

Is Austin's Transportation Policy Really About Transportation?

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Abstract

This paper explores transportation policy in Austin, Texas in light of an observable and paradoxical gap between the implications of the new proposals and empirical evidence needed to support them. The paper examines the issue in light of four common explanatory rationales of new transit expansions developed by a review of the literature. These are: traffic congestion, sprawl, air pollution, and federal governmental influence. Each rationale exerts pressure in the transportation debate.

As a means of approaching the research question, the paper examines Capital Metro Transportation Authority for its stance on the issue. This is done by use of a content analysis. A videotape of the AIM presentation, a program designed by the agency to inform the citizenry on the issue, was chosen as a key document. The analysis recorded and weighed all statements and compared them against the research models. The results indicate that many statements were made about *qualities*, vague ideals such as choice, quality of life, and urgency, and that quantitative-based supportive research was lacking.

Additionally, the research examines the implications of ridership methodologies as measures of transit significance. It develops a predictive model based on the national experience with light rail systems. The model creates a novel Reduced-Traffic constant (RT constant) for estimating the potential numbers of automobiles likely to be removed from traffic due to a light rail system. The study concludes that while the message is largely about congestion, the empirical findings reveal that relief for the average commuter is likely to be unobtainable.

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Chapter 1

Introduction

Is Austin's transportation policy really about transportation?

It is an oddly complex question. If transportation policy is about urban transport it will concern itself with transportation results. That is a logical hypothesis. Yet, anyone attending the transportation issue today, as expressed by the governing bodies, the public agencies, and the news media may discover little that speaks to accurately measuring expectations. Hence, the research question.

This paper suggests that the Austin transportation issue, though well aimed, is ambiguously defined. It holds promise of nebulous qualities accruing to certain urban conditions. It intimates what in fact may be infeasible: the promise that public transportation will act as an ameliorative aid to automobile traffic congestion. This message is publicly observable. Much of what the Austin transportation agency (Capital Metro Transportation Authority) stands for is broadcast to the city. The sound bite on the evening news, and the "Metro" page of the *Austin American-Statesman* carry the agency's news releases. The agency, in fact, both promises and intimates some significant effects.

At a November 8, 1999 regular meeting of the Capital Area Metropolitan Planning Organization (CAMPO), a private citizen (Mr. Thompson), speaking about the Capital Metro light rail plan, as it was presented to CAMPO commissioners, made some observations relating to those effects:

- Transit systems only move about 2% of the population of any given city
- Transportation involves moving people *and* commerce
- The fixed guideway transit system [HOV lanes and light rail], called for by CAMPO, would address only part of that equation, and, thus, was not an efficient use of the public resource

The room offered some scattered applause. His was not the only opposition voice that night, and certainly there were many who spoke in favor of the plan. The Chairman (Senator Barrientos), however, called this man back to the microphone for a moment¹:

B: Mr. Thompson..., I have a couple of questions, please....
I take it you are against light rail.

[Laughter in the room]

T: Yes sir.

B: Ok. And that's...hey, it's a free country.
Let me ask you, you had quite a bit of information in your statement, uh, how many times did you voice those concerns to the board of Capital Metro?

T: How many times? This is the first time.

B: So, you've never been before the Capital Metro Board to voice these concerns?

T: No sir. I haven't been made available of when meetings were..., I've just now got involved with this process in just the last six months.

B: How long have you been in Austin?

T: I've been in Austin eight years.

B: And you never heard about this before?

T: Didn't know the process before, no sir.

B: So, you didn't write any letters to Capital Metro administrators voicing your concern either.

T: Well, I didn't know that Capital Metro was a planning organization for this city.

B: Okay. Thank you.

¹ The following interchange was transcribed by the author from the archived video-tape of that meeting (courtesy of Austin Public Library History Center).

It was a keen point (and it stopped the Chairman short). Capital Metro is not the planning agency; CAMPO is. Fixed guideway infrastructure was the CAMPO recommendation to Capital Metro. This interchange serves to exemplify a certain haziness surrounding this issue between what it promises to do, what its potentialities might be, and who is responsible for truly revealing and evaluating the possibilities.

A Live-Wire Issue

It should be noted that this is a contemporary public debate charged with intensity in its immediacy. This paper makes broad use, therefore, of news sources as the representative “criers” of the local scene. Indeed, incorporated in the agency’s plan for communicating with the public is a strategy for making liberal use of the news media as a conduit for information-flow. For instance, the agency conceived that its public relations campaign should reach “over 5 million persons.” Of these, nearly *4.4 million* were to occur via the media, “radio, TV, or printed press” (AIM, 2000, “Overview of Public Involvement Process,” p.3). The message merely had to go out. The Capital Metro website, the use of response cards, and a telephone hotline were the available means of reception of public input.

Thus, news reports are occasionally cited in this paper as contemporary sources reporting the agency’s position on issues. It was the intent of the agency that these sources echo the agency’s voice.

The Austin Plan

Is the research question a fair question? Is the Austin transportation policy so amorphous that it prompts such an inquiry? On July 17, 1999 a representative of CAMPO (the regional planning body), participating in the Capital Metro "Transportation Workshop"² which was designed to inform the public about the issue, explained her organization's planning philosophy as articulated in the "CAMPO 2025 Plan"³. A section of her comments is transcribed below. It offers insight into the roots of this research question⁴:

1	So, finally as we update our plan from 2020 to 2025 I wanted to let you know how important it is that we have a balanced system, or at least how important it was to the assumption that led to the 2020 plan.
	[Indicating a graphic overhead...]
2	So what we did is when we sized our freeways, we assumed those systems would be in place.
3	We did a what-if analysis.
4	If we didn't have any rail, and we didn't have any HOV lanes, what would we have to do to move the people in 2020?
5	And it shows on I 35, it is currently 6 to 8 lanes, we would need to have 12 lanes.
6	And it shows on Loop 1, it is currently 4-6 lanes, we would need to have 8 lanes if we didn't put rail in place and we didn't put HOV lanes in place.
7	That was unacceptable to our board.

