

THE TRANSPORTATION COSTS OF NEW DEVELOPMENT

**A New NCHRP Model to Calculate Local
Costs/Revenues of New Development**



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ROCKY MOUNTAIN LAND USE INSTITUTE
University of Denver Sturm College of Law
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INTRODUCTION TO THE TRANSPORTATION COSTS OF NEW DEVELOPMENT

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Suburban Collector Road



Transportation Costs/Revenues Related to New Development:

Capital and Operating Public Services

- New development occurs locally and causes local capital and operating costs and revenues.
- These costs involve *capital* items such as: road construction/expansion; transportation vehicles for the poor, disabled, infirmed, and elderly; improved intersections; signalization; public parking lots; school bus stations; school parking facilities.
- They also involve *operating* items such as: road cleaning and repair; transportation services for the poor, disabled, infirmed, and elderly; school district student transportation.
- Impact fees, property taxes, and other revenues pay a portion of the capital and operating costs and are counted as revenues against the above costs.

Rounds of Transportation Costs/Revenues

Direct, Indirect, and Induced Costs/Revenues

- Transportation cost impacts begin with those related to the initial development increment. New residents pay taxes. The foregoing are termed *direct costs/revenues*.
- The initial development may have employees who live within the community or residents who create new jobs due to the magnitude of their local spending. Employee households pay taxes. These are termed *indirect costs/revenues*.
- The initial and subsequent development may create the need for road improvements. A portion of this new capacity causes other people to locate within the community, consume services and pay taxes. These costs and associated revenues are termed *induced costs/revenues*.

Direct Costs/Revenues: Capital and Operating

Calculation Procedures

- *Direct capital* costs/revenues are calculated using standard impact fee procedures to determine the magnitude of direct capital costs and revenues.
- *Direct operating* costs/revenues are calculated using standard fiscal impact procedures to determine the magnitude of direct operating costs and revenues.
- *Direct capital* costs/revenues are charged to the developer if local impact fee ordinances are in place. *Direct operating* costs/revenues are almost never charged to the developer but are paid for by development residents in the form of property taxes.

Indirect Costs/Revenues: Capital and Operating

Calculation Procedures

- *Indirect capital* costs/revenues are calculated using impact fee procedures applied to the increment of housing units and nonresidential space comprising indirect development. (Employee housing and additional commercial space)
- *Indirect operating* costs/revenues are calculated using fiscal impact procedures and data applied to the increment of housing units and nonresidential space comprising indirect development. (Employee housing and additional commercial space)
- *Indirect costs/revenues* are never charged to the initial round of development that caused them. On the capital side, they may be charged as direct costs of subsequent development. Indirect operating costs, while almost never charged to the developer, are paid for by residents in the form of property taxes/other revenues.

Induced Costs/Revenues: Capital and Operating

Calculation Procedures

- *Induced capital* costs/revenues are calculated using elasticities of demand to develop an increment of new population living within the community related solely to the excess capacity of the road improvements. In most cases, they are afforded the same level of service as currently held by existing residents.
- *Induced operating* costs/revenues are calculated using the same elasticities of demand. This produces a new population that consumes local operating services at the same level and costs of the old population.
- *Induced capital and operating* costs/revenues are never charged directly to the developer. They often are not even charged as subsequent rounds of development. They are paid for in the property taxes/other revenues of new local housing and commercial space.

OPERATING COSTS IN THE NCHRP MODEL

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Drainage Repair along Road ROW



Operating Costs/Revenues

1. This is the standard fiscal impact approach using methods from Burchell and Listokin (Rutgers University). TischlerBise, Mary Edwards (St. Cloud University).
2. Basic Formula
$$\text{Revenues} - \text{Costs} = \text{Net Fiscal Impact}$$
3. Costs/revenues come from local municipal/county and school district budgets.
4. Costs related to transportation services are separated from other costs, both operating and debt service.

The Development Proforma

1. This is a profile of the new development increment to the municipality/county and school district.
2. On the proforma is contained information on:
 - a) Number of housing units by type and bedrooms
 - b) Amount of nonresidential space by type and square feet
 - c) Price per dwelling unit for residential or per square foot for nonresidential
 - d) Assessment or equalization ratio so that local property tax rate can be applied

Calculating Costs

1. Disaggregation of municipal/county and school district budget into departmental categories (gen. govt., public safety, public works, econ. develop., health, and debt service).
2. Extracting transportation share in the above areas (usually from public works, econ. develop., debt service).
3. Estimating share of municipal/county budget to support employees versus residents. School budget for students.
4. Develop overall cost per employee and resident and transportation cost per employee and resident.

