SUMMARY OF COMMENTS
PREPARED BY
TRAVEL FORECASTING
PEER REVIEW PANELS

September 1994
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Prepared by
SG Associates, Inc.

Prepared for
U.S. Department of Transportation
  Federal Transit Administration
  Federal Highway Administration
  Office of the Secretary
U.S. Environmental Protection Agency
PEER REVIEW PANEL FUNCTIONS

The procedures used by transportation planning agencies to forecast future travel demand and the split of demand among drive alone, ridesharing and public transit are quite complex. Over the past thirty years, a basic process has been developed that involves four major elements.

1. How many trips will be made? (Trip generation)
2. What destinations will be selected by people living in specific areas? (Trip distribution)
3. How will travel be divided between driving alone, ridesharing and public transit? (Mode choice)
4. How many vehicles or people will want to use specific roadways or transit services? (Assignment)

Initially, the methods used to address each of these questions were relatively simple. Over time, as more research has been reported on personal travel behavior, new procedures were recommended. Advances in personal computer technology and reduced costs for computers has made it possible to implement many of the methods recommended by the research. As this has happened, the methodologies used to consider each of the questions have become more complex.

When an agency undertakes development of new travel forecasting methods, it must consider many questions related to the details of the methodology. The questions might include:

- How should the population be stratified for estimating travel demand?
- What factors are important in determining the number of trips to be made?
- What factors affect an individual’s choice of the destination for a trip? If both highway and transit are available, does this affect the choice of destination? If so, how are these travel opportunities represented?
- When allocating travel to the available modes, what modes must be considered? Should different types of transit service be treated as different modes? Does the methodology need to differentiate between people who walk to transit and those who drive to transit?
- What factors determine a traveler’s choice of mode? How important is each factor?

Each of the questions listed above implies further questions relating to details of the computer programs and the techniques used to represent transportation facilities in the computer models. There are many possible pitfalls. Seemingly simple decisions made at the beginning of work to develop travel forecasting methods can make it difficult or impossible to answer questions that arise when specific investment actions are being considered.
Few individuals have had the opportunity to develop and apply more than one travel demand forecasting procedure. No individual can foresee all the issues that may arise in developing or applying a new model set. One approach to improving travel forecasting procedures has been the use of Peer Review Panels. These Panels, composed of individuals who have "hands-on" experience with both developing and applying travel forecasting models, assist local agency staff in both identifying possible problems and in developing workable solutions.

For a project involving development of new models, a Panel will typically schedule a two or three day meeting that functions much like a seminar. Documentation of existing travel forecasting procedures and of available data sources are distributed to the Panel in advance of the meeting, permitting the Panel to read the items and become familiar with the methods. At the meeting, each aspect of the travel forecasting procedures is discussed in detail. Deficiencies, if any, in existing procedures are noted and suggestions for improving the methods are made. The objective is to assure that travel forecasting methods will be able to answer important questions and that the methods are consistent with the general "state-of-the-art." At the end of the Panel meeting, documentation is prepared of specific recommended and desirable actions.

For a project involving the application of travel forecasting models to analysis of a proposed transportation investment, the role of the Panel is slightly different. In these situations, the Panel will provide comments on the application of the existing models to the issues under study, suggest areas in which additional analyses are required, provide review of basic assumptions (e.g. demographic forecasts, parking costs) and design of alternatives to be tested, and comment on the interim and final results.

In the past few years, Panels have been formed in at least a dozen metropolitan areas. Some Panels have been established as part of FTA's review of Alternatives Analysis studies; others have been assembled by the local transit agency or Metropolitan Planning Organization. As there are many similarities in the travel forecasting procedures used by planning agencies, it is likely that comments made by these Panels would have application in other areas and might provide guidance to the travel forecasting profession on topics where there appears to be concerns on the need for improvements. A synthesis of the comments from the recently convened Panels might assist in this process.

The following materials are a terse summary listing of relevant comments from a number of recent Panels. The factors leading to the cited recommendations reflect both the issues under study in specific projects and the existing model structure used by each of the agencies. Full understanding of specific comments would require knowledge of the detailed procedures in use by the agencies. The summary, however, does provide a useful overview of the topics in travel forecasting meriting attention.