² To distinguish between these two entities, CAMPO is a federally mandated "metropolitan planning organization" for the region. Its study and recommendations are influential in the City of Austin's transportation plan which comes under the purview of Capital Metro.

³ This is the Austin region's long term transportation plan. It will encompass Capital Metro provisions.

⁴ Excerpt was transcribed by author from an archived video tape (Austin History Center) of the July 17, 1999 Capital Metro sponsored "Transportation Workshop."

8	They said, there's got to be a better way.
9	That's why we have a balanced system.
10	That's why we are showing the rail.
11	That's why we are showing HOV, is ...we do not want to be a system that's strictly dependent on highway.

What this information implies is somewhat remarkable. It promises that light rail transit and HOV lanes will displace future transportation needs in crowded corridors. It is not clear how much, yet a measurable result is implied. The public might logically assume that reductions will be significant, ergo, the organization's high recommendation.

In fact, no such thing may result, and the lane requirements for future road use may persist despite the best efforts of the plan. What evidence is there to speak otherwise?

The Paradox

This paper explores a paradox. The agency's message defining Austin transportation issues is simply not supported by evidence in the literature. This paper investigates several elements of the condition. Observable factors include:

1. The issue is framed by imprecise language.
2. The debate is often about interpretations.
3. The process employs mixed messages.
4. The discussion excludes opposing perspectives
5. Numbers are used as metaphors
6. Use of symbolism and syllogism

This research effort explores the paradox by collecting data from a video-taped presentation of Capital Metro's public education effort (the AIM program). The paper examines key elements of the agency's message to the voters in light of a literature review and a quantitative analysis.

Implications for Public Administration

If policy is about issues that can be weighed in results, then this should suggest a simple evaluative schematic. Find ways to measure the results. The process of policy-making is a chain of events. Where along that chain might the responsibilities for completeness and objectivity in such analyses fall? When politics mixes with public administration it can become a complex question. It touches on a myriad of sub-texts.

Public administration is often considered a profession of pragmatism, a culture wherein administrators must find "what works," implementing means of maintaining continuity of functionality in a world of shifting political sands. Through an organic evolution of its own, bureaucracy often leaves its "de facto imprint" on "the policy mosaic" (Shields, 1996, pg. 391). Public administration is, however, simultaneously and necessarily, a field of strict adherence to codes and standards. It seeks to hold itself to high levels of quality in stewardship of the public trust and as implementor of the public interest.

Citizen deliberations form a crucial part in the democratic process, of course. That means citizens need to be informed. Today, policy-making is often forgiven a lack of empirical basis when data are unavailable and issues are immediate. Policy-making is often political, as well, and "political reasoning is a metaphor-making and category-

making” process (Stone, 1997, p. 9). Rules must sometimes bend to the putative argument. “Analytical concepts” help explore possibilities beyond the limits of objectivism, such as the strict nature of quantitative analyses. What this says, as Stone believes to be the case, is that policy is an arena of articulative device; “politics obeys the laws of poetry” (p. 161). People debate words and ideas as much as they do facts and measures. It is a world where “the representation of issues is strategically designed to attract support to one’s side” (p.34).

Thus, from the idealist’s standpoint, in democracy there is little need to prove that ideas work. What is more important is to win support for them. The appeal to idealism is not without its monumental precedent in policy-making, of course. Look at the Roosevelt transformation of the 1930s. Often academic analysis and/or criticism must follow in the wake of major shifts in national (or local) policy; there is little time beforehand, and often insufficient data. This is the rationale behind much welfare policy. It is hard to test and measure human subjects in order to pre-evaluate responses.

Yet, what if the data are available? What if studies come pouring in far down the political stream? Are misinterpreted, misapplied, inaccurately tested, misrepresented, or simply ignored empirical findings an acceptable practice for public administrators?

Many public transportation agencies are currently engaged in the modern transportation debate involving fixed guideway infrastructure (particularly rail transit). The issue has been underscored by some legal actions in court. A most notable example is the Orange County (California) grand jury’s investigation of the local transit authority for inaccuracies in its representation of the light rail issue (OCTA, 2000, internet). Likewise, a federal judge in San Antonio issued an injunction against the transit authority

there (VIA) for illegally “advertising” its light rail proposition (Texas Justice Foundation, 2000, internet).

If transportation policy is strongly grafted to the issues it attests, these type questions should matter little. But if it is not, other implications arise, such as:

- public lying
- public integrity
- public ethics
- public stewardship
- pragmatic administration
- research methodologies

There is reason to every method, of course. This paper, therefore, seeks a means of understanding the methods and reasons behind the public transportation issue as presented by the administrative agency, Capital Metro. It is an investigative effort to let the agency and the issues speak for themselves.

The Conceptual Framework

The conceptual framework of this paper employs four rival explanatory models as a means of approaching the research question. These models, derived from the literature review, represent certain common urban ills which new transportation policy seeks to address: traffic congestion, sprawling growth, air pollution, and Federal regulation. These are the most commonly pronounced rationales, observable by anyone attending the news coverage, resulting in the call for new modes of fixed guideway transit.

Researchers have reinforced each of these concepts as potentially causative agents, as well. In an early study of public transit, Dr. Robert Cervero (1983, internet) concluded that "provision of improved mobility to the needy, relief of congestion, and

improved land uses are the primary social benefits"⁵ of transit. Similarly, the Federal Transit Administration (FTA, 1996, internet)) noted that "the benefits of public transit include: providing an affordable, high-quality alternative to the automobile for commuting to work and other travel; *reducing traffic congestion* and improving travel time for motorists; less auto-related *air pollution* and fuel consumption; low cost mobility for people who cannot afford to own or are unable to drive a car; and increased *neighborhood vitality and productivity of business centers*".⁶ The Center for Transportation Excellence (CTE, 2001, internet), a national transit advocacy group, likewise lists the benefits of transit as these:

- Reducing congestion
- Creating Transit Oriented Livable Communities
- Reducing Auto Emissions
- Providing Basic Mobility

There are other examples. Anyone attending the comments of Austin transportation planners and local transit officials might remark the distinct similarities in themes. In a 1996 interview Capital Metro's General Manager, Karen Rae, for instance, emphasized two key aspects of the city's transportation plan as "impact on traffic congestion," and "lining up for federal dollars."⁷

⁵ The article, "Perceptions of Who Benefits From Public Transit," sponsored by the Transportation Research Board (Record "936") is out of print. See Abstract at http://www.dcddata.com/dbtw-wpd/exec/dbtwpub.dll?AC=GET_RECORD&XC=/dbtw-wpd/exec/dbtwpub.dll&BU=http%3A%2F%2Fwww.dcddata.com%2Ftrb%2Ftrb.htm&TN=trb&SN=AUTO10417&SE=669&RN=5&MR=20&RF=Table&DF=Full&RL=1&DL=1&NP=0&ID=&MF=WPEngMsg.i

⁶ Emphasis added by author to illustrate parallels.

