Learning Objective

- Essential steps in preparing a TIS
- Best sources of information
- Methodology
- Pitfalls
- Mitigation measure examples

When are Traffic Impact Studies Prepared?
Environmental Laws

- Nat’l Environmental Policy Act (NEPA)
  - Environmental Impact Statement (EIS)
  - Negative Declaration (ND)
  - Finding of No Significant Impact (FONSI)

- California Environmental Quality Act (CEQA)
  - Environmental Impact Report (EIR)
  - Negative Declaration (ND or MND)

Exemptions

- Maintenance and repair (most)
- Disaster response
- Denied actions
- Most tolls, fares, parking charges
- Increase of rail passenger service
- Most railroad grade separations
- Traffic control devices
Thresholds For Conducting Studies

- 50 to 100 peak hour trips (in highest hour)
- 1% added to sum of critical movements
- Safety problem (existing or future)
- Sensitive area/controversial project
- LOS of nearby intersections is ‘D’ or worse

Thresholds for various land uses

Source: Site Impact Handbook Florida DOT
What is the Purpose of a TIS?

- Determine if significant impact exists
- Recommend mitigation and responsibility
- Use most intense land use for analysis
- Input to environmental impact report
Who Should Prepare a TIS?

- Agency (unlikely!)
- Regional MPO (unlikely)
- Consultant hired by developer (conflicts)
- Consultant hired by agency (preferred)
- Developer pays for TIS cost

What Should a TIS Do?

- Assess traffic volumes
- Inventory existing infrastructure
- Evaluate site plan
- Include Operations and Safety Analyses
- Identify off-site improvements
- Address cumulative impacts
- Identify mitigation responsibility
TIS Outline

- Existing counts
- Trip generation
- Trip distribution
- Parking demand/signal timing/crashes
- Pedestrian/bicycle access
- Mode split/transit access/ADA
- Construction impacts
- Development and evaluation of mitigation measures

Pre-Study Preparation
Land Use and Traffic Data

- Accurate description of land uses by gross SF, DU, rooms, acres, beds, seats
- Current site plan
- Knowledge of key areas of concern: parking, access, safety, signal progression, residential impacts
- Approved scope of work by agency

*Note: Developers change their minds frequently!*

Data Collection

- Site visit to observe: traffic conditions, street geometrics, queuing, pedestrians, transit, parking demand, sight distance etc.
- Conduct traffic counts: peak hour, ADT, parking occupancy, signal timing, collisions
- City/County Circulation Element
- Other EIRs/TIS for nearby developments
- Cumulative land use data for future projects
Defining Study Area

- Discretionary but not arbitrary
- Potentially impacted intersections
- Typically 1 to 10 square miles (size of project)
- Use a map as attachment to form
- Negotiate with approving agency before study begins

Two Basic Traffic Studies in Site Impact Analysis

- Long Range Planning
- Short Range Planning
**Work Scope form for Traffic Impact Studies**

- **Existing and Proposed Land Uses**
  - Specific as possible
  - Permitted uses under general plan
  - GSF, DU, ACRES, ROOMS, SEATS etc.
  - Other characteristics (operating hours, employees, deliveries)
  - Use reasonable worse case
Existing Street Network

- Geometrics – lane configurations
- Traffic volumes
- Intersection control
- Street lighting
- Crosswalks/transit stops

Peak hour volume is 10% of ADT

Source: Site Impact Handbook Florida DOT
Example of existing conditions
Source: Site Impact Handbook Florida DOT

Traffic Analysis

- Existing
- Existing + project without mitigation
- Existing + project with funded mitigation
- Existing + project + cumulative without mitigation
- Existing + project + cumulative with mitigation
Trip Generation

- ITE rates
- SANDAG (San Diego Assoc. of Govts)
- Special studies of similar uses
- Know how data was obtained: sample size, location, based on actual counts
Trip Generation

- Institute of Transportation Engineers *Trip Generation* Report
- Three volumes, over 1,000 pages
- Essential for any transportation library
- Trip generation rates based on driveway counts
- Number of data points varies

