



# City of Santa Barbara California

## PLANNING COMMISSION and TRANSPORTATION & CIRCULATION COMMITTEE STAFF REPORT

**REPORT DATE:** April 29, 2008  
**AGENDA DATE:** May 8, 2008  
**PROJECT:** *Special Work Session: Transportation Modeling for Plan Santa Barbara*  
**TO:** Planning Commission, and  
 Transportation & Circulation Committee  
**FROM:** Transportation Planning Division (805) 564-5385  
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### I. PURPOSE OF WORK SESSION

This work session is intended to facilitate City decision-maker and public understanding of the upcoming transportation planning and modeling effort that is integral to the *Plan Santa Barbara* General Plan update and a component of the associated Environmental Impact Report (EIR). This workshop is also intended to provide an opportunity for early input from City decision-makers and the public on transportation-related issues and the goals and assumptions inherent in constructing a comprehensive transportation model.

This is a work session discussion only and no action by the Commission and Committee is requested. Transportation Planning staff and the City's *Plan Santa Barbara* transportation professional services team Fehr & Peers/Kaku Associates will describe the transportation modeling effort. The Planning Commission and Transportation and Circulation Committee will receive public comment and discuss the transportation modeling.

### II. BACKGROUND

#### City Transportation Policies

A key element of *Plan Santa Barbara* is the City's commitment to continue and expand sustainable development policies and the goal of "living within our resources." Existing City policies, particularly, the Circulation Element, promote a shift toward more sustainable forms of transportation and expanded mobility options such as buses, bikes, and walking. Increasing the use of alternative transportation modes provides a means of expanding the overall travel capacity without increasing the road network. These policies also direct that land use development patterns support and facilitate this

shift towards sustainable modes of transportation by concentrating new development, especially mixed-use and residential projects, along transportation corridors in close proximity to jobs and shopping. These forward looking policies are accompanied by City Charter findings applied to individual non-residential development projects, which strictly limit increases in peak-hour traffic at intersections defined as congested by the City.

### **City Transportation Planning and CEQA Analysis**

The City has not conducted a comprehensive city-wide analysis of transportation infrastructure, congestion, and mobility options within the last 20 years. Although various studies have provided detailed examination of selected areas, such as the Downtown-Waterfront Study, and Upper State Street Study, the City typically focuses on traffic analysis for individual projects and sub-areas associated with the potential for cumulative impacts of pending developments. The City's ability to craft policy responses and programs to more fully address transportation issues or to account for the effects of changing trends (such as higher gas prices) on mobility choices will be enhanced with the transportation model. In addition, mobility and traffic congestion within the City are primarily related to regional transportation patterns and long-distance commuting, which will also be considered with the model.

The City's existing CEQA environmental review process uses detailed case-by-case traffic studies of individual development proposals. These project traffic studies provide hand calculations of intersection Levels of Service (LOS) of existing conditions and projected future conditions with the project, primarily using the Institute of Transportation Engineers (ITE) manual for trip generation rates of various land uses. The City employs very strict thresholds of impact significance to evaluate potential congestion impacts of development projects to intersections (intersection operation at LOS C, with a volume-to-capacity ratio of 0.77<sup>1</sup> is considered the maximum acceptable service level per Charter and Circulation Element policies). Compared to the individual traffic study approach, the model will be able to more fully account for the importance or role of alternative modes of transportation, variations in unit type, size or affordability, and factors unique to a local jurisdiction.

### **Professional Services Team**

In order to provide a comprehensive and balanced assessment of transportation issues associated with *Plan Santa Barbara*, the City has retained a transportation consultant team with substantial experience in preparation of transportation models, their application to general plan updates, ability to assess all modes of transportation, and the integration of the findings of such models with Program EIRs.

The transportation modeling team is comprised of two firms. The primary transportation consultant, Fehr and Peers/Kaku Associates, will construct and operate the model, with support provided by Nelson-Nygaard on identifying assumptions for the existing and probable future use of alternative

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<sup>1</sup> LOS and accompanying volume-to-capacity ratios are a traditional traffic engineering approach toward measuring congestion at intersections, with LOS A representing uncontested free flow and LOS F being highly congested conditions equivalent to gridlock. LOS C is generally considered as an acceptable LOS by most local jurisdictions. For example, Santa Barbara County and the cities of Ventura and San Luis Obispo generally identify LOS D, E, or F as unacceptable, depending on the jurisdiction and intersection location.

modes of transportation. Both firms have substantial expertise in factors that affect travel choices, including shifts in land use development patterns, demographics, the type and availability of mobility options, and related issues such as parking requirements. The transportation modeling effort of these firms will be coordinated by the lead EIR consultant, AMEC Earth and Environmental. AMEC's team has extensive experience preparing EIRs which integrate CEQA with transportation modeling in Santa Barbara county and other central coast jurisdictions.