⁷ See the full article, "Getting Around: The Transportation Plan" in the Editorial section, *Austin American-Statesman*, Oct. 13, 1999, Section A-10.

The conceptual framework of this paper suggests that understanding Austin's transportation policy becomes approachable through use of these models as proffered explanations. They help guide the investigation.

A second conceptual framework is used in the paper. A predictive model, based on empirical findings from the literature, is created which will answer a key question. At the November meeting of CAMPO, mentioned above, two commissioners asked on separate occasions if it was known how many automobiles might be removed from traffic due to Capital Metro's proposed light rail line. It is a logical, evaluative question. This paper produces a predictive model that yields a novel multiplier, the Reduced-Traffic Constant (RTC) which easily estimates that number based on projected ridership of the rail line. The RTC concept is based on the national experience with light rail transit, and is easily customizable to fit specific U.S. locations. This predictive model addresses the evaluative question above with a quantified result.

The Research Purpose

This paper examines the primary issues articulated by the Austin transportation agency, and compares them to the explanatory models developed by the literature review. That review begins in Chapter 2 with a look at the land-use issue as it relates to transportation. Sprawl and urban development patterns are heavily implicated in the transportation debate, and are offered as rationales for new transportation proposals. The third chapter examines the air pollution aspects of transportation policy. Chapter 4 discusses the Federal governmental impact. Policy direction and regulation from Washington D.C. are unmistakable and powerful. Chapter 5 investigates the traffic

congestion rationale. It is probably the most often cited reason for comprehensive urban transportation reassessments today. The sixth chapter investigates the “ridership” methodologies of transit measurement, and discusses how large ridership counts can be condensed into a key single unit of analysis, the average rush hour. It examines what effects might be found there. Chapter 7 discusses Austin’s transit ridership in this context. Chapter 8 presents the methodology used in the quantitative sections of the paper, presents the strengths and weaknesses of the chosen methods, and outlines the predictive model methodology and its makeup. Chapter 9 presents the results of these empirical analyses, and, finally, Chapter 10 draws conclusions from the findings.

Chapter 2

Land Use and Transportation

*

“That’s the strongest argument for light rail—it’s an agent of land-use change.” – Austin Council Member Will Wynn, (2000).

“Cities have become impossible to describe” – Richard Ingersoll

*

The purpose of this chapter is to explore the relationship between transportation policy and urban land-use. It provides an overview of the historical and contemporary contexts of the urban condition and discusses how new concepts play into the collaborative municipal mix of land and transport.

An urban form lacking transport access today would be uninhabitable. History demonstrates that cities have largely been shaped by their access to transport, i.e. maritime facilities, railroads, roadways. The land use question comes to involve a controversy when it seeks external influences over the historical theorems of form and utility. Urban growth management is not a new concept, however. This chapter illustrates the character of land-use theory as an explanatory model of current transportation policy.

Early Issues

Transportation policy is about urban land uses. Historical examples of suburbanization demonstrate this connection.¹ Private developers were often the builders of streetcar lines in U.S. cities, as a means of real estate sales. Customers came to value the link between residential sub-areas and commercial centers by a trolley car. The automobile later supplanted this role. The residential street grid displaced the rail line, and trolleys slowly faded into history.

The coming of the automobile has made an especially forceful impact on municipal infrastructure, where new streets, signage, lighting, and other necessities of growth move further away from the urban center. Paved roads have become the undeniable connectors of choice in modern city life.

While still fed by real estate entrepreneurialism (though no longer using trollies), suburbanization today is often a result of economic factors. Developing real estate can be cheaper outside of zoning and building restrictions. Economies of scale logically accrue to large tract developments, and often results in newer homes on larger parcels of ground with modern amenities at less cost than in-town homes.

The Transportation Aspect

Land use and transportation have their symbiosis. Sprawling suburbanization fed by automobiles is now decried a national problem². The spreading of city borders has

¹See, Sam Bass Warner's *Streetcar Suburbs: The Process of Growth in Boston (1870 – 1900)*, as one example. It discusses the first wave of suburbanization.

² See "Solving Sprawl, The Sierra Club Rates the States," for a discussion illustrating the point of view that sprawl likely represents a national ill. <http://www.sierraclub.org/sprawl/report99>

been linked to a condition known as the “dying” of inner cities.³ Some researchers say that we may need to take actions, which lead to “reinventing the city” (Olson, 1996, internet). How we move people en masse is seen as a key element in such restructuring. “Accommodating more vehicle traffic is not necessarily better for society” (Littman, 1999, internet), however, a perspective which many municipalities are now attempting to address, often through policies aimed at reducing car “dependency.”⁴

Among the strategies to reverse these trends is a coordination of preferred transit and land developments. Austin’s long-range planner, Austan Librach, in a news interview (1999) addressed the theoretical connection between land and light rail transit. “By deciding where you locate the stations and the lines themselves, what you’re really doing is affecting the future growth of Austin”⁵

It seems intuitive that transportation should affect land use. Dr. Robert Cervero (1999, internet) in a study of potential benefits for the Charlotte-Mecklenburg area noted:

Coordinated transit and land use is widely embraced, but remains relatively little understood in a hands-on technical sense. Recent research provides benchmarks on what we might expect from integrated planning. However adapting and applying the information using traditional models in a case-specific context is no easy task.