Materials from a number of Peer Review Panels assembled to comment on travel forecasting methods have been obtained and reviewed. Data for panels convened in eight metropolitan areas involving sixteen separate meetings have been obtained. Thirteen of the meetings addressed methods being proposed or used for analysis as part of a specific transit investment study. Three of the meetings had a more general scope related to overall improvements to the demand forecasting procedures being used in or developed for a metropolitan area.
### Peer Group Comments Included in Summary Analysis

<table>
<thead>
<tr>
<th>City</th>
<th>Meeting Number</th>
<th>Date</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlanta</td>
<td>1</td>
<td>April 1994</td>
<td>Model Development</td>
</tr>
<tr>
<td>Cincinnati</td>
<td>1</td>
<td>July 1994</td>
<td>Model Review Prior to Corridor Study</td>
</tr>
<tr>
<td>Cleveland</td>
<td>1</td>
<td>January 1994</td>
<td>Dual-Hub Corridor</td>
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<tr>
<td>Hartford</td>
<td>?</td>
<td>November 1993</td>
<td>Griffin Line</td>
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<td>Honolulu</td>
<td>1</td>
<td>April 1991</td>
<td>Ewa-University of Hawaii</td>
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<td>2</td>
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<td></td>
<td>3</td>
<td>February 1992</td>
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<td></td>
<td>Models</td>
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<td>Model development</td>
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<td>1</td>
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<tr>
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<tr>
<td>San Diego</td>
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<tr>
<td></td>
<td>2</td>
<td>January 1994</td>
<td>Mission Valley East</td>
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</table>
Panel comments are grouped under nine broad topics:

- Observed Data
- Demographic and Economic Forecasts
- System Design
- General Forecasting Model Issues
- Trip Generation
- Trip Distribution
- Mode Share
- Assignment
- Details

There is some overlap and duplication among these topic areas. The comments of panels assembled in specific areas reflect the nature of the project being considered, the status and sophistication of the existing model set and the membership of the panel.

In broad terms, the recommendations that appear to be made most frequently relate to:

1. Obtaining current data on travel behavior, system use or system performance.
2. Validating models against observed data.
3. Assuring consistency of travel times through all steps of modeling and evaluation.
4. Developing new models, especially mode choice models, that adequately treat mode-of-access. A need for a two phase development effort is seen, with near-term efforts focusing on the four-step process and long-term efforts based on processes yet to be defined.
5. Fully documenting procedures and assumptions.
**OBSERVED DATA**

Develop a regional travel database

New travel data are needed. The current base-data are too old.

- Home-interview
- On-board transit survey
- Highway travel speed and travel time

Conduct household survey (3,000-7,000) (activity based)

Conduct panel survey (1,500-2,000)

Obtain actual highway speed data for current year

CBD Parking Costs should be analyzed
  - Under/Overstated
  - Better data needed

Obtain better data on transit fares and parking costs

Conduct surveys at trip destinations

Develop a consistent traffic count database

Obtain data on pedestrian and bicycle facilities

Conduct survey of taxis

<table>
<thead>
<tr>
<th>Location</th>
<th>Activities</th>
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<td>Various data needs</td>
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<tr>
<td>Cincinnati</td>
<td>Various data needs</td>
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<td>Atlanta</td>
<td>Various data needs</td>
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</table>
**DEMOGRAPHIC AND ECONOMIC FORECASTS**

| Sensitivity tests of model elements/inputs should be conducted | Honolulu 3 |
| Conduct Sensitivity Testing of CBD Growth Forecasts | Honolulu 1, Sacramento 1 |
| Check consistency of population and employment forecast | Cleveland, Hartford, Sacramento 1 |
| Analyze apparent lack of consistency between employed resident forecasts and auto ownership forecasts in corridor | Los Angeles 3 |
| Demonstrate financial ability to construct and operate no-build | Los Angeles 1 |
| Document availability of funding for feeder bus services | Honolulu 1 |
| Analyze effect of aging population on system average fares | Honolulu 1 |
| Document, with tabulations and maps, base year, future year and growth in population and parking costs by zone. | Sacramento 1 |
| Reflect transit availability in auto ownership, trip generation, trip distribution, etc. | Atlanta |
| Review auto ownership forecasts | Hartford |
SYSTEM DESIGN

The TSM Alternative requires:

-- Better definition
-- Community involvement in defining services

Prepare full documentation of alternatives, including rail operating plans

Do "winners and losers" analyses to refine networks

Compare bus operating speeds developed from highway network to scheduled times

Document the equilibration of transit service supply and demand procedure

Check to assure that all alternatives, including TSM, offer comparable service and have comparable service areas

Document current and future peak-to-base service ratios

Document and justify annualization factors

Los Angeles 1
San Diego 1, San Diego 2
Los Angeles 3, San Diego 1, Cleveland 1
San Diego 1
Los Angeles 1
Sacramento 3, Los Angeles 1
Sacramento 3
Sacramento 3
GENERAL FORECASTING MODEL ISSUES

A two level approach to model development is needed:

-- Short-term
-- Long-term

Prepare to spend 2-3 years to develop new models

Layout basic model design before data collection

Make models state-of-the-practice not state-of-the-art

Must regularly update models

Focus on activities not trips

Develop methods to analyze Land Use-Transportation linkage

Analyze impact of land use assumptions on forecast transit ridership

Need Airport models: distribution, mode share and special generator

Supply representation and travel forecasts should treat peak and off-peak periods separately