Calculating Per Capita Costs

■ Exhibit I–B.5

■ Estimating Municipality/County/School District Per Person, Per Employee, and Per Student Costs

<i>Expenditure (Municipal/County)</i>	<i>Per Capita (Transportation)</i>	<i>Per Worker (Transportation)</i>
General Administration	\$99.34	\$41.25
Public Safety	\$252.87	\$105.00
Public Works	\$127.88	\$53.10
Transportation	(\$51.15)	(\$21.24)
Economic Development	\$48.77	\$20.25
Transportation	(\$12.19)	(\$5.06)
Health/Human Services	\$16.26	\$6.75
Recreation/Culture	\$66.83	\$27.75
Debt Service	\$72.25	\$30.00
Transportation	(\$36.12)	(\$15.00)
TOTAL Overall	\$684.19	\$284.00
 Transportation	(\$99.47)	(\$41.30)
<i>Expenditure (School)</i>	<i>Per Student Total</i>	<i>Per Student (Transportation)</i>
Teaching	\$9,300	\$0.00
Administration	\$1,500	\$0.00
Transportation	\$3,000	\$3,000
Debt Service	\$1,200	\$360
TOTAL	\$15,000	\$3,360

Calculating Total Costs/Transportation Share

Exhibit I-B.6		
Calculating Total Municipal/County and School District Operating Costs		
<i>Municipal/County Residential Operating Costs</i>	<i>Amount (Total Costs)</i>	<i>Transportation Costs</i>
a. Per person costs	\$684	\$99.47
b. Population of development	4,956	4,956
Total (a X b)	\$3,390,848	\$492,962
 <i>Municipal/County Nonresidential Operating Costs</i>		
c. Per employee costs	\$284	\$41.30
d. Employees in development	2,625	2,625
Total (c X d)	\$745,763	\$108,419
TOTAL MUNICIPAL/COUNTY	\$4,136,610	\$601,381
 <i>School District Operating Costs</i>		
e. Per student cost	\$15,000	\$3,360
f. Students in development	700	700
Total (e X f)	\$10,500,000	\$2,352,000
TOTAL SCHOOL DISTRICT	\$10,500,000	\$2,352,000
TOTAL: MUNICIPAL/COUNTY AND SCHOOL DISTRICT OPERATING COSTS	\$14,636,610	\$2,953,381

Calculating Revenues – Gross Revenues

1. Property Tax = New Valuation X Eq. Ratio X Tax Rate
2. Gross Receipts = GRT/Employee X New Employees
3. Fees, Fines, Forfeits = FFF/per Capita X New People
4. Interest, Rents, Royalties = IRR/per person X New Persons + IRR/per Employee X New Employees
5. Licenses/Permits = L&P/per Person X New Persons + L&P per Employee X New Employees
6. Transportation Share of Revenues = Share of Costs

Calculating Total Revenues

Exhibit I-B.11				
Calculating Municipal/County and School District Future Operating Revenue				
	A.	B.	C.	D.
<i>Municipal/County Revenues</i>	<i>Per Person</i>	<i>Transportation Share</i>	<i>Per Employee</i>	<i>Transportation Share</i>
Other revenues	\$245.65	\$84.11	\$102.00	\$27.461
Property tax revenues	\$387.41	\$19.37	\$228.57	\$11.43
Total	\$633.05	\$103.48	\$330.57	\$39.04
People/employees in development	4,956	4,956	2,625	2,625
Municipal/county revenues	\$3,137,411	\$512,871	\$867,750	\$102,469
Total				
Municipal/County (A + C)	\$4,005,161			
Transportation (B + D)		\$615,340		
<i>School District Revenues</i>	<i>Per Student</i>	<i>Transportation Share</i>		
Other revenues	\$3,723	\$367		
Property tax revenues	\$7,200	\$1,440		
Total	\$10,923	\$1,807		
Students in development	700	700		
School district revenues	\$7,646,383	\$1,264,915		
Total				
School District	\$7,646,383			
Transportation		\$1,264,915		

Net Fiscal Impact

1. Net Fiscal Impact equals revenues minus costs.
2. All revenue minus all costs and transportation share revenues minus transportation share costs.
3. For residential development (including school costs), result frequently comes out negative; for nonresidential development (no school costs) result frequently comes out positive.

Net Fiscal Impact

Exhibit I–B.12 Transportation Operating Costs/Revenues of Development		
Net Fiscal Impact	Project-Specific (Total)	Transportation Share
I. Revenues		
Municipal/County	\$4,005,161	\$615,340
School District	7,646,383	1,264,915
Total	\$11,651,544	\$1,880,255
II. Costs		
Municipal/County	\$4,136,610	\$601,381
School District	10,500,000	2,352,000
Total	\$14,636,610	\$2,953,381
III. Net Fiscal Impact		
Municipal/County	-\$131,449	\$13,959
School District	-\$2,853,617	-\$1,087,085
Total	-\$2,985,066	-\$1,073,126

CAPITAL COSTS IN THE NCHRP MODEL

Arthur (Chris) Nelson, Ph.D.
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Director, Metropolitan Studies Center
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Capital Costs/Revenues

1. This is the standard impact fee approach using a composite of methods from Nelson and Nicholas (Utah, Florida), Duncan Associates (Texas), and Tindale-Oliver (Florida).
2. Basic formula for residential or nonresidential unit based fees:
Vehicle Miles Traveled by New Population/Employment
X
Net Cost Per Vehicle Mile Traveled
(levels of service, improvement costs, revenue credits)
÷
Number of Units/1,000 ft² in Proposed Development
3. Costs are proportionally/rationally assigned (Rational Nexus).
4. Rational Nexus – only those costs actually attributable to the new development increment are assigned.

