City of Santa Barbara
California

PLANNING COMMISSION
STAFF REPORT

REPORT DATE: May, 2006

AGENDA DATE: May 4, 2006

PROJECT: Level-of-Service Workshop

TO: Planning Commission

FROM: Transportation Division, (805) 564-5390
Robert J. Dayton, Supervising Transportation Planner

The Transportation Division, in coordination with the Planning Division and other divisions and departments, is conducting a series of workshops in order to educate and increase decision-maker and public confidence in transportation review of land development projects. The first workshop was held on March 2, 2006 to discuss procedures for traffic analysis of land development projects. The second and current workshop is to understand the concept of traffic "Levels of Service" (or LOS), how the City uses level of service in traffic policy and traffic analysis, and to discuss measures for reducing congestion levels. The third workshop will be on parking (no date currently set).

Outcomes of the Last Workshop

During the first workshop on traffic analysis procedures, staff presented the process and reasoning used to establish the environmental review "baseline trips" of infill redevelopment project sites. The Planning Commission supported the general procedure and requested staff to address trips that are not on the road now, but are credited to such projects. Planning Commission members wanted to better understand how these trips impact the roadway network.

Because projects on Upper State Street have been the focus of this issue, City Council directed staff to conduct a traffic study to measure the level of service at the Upper State Street Corridor intersections. The traffic study will include existing traffic counts and will also forecast the traffic level of service of the street assuming build-out of all foreseeable redevelopment projects. The study will examine each parcel on the street to determine the potential for redevelopment. Environmental baseline trip generation analysis will be conducted for those sites that are likely to be redeveloped in the foreseeable future. The environmental baseline trips will be adjusted by subtracting existing driveway traffic from the average trip generation potential of such sites and then adding the difference to the street traffic. A cumulative analysis that considers all approved and pending development that may affect the area will also be included. The result will be a comprehensive look at the potential future level of service of a fully redeveloped Upper State Street.

The study is expected to be presented to public workshops and the Planning Commission in late 2006.

Purpose of Current Workshop

The purpose of this workshop is to understand the concept of traffic Level of Service and how it is used to measure congestion levels in the City of Santa Barbara. We will explain level of service from the perspective of the driver experience. We will show how professionals calculate level of service at intersections. We will show examples of the more congested areas of the City. And we will examine the City's available options to increase and extend its travel capacity.

Level of Service

Level of service (LOS) is a grading system that describes the amount of congestion at an intersection as experienced by motorists. Level of service is mainly a qualitative description based on observed conditions. Table I shows the level-of-service definitions for each grade.

Motorists will unlikely be stopped by a red light at an intersection operating at LOS A. Level of Service A conditions commonly occur on major thoroughfares where a traffic signal has been installed to allow vehicles on a local street to safely cross or turn left onto the major street. Cabrillo Boulevard at Calle Cesar Chavez is an example of a traffic signal operating at LOS A. Level of Service B operation is characterized by more frequent stopping or red lights. During peak times, the traffic can feel somewhat constricted to motorists. Although progression is maintained at LOS B, during peak congestion hours, the signal phase will be fully used. Most of the traffic signals in the City operate at LOS B.

At Level of Service C, progression slows. Many motorists are required to stop at a red light. During the most congested times, some motorists may have to wait through a second red light at the same signal before proceeding through the intersection on a green light. The City has long established and reconfirmed LOS C as its goal and standard for the maximum acceptable congestion level during the peak travel times.

At LOS D and E, most vehicles must stop at the intersection (get a red light). Progression is poor. Delays during the peak traffic times are substantial. Long lines of vehicles commonly wait through one or two red lights before proceeding.