### **Use of Transportation Model**

The model will be used to test the effectiveness of sustainable land use development and transportation policy options under consideration as part of *Plan Santa Barbara* and the effectiveness of various transportation mitigation strategies. The output of the transportation model will also support the transportation impact analysis in the EIR, including assessment of development-related future congestion along the City's roads and at key intersections on arterials which connect with U.S. Highway 101.

Transportation models have become the primary method of assessing long-range transportation planning issues and the congestion-related impacts of general plans. The cities of San Luis Obispo and Ventura both employ transportation models, as does the Santa Barbara County Association of Governments (SBCAG), and the County of Santa Barbara in the communities of Goleta and Orcutt. The City of Goleta and UCSB currently share the same transportation model.

The new transportation model being prepared for *Plan Santa Barbara* will provide a tool to comprehensively update long-range transportation planning in the City. It will provide the means to do the following:

- Address all modes of transportation and assist the City in planning a balanced transportation system
- Account for changing land use patterns and types of development
- Assess the effectiveness of various mitigation strategies and options for shifts in City policies
- Account for regional transportation patterns and promote coordination for regional transportation planning
- Account for changing trends such as variation in unit sizes and affordability, or alterations in gas prices

Details of the proposed new transportation model will be explained in the presentation to the joint meeting of Planning Commission and Transportation & Circulation Committee.

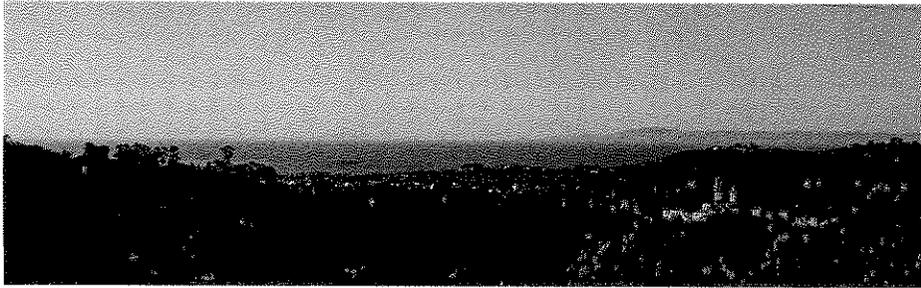
Attached is a copy of the Fehr & Peers power point presentation.

### **Exhibit:**

A. Power Point Presentation



**Travel Demand Model Overview**



*PlanSB PC/TCC Work Session on Transportation Modeling  
May 8, 2008*

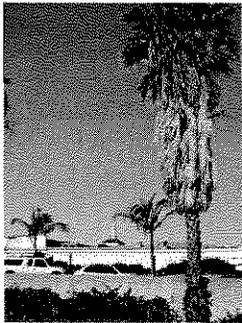
**WHAT WE WILL COVER**

- What is a travel demand model and how is it useful?
- What are we estimating with the Santa Barbara model?
- Summary of our approach to the Santa Barbara model



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## WHAT IS A TRAVEL DEMAND MODEL

**It is a tool that forecasts the supply and demand interaction of transportation where:**

- Supply: Roadway networks, transit networks, sidewalks, etc
- Demand: People and all the places they wish to travel



## WHAT IS A TRAVEL DEMAND MODEL? (continued)

And the future demand for travel is estimated in terms of:

- Magnitude (amount of traffic),
- Direction (where are people going?), and
- The interaction between different land uses in different areas



## HOW THE MODEL WORKS?

These forecasts are typically achieved through the “4-step” process of:

1. Trip Generation (How many trips?)
2. Trip Distribution (Where do these trips go?)
3. Mode Split (What type of transport is used?)
4. Route Assignment (What path is taken?)

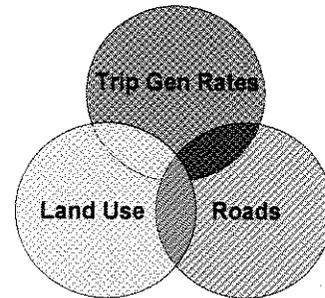


## HOW THE MODEL WORKS (CONTINUED)

Specifically, the model is based on:

**A database of land use in the City**

- # of households
- 1000 square feet of office or employees, etc



**•A database of the highway network and its characteristics**

- Number of lanes, capacity, one way or two way, etc

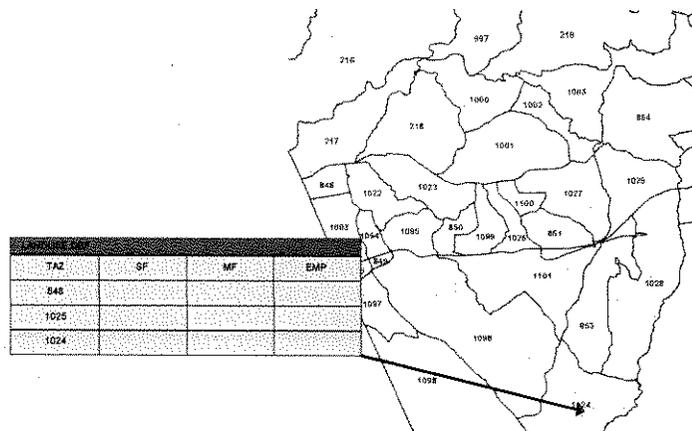
**•A table of trip rates based on land use**

- 1 acre of golf course = 5.04 vehicle trips/day, etc



## LAND USE INPUTS

Land use data

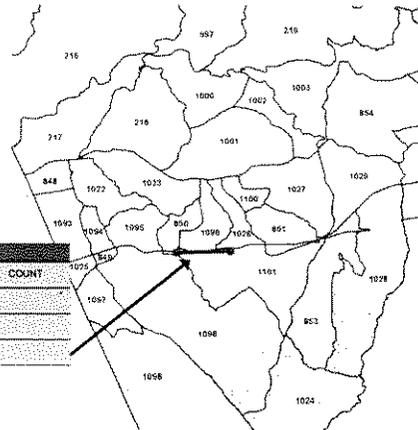


# ROADWAY NETWORK INPUTS



## Roadway network data

| LINK      | SPEED | DIST | LANES | COUNT |
|-----------|-------|------|-------|-------|
| 848-1025  |       |      |       |       |
| 1025-1024 |       |      |       |       |
| 1024-848  |       |      |       |       |



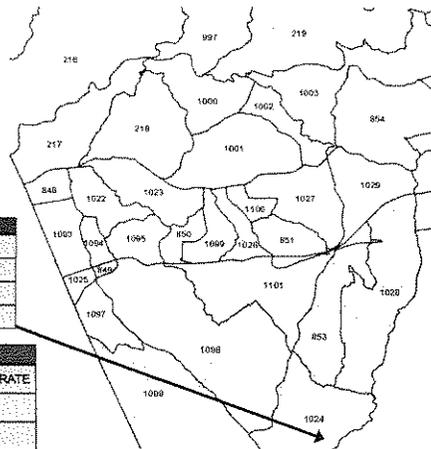
# TRIP GENERATION



- Generates...

| TAZ  | SF | MF | EMP |
|------|----|----|-----|
| 848  |    |    |     |
| 1025 |    |    |     |
| 1024 |    |    |     |

| TRIPS OF |                 |
|----------|-----------------|
| LANDUSE  | DAILY_TRIP_RATE |
| SF       |                 |
| MF       |                 |
| EMP      |                 |



## DIFFERENT TYPES OF LAND USE INPUT VARIABLES

### Socio-economic base

- Typical of Regional models
- Input variables may include:
  - Number of households
  - Household income
  - Household auto ownership
  - Number of employees (retail, industrial, office, etc)



## DIFFERENT TYPES OF LAND USE INPUT VARIABLES

### Land use base

- Typical of municipal level models
- Input variables may include:
  - Dwelling units (single or multi-family)
  - Square footage of non-residential uses



## TRAFFIC ANALYSIS ZONES

Land uses are aggregated into Traffic Analysis Zones (TAZs)

- Vary in size depending on:
  - Level of detail needed for traffic assignment
  - Variety of routes available
  - Mix of land use



## HOW IS IT USEFUL?

Allows us to look at traffic at a city wide perspective

- *Plan Santa Barbara* General Plan may call for a variety of changes
- How will these changes interact in the future?



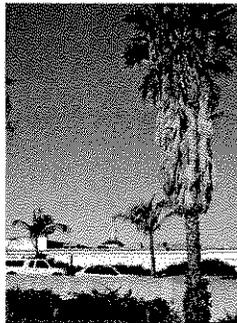
Allows us to place Santa Barbara in a regional context

- Changes in Santa Barbara influence travel from elsewhere and
- Changes elsewhere influence travel to Santa Barbara



## WHAT WE WILL COVER

- What is a travel demand model and how is it useful?
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## WHAT ARE WE ESTIMATING?