Trip Generation Rates

- Daily
- Weekend
- Peak hour of the street
- Peak hour of the generator
- Directional split of traffic
- Mode split included in rates
Trip Generation Report

and use of the 7th Edition
ITE Trip Generation Report and Handbook

Trip Generation – Users Guide
Trip Generation Example

- 100 new homes proposed for a 20-acre parcel, with a 20,000 s.f. shopping center
- Trip Gen Rates: 10 trips/day per SFDU;
  - 50 trips/day per 1,000 s.f.
- Answer: \((100 \times 10) + (20 \times 50) = 2,000\) daily vehicle trip-ends

ITE Trip Generation Report

Not a Manual

- National data – Florida, Arizona and California, played big role
- Suburban locations with little or no transit
- Some small sample sizes for new (though important) uses
  - Discount clubs (861)
  - Stand-alone drug stores (881)
- May not work downtown
What is a Trip End?

- Number of trips that come in or go out of a development
  - (Volume at Driveways)

A trip end is a single or one-direction vehicle movement with either the origin or destination (exiting or entering) inside the study site.

Journey/Trip/Trip Ends

1. Journey
   - (Home-Work-Shops-Home)

2. Trips
   - (Home to Work)
   - (Work to Shops)
   - (Shops to Home)

6. Trip Ends (2 Per Trip)

2 TRIP ENDS
Vehicle Trips (ITE) vs. Person Trips

- **ITE Trips**
  - 1 Vehicle Trip

- **Person Trips**
  - 5 Person Trips

How Are Trip Generation Rates Determined?

- Traffic is counted at each entrance of a certain land use.
- Traffic is then studied in relation to the size of certain "independent variables."
What is Meant by “Daily Trips”?

- For our use, we usually mean the number of WEEKDAY TRIPS.

What’s Peak Hour?

- Any 4 consecutive 15 minute periods that equal the highest 1 hour volume
- There are usually morning and evening
  - Some lunch time peaks are important
- We are usually using peak hour of Adjacent Street Traffic
- Can be 3 hours!
Generator vs. Adjacent Street Traffic

- Usually the same PM peak for shopping, office and residential
- Hospitals, industrial and schools may be different due to different work shifts
- Fast food restaurants have short trip durations and peak during mid-day peak periods

PM Peak Hour Trips Aren’t Always Equal

- **Shopping Center (820)**
  - 202,400 sq.ft = 1,000 Peak Hour trips
    - 480 in
    - 520 out

- **General Office (710)**
  - 821,300 sq.ft = 1,000 Peak Hour trips
    - 170 in
    - 830 out

See peaking characteristics
**Gross Leaseable Area (GLA)**

- GLA is only the area that can be used by shops
- Does not include parking areas or common pedestrian areas

**Gross Floor Area (GFA)**

- GFA includes all enclosed area for each floor

**Specialty Retail vs. Shopping Center**

<table>
<thead>
<tr>
<th>Shopping Center (820)</th>
<th>Specialty Retail Center (814)</th>
</tr>
</thead>
<tbody>
<tr>
<td>407 studies</td>
<td>5 studies</td>
</tr>
<tr>
<td>379,000 sq.ft. Gross</td>
<td>69,000 sq.ft. Gross Leasable</td>
</tr>
<tr>
<td>Leasable average</td>
<td>average</td>
</tr>
<tr>
<td>Rate in PM Peak = <strong>3.75</strong></td>
<td>Rate in PM Peak = <strong>2.71</strong></td>
</tr>
</tbody>
</table>

Read the Descriptions in the ITE Report
**Description**

Specialty retail centers are generally small strip shopping centers that contain a variety of retail shops and specialize in quality apparel; hard goods; and services, such as real estate offices, dance studios, florists and small restaurants. Shopping center (Land Use 820) is a related use.

**Additional Data**

The sites were surveyed from the late 1970s to the 2000s in California, Florida, Georgia, New York and Pennsylvania.