Transportation must exert *attraction* in order to influence land development patterns. In a study of Amtrak ridership, Hanna and Drea (1995) found that as the convenience of stations to final destinations increased, Amtrak ridership increased. Their study suggested that Amtrak customers often held “a holistic view of travel” (p. 44). In other words, it was more than an in-transit experience. What happens after debarking the

³ Jane Jacobs’ seminal publication, *Life and Death of Great American Cities* (1961), is dedicated to this point of view. See bibliography.

⁴ For a concise statement of this concept see the British site:
<http://www.research.detr.gov.uk/tpp99/index.htm>

⁵ From “Next Century’s Sidewalk,” *Austin American-Statesman*. February 25, 1999. pg. J6

transit mode is important as well. Thus, proximity of stations to destinations is one key concern. The study highlighted *convenience* as a prime motivating factor in transit service approval.

Convenience is also a primary developmental impetus in inner-city transit. “[A] successful light-rail system is ‘highly dependent’ on development around stations that will let people live, work, shop, play and move about a city using trains, not cars.”⁶ Locational convenience can be problematic, however, according to research. Rail is locked in place; tracks cannot go everywhere. Newer developments and re-developmental efforts, must occur near the stations. It is hoped such “densification” will be market driven. Yet, private investors can be wary.⁷

Using mass transit as a tool for controlling suburban growth may prove a difficult retrofit. Wendell Cox sums up the post WWII demographic defining the modern U.S. city. “From 1950 to 1990 average densities in the central cities of the nation’s 25 largest urbanized areas declined 42 percent” (Cox, 1993, internet). Population densities of suburban areas have oddly declined as well, by as much as 24 percent (Cox). This last seems starkly contrary to the notion that suburban sprawl is draining central cities. Sprawl, in fact, leaks further abroad than the housing tracts on the fringes. Fuguitt and Beale (1996, p. 161), tracking 30 years of non-metropolitan migration, concluded that historic trends in city immigration have now reversed themselves. Due primarily to changing employment patterns outside the city boundaries; more people are leaving the central area. Their study concludes that, regardless of previously held assumptions, a

⁶ A reporter’s paraphrase of the Austin Chamber of Commerce’s task force findings on light rail, quoted in the *Austin American-Statesman*, “Understanding Light Rail, Building Blocks,” Oct 7, 2000 (pg.1).

⁷ Government can and does help, of course, with the use of inducements such as tax abatements, fee waivers, and low-interest loans.

continued long-term stability in inner-city populations is not a given, as it once was. In fact, increasing *out*-migration is their prediction for the near future.

Burgess finds that growth today is not the same as that explosive residential expansion following World War II. It is rather a slow and steady outward spread, not necessarily aimed at the traditional suburb. "It is instead a dispersing of level (or slowly growing) numbers of people over a much broader area" (Burgess, 1998, p.32). New homes are being built on larger parcels of land further away from the urban area.

The suburb is often envisioned as a semi-rural culture, dependent on the metropolitan center. Yet, this may not be the case. New shopping centers, high-tech industries, office buildings, and even cultural facilities have been routinely springing up outside traditional metropolitan centers in the last three decades, in tandem with a rise of a "suburban culture." Joel Garreau called these independent fringe developments "Edge Cities" (Garreau, 1991, internet).

According to Garreau, the metropolis of today does not contain the single solidly centralized urban core it once did. It is instead a metastasis of "centers," each unique and complete. Many of these Edge Cities are larger than the nucleus itself. The modern metro region has become a matrix of such entities, much like lily pads on a pond. Garreau does not consider these developments to be "sprawl" in a usual sense. He sees them as purposeful clusters of people and functions, separated from the central city. Residents live and work independently of the center, often finding little reason to go "downtown" other than as "tourists." The Edge City, Garreau claims, has come to dominate the list of the nation's top areas of job growth and population increase. They rank among the nation's highest numbers of people who work at home.

Garreau's thesis is not without its historical precedent. Myers and Kituse (1999, p. 28) suggest the "contemporary suburban landscape, so castigated as 'sprawl,' may rightly be seen as the realization of a utopian ideal stemming from the 1939 World Fair, which envisioned widespread homeownership in a setting that combined urban and rural amenities." This is markedly reflective of the views of one of our nation's preeminent architects of the time, Frank Lloyd Wright. Wright espoused the vision of our nation's future growth occurring in communities outside the traditional metropolis, offering escape from the depersonalized, high-density living environments. Wright predicted the human spirit, shunning pressures of over-crowding, would gravitate to these new cities in the countryside where self-transport along super highways would replace mass transit, and a new corporate culture might arise surrounded by gardens (Wright, 1932).

Wright's philosophy may have presaged its self-fulfilling prophecy. His perspective seems adopted by much subsequent planning and development of post-WWII housing. But Wright's ideas are not in vogue today. In fact, the "new urbanist" thought, a more modern lineage of urban planning, has taken issue with at least one singularly overriding principle of Wright's vision: the automobile.

The Changed City

Jane Jacobs in her book, *Life and Death of Great American Cities*, referred to "automobile dominance" as the destroyer of America's cities (Jacobs, 1961). The theoretical connection between transportation and land-use firmly established itself by the wrecking ball of the 1956 Federal Highway Act. Jacobs observed with revulsion the Interstate Highway System cutting itself in large swaths through American cities, often

dissecting older, traditional neighborhoods, and destroying artifacts of architecture and cultural dating into the previous century.

This emphasis on the “traditional” urban values, meaning those which pre-date the automobile, has been credited with giving birth to the theory of “New Urbanism,” a philosophy prevalent throughout much of the architectural literature today. It is a philosophy that points to population *densities* and urban *mass transit* as necessary elements of a balanced metropolitan life. It is an environmental vision that is philosophically foreign to automobile dominance. It is the New Urban theme to *preserve* rather than blindly *modernize*.

New Urbanism calls for a different metropolitan schematic, built on planning rather than real estate commerce. In this vision homes should be built closer together, placed on smaller tracts, provided with traditional alleyways in the back, large sidewalks in the front with open spaces and commercial/residential mixed uses for improved convenience, allowing a lessening need for automobile transit. Walking and biking are viable options of transport when distances are shrunken. The image has its appeal.