Levels of Service

1. Standards exist to determine the level of service that the improvement is attempting to replicate.
2. Levels of service can be determined locally or may be influenced by state standards.
3. Many jurisdictions use ITE/TRB Service Levels A – B – C – D – E – F (A is for free flowing; F is stopped for periods of time).
4. Often LOS is a local determination of how heavy road use will be in the future. This takes into account all other forms of transportation.

Transportation Service Areas

1. No hard-and-fast rules on how to construct service areas.
2. Depends on local assessment of travel demand.
3. Albuquerque N.M. – has seven service areas: same land area, City of Atlanta has only one service area.
4. Service areas depend largely on local prior practices of transportation services (road as well as transit, bike, pedestrian).

Albuquerque Service Areas

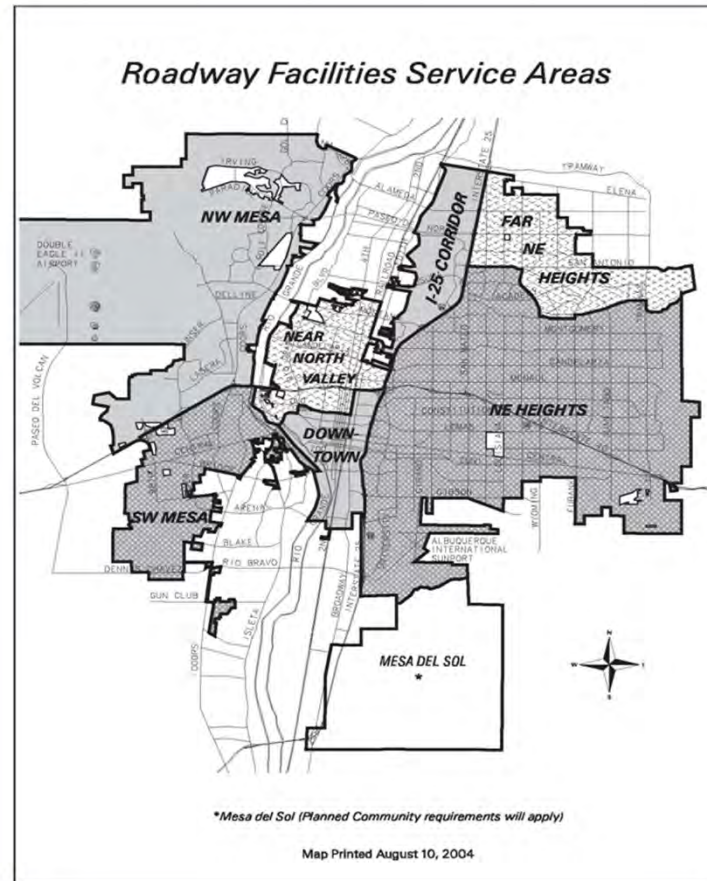


Figure 1. Albuquerque transportation facility service areas.

Estimates of Transportation Demand

1. Begin with assessment of current conditions.
2. $\text{VMT (links)} \div \text{VMC (links)} = \text{VMT/VMC Ratio}$
VMT to VMC Ratio equals 0.5 to 0.9
3. Determine unit of demand: VMT (trip miles) at peak, assigned to each new unit/1,000 ft² of land use.
4. Trip miles is the current impact fee standard of demand.
5. Transit and other modes are also calculated.

Road Costs (Units/Unit Size)

1. Costs are costs per trip mile X distance per trip (adjusting for pass-by and diverted trips).
2. Costs involve scaling for unit size – larger units: equals more people per unit equals more trips per unit.
3. Resultant impact fees are then scaled by size of unit.
4. If costs are scaled per unit so too must be the credits assigned.

Road Capital Improvement



Road Cost Credits

1. Credits – adjustments made to reflect the net capital cost of new development.
2. Gross costs are reduced by federal, state, local, and other funds contributing to road building (transportation) costs.
3. New development must pay for only its net capital facility impacts.
4. The above addresses double counting issues.

Capital Cost Calculation

1. $\text{VMT Per Capita} \times \text{New Pop/D.U.} = \text{VMT/DU}$
2. $\text{Capital Improvements} - \text{Existing Deficits} = \text{Costs of Growth}$
3.
$$\frac{\text{Net Cost of Growth}}{\text{VMT}} = \text{Net Cost / VMT}$$
4. $\text{VMT/D.U.} \times \text{Net Cost/VMT} = \text{Impact Fee/D.U.}$

Calculating Net Cost Per VMT

■ Exhibit I–A.8

Average Construction Cost Per Lane Mile based on the Tucson Study

Arterial	Segment	Miles	Lanes	New Lane-Miles	Cost	Cost per Lane-Mile 2004
Golf Links	Pantano-Harrison	1.00	0 6	6.00		
Golf Links	Harrison-Bonanza	0.50	0 4	2.00		
Golf Links	Pantano-Bonanza	1.50		8.00	\$8,860,278	\$1,107,535
Harrison	Golf Links-OST	1.25	0 4	5.00	\$5,841,510	\$1,168,302
12th Avenue*	Drexel Rd to Valencia Rd	1.00	0 4	4.00	\$4,810,679	\$1,202,670
Pima St*	Swan Rd to Craycroft Rd	1.00	0 4	4.00	\$7,903,501	\$1,975,875
Ft Lowell	Laurel-Swan	0.25	0 4	1.00	\$1,918,478	\$1,918,478
Pantano	Golf Links-Escalante	1.00	0 4	4.00	\$5,290,657	\$1,322,664
Total		6.00		26.00	\$34,625,103	\$1,331,735

