example, if a given TAZ has access to Retail, Office, and Entertainment, but none of the other land use types within a 5-minute walk, the metric value for that particular TAZ will be 3.

A dwelling-unit weighted average of all TAZ-level Pedestrian Accessibility metric values within the City gives a measure of the walking environment experienced near the average resident's home. 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 0 land use types and less than 2 land use types
- **B** – greater than or equal to 2 land use types and less than 5 land use types
- **C** – greater than or equal to 5 land use types and less than 8 land use types
- **D** – greater than or equal to 8 land use types

The calculation methodology for the Employment Pedestrian Accessibility Score is similar, using an employment-weighted average of the TAZ-level metric values in place of the dwelling-unit weighting to give a measure of the walking environment experienced near the average employment location in the City.

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.

RESIDENT AND EMPLOYMENT BIKE FACILITY ACCESS

Resident Bike Facility Access measures the percent of the City's dwelling units 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 6

TABLE 6 – BIKE FACILITIES HIERARCHY

LEVEL	DESCRIPTION	FACILITIES INCLUDED
1 (A)	Advanced Facilities	Bike Paths (P1) Multipurpose Paths (PP) Cycle Tracks (not planned)
2 (B)	Dedicated Facilities	Buffered Bike Lanes (not planned) 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 facility level, a quarter-mile network distance buffer is calculated and the total dwelling units within the buffer are added. The facility levels are exclusive and follow the precedence of the bike facility hierarchy; a given dwelling unit is counted under the highest facility type to which it has access within a quarter mile.

The Resident Bike Facility Access measure improves when the percent of the City's dwelling units with access to a given facility level increases without decreasing the percent with access to a higher facility. For example, upgrading a Bike Route to a Bike Lane will increase the Level 2 percentage and decrease the Level 3 percentage, resulting in an overall improvement. However, if residential development moves from an area served by a bike path to one served only by a bike route, it would increase Level 3 percentage, thereby decreasing Level 1 percentage, resulting in an overall worsening of access. Adding a new facility that covers areas of the City not currently served by bicycle facilities will, by default, improve the measure.

The calculation methodology for Employment Bike Facility Access is similar, adding the jobs within the quarter-mile network distance buffer rather than adding dwelling units. 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

RESIDENT AND EMPLOYMENT TRANSIT ACCESS

Resident Transit Access measures the percent of the City's dwelling units within a quarter mile of each of three transit facility types, as defined in the *Draft Streets Types Plan* and in Table 7.

TABLE 7 – 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 fifteen minutes in peak periods.
3 (C)	Includes corridors with transit headways of sixteen 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 within the buffer are added. As with the Bike Facility Access measures, the facility levels are exclusive and follow the precedence of the hierarchy; a given dwelling unit is counted under the highest facility to which it has access within a quarter mile.

The Resident Transit Access measure improves when the percent of the City's population with access to a given facility level increases without decreasing the percent with access to a higher facility. For example, adding transit service that reduces headways from 20 minutes to 10 minutes will increase the Level 2 percentage and decrease the Level 3 percentage, an overall improvement. However, residents moving from an area served by 5-minute headways to one served only by 20-minute headways will increase the Level 3 percentage, but decrease the Level 1 percentage, an overall worsening of access. Adding a new transit service that covers areas of the city not served by existing services will also improve the measure.

The calculation methodology for Employment Transit Access is similar, adding the jobs within the quarter mile network distance buffer rather than adding dwelling units. The City can improve the measures of Transit Access 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.

NEXT STEPS

Following review by the Transportation Advisory Commission at your February 27 meeting the proposed Transportation Performance Measures will be refined and presented to the Planning Commission in March. Staff will also hold a community meeting in March before returning to the Transportation Advisory Commission at your March 27 meeting. The Transportation Performance Measures will then be presented to the Municipal Services Committee and the City Council for adoption in April.

ATTACHMENTS
A Introduction to Transportation Performance Measures, TAC Presentation
B City Council Workshop on Transportation Performance Measures
C OPR – Preliminary Evaluation of Alternative Methods of Transportation Analysis