Table I
Level-of-Service Definitions

Level of Service	Qualitative Definition
A	Most vehicles do not stop and reach the signal when it is green. If a vehicle does stop, it is only a short delay.
B	Generally good progression is maintained with some vehicles stopping. An occasional approach phase is fully used; many drivers begin to feel somewhat restricted within groups of vehicles.
C	Individual cycle failures begin to occur at this grade with some motorists waiting multiple cycles to get through an intersection during the most congested moments of the peak hour. Unfavorable progression is common, meaning many vehicles are required to stop at the intersection.
D	The influence of congestion is noticeable. Most vehicles must stop at the intersection and individual cycle failures are more common (more than one signal phase is required for a vehicle to progress). Delays may be substantial during portions of the rush hours.
E	Represents the most vehicles that can be accommodated in an intersection; long lines of waiting vehicles through several signal cycles.
F	All vehicles must stop at the intersection. Individual cycle failures are frequent occurrences. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.

Level of Service F occurs when the demand of vehicles at a traffic signal exceeds its capacity to accommodate them. Vehicle queues are quite long, often extending back to the preceding intersection. The demand on the intersection cannot typically be met unless the intersection can be physically improved or the traffic signal timing adjusted. It normally takes several traffic signal cycles to progress through the intersection. The congestion at an LOS F intersection becomes a problem for other parts of the roadway system and grows as demand is not met.

Currently, no level-of-service standards exist for other modes of transportation, such as bikes, transit, or pedestrians.

Other Considerations That Change Level of Service Awareness

Motorists traveling through the same intersection may experience different levels of service. There may be certain movements in an intersection (e.g., left-turn, right-turn, through) that are worse than others. For example, on Carrillo Street traveling westbound from Downtown toward the freeway during the PM peak travel time, a motorist waiting to go northbound on Highway 101 will likely experience LOS D or E. However, a motorist traveling in the same direction to the Westside might not even need to stop for a red light (LOS B). When this disparity of demand on turning movements occurs at an intersection, the observed LOS of the different movements is averaged in order to arrive at the overall LOS of the intersection. As a result, although the average LOS of all the movements at Carrillo and the Northbound 101 on\off-ramps may be D; some motorists will experience less congestion and others will experience more.

Other elements of a street can impact the motorist's awareness of congestion other than typical traffic signal operations. A closed lane or turning movement, such as during construction, can substantially increase congestion. Streets that have a myriad of retail or office access driveways can also affect congestion levels. Motorist waiting to merge from a driveway onto a heavily traveled street may choose shorter gaps in traffic that cause disruption or slowing. Conflicts at driveways can also block or impede on-street travel. Most of the City's collisions occur at mid-block locations where driveways are being accessed. These types of disruptions to the flow of traffic can add to the perception of congestion even though they are not directly related to the level of service at any given intersection.

The location of bus zones also has an impact on level of service. Planners must carefully consider whether a bus stop should be on the near or far side of an intersection and whether or not a bus bay is required.

The City's Peak Travel Times

As with other cities, Santa Barbara measures level of service during the peak travel times, or when the roadway network and related traffic signals experience the most demand. The peak travel times are generally when people are going to, or returning from, work. Although less congested, the noon hour and, in some locations, the afternoon periods also experience heavy travel demands. Level of service is generally measured in one hour periods. Accordingly, the AM and PM peak hours are commonly measured for level of service.

Because the City has a significant amount of retail in the Downtown and Upper State Street areas, the AM peak hour tends to be less congested than the PM peak hour. Retail workers generally do not begin work until after the AM peak hour (highest hour between 7:00 and 9:00 AM). This is particularly true for Upper State Street where the street operates at LOS A at most intersections during the AM peak hour. As a result, the PM peak hour (highest hour between 4:00 and 6:00 PM) is more likely to be used to measure traffic impacts of proposed land development for a reasonable worst-case analysis.

There may be other times of the day that are worse for a particular location. For example, an intersection next to a school may experience the most congestion when school lets out in the afternoon between 2:00 and 3:00 PM.

How is LOS Calculated?

Transportation engineers and planners calculate level of service based on the traffic volumes that occur over an hour time period in an intersection. Two types of level-of-service calculations can be conducted: for current roadway operations; and for long-term planning. The operations level-of-service measures the amount of average delay (measured in seconds) that motorists experience. The planning methodology calculates the percentage of intersection capacity (measured in a volume-to-capacity ratio) used by cars in an intersection. The result of each calculation will show how the data collected at an intersection relates to the motorist's experience, or level of service.