The trends, however, are clearly in the opposite direction, not only in the United States, but in Europe, Australia and Canada. Automobile use is rising more than ever (Cox, 1998, internet). A survey of Austinites may explain one reason. It found that “one obstacle to shifting commuters from single occupancy vehicles to alternative modes is the combination of the trip to or from work or school with other purposes” (CAMPO, p. 9). Further, over a third of respondents said they required use of a car during work hours (p 11). The automobile may simply not be easily preempted.

The new-urbanist philosophy may decry the sterile suburbs, which are mostly empty by day, yet, the inner-city option of living might be a hard sell to many citizens. The literature seems unvarying in at least one respect; urban density is a prerequisite for efficient use of mass transit systems. Yet, urban density often connotes other things, such as less safety to persons and property. James Moore, in Senate testimony summed up his criticism of the urban ideal. "Suggesting that urban residents should reconfigure their life-styles to fill trains confuses ends and means. There is no intrinsic value in a full train" (Moore, 1995, internet). Moore believes the overwhelming "value" people choose has been demonstrated by residential neighborhoods springing up outside the urban core (Moore, 1995, internet).

Even well-known new-urbanist Peter Calithorpe admits that "transit isn't an end of itself...transit isn't even a goal in and of itself....transit is just a technology that you're going to lay down upon your city and wait to see what happens. It's a framework for community participation."⁸ Transit, then, becomes a land-use issue. It is expected to influence and channel growth.

Sprawl Containment

National concerns over suburban sprawl have resulted in half the states in the nation establishing "task forces which most often recommended some form of 'sprawl containment'..." (Staley, 199, p. 5). Nor is it surprising that the automobile factor is at the center of such reformation. Lawrence Speck, Dean of the UT School of Architecture,

⁸ The Calithorpe quote is from Austin American-Statesman, Editorial Report, "Transit is Not the Goal," by Maria Henson, Deputy Editorial Page Editor. Section AQ-10, December 6, 1999.

speaking of urban design to a newspaper reporter, noted that in constructing new office buildings, “as many square feet are built for cars as are built for the office workers.”⁹

How might the country stem this tide of automobile use? The direction among planners today, largely influenced by federal government, has been to displace the market force with an external governmental factor—planned mass transit. The free market has traditionally driven land developmental patterns and has been most favorable to automobile transit through easy access and plenty of free parking. Would WalMart think it a good idea to charge patrons to park? Not likely. But what if WalMart had no parking at all, and was fed by a light rail line? Would consumers park at the designated outlying areas and take the train in to shop? Heavy investment in public transport is thought to offer a viable alternative by subverting the traditional market force.

A “major market distortion is the abundance of free parking” (Littman, 2000 pg 3). It results from a history of developments in which building codes have required parking spaces sufficient to fit land uses, and thus, has acted to skew building trends toward automobile inclusiveness. An antidote is thought to be automobile *exclusion* in the neo-traditional setting. It is hoped that stimulation of transit-oriented development will exert influences counter to contemporary automobile domination. New mass transit systems, such as light rail, are seen as important developmental tools in such restructuring. LRT is “not worth the cost if you’re just looking at transit,” says Metro’s John Fregonese. “It’s a way to develop your community at higher densities.” (O’Toole and Scheller, 1997, internet).

⁹ From an interview in the Austin American-Statesman, Sunday, Aug 29, 1999, p J2.

Reforming the City

The American Public Transit Association (APTA, 1996, internet) synthesized the theory of modern transit development around four “plausible futures:”

- (1) “Boundless Sprawl”
- (2) “Dying Cities”
- (3) “Community-oriented Growth”
- (4) “Reinventing the City”

The last two link public transit with land-use change. “Naysayers will criticize light rail if it doesn't quickly ease congestion,” RTD board member Bob Tonsing told a reporter, “but the service is really about easing the pressure from future development.”¹⁰

In a review of the empirical literature touching this relationship between land and transit, T. Ewing Messenger (1995, internet) observed that

at least six studies report direct relationships between residential density and transit ridership. Three studies assert that mixed land uses generate more transit trips than any single land use. Two studies show that pedestrian-friendly urban design boosts transit riding. And finally, older neighborhoods capture higher transit mode shares than new neighborhoods.

The literature adequately reflects the current trend of thought. Transit development is perceived as an urban force, reacting to human mobility with “real estate possibilities” (Clark-Madison, 1999, internet). Transportation planning is land-use planning aimed at “creating livable communities” (APTA, 1996 p. 1). This idea has most prominently been articulated at the national level by Vice President Al Gore’s support of anti-sprawl and public transit initiatives. “Investing in important mass transit projects like these is key to rebuilding our cities and creating livable communities.” (Gore, 2000, internet). It is clear the Clinton/Gore administration believed this.

¹⁰ Tonsing was quoted in a 1999 news article in the *Denver Rocky Mountain News*, “Train of Thought” by April M. Washington and M.E. Sprengelmeyer, March. 18.

According to a study published by the Transportation Research Board (TRB), light rail transit will address “seven opportunity areas” in land-use development (Campion, et al. 2000. p2):

1. Influence on Urban Form
2. Concentrated Development around Stations
3. Multimodal Corridors
4. Partnerships [joint development activities]
5. New Passenger Markets [stadiums, convention centers, special events, etc.]
6. Facilitation of Multimodal Connections [buses, airports, commuter rail]
7. Phased Implementation of Lines [continuing upgrades]

It is interesting to note that none of these speak strictly to the moving of masses. They focus mostly on isolated pockets of influence. Indeed, if the concepts are trundled into a single statement, they would seem to synthesize an overall thesis of public transit as an urban-rebuilder that would look like this:

Light rail transit is the new urban form of concentrated developments around stations, built in public/private partnerships, linked by multimodal corridors, which are expandable in phased implementations, and will serve new passengers and link with other transit modes as well (such as airports, buses, etc.).

This is the theoretical scenario. But will it work?