APPENDIX A – Existing Auto Level of Service (LOS) Results

INTERSECTION ID	STREETS	MINIMUM LOS	EXISTING	
			AM LOS	PM LOS
1	N San Rafael & Colorado	D	C	C
2	Colorado & Orange Grove	D	C	C
3	Pasadena & Del Mar	E	C	C
4	Pasadena & California	F	B	C
5	St. John & California	E	C	C
6	Pasadena & Columbia	E	E	D
6.5	Fremont & Columbia	E	D	D
7	Lincoln & Howard	D	B	B
8	Lincoln & Mountain	E	B	A
9	Fair Oaks & Washington	D	C	C
10	Fair Oaks & Orange Grove	D	C	C
11	Fair Oaks & Walnut	F	C	C
12	Fair Oaks & Colorado	F	B	B
13	Fair Oaks & Del Mar	F	C	C
14	Fair Oaks & California	F	C	C
15	Fair Oaks & Glenarm	D	B	B
16	Arroyo Parkway & Glenarm	E	C	E
17	Marengo & Union	F	B	B
18	Marengo & Colorado	F	B	B
19	Marengo & Green	F	B	B
20	Los Robles & Walnut	D	B	B
21	Los Robles & Union	F	B	B
22	Los Robles & Colorado	F	B	B
23	Los Robles & Green	F	B	B
24	Los Robles & Del Mar	E	C	C
25	Lake & Washington	D	D	C
26	Lake & Orange Grove	D	D	C
27	Lake & Walnut	F	C	C
28	Lake & Union	F	A	A
29	Lake & Colorado	F	C	C
30	Lake & Green	F	B	B
31	Lake & Del Mar	F	C	C
32	Lake & California	F	D	D
33	Hill & Orange Grove	E	D	C
34	Hill & Del Mar	D	C	C
35	Hill & Colorado	D	C	C
36	Allen & Walnut	D	B	B
37	Allen & Colorado	D	B	B

INTERSECTION ID	STREETS	MINIMUM LOS	EXISTING	
			AM LOS	PM LOS
38	Sierra Madre Blvd & Orange Grove	D	C	C
39 [1]	Sierra Madre Blvd & Maple	E	C	C
40	Sierra Madre Blvd & Walnut	E	B	B
41	Sierra Madre Blvd & Colorado	D	C	C
42	Sierra Madre Blvd & Del Mar	E	C	C
43	San Gabriel & Foothill	D	B	C
44	San Gabriel & Walnut	D	A	A
45	San Gabriel & Colorado	D	C	C
46	Halstead & Foothill	D	B	C
47	Rosemead & Foothill	D	D	D
48	Michillinda & Foothill	E	D	D
49	Sierra Madre Villa & WB I-120 Ramps	D	B	B
49.5	Sierra Madre Villa & EB I-120 Ramps	E	C	C
50	Allen & Maple	D	C	C
51	Allen & Corson	D	C	B
52	Hill & Maple	E	D	C
53	Hill & Corson	E	F	C
54	Lake & Maple	F	D	D
55	Lake & Corson	F	C	C
56	Marengo & Maple	E	C	C
57	Marengo & Corson	E	C	C
58	Fair Oaks & Maple	D	C	C
59	Fair Oaks & Corson	D	C	C

Note: [1] Due to methodological limitations of HCM 2010 for complex intersections, Intersection 39 is analyzed according to HCM 2000.

APPENDIX B – DTA Model Auto Travel Time Results

STREET	DIR	FROM	TO	EXISTING TRAVEL TIME (MINUTES)	
				AM	PM
ORANGE GROVE	NB	COLUMBIA	COLORADO	4:06	3:59
	SB	COLORADO	COLUMBIA	4:24	4:16
LINCOLN	NB	ORANGE GROVE	HOWARD	3:16	3:22
	SB	HOWARD	ORANGE GROVE	3:27	3:26
FAIR OAKS	NB	GLENARM	WASHINGTON	8:16	8:31
	SB	WASHINGTON	GLENARM	9:01	9:07
ARROYO PKWY	NB	GLENARM	COLORADO	3:53	3:29
	SB	COLORADO	GLENARM	4:07	4:31
LAKE AVE	NB	DEL MAR	WASHINGTON	6:01	7:28
	SB	WASHINGTON	DEL MAR	6:22	6:25
HILL AVE	NB	DEL MAR	WASHINGTON	5:04	5:11
	SB	WASHINGTON	DEL MAR	5:06	5:13
SAN GABRIEL	NB	SAN PASQUAL	FOOTHILL	2:11	2:11
	SB	FOOTHILL	SAN PASQUAL	2:02	2:11
WASHINGTON	EB	FAIR OAKS	LAKE AVE	2:34	2:41
	WB	LAKE AVE	FAIR OAKS	2:37	2:31
ORANGE GROVE	EB	FAIR OAKS	SAN GABRIEL	7:59	8:13
	WB	SAN GABRIEL	FAIR OAKS	7:59	7:57
WALNUT	EB	FAIR OAKS	KINNELOA	10:35	11:08
	WB	KINNELOA	FAIR OAKS	10:39	10:42
FOOTHILL	EB	WALNUT	ROSEMEAD	5:27	5:51
	WB	ROSEMEAD	WALNUT	5:53	5:46
UNION	WB	HILL AVE	ST JOHN	6:47	6:55
COLORADO	EB	ARROYO PKWY	SAN GABRIEL	9:29	10:34
	WB	SAN GABRIEL	ARROYO PKWY	9:40	10:04
GREEN	EB	ST JOHN	HILL AVE	5:43	7:45
DEL MAR	EB	ORANGE GROVE	SAN GABRIEL	10:41	11:26
	WB	SAN GABRIEL	ORANGE GROVE	11:24	10:23
CALIFORNIA	EB	ORANGE GROVE	LAKE AVE	4:41	4:36
	WB	LAKE AVE	ORANGE GROVE	4:31	4:11