

TCRP Report 95 Series – Chapter 17

Traveler Response to Transit Oriented Development

presented to

North Carolina Model Users Group Meeting

Greensboro, North Carolina

presented by

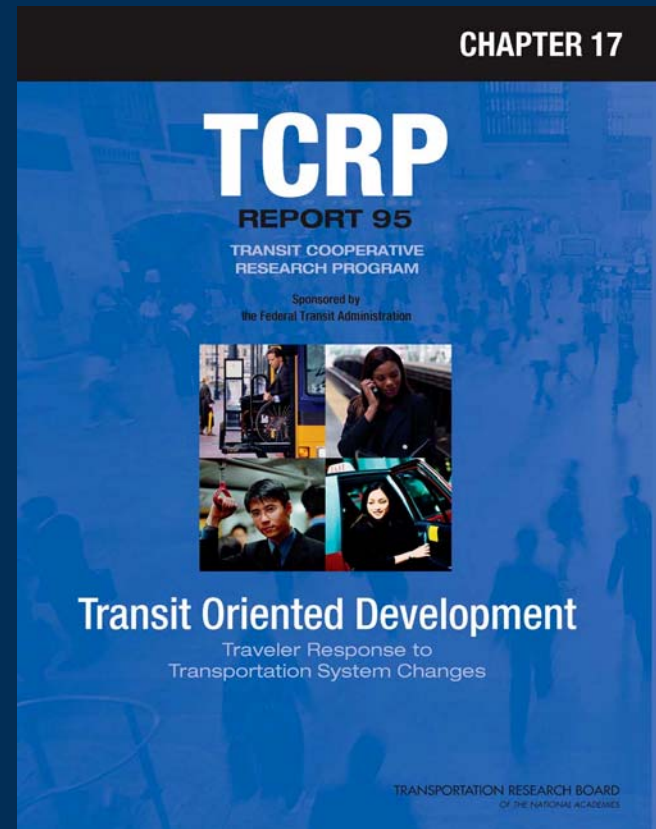
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Cambridge Systematics, Inc.**

October 24, 2007

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Presentation Outline

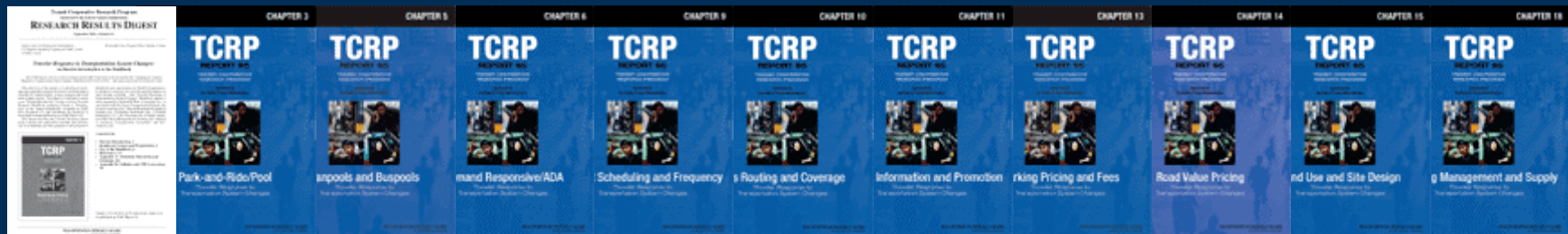
- *Introduction*
- Types of TOD
- Traveler Response Summary
- End Notes



TCRP Report 95 Series – Chapter 17

Traveler Response to Transit Oriented Development

TCRP Report 95 series identified as one of the “most essential transportation publications” in a national survey of transportation professionals conducted by *The Urban Transportation Monitor*



Sources: As quoted in February 3, 2006 issue. Cover images from Transportation Research Board web site.

Project Overview

What the Handbook **IS**

- Travel demand impact manual
- Sourcebook on results of transportation actions
- Survey of information on usage and feasibility



Project Overview

What the Handbook IS (continued)

TEXT

Traveler Response Summary

Roadway transportation is a latecomer, relative to utilities, airlines and hotels, to the application of variable or peak-period pricing. In the United States, projects only began to take hold after the FHWA started funding demonstrations in the 1990s. Value pricing clearly impacts traveler behavior. When observed traveler sensitivities to value pricing are expressed as price elasticities, most fall in the range of null to -0.5, similar to but marginally less than sensitivities to transit fare. Short-term trip-making adjustments made by travelers in response to pricing include changes in route choice, time of travel, mode choice, trip frequency and selection of activity and destination. Route choice adjustments predominate when free highway alternatives are available. Long-term effects are less certain; road value pricing may influence not only further decisions about trip-making, but potentially also automobile ownership and location choice for residences, employers, and activities.