Table II shows the level-of-service grades and the respective amounts of delay and volume-to-capacity ratios for each grade.

Table II
LEVEL OF SERVICE
Volume-to-Capacity Ratios
and Average Stopped Delay

Level of Service	Volume/ Capacity Ratio	Average Stopped Delay per Vehicle (seconds)
A	0.00 - 0.60	0.0 - 5.0
B	0.61 - 0.70	5.1 - 15.0
C	0.71 - 0.80	15.1 - 25.0
D	0.81 - 0.90	25.1 - 40.0
E	0.91 - 1.00	40.1 - 60.0
F	1.01 +	>60.0

The operations or delay methodology of calculating LOS involves traffic volumes, lane geometries[1], peak hour factors,[2] passenger car equivalents,[3] signal phasing, cycle length, yellow and all red time[4], and the saturation flow of a given intersection. The operations method of calculation LOS is used by the City's transportation engineers to recommend and implement appropriate signal timing adjustments, lane configuration adjustments/additions, and signal progression coordination.

[1] Lane geometries include the number, type, and dimension of each designated lane within an intersection.
[2] Peak hour factors account for a short period of increased congestion within the hour of congestion.
[3] Passenger car equivalents are added to the calculation to account for large trucks.
[4] Yellow time is the amount of time allowed for the amber phase of a traffic signal. All red time is the amount of time allowed for the signal to remain all red to effectively clear the traffic stream before proceeding to the next green phase.

The planning methodology uses the traffic volume and turn lane configuration information to estimate level of service. The quantity and type of travel lanes determine the intersection's capacity. Thus, the volume-to-capacity ratio (from Table II) of an intersection is determined by dividing the number of vehicles making critical movements by the capacity of those movements. Critical movements in an intersection are the highest sum of the north-south left and through movements and the highest sum of the east-west left and through movements after dividing the totals by the number of lanes provided in each movement. The sum of all critical movements is divided by an intersection's capacity in order to calculate the volume-to-capacity ratio, which is used to estimate level of service. Adding to critical movements increases the volume-to-capacity ratio and decreases the level of service. More explanation of this formula will be included in the staff presentation.

The planning methodology is used for calculating LOS when determining the traffic impacts of land development proposals. Staff converted to using the operations methodology for development review in the late 1990s. This proved to be problematic for many reasons, including variations in LOS results using the same traffic count information and improvements to LOS when traffic was added to an intersection. Additionally, the planning methodology often gave more conservative results. Staff returned to the Planning Commission in 2000 to report these issues and switch back to using the planning methodology. See the attached Planning Commission Report, dated December 14, 2000, for a detailed description of why staff switched back.

Which Intersections Are Currently Operating Below the City's Standard?

The City of Santa Barbara, in the Circulation Element and Master Environmental Assessment (MEA), has established Level of Service C at a Volume-to-Capacity (V/C) ratio of 0.77 as the level beyond which an intersection is considered to be "impacted." The V/C ratio of 0.77 was chosen in an attempt to stop congestion levels from rising above V/C 0.80, or Level of Service D. Currently, the following Highway 101 interchanges are considered to be impacted (AM, PM, or both) because they are more congested than Level of Service C with a volume-to-capacity ratio higher than 0.77:

- Las Positas
- Mission
- Carrillo
- Castillo
- Garden
- Cabrillo

Additionally, the following intersections are currently impacted because they are more congested than Level of Service C with a volume-to-capacity ratio higher than 0.77:

- State and Las Positas
- Modoc and Las Positas
- Cliff and Las Positas
- Mission and Castillo

- Mission and Bath
- State and Cabrillo (Sunny Summer Sundays)
- Carrillo and Bath
- Carrillo and Chapala
- Garden and Gutierrez
- Hot Springs/Coast Village/Old Coast Highway
- Coast Village/Olive Mill

As one can observe from the above list of intersections, the City's congestion is predominantly related to accessing the freeway. The actual freeway interchanges and the intersections on the roadways leading to them are commonly the same ones that operate below the City's standard LOS C. As a result, freeway conditions and traffic flow have a direct relationship with the operation of traffic on our local streets.