Exhibit I–A.12

Average Cost Per Service Unit based on the Tucson Study

	2004
Average Cost per New Lane-Mile	\$1,331,735
Average Hourly Capacity Added per New Lane	780
Average Cost per Peak Hour VMC	\$1,707
Systemwide VMC/VMT Ratio	1.16
Cost per Peak Hour VMT	\$1,980

Exhibit I–A.13

Net Road Cost Per Vehicle Mile Traveled Based on the Tucson Study

	2004 Road Cost
Cost per Peak Hour VMT	\$1,980
Debt Credit per Peak Hour VMT	\$164
CIP/County Funding Credit per Peak Hour VMT	\$349
Net Cost per Peak Hour VMT	\$1,467

Calculating Impact Fees Per Unit

■ Exhibit I-A.14

**Schedule of Road Capital Cost Charges
(at 100% assessment) Based on the Tucson Study**

Land Use Type	Unit	Peak Hour VMT	Net Cost/VMT (2004 Cost)	Net Cost/Unit (2004 Cost)
Progressive Residential Fees by Unit Size:				
Less than 500 sq. ft.	Dwelling	1.49	\$1,467	\$2,186
500 - 749 sq. ft.	Dwelling	1.87	\$1,467	\$2,743
750 - 999 sq. ft.	Dwelling	2.18	\$1,467	\$3,198
1,000 - 1,249 sq. ft.	Dwelling	2.36	\$1,467	\$3,462
1,250 - 1,499 sq. ft.	Dwelling	2.61	\$1,467	\$3,829
1,500 - 1,999 sq. ft.	Dwelling	2.86	\$1,467	\$4,196
2,000 - 2,999 sq. ft.	Dwelling	2.99	\$1,467	\$4,386
3,000 - 3,999 sq. ft.	Dwelling	3.11	\$1,467	\$4,562
4,000 sq. ft. or more	Dwelling	3.23	\$1,467	\$4,738
Single-Family Detached	Dwelling	2.74	\$1,467	\$4,020
Multi-Family	Dwelling	1.93	\$1,467	\$2,831
Mobile Home Park	Pad	1.74	\$1,467	\$2,553
Hotel/Motel	1,000 sq. ft.	0.82	\$1,467	\$1,203
NONRESIDENTIAL	1,000 sq. ft.	2.71	\$1,467	\$3,976
General Retail	1,000 sq. ft.	3.22	\$1,467	\$4,724
Commercial Office	1,000 sq. ft.	2.23	\$1,467	\$3,271
Institutional	1,000 sq. ft.	0.79	\$1,467	\$1,159
Hospital	1,000 sq. ft.	0.94	\$1,467	\$1,379
Nursing Home	1,000 sq. ft.	0.45	\$1,467	\$660
Church Elementary/Sec. School	1,000 sq. ft.	1.39	\$1,467	\$2,039
Industrial/Warehousing				

Calculating Direct Capital Costs Related to New Development

Exhibit I-A.15

Applying the Tucson Study Methodology for Direct Capital Costs to the Development Being Analyzed

<i>Number of Residential Units/ 000s of Square Feet of Nonresidential Space</i>	<i>Cost per Residential/Nonresi- dential Unit</i>	<i>Total Direct Capital Costs) (Transportation)</i>
Dwelling units	\$2,070	\$2,484,586
1,200 2 bedroom Town Houses @ 1,400 sq.ft.		
800 2 bedroom Town Houses @ 2,000 sq.ft.	\$2,562	\$2,049,989
Office space 750,000 square feet	\$3,198	\$2,398,487
Total		\$6,933,062

Revenues

1. In capital cost or impact fee calculations, revenues equal costs.
2. The fees or revenues are specifically set to equal costs.
3. The fee or revenues only apply in jurisdictions that raise impact fees.
4. This (Direct Capital) is the only potential charge to a developer. Operations costs and Indirect/Induced costs are not formally charged.

Conclusions

1. Capital Costs in the NCHRP Model follow impact fee procedures.
2. These procedures reflect court opinions and continuous general practice upgrades.
3. These have been built into the NCHRP Model.
4. These procedures will be available to all planning practitioners upon publishing of the Model.

INDUCED TRANSPORTATION CAPITAL AND OPERATING COSTS IN THE NCHRP MODEL

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Director, Doctoral Program and
Director, Center for Metropolitan Studies
University of Utah

Induced Travel and Transportation Costs

1. Induced Costs – additional highway capacity creates additional traffic and promotes additional urban development in proximity to the added highway capacity.
2. Highway capacity is expanded to relieve congestion. Road supply increases – travel times decrease
3. Lower travel times lead to an increase in traffic.
4. The amount of traffic on an expanded highway is greater than existed without the expansion, i.e. induced traffic.