**Offices Using Different Independent Variable**

- **Business Park (770)**
- **28 acres average**
- **379,000 sq.ft. Gross Floor Area average**
  - average density = 379/28 = 14K sq.ft. per acre
- **An analyst could hide trips by using “acres” if the development was higher than the average**
Size Does Matter

Generally, the larger any use becomes the fewer number of trips generated per square foot.

| LAND USE | TRIP CATEGORIES | ESTIMATED PEAK TRIP VOLUME (PM Peak) | HIGHEST PEAK HOUR % | TRIP GENERATION RATE (PT/AC) | TRIP SAVERS
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRICULTURE</td>
<td>Livestock</td>
<td>20,000 customers **</td>
<td>80</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>General</td>
<td>15,000 customers **</td>
<td>60</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Farm</td>
<td>10,000 customers **</td>
<td>40</td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nursery</td>
<td>5,000 customers **</td>
<td>20</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Orchard</td>
<td>3,000 customers **</td>
<td>10</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vineyard</td>
<td>1,000 customers **</td>
<td>4</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>wooded =</td>
<td>500 customers **</td>
<td>2</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Campground</td>
<td>200 customers **</td>
<td>1</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hunting facility</td>
<td>50 customers **</td>
<td>0.5</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CEMETERY</td>
<td>20,000 visitors **</td>
<td>80</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Church or Synagogue</td>
<td>10,000 visitors **</td>
<td>40</td>
<td>2.4</td>
<td></td>
</tr>
</tbody>
</table>

Trip Generation Handbook

Trip Generation Handbook Topics

- Estimating trip generation
- Conducting a trip generation study
- Internal trip capture for multi-use development projects
- Pass-by and diverted trips
Is Internal Capture Optimistic?

Some Developments Are So Large and Diverse That Trips Are Served Internally

Studies Have Shown That Internal Capture Rates Have Not Been As High As Expected by Their Developers

Trip Capture Rates

- Trip Generation Handbook Topic
- Tables 7.1 and 7.2
- Unconstrained Rates for Trip Origins
- Residential to Retail Midday Peak Hour: 34%
What are Pass-By Trips?

Trips attracted from passing traffic

Source: Site Impact Handbook Florida DOT
Are Pass-by Trips Over Predicted?

The smaller and more “convenience-oriented” a business is, the higher the proportion of trips generated that are already on the road.

Gasoline /Convenience Mkts ITE #845
45 - 80% (measured - but use caution)

Shopping Center ITE #820
20% and more (measured - but use caution)

Source: ITE Trip Generation, Handbook
Pass-By Trips

- **Definition**: Trips that would have traveled on a street adjacent to a *Retail Center* even if the retail was not constructed.

- **Applied only to retail-oriented land uses**
  - Shopping centers
  - Convenience markets
  - Gas stations
  - Fast-food restaurants
  - Drive-in banks

- Results in reduction of new trips added to network attributable to retail center.

---

<table>
<thead>
<tr>
<th>Generator</th>
<th>Percent of Site Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks with drive-thru windows</td>
<td>14 %</td>
</tr>
<tr>
<td>Supermarkets</td>
<td>28 %</td>
</tr>
<tr>
<td>Hardware Stores</td>
<td>8 %</td>
</tr>
<tr>
<td>Convenience Stores</td>
<td>16 %</td>
</tr>
<tr>
<td>Fast-food Restaurants</td>
<td>45 %</td>
</tr>
<tr>
<td>Service Stations</td>
<td>58 %</td>
</tr>
<tr>
<td><strong>Shopping Center, sq ft GLA:</strong></td>
<td></td>
</tr>
<tr>
<td>&gt; 1 million, 2 centers, range 12%-25%</td>
<td>19 %</td>
</tr>
<tr>
<td>800,000 to 1 million, 3 centers, range 9%-25%</td>
<td>15 %</td>
</tr>
<tr>
<td>600,000 to 799,999, 2 centers, range 14%-23%</td>
<td>19 %</td>
</tr>
<tr>
<td>400,000 to 599,999, 6 centers, range 15%-48%</td>
<td>32 %</td>
</tr>
<tr>
<td>200,000 to 399,999, 4 centers, range 17%-56%</td>
<td>41 %</td>
</tr>
<tr>
<td>100,000 to 199,999</td>
<td>50 %</td>
</tr>
<tr>
<td>&lt; 100,000, 4 centers, range 51%-72%</td>
<td>60 %</td>
</tr>
</tbody>
</table>

Source: Traffic Institute, Northwestern University [3].

Trips attracted from passing traffic
**Pass-by Reasonableness Checks**

- The number of pass-by trips should not exceed **10 percent** of the adjacent street traffic during peak hour.
- Strong justification must be provided to document pass-by rates greater than **25 percent** of the total external trip generation for the developments retail portions.
  - Ensure proposed development displays ideal characteristics to generate pass-by trips.