What Are the Primary Influences on Travel Demand?

As we discussed at the workshop on traffic impact analysis, traffic levels grow approximately 0.5 to 1% per year on the main travel corridors such as Milpas, Anapamu, Carrillo, Mission, and State Street.[5] Traffic growth on local residential streets is generally less or unchanged.

Much of the on-street traffic growth has been produced by housing created in neighborhoods. Because they tend to be small, few housing projects generate enough traffic to produce a traffic impact. Furthermore, most housing projects tend to be located away from impacted intersections. The cumulative effect of the City's housing production, however, does add up to measurable traffic increases over time.

As mentioned above, the traffic on Highway 101 has a strong relationship to and influence over local streets. Prior to the six-lane freeway that was completed between Fairview and Castillo in 1989, congestion levels on Upper State Street were actually higher than they are today. Once the six-lane was completed, approximately 6,000 average vehicle trips per day left the Upper State Street corridor and began using the then congestion-free highway. Similar freeway effects have occurred over time. The Crosstown Freeway section, which eliminated the traffic signals, also removed significant traffic volumes from Downtown local streets and from the Waterfront area. In both cases, the freeway congestion had caused motorists to seek faster travel times on local streets.

As a significant portion of the workforce moved to Carpinteria or Ventura County, freeway congestion increased south of Milpas. Consequently, local streets have also incurred traffic increases. As freeway traffic and congestion continue to increase because of regional market forces, housing prices, increases in tourism, and general South Coast development, traffic on local streets will also increase as fewer motorists choose the freeway for City-related trips.[6]

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[5] Based on an internet search, 2% to 9% highway traffic growth rate is common in other U.S. cities.
[6] A city-related trip is a trip that has an origin and/or destination within Santa Barbara.

This cycle of higher congestion levels on the freeway leading to the addition of more freeway lanes also requires capacity improvements at the interchanges. When Highway 101 has been widened in the past, the local roadway network has also improved. However, a wider, higher capacity freeway increases the arrival rate of vehicles to the interchange. Consequently, older interchanges (e.g., Mission Interchange) that were designed for a lower capacity freeway, no longer function well during peak periods. Increasing the capacity of the interchange is not always an effective solution because the roads leading to/from the interchanges would, in many cases, require widening as well.

The price of gas is rapidly becoming a factor for long distance travel demand. As prices rise, the use of alternatives, such as the Clean Air Express, Valley Express, and VISTA bus services to/from the North County and Ventura, have also increased. Broader housing and employment location changes may also become a factor if gas prices continue to rise.

What Are the City's Available Options to Increase the Roadway Network Capacity and Reduce Congestion?

Throughout Santa Barbara's history, the community has consistently acknowledged a desire to prevent the automobile from overwhelming the City. The City's general planning documents have elevated traffic congestion as a high priority quality of life issue. The City's low tolerance traffic impact threshold is evidence of this fact. The most recent General Plan document addressing traffic, the Circulation Element, acknowledges that we can no longer build our way out of congestion. The document focuses the City's resources on the demand side of transportation, rather than on supply or roadway capacity. The stated goal of the Circulation Element is to make alternative modes of transportation so available and so attractive that the use of an automobile is a choice, not a necessity. As a result, the solutions that will be most effective at addressing congestion will be those actions that eliminate the need to make auto-related trips.

Solutions that address travel demand will not lead to the extinction of the car. The automobile will likely continue to be the most used form of transportation in the City. Intersection and roadway improvements and refinements will continue to be included in the City's approach to address congestion. Vehicle access management through redevelopment projects can reduce and consolidate driveways. But reducing the use of the car by even small percentages can have a greater impact on managing congestion and enabling the City to allow the small amount of incremental growth that is important for economic vitality.