Short and Long Term Effects of Highway Expansion

Exhibit III-1
Short-Term Effect of Highway Expansion

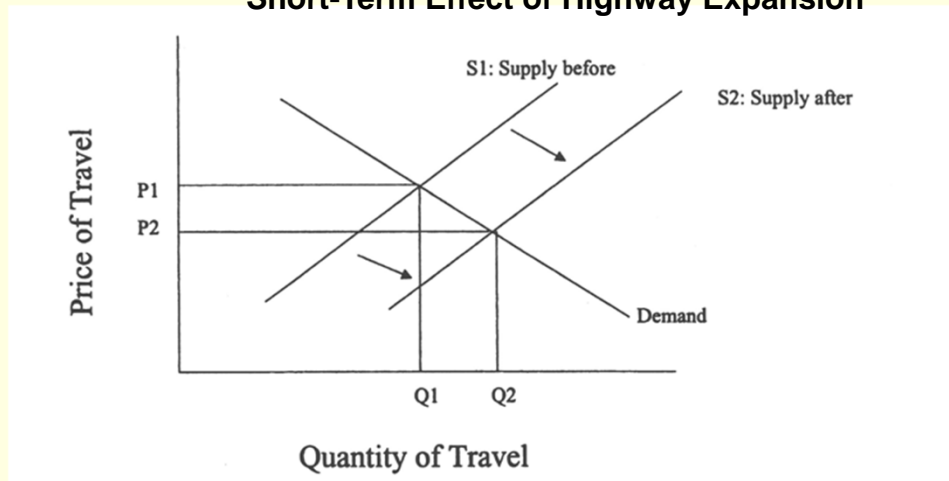
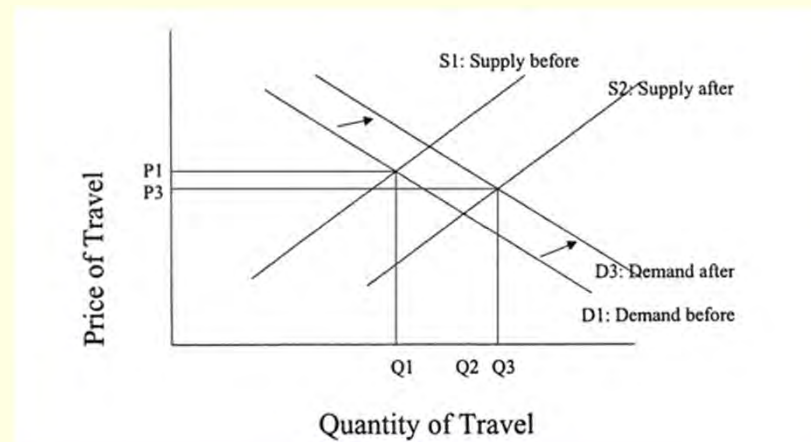


Exhibit III-2
Long-Term Effect of Highway Expansion



The Components of Induced Traffic

1. Increases in highway capacity in the short run involves route switches, mode switches, and changes in destination.
2. Also possibility of new trips that would not have occurred without road expansion.
3. Increases in highway capacity in the long run improves accessibility – lowers travel time – residences and businesses are drawn to the location.

Urban Regional Road



Induced Traffic Issues Related to Definition

1. Type of Travel – person or vehicle travel
2. Unit of Measure – new trips or new trips + lengthening
3. Time Frame – any increase in travel or peak hour increases
4. Geographic Frame – corridor or regionwide
5. Period – short term (<1 year) or long term (<5 years)

Resulting Definition of Induced Traffic

1. Induced Traffic – any increase in daily VMT in the long term at the regionwide level resulting from expansion of highway capacity.
2. Induced Traffic
 - a) vehicle not person trips
 - b) daily travel, not peak or off peak
 - c) Regionwide, not limited to a corridor
 - d) long term, not short term