---

**Don’t Count Twice,**

*It’s not alright*

If internal capture is considered:

Use internal capture first;
then apply pass-by percentages to **shopping external trips only**

<table>
<thead>
<tr>
<th>Trip Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Internal Capture</td>
</tr>
<tr>
<td>= External Trip Generation</td>
</tr>
</tbody>
</table>

- Pass-By Trips (% of External) = New External Trip Generation
Pass-by Trips Example

Total Trip Generation
- Internal Capture
= External Trips
- Pass-by Percent
= External Trips
New to the System

Driveway Traffic Will Include All Of The Pass By Traffic

Beware when analyzing driveways: analysis must include pass-by trips in driveway volumes.
Trip Distribution

- No standard reference - subjective
- Analyst experience or “feel”
- Pattern of traffic along corridor
- Where do the trips go?
- Distribution is done for each purpose
Trip Distribution Methods

- Points of the compass
- Existing counts/turning movement patterns
- Data from nearby development TIS
- Existing and future land uses
- TIS Models/Select Link Analysis

Trip distribution desire lines
Source: Site Impact Handbook Florida DOT
Trip Assignment

Route Assignment

- How does a particular trip get from “A” to “B”?  
- People wish to minimize travel time  
- In highway network, more than one path  
- Not all traffic will select one path  
- Most important in congested networks  
- *It has to make sense!*
Route Assignment (2)

- Process is iterative
- Various speed/flow curves
- Most common assumption: Wardrop’s principle: “In equilibrium, no person can unilaterally change his/her travel path and achieve a lower travel time.”

Source: Site Impact Handbook Florida DOT
Capacity Analysis
Traffic Impacts

- Calculate levels of service
- Compare to level of service standard
- Compare to threshold of significance
- Identify potential mitigation measures
- Recalculate with mitigation measures

Capacity Analysis Methods

- Analysis method determined by agency
- HCM or ICU
- Intersections
- Segments
- Roundabouts (FHWA Study)
Some Basics Level of Service (LOS) Fundamentals

Measures describing operating conditions of roadways

Delay increases exponentially

Why Use Level of Service "D"?

Delay increases exponentially
## Typical Minimum LOS Standards

*Source: Site Impact Handbook Florida DOT*

<table>
<thead>
<tr>
<th></th>
<th>Rural Areas¹</th>
<th>Transitioning Urbanized Areas², Urban Areas³ or Communities⁴</th>
<th>Urbanized Areas² under 500,000</th>
<th>Urbanized Areas² over 500,000</th>
<th>Roadways Parallel to Exclusive Transit Facilities¹</th>
<th>Inside Transportation Concurrency Management Area⁷</th>
<th>Constrained⁸ and Backlogged⁹ Roadways</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRASTATE</strong>¹²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited Access Highway (Freeway)¹²</td>
<td>B</td>
<td>C</td>
<td>C(D)</td>
<td>D(E)</td>
<td>D(E)</td>
<td>D(E)</td>
<td>Maintain¹⁰</td>
</tr>
<tr>
<td>Controlled Access Highway¹¹</td>
<td>B</td>
<td>C</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>E</td>
<td>Maintain</td>
</tr>
<tr>
<td><strong>OTHER STATE ROADS</strong>¹⁰</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Multilane</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>D</td>
<td>E</td>
<td>E</td>
<td>Maintain</td>
</tr>
<tr>
<td>Two-Lane</td>
<td>C</td>
<td>C</td>
<td>D</td>
<td>D</td>
<td>E</td>
<td>E</td>
<td>Maintain</td>
</tr>
</tbody>
</table>

### Thresholds of Significance*

<table>
<thead>
<tr>
<th>Existing Level of Service</th>
<th>Increase in V/C or Trips Greater Than</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS A</td>
<td>0.20</td>
</tr>
<tr>
<td>LOS B</td>
<td>0.15</td>
</tr>
<tr>
<td>LOS C</td>
<td>0.10</td>
</tr>
<tr>
<td>LOS D</td>
<td>10 Trips</td>
</tr>
<tr>
<td>LOS E</td>
<td>5 Trips</td>
</tr>
<tr>
<td>LOS F</td>
<td>1 Trip</td>
</tr>
<tr>
<td>LOS F ++</td>
<td>0 Trips</td>
</tr>
</tbody>
</table>
Background Traffic and Trends for Analysis of Cumulative Impacts