According to the land-use, anti-sprawl thesis, rail transit is the link connecting transit-oriented developments (TODs), those lily pads on the pond, to the central core. Transportation modes influence growth; it is the commonly accepted theory, reinforced by years of federal highway subsidies in the U.S. “The reality is that in an urban region, the behavior that leads to development patterns and the behavior that leads to travel in the satisfaction of daily activities are inextricably intertwined. It is one system” (Bhat and

Lawton, 2000, p. 5). Transportation policy today, therefore, is seen as an agent for stimulating urban change.

Washington columnist Neal Peirce, who writes about public transit, says it “offers the choice that a 100 percent auto system denies us” (1999)¹¹ This theme of “choice” is a commonly espoused transit advantage. But not everyone conforms to the demographic suitable for an LRT option. Even Peirce notes that the predominant public transit user today is a low-income, minority, bus rider. When bus routes are converted into “feeder routes” as light rail transit is introduced, the bus rider becomes a captive rail rider.

Who is the Transit Rider?

Aside from the diverted bus-rider, what defines the *new* light rail rider is somewhat hazy. It is expected that middle-income suburbanites, sick of commuter traffic, will be the new rail rider, given the option. St. Louis calls these, “riders of choice” (CMT-STL, 2000, internet¹²), claiming 79% of their light rail riders are “new to transit.” They buttress the observation by adding that “68% of Metro Link riders (the St. Louis light rail line) own two or more cars.” Dallas Area Rapid Transit (DART) calls the LRT riders who use their trains “new urban pioneers,” defined mostly as

- singles
- young couples
- middle-aged professionals
- and empty nesters.¹³

This does not likely match the suburban demographic.

¹¹ From a Neal Peirce column in the Austin American-Statesman Aug. 18, 1999. Peirce is also a contributing editor of the National Journal.

¹² See <http://www.cmt-stl.org/metro/metro.html#all>

¹³ See <http://www.capmetro.austin.tx.us/future/DARTDAAPres/index.htm>

—singles
—young couples
—middle-aged professionals
—and empty nesters.¹³

This does not likely match the suburban demographic.

Indeed, a more pertinent finding for St. Louis might be the observation that 53% of MetroLink riders are work commuters. Thus, of the 1998 ridership total (44,500 riders per day), 11,792 of these would have been roundtrips for work purposes ($44,500 \times .53 / 2 = 11,792$). Spread over 6 peak hours in the day that would mean an average of only 1965 trips at any given rush hour.¹⁴ If 79% of these were “new riders,” as the CMTL website claims¹⁵, and if 60% of these riders are traveling in peak direction¹⁶, then possibly only about 776 autos (calculated at 1.2 persons per auto) would have been removed from rush-hour traffic due to the presence of the light rail line ($1965 \times .79 \times .60 / 1.2 = 776$). Further, since there are two rail routes into and out of town (two separate “corridors”), then each might result in about 450 autos removed from the typical rush hour condition.

This indicates very little commuter participation will likely be found among light rail ridership. Only by additional study can it be adjudged whether “choice riders” are sufficient to justify regional goals which include light rail transit.

Light Rails “Appeal”

Other factors mitigate against the logic that light rail might stimulate sufficient transit-oriented developments. Suburbanites may not readily choose to move back into

¹³ See <http://www.capmetro.austin.tx.us/future/DARTDAAPres/index.htm>

¹⁴ The variables used in this chapter are discussed in depth in Chapter 8.

¹⁵ See discussion in Chapter 8 concerning the inaccuracies in this 79%.

¹⁶ Chapter 8 discusses the source of the peak direction variable, among others.

urban areas for rail transportation reasons. Staley believes that supposed “pull” factors such as light rail (considered more “attractive” than bus) do not actually induce home-buyers to change habits. It is, rather, the presence of “push factors,” such as lower-quality urban schools, higher risks of urban crime, higher taxes, higher regulatory burden, and fewer housing options” that drive residents away from interior locales, and thus feeds suburban sprawl (Staley, 1999, internet). Light rail as a commuter “choice” may not hold sufficient appeal to influence many residential decisions.

The factor of average trip length of travel may bear this out. Average trip length is short for rail travelers, about 4 miles (see chart below). Mallinckrodt reports average trips lengths for auto travel is about 9 miles (Mallinckrodt, 1998, internet).

Chart 2.1
Average Trip Lengths and Speeds

Average Trip Length (miles):		Average speed (mph):	
Motor Bus	4	Motor Bus	13
Light Rail	4	Light Rail	14
Commuter rail	24	Commuter rail	33

This chart indicates the similar speeds and trip lengths of bus and light rail. ¹⁷

Average light rail trip length, as seen in the chart, is equivalent to bus travel. Further, the average speed of light rail, 14 mph, is about the same as bus (13 mph). Thus, light rail trips, like bus trips, are not only shorter in distance, but are slower in speed than

¹⁷ Taken from USDOT National Transit Library. “Transit Profile.”
<http://www.bts.gov/ntda/nts/NTS99/data/profiles/TRANSIT.html>

average automobile use (35 mph according to government studies¹⁸), and slower than commuter rail as well, which averages 33 mph (see chart). This might explain why a 1997 Austin Transportation Survey revealed that Austinites had far more interest in commuter rail than light rail as an option for Austin by a margin of almost two-to-one (ATS, 1997, p. 21). If the perception is that commuter rail is the faster mode, the above averages bear that out. Residents with long distances to travel may not be drawn to slower LRT.

Transit Oriented Developments

Transit today, as a tool for directing municipal growth, faces significant challenge, not the least of which is aligning private developers' habits with regional planners' visions. This may not prove easy without strong regional authority backing it, and some intense re-zoning deliberations. Rail transit is considered one method of approaching the problem of what influences growth.

Some research cites the positive effects of neighborhood configurations built around rail transit. Studies of models of "transit-oriented developments" (TODs) have found that in Portland, for example, a light rail alternative, coupled with neotraditional developments, projected 35% fewer vehicle miles traveled (VMT) by the year 2015, than did a freeway alternative (Cervero & Gorham, 1995, p. 212). It would seem to indicate that for rail transit to exert positive effects it must be coupled with strong TOD, not contemporary suburbanized sprawl. Rail transit is, therefore, a density issue.