The United States has seen public reluctance to implementing areawide value pricing projects, and they have not been common internationally. The major example of longest standing is the Singapore Area License Scheme (now Electronic Road Pricing), in effect since 1975 within Singapore's central area. Initiated with an AM peak period auto entry fee equivalent to almost 5 percent of a car-owning household's average income, with 4-plus occupant HOVs free, the pricing cut morning traffic entering the zone by over 40 percent and greatly increased transit use and carpooling. Enhancements over the years have kept this island state's central area traffic under control. Three Norway cities have for a decade or more charged autos US \$0.80 to \$1.75 during workday hours for crossing a ring around their central areas. The traffic reduction obtained by diverting some travelers to other modes or hours was on the order of 5 to 10 percent. Early results from a new £5 (about \$8) congestion charge for entering central London between 7:00 AM and 6:30 PM indicate a 20 percent reduction in entering traffic. No U.S. areawide projects are in place.

Some North American examples of corridor pricing have been implemented, but most so recently that their evaluations are still incomplete. Typically, tolling was already in place, and the value pricing is applied as either an off-peak discount or peak-period surcharge. A bridge toll demonstration in Lee County, Florida, has seen a \$0.25 (50 percent) shoulder-of-the-peak discount attract drivers away from the peak hours enough to reduce AM peak hour traffic of eligible drivers by 7 percent, with a much lesser effect in the PM. A newly instituted off-peak E-Z Pass savings of \$1.00 (20 percent, relative to peak E-Z Pass crossings from New Jersey into New York, may be producing comparable peak hour reductions. In all of the cases, U.S. and international, there is a clear sensitivity of motorists to peak pricing, and the expected effect of shifting traffic away from periods with the highest charges has been commonly observed.

The United States has three major projects of the lane pricing variety, the SR 91 Express Lanes tollway and I-15 HOT Express Lanes projects in California, and the lower-key Katy Freeway HOT lane project in Houston. Pricing has been successfully used to maintain good levels of service on the premium lanes, while enhancing their use in the case of the HOT lanes, and financing construction and operation in the case of the SR 91 tollway. Only a minority of paying customers elect to use the special lanes regularly, as compared to only occasionally electing to pay in preference to traveling on adjacent free lanes. The LOV toll option has not detracted from use of the HOT lanes by HOVs; indeed, I-15 Express Lanes usage by HOVs grew by more than 20 percent over "before" volumes during three demonstration years. Transit use has not been adversely affected, but questions remain concerning impact on

TABLES

0.25 by traveling in the discount periods (Cain,

and after implementation, traffic volume data spreading effects at the bridge and the basic need unchanged. This is best explained by the to the discount was small relative to the total sweater, at the disaggregate level, among users and were observed within all discount periods, and during peak periods. The strongest response bridge, where an 18 percent increase in eligible AM discount period, associated with a 7 percent m 7:00 to 9:00 AM. In surveys, approximately ed that they had altered their travel since the counts, and 50 percent indicated they took the ; trips across the bridges. Of those modifying of travel, 9 percent changed their route, and in, Burris and Pendyala, 2001; Center for Urban

if the responsiveness of traffic to the travel cost time advantage gained from traveling during the cents the sensitivity to value pricing toll cost calculated demand sensitivities (characterized as in traffic during the relevant period divided by way Administration, 2001a; Cain, Burris and sensitivities are shown in Table 14.5 for each of arc elasticities computed by the Handbook

Lee County Demonstration Project

Cape Coral Bridge					
Log Arc Elasticity	Percent Change in Price	Change in Demand	Elasticities per source*	Log Arc Elasticity	Log Arc Elasticity
-0.23	-50.0%	30.0%	-0.20	0.14	
-0.03	-5.00	5.4	-0.11	0.08	
-0.08	-5.00	5.4	-0.11	0.08	
-0.04	-5.00	1.3	-0.03	0.02	

the percent change in toll cost, a shrinkage-ratio-like

log arc elasticities computed by Handbook authors.