Staff has included a video entitled, "Santa Barbara Transportation: Past, Present, Future," that was produced following the approval of the Circulation Element. The video presents the reasoning behind the grass roots efforts of the Circulation Element and clearly articulates the City's transportation planning vision. The video will also be aired on City TV18 at various times the week of the workshop and the week following.

Exhibit:

A. Planning Commission Staff Report, Level of Service Methodology, December 14, 2000
B. Video, "Santa Barbara Transportation: Past, Present, Future"

CITY OF SANTA BARBARA

Public Works Department

Interoffice Memorandum

DATE: December 14, 2000

TO: Planning Commission

FROM: Transportation Planning Staff

SUBJECT: LEVEL OF SERVICE METHODOLOGY

Purpose of Meeting

In February 1999, Transportation Planning staff held discussions with the Planning Commission prior to using a different intersection Level of Service methodology, known as the Highway Capacity Manual delay methodology. Transportation staff has been using the Highway Capacity Manual (HCM) delay software to analyze Level of Service (LOS) at intersections for about 18 months. This approach seemed the best direction at the time; however, we have learned some unexpected aspects of the program that no longer make it appropriate to use in traffic studies for projects, California Environmental Quality Act (CEQA), and policy review. Although the HCM delay methodology will continue to be used by Traffic Operations staff for maximizing *existing* traffic signal timing and operations, Transportation Planning staff is proposing to resume using the volume-to-capacity (V/C) methodology to measure *existing and future* Level of Service.

There are a number of traffic studies pending and in progress that staff proposes be presented with the V/C methodology, and the purpose of this discussion is to have an opportunity to review LOS methodology with the Planning Commission prior to moving forward.

What is Level of Service (LOS)?

LOS is based on one's observations of an intersection's operations. A letter grade scale identifies six different traffic congestion levels, A – F. When applied to the perception of delay, these letter grades represent qualitative descriptions of the average motorist's experience with congestion (see chart below). The grades and qualitative descriptions have corresponding numbers or a scale by which a quantitative measurement of LOS is calculated.

LOS Expressed in V/C

The volume to capacity methodology is expressed as a ratio (critical intersection volume over capacity). The scale ranges from 0.00 (LOS A) to 1.01+ (LOS F). The maximum capacity of an intersection is expressed as 1.00 V/C. The letter grade assigned to 1.00 V/C is an E, the highest E possible. Any intersection operating over 1.00 V/C is considered to be failing, and assigned is the letter grade F. Please reference the chart below for the qualitative and quantitative descriptions of intersection LOS.

LOS Expressed in HCM Delay

The delay methodology is expressed in average seconds of stopped delay. The average delay is calculated by inputting the capacity of vehicle lanes and comparing the capacity to the number of vehicles and other factors that cause drivers to spend additional time stopped at an intersection. The

scale ranges from 0.0 seconds of average delay to 60.0+ seconds of average delay. The maximum capacity of an intersection using the HCM delay methodology is 60 seconds of average stopped delay. Any intersection where the average delay exceeds 60 seconds is considered to be failing and assigned the letter grade F. Please reference the chart below for the qualitative and quantitative descriptions of intersection LOS.

LEVEL OF SERVICE DEFINITIONS FOR SIGNALIZED INTERSECTIONS

Level of Service	Volume/ Capacity	Average Stopped Delay per Vehicle (seconds)	Definition
A	0.00 - 0.60	0.0 - 5.0	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	0.61 - 0.70	5.1 - 15.0	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.71 - 0.80	15.1 - 25.0	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.81 - 0.90	25.1 - 40.0	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	0.91 - 1.00	40.1 - 60.0	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	1.01 +	>60.0	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.