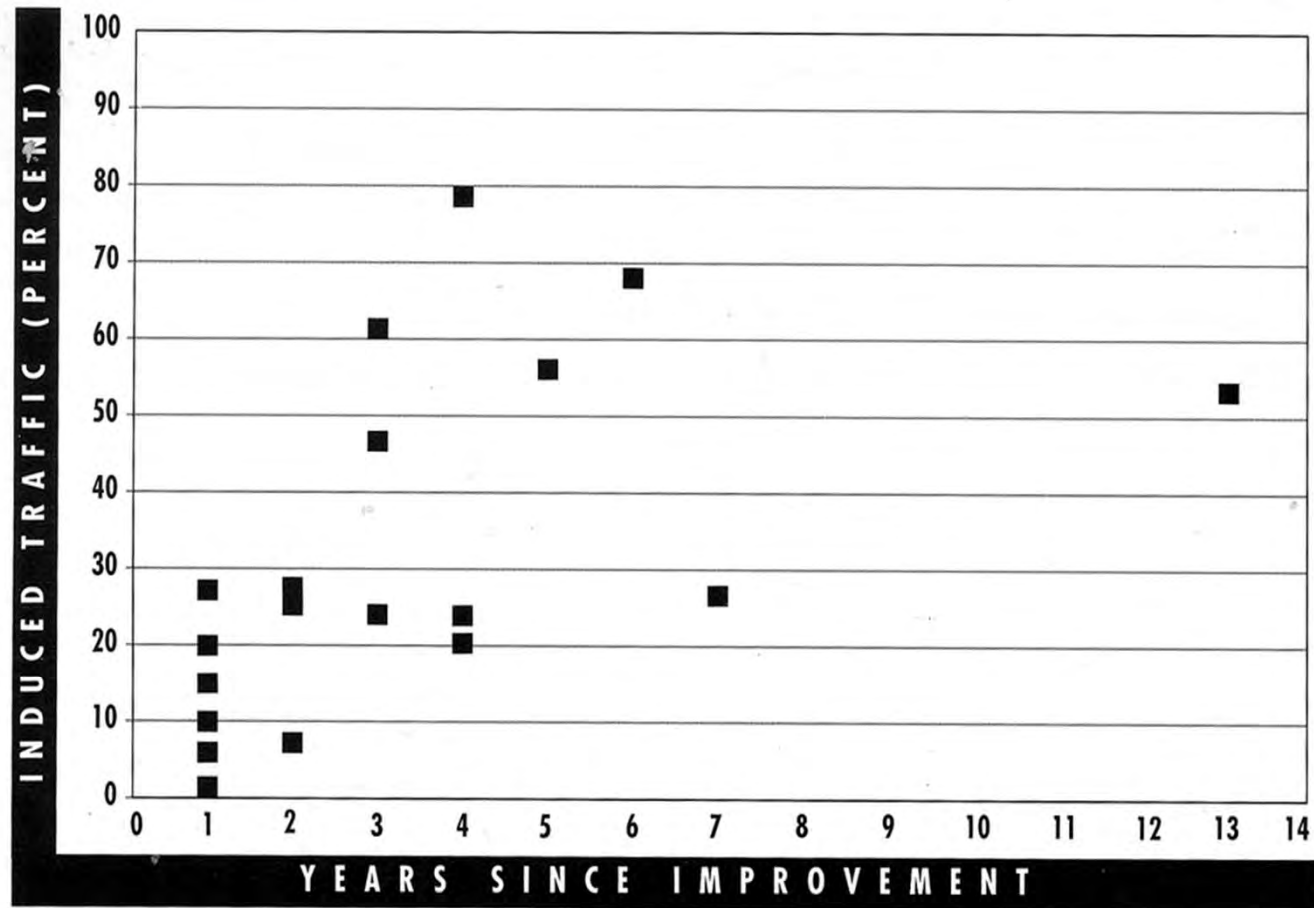
Induced Transportation Capital and Operating Costs

1. Impacts of induced demand can be calculated using the elasticities of direct VMT.
2. VMT varies with:
 - a) density (development)
 - b) diversity (development)
 - c) design (street)
 - d) destination (accessibility)
 - e) distance (to transit)
 - f) development (scale)
 - g) demographics
3. Direct development costs yield a direct VMT figure and additional land mile capacity (LOS constant).

Elasticity Ratio and Induced Costs

1. Elasticity ratios are used to calculate the increment of induced costs over direct and indirect costs.
2. An elasticity ratio is the ratio of percent change in one variable to percent change in another.
3. Induced transportation involves both redistributed and steady state traffic. At first, redistributed traffic; at steady state, new residents brought to area.

Growth of Traffic Over Time



Cervero's Bottom Lines

“...the preponderance of research suggests that induced-demand effects are significant, with an appreciable share of added capacity being absorbed by increases in traffic.”

“All that can be said with certainty is that induced-demand effects exist ... and they accumulate over time.”

Average Elasticities

	<i>Facility-Specific Studies</i>	<i>Areawide Studies</i>
<i>Short-Term</i>	<i>0</i>	<i>0.4</i>
<i>Medium-Term</i>	<i>0.27</i>	<i>NA</i>
<i>Long-Term</i>	<i>0.63</i>	<i>0.73</i>

Dual Causality

“... over the past several decades in California, road supply has been both a cause and an effect in relation to VMT.”