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Project Overview

What the Handbook Is **NOT**

- Best practices manual
- Implementation manual
- Design or operation manual



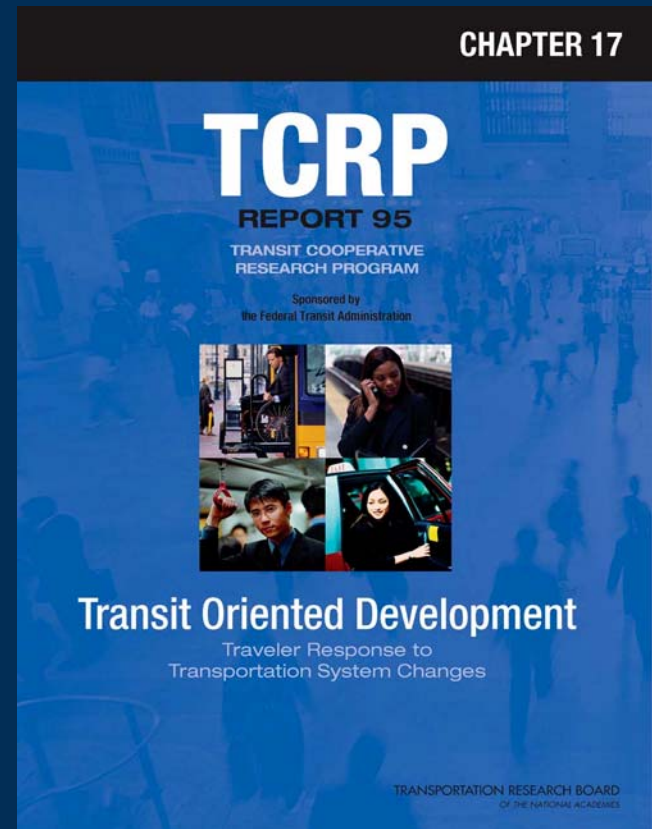
Handbook Organization

Topic Area Chapter Format

- **Overview and summary**
 - Objectives of [the system change]
 - Types of programs
 - Analytical considerations
 - Traveler response summary
- **Response to [the system change]**
- **Underlying traveler response factors**
- **Related information and impacts**
- **Additional resources**
- **Case studies**
- **References**

Presentation Outline

- Introduction
- *Types of TOD*
- Traveler Response Summary
- End Notes



Types of TOD

Definitional Dimensions

We selected three dimensions that significantly characterize TODs and along which traveler response varies

- **Regional context**
 - City Center ↔ Suburban
- **Land use mix**
 - Less Diverse ↔ More Diverse
- **Primary transit mode**
 - Heavy Rail, Commuter Rail, Light Rail
 - Bus Rapid Transit, Traditional Bus

Types of TOD

TOD Index

We developed a TOD Index

- A construct for potentially characterizing “TOD-ness” in models
- Divided attributes into “essential indicators” and “supporting indicators”
- Case study presented with very basic construct

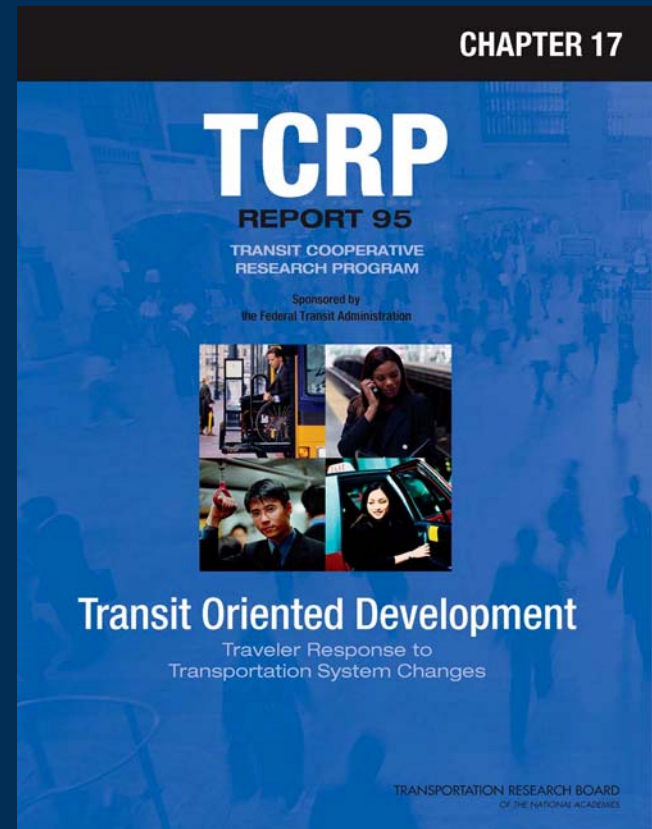
Types of TOD

TOD Index

- **Among the key indicators**
 - **Centrally located transit with walking distances no more than 1/4 to 1/2 mile**
 - **Superior walkability with small blocks and pedestrian traffic management priority**
 - **Extended hours of highly-reliable transit service at 5 to 15 minute intervals**
 - **Land use mix to meet daily needs paired with good transit connectivity to other activities**
 - **Density sufficient to support cost-effective transit, retail services, and infrastructure**
 - **Managed parking with reduced supply relative to standard development**