Basis For Cumulative Impacts

- Impacts from new project
- Impacts from approved “un-built” projects and projects in pipeline
- Background growth in thru trips – based on historical count data
- Agency general plan model projections – okay to use if projects are consistent with plan
- Other traffic impact study data
Trend Analysis

- Historical data for at least the last five years

- Check for major transportation changes
  - Which change capacity and attract new trips

- Check for major development changes

Different Types of Trends

- Linear growth
- Geometric growth
- Declining growth
Some Historical Volumes

<table>
<thead>
<tr>
<th>Year</th>
<th>Volume (AADT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>12,300</td>
</tr>
<tr>
<td>1998</td>
<td>12,000</td>
</tr>
<tr>
<td>1999</td>
<td>13,500</td>
</tr>
<tr>
<td>1998</td>
<td>13,220</td>
</tr>
<tr>
<td>1997</td>
<td>13,000</td>
</tr>
<tr>
<td>1996</td>
<td>13,775</td>
</tr>
<tr>
<td>1997</td>
<td>14,125</td>
</tr>
<tr>
<td>1998</td>
<td>15,000</td>
</tr>
<tr>
<td>1999</td>
<td>14,000</td>
</tr>
<tr>
<td>2000</td>
<td>15,000</td>
</tr>
<tr>
<td>2001</td>
<td>15,600</td>
</tr>
<tr>
<td>2002</td>
<td>15,300</td>
</tr>
<tr>
<td>2003</td>
<td>16,500</td>
</tr>
<tr>
<td>2004</td>
<td>15,900</td>
</tr>
<tr>
<td>2005</td>
<td>16,500</td>
</tr>
</tbody>
</table>

Different Types Of Traffic Growth

Natural Growth

Geometric

Linear

Declining
Results Comparison

Operational Analysis
Queue Analysis
(for signal improvements and median opening changes)

Traffic Safety Analysis
Address Impacts to Locations with Known Safety Problems

- Impacts from new project
- Analyze collision patterns
- Identify mitigation measures
- Include in overall project mitigation

Collision Diagram
Narrow two-lane highway with hairpin bends

Grimes Canyon Quarries

Project Specific Mitigation Measures
**Project Specific Mitigation**

- Depend on results of analysis
- Determined by local LOS standards
- Funded versus un-funded
- Keep TDM measures separate
- Responsibility and timing important

**Typical Mitigation Measures**

- Reduction in project size
- Transportation Demand Management
- Enhancement of circulation system
  - New facilities
  - New lanes
  - Operational improvements
- Project denial
Mitigation Monitoring

- Public Resources Code 21081.6
- Site Plan Requirements
- Mitigations should be in EIR
- Enforcement by:
  - Liquidated Damages
  - Bonds
  - Cash Deposit Surety

New casino constructed near Palm Springs
Site access improvements

Closest impacted intersection widened and signalized as part of mitigation measures
Roadway realigned as part of mitigation for residential tract
Brand new shopping center where 150’ left-turn lane was not lengthened

Example Using the LOS Tables to Determine Proportionate Fair-Share
Proportionate Fair-Share Example

A development adds 300 peak hour directional trips to segment, causing the road to fail.

- 4 Lane divided Arterial
- LOS Standard = D

From Directional Peak Hour Tables, Urbanized Class II

<table>
<thead>
<tr>
<th>Lanes Divided</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Undivided</td>
<td>**</td>
<td>100</td>
<td>590</td>
<td>810</td>
<td>850</td>
</tr>
<tr>
<td>2 Divided</td>
<td>**</td>
<td>220</td>
<td>1,360</td>
<td>1,710</td>
<td>1,800</td>
</tr>
<tr>
<td>3 Divided</td>
<td>**</td>
<td>340</td>
<td>2,110</td>
<td>2,570</td>
<td>2,710</td>
</tr>
<tr>
<td>4 Divided</td>
<td>**</td>
<td>440</td>
<td>2,790</td>
<td>3,330</td>
<td>3,500</td>
</tr>
</tbody>
</table>

Proportionate Fair-Share Example

To maintain a LOS D, this road must go from 4 to 6 lanes.