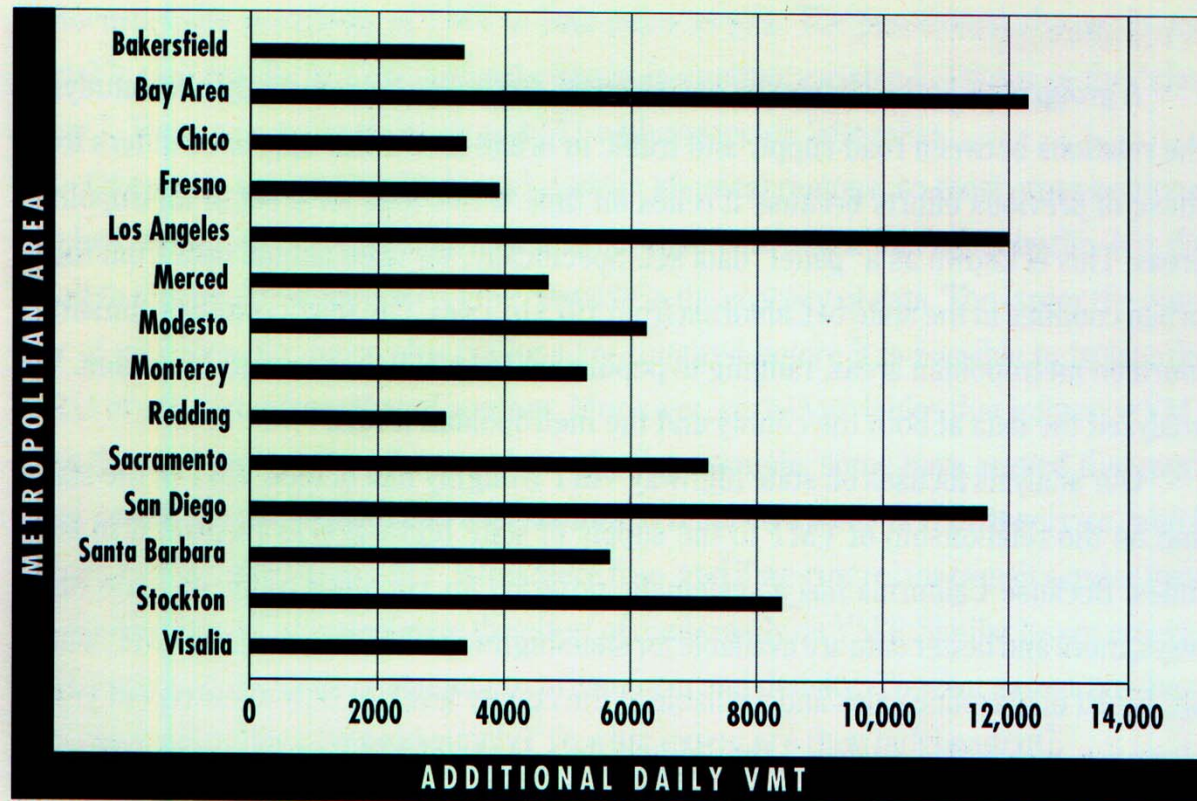
$$\text{elasticity}_{\text{VMT wrt lane miles}} = 0.56$$

(with respect to)

$$\text{elasticity}_{\text{lane miles wrt VMT}} = 0.33$$

(with respect to)

Additional VMT per Lane Mile



Forecasting Induced Traffic

$\% \text{ growth of traffic} = \text{elasticity} * \% \text{ growth of capacity}$

or

$\% \text{ growth of traffic} = \text{elasticity} * \% \text{ reduction in travel time}$

Calculation of Induced Costs

1. The direct and indirect effects add 26 percent extra population and employment to the jurisdiction.
2. Road capacity assumed to increase by same increment.
3. An average elasticity of 0.5 is applied to new capacity to estimate induced VMT.
4. The elasticity is multiplied by 0.5 to include the expected share of new households likely to live within the jurisdiction.
5. The induced effect is one-quarter of the combined direct and indirect effects (26%) or about 6%.

Calculations of Induced Costs

■ Exhibit III-3
Calculating Induced Development
Residents, Units, Jobs, Square Feet of Nonresidential Space

Initial Activity (Residents and Jobs in Existence before Development)	23,530 Residents + 10,000 Jobs = 33,530
Added Activities from Development Generated Direct and Indirect Growth	7,581 Added Residents + 1,175 Added Jobs = 8,756
Direct and Indirect Activities as Percent of Initial Activities – Assume Same Percent Growth of Capacity	$8,756 / 33,530 = 0.261132236$
Multiply Above by Elasticity of VMT with Respect to Capacity	$0.261132236 \times 0.5 = 0.130566118$
Multiply above by Percent of Induced Development inside Jurisdiction	$0.130566118 \times 0.5 = 0.0652831$
Induced Population (Base Residents Times above Value)	$23,530 \times 0.0652831 = 1,536$
Induced Jobs (Base Jobs Times above Value)	$10,000 \times 0.0652831 = 653$
Induced Students (Base Jobs Times above Value)	$9,400 \times 0.0652831 = 614$
Induced Housing Units (Induced Population Divided by Household Size)	$1,536 / 2.503 = 613$
Induced Square Feet of Nonresidential Space (Induced Jobs / Average Jobs per 1,000 sq. ft). X 1,000	$(653 / 2.1373) \times 1,000 = 305,446$

IMPLICATIONS FOR FIELD PRACTICE AND CONCLUSIONS

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Products Emanating from the NCHRP Study: Implications for Field Practice

- The NCHRP study has produced three component devices to assist in analyzing costs and revenues.
- The first is a Procedural Guide explaining the cost and revenue calculation procedures in detail and showing their historical origins.
- The second is a User Guide defining terms, showing the origins and form of data, and explaining the model in parallel with the software sequence.
- The third is Model Software that provides an automated solution of the cost/revenue assessment either quickly (using provided data) or over a longer time period (using self-gathered data).