Presentation Outline

- Introduction
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- End Notes



Traveler Response Summary

Ridership Gains from TOD

- TOD concentrates trip ends around transit stations resulting in *more transit ridership* even if TOD transit mode shares were the same as those produced by conventional development
- TOD *transit shares are typically higher* – and automobile mode shares are lower – than for non-TOD due to the special transit-usage-supportive attributes of TOD
- *Few actual examples* of ridership gains that can be clearly attributed to TOD implementation because of the many sources of ridership and multiple confounding factors typically present
- We provide examples in the chapter from many areas and transit systems in the U.S.

Traveler Response Summary

Mode of Transit Access

- **TOD positions large numbers of transit riders close enough to their transit stop that they can and will walk to it in preference to auto use for the access mode**
- **The greater the concentration of transit trip generation within station areas, the higher a station's overall walk access share will tend to be**
- **TOD residents were found to be generally associated with lower automobile ownership rates**

Traveler Response Summary

Vehicle Trips and VMT

- The degree to which TOD can reduce vehicle trips and vehicle miles of travel (VMT) from a regional perspective is poorly established
- The seemingly ideal measure would be the change in travel choices made by individual TOD residents when they move and settle in, but very few studies were encountered that provide comprehensive observations
- VMT itself has not generally been an observable measure (usually model derived) creating further problems with drawing conclusions in this area

Traveler Response Summary

Influencing Factors

- **Several interactive factors contribute to traveler response**
 - Land use and site design
 - Automobile ownership
 - Relative transit and highway accessibility
 - Parking supply
 - Parking pricing
 - Transit support
 - Self-selection of residents
- **More than just good transportation policy required to develop high-quality and effective TOD**

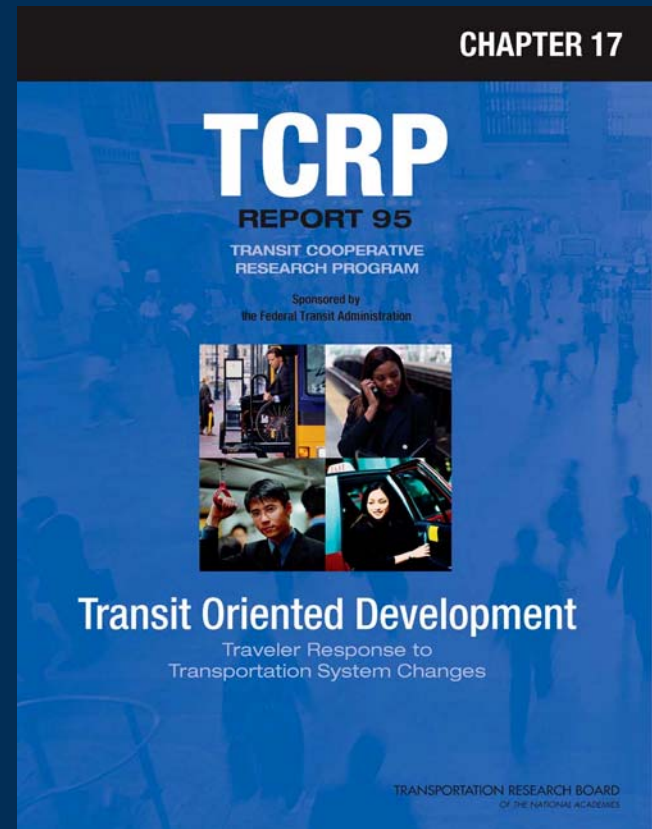
Traveler Response Summary

Self-Selection and TOD

- Attraction of “transit oriented residents” to TOD housing has been dubbed “self selection”
- Could higher transit mode shares normally observed in TODs simply result from self selection? If so, then TOD would not cause increased transit use from a regionwide perspective
- Modest proportions of TOD residents surveyed made their housing choice with good transit use opportunities as one of their top reasons
- For there to be no increase in regional transit use going forward, the transit usage of TOD individuals must — on average — not change overall with the level of TOD
- TOD resident self-selection could be a positive force in reducing regional auto travel and enhancing ridership