Impacts Defined

The City defines an intersection as impacted if it exceeds LOS C. For environmental review purposes, an intersection is considered impacted if it exceeds 0.77 using the V/C methodology or 22 seconds of delay using HCM delay methodology. A cumulative traffic impact is generated if a project adds traffic to an intersection operating at a V/C above 0.77 or 22 seconds of delay (defined as a significantly impacted intersection). A project-specific impact is generated if a project's traffic causes an intersection to become impacted, or increases an impacted intersection LOS by 0.01 V/C or 1 second of average delay.

Mitigations

If a commercial project results in a cumulative or project-specific traffic impact, they are required to mitigate the traffic impacts to a level of insignificance.

Using the HCM delay methodology, an applicant could propose a signal timing adjustment as a mitigation. It is uncertain that any signal timing changes will be in place in the future, due to needs of Caltrans and Transportation Operations Division staff' need to respond to changes in traffic circulation.

The V/C methodology does not rely on signal optimization in the field. Any recommended mitigations would either need to increase capacity or reduce added traffic through strategies such as transportation demand management. Capacity mitigation could include additions to the number of lanes (capacity) or changes to the lane configuration (e.g. change a through lane to a shared lane for lefts and through vehicle movements).

Why Did We Try the HCM Methodology?

The HCM delay methodology uses about 30 variables (e.g., number of vehicle lanes and their widths, number of vehicles, pedestrians, bicycles, buses, and trucks) to calculate the average amount of stopped delay that a vehicle driver will experience at the intersection. Rather than a V/C ratio, we were attracted to measuring congestion in average seconds of delay because we thought it was more representative of a driver's experience. The number of variables was also viewed as a benefit because it allowed us a way to factor alternative modes of travel into LOS calculations. The HCM delay is also the most accurate methodology that we know of to measure existing LOS. Local traffic consultants recommended its use. Finally, the HCM delay method is the best tool for optimizing existing traffic signal operation.

What Did We Discover?

Although the HCM delay method seemed the best approach at the time, a number of negative characteristics about the analysis methodology were discovered that eroded the confidence we previously had. These include:

1. Add Traffic, Improve LOS

We discovered that in certain instances traffic could be added to an intersection and cause the LOS to improve. The improvement occurs because the methodology calculates the average delay. The average is lowered when traffic is added to a part of the intersection where drivers experience little or no delay. For example, if traffic was added to a free right turn movement that had little delay, the total average intersection delay is reduced. We believe this occurrence may appear illogical, and that it is potentially inconsistent with our environmental traffic thresholds. At the Planning Commission discussion, staff will provide examples illustrating this aspect of the HCM delay methodology results whereby traffic can be added to an intersection and the LOS improves.

2. Same Traffic Count, Different LOS

Working with various consultants using HCM delay methodology over the past 18 months, we did not find a single intersection that had the same LOS conclusions, even when the consultants used the same traffic counts for a given study intersection. This difference occurs because some of the input variables of the HCM delay software require engineering judgement. In one instance, we had the opportunity to have two traffic engineering firms consult with each other regarding the HCM delay methodology inputs for an intersection. Although the same count data was used, the two firms came up with different LOS answers. Aside from the potential to confuse the public, staff found it challenging in these situations to determine the appropriate LOS.

3. Uncertain Future LOS Projections

The HCM delay method uses signal timing and phasing as analysis variables. When analyzing future traffic, these variables are also projected. These projections, however, cannot be guaranteed because Traffic Operations staff adjusts these variables on an "as needed" basis. In the case of a Caltrans controlled intersection, Caltrans can also vary the signal timing and phasing at will. These changes are expected responses to changing traffic conditions. When the timing and phasing variables are changed, the LOS result can vary greatly. Therefore, future LOS traffic projections and mitigations in environmental documents are uncertain. Additionally, a change in timing or phasing could make an environmental document quickly outdated, which will be problematic, especially for area-wide traffic studies such as the Waterfront Area Transportation Study (WATS2).

4. Unstable Methodology

The HCM delay methodology is constantly being revised and improved. At one time, this seemed like a benefit because the software has a great deal of support in the professional community. The method has been updated twice since staff began using the software. Unfortunately, the revisions included changes to the scale by which the letter grades are assigned. Staff believes that working with a consistent scale is important not only so that decision-makers and the public can understand the methodology but also to prevent environmental documents from becoming outdated.