Need capability in models to address management type actions, including TDM and pricing

Develop and document methods for modeling the effects of programs established to meet emission reduction goals that require employers to develop programs to promote reduced use of single-occupant autos for commuting

There is a need for "Special Generator" analyses

Complete analysis and documentation of model set prior to start of corridor investment studies

Feedback congested speeds to distribution, mode choice
GENERAL FORECASTING MODEL ISSUES (Continued)

Highway congestion effects should be reflected in transit patronage forecast

Check the forecasts of future bus operating speeds

Check bus speeds, as developed

Develop regional model with flexibility to permit analyses at or below corridor level

Extend study area boundary

Support linking GIS/Transportation Analysis

Use focus groups or stated preference surveys to identify trade-offs

Validate base year model simulations

-- against on-board survey and household survey
-- against screenline crossings

Compare trip length distribution of person trips and transit trips, as simulated, against on-board and home interview surveys

Include an incremental build-up analysis in Results Report. This would include a step-by-step analysis of the impacts of demographic/economic change, and system changes so the effects of each on the resulting forecasts can be identified.

Concern about use of FRATAR to expand transit trip table for incremental analysis

Project schedule too short

Do not "hand adjust" forecasts upon completion of model application

Commercial trip data and analysis are needed.
TRIP GENERATION

Trip generation

-- include walk trips
-- should include a measure of
  level of service available
-- stratify by income (or similar measure)
-- The dwelling unit is the decision unit

Include household size in work trip
generation model

Life-cycle analysis of households is needed

Non-Home Based

-- Divide into work-based and others
-- Generate based on household data
  then allocation to Origin and
  Destination Zones

Review reasonableness of future year trip
generation results

Develop cross-classification trip generation model

The assumption of auto ownership rates
and income constant over time at the zone
level may be incorrect for zones that will
have substantial change (e.g. from rural to
suburban).

Honolulu Models
Honolulu Models
Honolulu Models
Honolulu Models
Hartford
Honolulu Models
Cincinnati
San Diego 2
Atlanta
Sacramento 1, Cincinnati
TRIP DISTRIBUTION

Check work trip distribution against Census

Los Angeles 3, San Diego 1
Los Angeles 1, Cleveland 1,
Sacramento 2

Need validation of geographic trip patterns

San Diego 1, Sacramento 2

Check model estimates of CBD travel

Cleveland 1

-- Number
-- Orientation
-- CBD Cordon

Use composite impedance at least for work trips

Honolulu Models

Use congested speeds for work trip distribution

Hartford

Do "time-of-day" analysis

Hartford

Use a single set of friction factors by purpose,
not peak and off-peak

San Diego 2

Examine need for K-factors

Sacramento 1
MODE SHARE

Develop/borrow non-work mode choice model

Develop procedure for transit mode of access modeling (including Kiss-and-Ride)

Develop better Park-Ride access coding

Use nested logit for work mode choice

Transit Mode of Access

-- Consider weight on auto connector time
-- There may be a need to represent access to several park-ride opportunities (different services)

Broadly define park-and-ride catchment area

Broadly define walk access area

Consider walk networks around stations

Revise zone structure for corridor investment study to assure small zones near stations and correct mode of access representation

Use mode choice model segmented by income group

Use congested highway speeds

Do/portray sample mode choice computation

Tie transit network coding to highway network

Use same maximum walk distances for bus and rail

Estimate college/university mode choice using work trip model

Document parking costs

Is factoring method (as used in Washington and Atlanta) adequate for non-work mode choice (as opposed to separate model)?

Need analysis to determine if "CBD Flag" variable and parking cost variable duplicate each other
MODE SHARE (Continued)

Need a methodology to eliminate "long drive access/short transit" trips with non-CBD origin and destination

Need to carefully check transit assignments for short (one station) trips

Conduct sensitivity analysis of timed-transfer operations

Analyze drive-access demand relative to Park-Ride lot capacity

Prepare District-to-District trip tables for alternatives to analyze differences

Identify "new" trips using "build project"

Hartford

Los Angeles 1

Sacramento 3

Sacramento 3

San Diego 1

San Diego 1, Los Angeles 3

Sacramento 1
ASSIGNMENT

Highway Assignment

-- Use multipath
-- Use generalized costs
-- Do by time of day
-- Use more iterations in equilibrium assignment

Use equilibrium highway assignment

Use generalized cost for highway path building

Compare uncongested and congested highway speeds (travel times)

A time-of-day analysis by trip purpose is required for transit assignment.

Assign on-board survey and check against load counts and transfer rates

Honolulu Models

San Diego 1

Cincinnati

Sacramento 1, Cleveland 1