Presentation Outline

- Introduction
- Types of TOD
- Traveler Response Summary
- *End Notes*



End Notes

- **Chapter 17 Authorship**
 - Lead Authors – Jay Evans, Dick Pratt
 - Contributing Authors – Andrew Stryker, Rich Kuzmyak

- **Getting the Handbook**
 - TRB website – Type “TCRP Report 95” in search box
 - Free download of PDF versions
 - Purchase hardcopy from TRB Bookstore
 - Free hardcopy via APTA’s www.tcrponline.org
 - Chapter 17 was published August 1, 2007

Additional Information

Handbook Usage Important Considerations

- Concept of elasticity
- Degree-of-confidence issues
- Impact assessment methods
- Demographic considerations

RRD #61 (Interim Chapter 1)

Transit Cooperative Research Program
Sponsored by the Federal Transit Administration

RESEARCH RESULTS DIGEST

September 2003—Number 61

Subject Area: LA Planning and Administration Responsible Senior Program Officer: Stephen A. Parker
TVA Highway Operations, Capacity and Traffic Control
VI Public Transit

**Traveler Response to Transportation System Changes:
An Interim Introduction to the Handbook**

This TCRP digest is one of a series of products from TCRP Projects B-12, B-12A, and B-12B. "Updating the 'Traveler Response to Transportation System Changes' Handbook (DOT-FH-11-9379)." This digest was written by Richard M. Pratt.

The objective of this project is to develop an up-to-date and expanded sourcebook on how travel demand is affected by transportation system changes and built environment options. This digest is structured to serve as an "Interim Introduction" for the evolving Traveler Response Handbook, replacing Chapter 1, "Introduction" of the "Interim Handbook" (available as TCRP Web Document 12), and facilitating the transition to final multi-volume publication as TCRP Report 95.

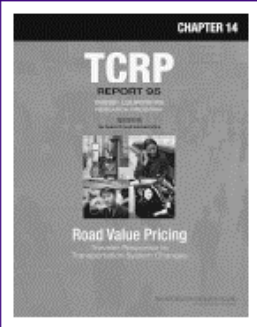
This digest describes the Traveler Response Handbook, contains the publication schedule and information on availability, provides guidance to the prospective Handbook user, and includes two Handbook appendices. It should be saved for use with the printed chapters as they become available. The "Traveler Response to Transportation System Changes" Handbook update is being prepared by Richard H. Pratt, Consultant, Inc., in association with the Texas Transportation Institute; Jay Evans Consulting LLC; Parsons Brinckerhoff Quade & Douglas, Inc.; Cambridge Systematics, Inc.; J. Richard Kumyak, L.L.C.; SGA Associates, Inc.; Gilling Corporation; McCollum Management Consulting, Inc.; Herbert S. Levinson, Transportation Consultant; and K.T. Analytics, Inc.

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Chapter 14 is the first of 19 stand-alone chapters to be published as TCRP Report 95.

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES



Handbook Organization

General Sections and Topic Area Chapters with Status

- Ch 1 – Introduction (with Appendices A, B)
- **Multimodal/intermodal facilities**
 - Ch 2 – HOV Facilities
 - Ch 3 – Park-and-Ride and Park-and-Pool
- **Transit facilities and services**
 - Ch 4 – Busways, BRT, and Express Bus
 - Ch 5 – Vanpools and Buspools
 - Ch 6 – Demand Responsive/ADA
 - Ch 7 – Light Rail Transit
 - Ch 8 – Commuter Rail
- **Public transit operations**
 - Ch 9 – Transit Scheduling and Frequency
 - Ch 10 – Bus Routing and Coverage
 - Ch 11 – Transit Information and Promotion

Color Key

Final
Published

Interim
Published

Not Yet
Published

Handbook Organization

General Sections and Topic Area Chapters with Status (continued)

- **Transportation pricing**
 - **Ch 12 – Transit Pricing and Fares**
 - **Ch 13 – Parking Pricing and Fees**
 - **Ch 14 – Road Value Pricing**
- **Land use and non-motorized travel**
 - **Ch 15 – Land Use and Site Design**
 - **Ch 16 – Pedestrian and Bicycle Facilities**
 - **Ch 17 – Transit Oriented Development**
- **Transportation demand management**
 - **Ch 18 – Parking Management and Supply**
 - **Ch 19 – Employer and Institutional TDM Strategies**

Color Key

**Final
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