Other Agencies

Staff has surveyed 23 peer agencies regarding the LOS methodology that they employ. Fourteen of the 23 agencies use a V/C methodology, six agencies use the HCM delay methodology, and three agencies use both methodologies. A common comment regarding the two methodologies, is that HCM delay methodology is the best tool for determining the existing LOS and the V/C methodology is the best tool for future projections. Staff does not recommend using both of the methodologies for environmental review due to inconsistencies between the two methodologies which could complicate the environmental review process.

Locally, the Santa Barbara County Association of Governments (SBCAG) uses a V/C LOS methodology for the Congestion Management Program (CMP). The Level of Service for all CMP intersections is monitored on a regular schedule using a V/C methodology. If an intersection is operating at a Level of Service E or worse, a deficiency plan is required. The first step in a deficiency plan is to provide a Level of Service calculation using the HCM delay methodology. If the HCM delay methodology results are better than LOS E, no mitigations are required. The SBCAG Transportation Technical Advisory Committee (TTAC) will be holding discussions in early 2001 regarding Level of Service methodologies. Members of TTAC and transportation professionals within the County of Santa Barbara have expressed a desired to discuss the pros and cons of using the HCM delay vs. V/C methodology.

The County of Santa Barbara (County) also uses a V/C methodology and requires a HCM delay methodology calculation if a traffic impact is generated.

Resume Use of Volume-to-Capacity (V/C)

We are proposing to use the V/C methodology for the following reasons:

1. Consistent LOS Results

Staff recently reviewed two traffic studies conducted using the V/C and HCM delay methodologies. The two studies had nine intersections in common. All the V/C methodology LOS results were consistent for the nine intersections. Because the inputs are fewer in V/C LOS methodology than in the HCM delay methodology, the consultants did not need to consult with one another prior to performing the calculations. Therefore, the V/C methodology results in more consistent calculations, as traffic experts get the same answer (LOS) using the same data.

2. Reliable Future Traffic Predictions

When conducting traffic studies, CEQA requires a future analysis if traffic is anticipated to enter or cause an intersection to become impacted. Usually, traffic projections are analyzed for five years past the project's expected completion date. In the case of area-wide studies, these projections can be 20 to 25 years in the future. The V/C methodology is more reliable for future traffic predictions because the changes that could occur following the LOS calculation are limited to the number or configuration of the vehicle lanes and the accuracy of the amount of projected traffic and not effected by signal timing changes.

3. Stable Methodology

The Volume to Capacity methodology has been around for more than 30 years and has remained consistent in its fundamental approach. It is therefore more predictable and practical to use.

4. Ease of Use

The V/C calculations can easily be made in the field or a Planning Commission hearing. A substantial amount of additional time has been required for any HCM delay methodology calculations. The simplicity of the V/C methodology will allow for staff's immediate response to "what-if" questions at hearings or public meetings.

Conclusion

Due to numerous significant inconsistencies and unpredictability in using the HCM delay methodology (as described above), Staff recommends resuming use of the Volume to Capacity methodology for calculating intersection LOS as it relates to planning and environmental review.

SW/avb

Attachment:
cc: David H. Johnson, Public Works Director
Dave Davis, Community Development Director
Bettie Hennon, Acting City Planner
Elizabeth Limon, Senior Planner
Barbara Shelton, Project Planner/Environmental Analyst
Helene Buchman, Transportation Planning Manager
Robert J. Dayton, Supervising Transportation Planner
Derek Rapp, Associate Transportation Engineer

City of Santa Barbara
California

PLANNING COMMISSION

EXHIBIT B

Consult the City TV schedule on our website for the showings of

**Santa Barbara Transportation:
Past, Present, Future**

The week of May 1, 2006 - May 13, 2006

www.santabarbaraca.gov
Go to quick links and click on City TV and then click on schedule.