¹⁸ Taken from "Average Commute Speed by MSA Size." 1995 NPTS Summary of Travel Trends. Table 26 p. 44. http://www-cta.ornl.gov/npts/1995/DOC/trends_report.pdf

The Cervero and Gorham study looked at other neighborhood types linked with their levels of mass transit, and auto use. It seems intuitive that auto-dominated neighborhoods, such as those found in many far-flung suburbs, do not promote walking as means of transport, nor easily facilitate the use of public transit, whereas more densely packed older neighborhoods, and modern neo-traditional neighborhoods would.¹⁹

The Cervero and Gorham model did not well fit the Los Angeles area with its 500 miles of freeways. "Islands of neotraditional development in a sea of freeway-oriented suburbs will do little to change fundamental commuting habits" the study concluded (p.220). "Areas defined as transit-oriented almost consistently had lower median incomes than surrounding auto-oriented areas did," Cervero & Gorham note (p.215). Here is probably one of the strongest reasons for promoting LRT as an economic benefit in a region. Redevelopment economics brings money into an area and may attract a higher-income clientele, those likely to be drawn to a neo-traditional urban lifestyle.

It is clear that to decrease automobile usage and to increase transit ridership a fundamental change must occur in the way real estate living spaces are designed and built. This is the crux of the land use model as an explanation of transportation policy. It suggests that the last fifty years of building our cities must be changed.

Increasing urban sprawl implicates still another problem often cited as a rationale for modern transportation policy and the need to alter the urban form. It is the fact that increased automobile usage on crowded roadways, spread over larger areas, threatens the quality of our air by increasing mobile emissions. This becomes the next explanatory model in the literature review.

¹⁹ In Austin this would seem to indicate that Tarry Town should show high transit use patterns, something unlikely to be found in this higher-income neighborhood.

Chapter 3

Air Pollution

*

"The likelihood of serious constraints on behavior as advocated by the environmental community seems quite slim." -- (Luberoff, GAO)

"This isn't about bad cars." -- Bradley L. Mallory, Pennsylvania DOT

*

The purpose of this chapter is to explore the relationship between transportation policy and air pollution. It provides an overview of the relationship between the rising air quality standards imposed by the federal government and the condition of automobile transportation today. Air emissions levels are a powerful influence in transportation policy-making due to a high citizen interest in clean air and a heavy federal penalty for non-attainment of standards. This chapter distinguishes the characteristics which make air quality an influential model in explaining transportation policies which seek alternatives to the automobile.

The New Air Quality

Transportation has had its impact on pollution concerns in our cities since the turn of the century when the automobile was hailed an advancement over the unsanitary conditions of horses in the streets. A logical connection between transportation and the

environment continues today. In March 2000, U.S. Transportation Secretary, Rodney Slater, announced that millions in federal highway funds would be made available to help promote “more livable communities.”¹ This is not a federal transportation effort aimed at increasing mobility. Quite the contrary, it is part of a proactive promulgation of transit substitutions which might replace automobile travel. It is a turned world. Today we find vague, ill-defined, unmeasured “alternatives” are hailed as preferable to the unsanitary conditions of automobiles in our streets.

Transportation policy in this vein is about “qualities.” It is about our living environments. The literature of the environmental model of transportation expounds this theme in language more akin to contemporary environmentalism, neotraditionalism, and new urbanism, than transportation engineering. It is a language of juxtaposition and theoretical correlations:

- Transportation and global warming
- Transportation and the ozone hole
- Transportation and smog
- Transportation and sustainability
- Transportation and livability

The environmental model of transportation reflects an activist approach to urban policy-making. The model seeks to compel change in modern American life, and it will utilize government to accomplish it. This phenomenon is easily observable in the federal legislation and regulations of the 1990s (see Chapter 4 for a fuller discussion). What are the expected results of this new direction as it relates to urban transportation? According to Mike Savonis the goal is to “reduce emissions through both technological means and travel behavior modification” (Savonis, 2000, p.2). This a sugar coating and a bitter pill.

¹ From a press release, March 17, 2000, U.S. DOT.

By all appearances air quality is becoming the new (and quite powerful) stimulant of urban and suburban change. Major metropolitan areas all over the country are exceeding EPA standards for air pollution now. Others cities in surrounding areas are soon to follow. At an Air Quality Hearing in the U.S. Senate (April 29, 1997) when EPA standards were being discussed, Mr. John Selph of the National Association of Regional Councils (NARC) and chairman of the regional Metropolitan Planning Organization (INCOG) of the Tulsa area, spoke against raising the standards. "If EPA imposes its proposed ozone standards, the number of non-attainment regions nationally will increase, by EPA's own estimates, from 68 areas currently to 185 areas - nearly a three-fold increase."²

An Associated Press report (1999) in the *Austin American-Statesman* noted that new and tighter air quality standards from the EPA threaten San Antonio with official "non-compliance" in the year 2000. Surrounding counties in the San Antonio Metropolitan Statistical Area would suffer the possibility of these same federal sanctions at an estimated cost of \$200 million.³ Such regulation as the air quality standard has the power to pose imminent fiduciary consequence, which will likely not be ignored. For areas like Central Texas, David Laney, chairman of the Texas Transportation Commission, admits, "air quality will be the crucial issue for transportation. The stakes are high."⁴

² Mr. Selph noted that, "EPA has stated that the proposed changes are policy-based rather than science-based." See "Statement of John Selph" at http://www.senate.gov/~epw/105th/sel_4-29.htm.

³ See "Suburbs Blaming San Antonio," *Austin American-Statesman*, Sept. 7, 1999.

⁴ Quoted in the *Austin American-Statesman* report, "Dirty air may delay highway projects," by Laylan Copelin, Feb. 12, 2000.