Procedural Guide for NCHRP Model



Input to NCHRP Model

STEP 2 - DEVELOPMENT DESCRIPTION - ENTER INFORMATION ON DEVELOPMENT BEING ANALYZED

DEVELOPMENT DESCRIPTION AND PREVIEW METHOD

Fill in cells only for included housing/nonresidential types

1. Name of Development	=	Sample Development		
2. Name of Owner	=			
Total Project Land Area in Acres	=	600.00 Acres		
Distance of Project to nearest rail-based transit system (default is 10 miles)	=	10.00 Miles		
Walkability (short description)	=	(Measure)		
Bicycle access (short description)	=	(Measure)		
3. Development Composition				
A. Number of Residential Units by type and size				
Unit Type and Size		Units	Square Feet Per Unit	Sales Price per Unit
Single-family det.	2 bedroom	=		
	3 bedroom	=		
	4 bedroom	=		
	5 bedroom	=		
Garden Apt.	1 bedroom	=		
	2 bedroom	=		
	3 bedroom	=		
Town House	2 bedroom	=	1,200	1,400
	3 bedroom	=	800	2,000
	4 bedroom	=		
High-rise	Studio*	=		
	1 bedroom*	=		
	2 bedroom*	=		
Mobile Home	1 bedroom*	=		
	2 bedroom	=		
	3 bedroom	=		
Other	Type 1*	=		
	Type 2*	=		
	Type 3*	=		
Age-Restricted	1 bedroom*	=		
	2 bedroom*	=		
Total Residential Units		=	2,000	

* Default person and student multipliers not available in the program for these unit types. Multipliers must be provided if these types are used.

Output from NCHRP Model

STEP 7 - VIEW OUTPUT FOR DIRECT, INDIRECT, AND INDUCED COSTS/REVENUES				
TRANSPORTATION COSTS OF NEW DEVELOPMENT MODEL				Page 1
Sample Development				
November 20, 2010				
5:35 PM				
OUTPUT 1 - DIRECT CAPITAL COSTS/REVENUES				
Residential/Nonresidential Unit Generation				
Residential Units	2,000			
Nonresidential Space (000 sq. ft.)	750			
Average Cost/Revenue per Residential Unit	2,267,288			
Average Cost/Rev. per 1,000 sq.ft. Nonresidential Space	3,197,983			
Transportation Capital Costs related to	Residential	Nonresidential	Total	
Direct Development	\$4,534,575	\$2,398,487	\$6,933,062	
Transportation Capital Revenues related to				
Direct Development	\$4,534,575	\$2,398,487	\$6,933,062	
OUTPUT 2 - DIRECT OPERATING COSTS/REVENUES				
Population Added	4,956			
Students Added Grades K-12	700			
Employees Added	2,625			
Residential Market Valuation	\$480,000,000			
Nonresidential Market Valuation	\$150,000,000			
Total Market Valuation	\$630,000,000			
	Total	Transportation Share		
Per Person Costs	\$684.19	\$99.47		
Per Employee Costs	\$284.10	\$41.30		
Per Student Costs	\$15,000.00	\$3,360.00		
Municipal/County Costs (person & Employee)	\$4,136,610	\$601,381		
School Costs	\$10,500,000	\$2,352,000		
Total	\$14,636,610	\$2,953,381		
Municipal/County Property Tax Revenues (res & nonres)	\$2,520,000	\$125,997		
School Property Tax Revenues	\$5,040,000	\$1,008,000		
	Municipal/County	School	Municipal/County	School
Nonproperty Tax Revenue (Total)(no intergov)	\$1,026,508	\$148,936	\$215,545	\$11,170
Intergovernmental Revenue (Total)	\$458,653	\$2,457,447	\$273,798	\$245,745
	Municipal/County Total	School Total	Municipal/County	School
Personal Property Tax (Residential Property)	\$0	\$0	\$0	\$0
Personal Property Tax (Business)	\$0	\$0	\$0	\$0
Personal Property Tax (Total)	\$0	\$0	\$0	\$0
	Municipal/County/ School	Transportation Share		
Total Income Generated by Growth (Municipal/County)	\$4,005,161	\$615,340		
Total Income Generated by Growth (School)	\$7,646,383	\$1,264,915		
Per Person Revenues (All Sources)	\$633.05	\$103.48		
Per Employee Revenues (All Sources)	\$330.57	\$39.04		
Per Student Revenues (All Sources)	\$10,923.40	\$1,807.02		
Municipal/County Surplus/Deficit	-\$131,449	\$13,959		
School Surplus/Deficit	-\$2,853,617	-\$1,087,085		
Total Surplus/Deficit	-\$2,985,066	-\$1,073,126		
Municipal/County Surplus/Deficit as Share of Budget	-0.69%			
School Surplus/Deficit as Share of Budget	-2.02%			

What the NCHRP Research Does:

Develops User Products:

- To provide a guide to cost/revenue calculations that heretofore did not exist.
- To provide a detailed definition of steps to gather data and enact calculations in the transportation impact cost/revenue studies.
- To provide both a relatively quick general procedure and a slower, more detailed procedure of transportation impact cost/revenue calculations.
- To display the overall impacts of new development on transportation in their various stages and relative magnitudes.

What the NCHRP Research Does Not Do

The NCHRP Research:

- Is not an impact fee calculator of the capital costs/revenues of new development—it approximates these types of costs/revenues.
- Is not a fiscal impact model of the operating costs/revenues of new development—it approximates these types of costs/revenues.
- Is not a prescription for whether or what these developments should pay locally in exactions or impact fees.

Conclusions/Implications for Policy

- Transportation costs/revenues of new development, both operating and capital, are capable of being counted.
- These costs/revenues are also capable of being counted by stage of occurrence: direct, indirect, and induced.
- The above is done by using the best procedures in the field (and variations of them) developed by those who initiated these original field procedures.
- Given the above, it is now possible to estimate the magnitude of forthcoming transportation costs/revenues related to new development.