<table>
<thead>
<tr>
<th>Lanes Divided</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tr>
<td>1 Undivided</td>
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<td>**</td>
<td>440</td>
<td>2,790</td>
<td>3,330</td>
<td>3,500</td>
</tr>
</tbody>
</table>

Service Volume Increase
Proportionate Fair-Share Example

Development adds 300 Peak Hour directional trips to segment
1,710 Maximum Service Volume at LOS D (4 lanes)
Widening to 6 lanes would bring facility to 2,570 Maximum Service Volume
2,570 – 1,710 = 860

\[
\frac{300}{860} = 35\%
\]

If the improvement were $1,000,000 Total
The developer’s share would be $350,000

$1\text{Million} \times 35\% = $350,000

$350,000 could also be applied to transit service improvements

Transportation Demand Management
Vehicle Trips vs. Person Trips

Definitions and Outline

- TSM vs. TDM
- Types of actions and effectiveness
- Limitations
- Monitoring programs
- Long term success/failure
**Program Definitions**

- TSM = Supply-side actions
- TDM = Demand-side actions
- Voluntary vs. Mandatory programs
- Transportation Management Associations (TMAs)

**TDM Program Essential Elements**

- Define clear, measurable objectives
- Community review and education
- Work with developers & employers
- Coordinate with other agencies
- Clearly identify penalties
- Audit the monitoring process
TDM Action Categories

- Increased options for commuters
- Market (pricing) strategies
- Time-of-travel shifting
- Better land use planning
- Regulation of parking or driving

Common Features

- Low cost (relative)
- Low impacts
- Fast implementation
- De-centralized implementation
- Multi-party cooperation/communication
Options for Commuters

- Carpool matching
- Employer-sponsored vanpools
- Club bus/Subscription bus passes
- Preferential carpool parking
- Transit stops/Locker rooms
- Park-and-ride lots
- Telecommuting

Measured Effectiveness

- Individual Employer Programs
  - Travelers Insurance 25-48%
  - Hartford Steam Boiler 14%
  - 3M Co. 10%
  - ARCO (L.A.) 19%
  - State Farm Insurance (Orange Co.) 30%
  - NRC (Wash. DC Metro) 42%
  - US West (Bellevue) 47%
Market (Pricing) Strategies

- Parking fees (or parking tax)
- Parking “cash out”
- Rideshare subsidies
- Transit pass subsidy
- Tax incentives
- Road pricing *(Central London fee)*
- “HOT” lanes

Key Sources for More Information

- TCRP Project B-12, *Traveler Response to Transportation System Changes (Interim Handbook)* March 2000 (on web)
- ITE, *A Toolbox for Alleviating Traffic Congestion*
Mitigation Monitoring

- California: Public Resource Code 21081.6 (AB 3180)
- Ensure mitigations implemented
- Include mitigations in EIR
- Enforcement by liquidated damages, cancellation of permits

Cumulative Mitigation Measures
Available Methods

- Sales Tax
- Traffic Mitigation Fees
- Reciprocal Agreements
- Assessment Districts
- Development Agreements
Current Practices in TIS Preparation

Common Criticisms of TIS

- Trip generation rates are fixed and do not reflect congestion or accessibility
- Adjacent similar developments produce differing results
- Relationships between variables may change over time
- The forecast is a “self-fulfilling prophecy”
Criticisms (cont'd)

- *Fuel price increases are not considered!!!*
- Model assumes “perfect information”
- Impacts to regional road network ignored
- Adjacent similar developments with different impacts
- More should be done to increase the modal split

Current Practices in TIS Preparation

- Trip generation ranges not just average rate (1 standard deviation)
- Multi-day counts
- HCM planning application method
- Segments AND intersections
- Mini TIS models
Software

- Trip distribution
- Street network simulation
- Turning movement projections
- LOS calculations
Web Sites

- FHWA Access Management Site: http://www.accessmanagement.gov
- ITE web site at www.ite.org and look under ‘Publications’
- ULI web site at www.uli.org and look under “Bookstore”
- NCHRP Web Site: http://www4.nationalacademies.org/trb/onlinepubs.nsf

QUESTIONS?

Hearst Castle