Overall we will forecast travel demand for the various *Plan Santa Barbara* General Plan land use scenarios

Estimate how certain policies might lead to changes in/reduction of vehicle trip making

- Mixture of land uses – Small walkable areas with compatible uses
- Changes in employee parking requirements central business district
  - Auto ownership/availability and parking availability affect vehicle trip-making rates



## HOW WILL THE FORECASTS BE USED?

Forecasts will be used for:

- The EIR impact analysis of the *Plan Santa Barbara* General Plan
- Testing effects of policy options on transportation



## MEASURES OF EFFECTIVENESS

- Intersection volume-to-capacity ratio (V/C)
- Link volume-to-capacity ratio (V/C)
- Vehicle trips (VT)
- Vehicle miles of travel (VMT)
- Vehicle hours of travel (VHT)
- Peak hour and daily screenline comparisons
- Change in speed



## POINTS TO CONSIDER

No commercial growth may not equate to no increase in traffic

What are possible outcomes of affordable housing in Downtown Santa Barbara?

Travel demand forecasts will feed into air quality forecasts



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## HOW THE SANTA BARBARA MODEL WILL BE USED



### Regional model as basis

- Roadway network
- Nest Santa Barbara detailed zones in larger regional model zones

### Pros:

- Allows us to leverage work of SBCAG
- Saves time in network coding, allows us to focus on other more detailed aspects
- Considerable data collection already undertaken



## LAND USE DATABASE VARIABLES



### Land use database will use Socioeconomic variables

- Conversion of the City's land use database

Find the relationship between land use quantity and employment density

- Through available data
- At the regional model zone level

- Pros:

Allows us to capture nuances land use base model would not see

- Different residential parking requirements
- Trip-making characteristics of different income groups
- Increased employment density
- Trip rates based solely on number of dwelling units do not see effects of unit size

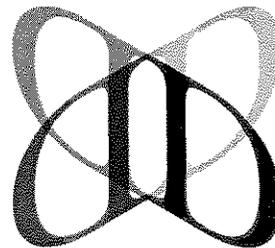


## 4D ADJUSTMENTS

A tool capable of analyzing how certain aspects of land use influence travel

- The 4Ds are:

1. residential and job **D**ensity
2. **D**iversity of land uses
3. walkable **D**esign
4. access to **D**estinations



## 4Ds ADJUSTMENT (CONTINUED)

**Rationale:** Surveys show that certain neighborhood characteristics have a significant effect on travel behavior (the “Ds”)

**Method:** Determine how much above/below average the neighborhood is for each characteristic, and multiply this by the adjustment factor (elasticity)

**Outcome:** Ability to address “blind spots” in traditional travel demand model for alternative transportation design and policy changes



## WHAT ARE BLIND SPOTS?

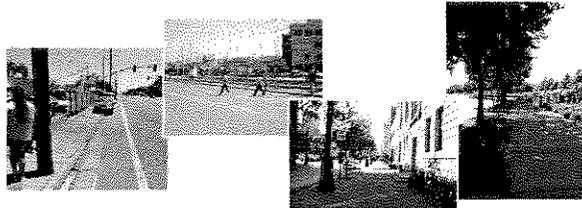
Traditional “4-step” traffic models are useful for measuring some types of changes, but not others. The “blind spots” are seldom discussed

Tests using traditional “4-step” models tend to underestimate the value of a strong alternative transportation network and design; not because something is wrong with this type of design, but because *something is wrong with the models.*



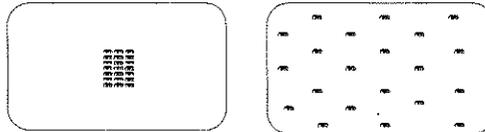
## “BLIND SPOTS” – WALKING TRIPS

- Walking trips must use road links, and only roads big enough to be in the traffic model
- Sidewalk completeness and other aspects of sidewalk condition (shade, aesthetics, etc.) are ignored
- Intra-zonal trips (the most important for walk mode) are handled very abstractly



## "BLIND SPOTS" – LAND USE

- No consideration is given to the distances between land uses within a given TAZ
- Interactions between different non-residential land uses (e.g. offices and restaurants) not well represented
- Density is ignored (a TAZ with a dense development in one corner is treated the same as a TAZ with the same population spread evenly throughout its area)



## CONSEQUENCE OF BLIND SPOTS

Tests of alternative transportation network design and policies understate benefits; what cannot be measured tends to be ignored



## OVERALL

Approach will create a travel demand model using the traditional  
“Step Model” approach

- But with a number of enhancements which allow us to better quantify:
  - The effects of alternative transportation design
  - The effects of policy changes
    - reduced employee parking
  - Certain “what if” scenarios
    - What if affordable housing brought some employees back downtown to live



## QUESTIONS?