Environmental Impacts

The environmental model of transportation policy is about cleaner air for our cities. “The largest source of ozone pollution in the Austin metropolitan area is motor vehicles,” according to Thomason of the city of Austin Clean Air Force. Mr. Thomason concludes that the “number of single-occupant vehicles is a problem, quadrupling the emissions to get four people from Point A to Point B” (Thomason, 1999, internet).⁵ This would only be a “problem,” however, if the ratio of one person-per-auto (single-occupancy) comprised a cultural and/or legal offense. This perspective is a relatively new phenomenon in American society.⁶ “The problem is really the culture and mindset,” Thomason believes.

Here is where the environmental rubber meets the road. The qualitative motivation behind the mixed-use neighborhood scenario and the new urbanism scheme of transit “alternatives” is part of this new cultural mindset. The aim is not merely the enhancement of our daily urban lives, but it is to attain the very practical aspect of removing automobiles (and therefore automobile *drivers*) from the roads.

The environmental model has exerted its impacts. Cars are cleaner today. “The emissions from one poorly maintained automobile equal that from at least 25 properly-functioning cars,” Thomason reports. Auto emissions levels nationally are improving by the very act of attrition. That is, levels have been falling yearly as older vehicles, lacking the modern pollution controls, are replaced by newer ones. This has had enormous effect. The American Highway Users Alliance, a national highway lobby group, published the following findings from EPA data:

⁵ See City of Austin, <http://www.ci.austin.tx.us/ats/caf.htm>.

⁶ It is the reasoning behind “High Occupancy Vehicle” (HOV) lanes and other means of compressing travel densities.

Since 1970, emissions of the six principal air pollutants monitored by the Environmental Protection Agency have dropped by an average of 30%. Yet, this impressive clean air progress came during the same time that our population grew by 30%, licensed drivers increased by 61%, registered vehicles by 90%, and the miles traveled by those vehicles jumped a whopping 123%.⁷

Wendell Cox echoed this in testimony before the Texas Senate. "Over the past 30 years, volatile organic compound emissions from mobile sources have dropped 60 percent, carbon monoxide 43 percent and nitrogen oxides five percent. This is despite a national increase in vehicle miles traveled of 130 percent" (Cox..2000, internet).

USDOT data listed by Metropolitan Statistical Area (MSA) demonstrates this phenomenon. Table 3.1 (below) provides a list of cities indicating the trends. All cities experienced fewer days in excess of EPA standards (PSI greater than 100) during the decade of the 1990s than during the 1980s.⁸

Table 3.1

Air Pollution Trends in Selected Metropolitan Statistical Areas

(Number of PSI Days Greater Than 100 at Trend Sites and All Monitoring Sites)

NOTE: If printing this table from your browser, please use Landscape as the paper orientation.

Metropolitan Statistical Area	All Sites		Trend Sites										
	Total Number of Sites	PSI Days > 100 (1995)	Number of Trend Sites	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Albuquerque, NM	26	2	20	28	26	8	10	7	5	0	1	1	2
Baltimore, MD	29	17	15	23	28	43	9	12	20	5	14	17	14
Boston, MA	28	2	24	2	5	15	4	1	3	1	3	1	1
Chicago, IL	60	5	42	8	17	23	4	3	8	7	1	8	4
Cincinnati, OH	24	7	21	7	11	24	3	6	7	0	1	4	7

⁷ See, "Clean Air and Mobility: We Can Have Both." *Roadblocks Ahead*. April 13, 2001.

<http://www.highways.org/roadblock/cleanair.html>. The American Highway Users Alliance can be reached at 1776 Massachusetts Ave. N. W., Suite 500. Washington, DC 20036.

⁸ See "Transportation, Energy, and the Environment, Section D, "Air Pollution Trends in Selected Metropolitan Statistical Areas, Chapter 4, Table 4-41, the National Transportation Statistics (NTS) of the U.S.DOT, Bureau of Transit Statistics. <http://www.bts.gov/programs/btsprod/nts/chp4/tbl4x41.html>

Cleveland-Lorain-Elyria, OH	39	5	24	2	6	21	4	2	3	2	2	4	4
Dallas, TX	23	17	9	9	13	14	7	8	1	3	5	1	13
Denver, CO	35	3	21	49	37	19	11	9	7	7	3	2	2
Detroit, MI	35	11	26	5	9	17	10	3	8	1	2	8	11
El Paso, TX	19	6	17	43	32	16	33	27	13	17	10	10	4
Fort Worth/Arlington, TX	8	6	8	10	4	11	8	5	9	2	1	8	6
Hartford, CT	17	9	14	7	20	27	11	7	14	9	9	10	9
Houston, TX	34	57	29	55	67	61	41	59	42	30	26	29	54
Indianapolis, IN	35	2	27	0	3	9	2	1	1	1	0	2	2
Jersey City, NJ	9	7	8	8	12	18	2	7	8	1	5	1	2
Kansas City, MO-KS	28	6	23	4	6	4	2	2	1	1	2	0	6
Las Vegas, NV-AZ	18	11	9	40	7	31	46	22	15	5	8	12	7
Los Angeles, Long Beach, CA	41	106	38	226	201	239	226	180	184	185	146	136	103
New Haven, Meriden, CT	12	8	12	7	20	16	7	10	22	3	11	8	8
New York, NY	37	10	25	58	44	46	18	18	22	4	6	8	8
Oakland, CA	29	12	22	8	14	10	3	5	6	2	3	3	12
Orange County, CA	12	6	11	66	58	65	66	48	42	43	25	14	6
Philadelphia, PA-NJ	51	22	38	22	35	35	19	14	25	3	21	6	14
Phoenix-Mesa, AZ	29	18	24	88	42	27	30	9	4	10	7	9	13
Pittsburgh, PA	51	13	36	5	10	20	9	11	4	2	5	2	7
Riverside-San Bernardino, CA	54	114	36	170	171	181	178	144	144	155	142	122	110
Sacramento, CA	36	18	17	69	52	73	60	43	44	21	10	11	16
St. Louis, MO-IL	62	15	53	13	17	20	13	8	6	3	6	12	14
Salt Lake City-Ogden, UT	24	2	18	26	7	11	15	2	19	10	3	10	1
San Diego, CA	27	15	17	70	61	84	90	60	39	37	17	16	14
Tampa, FL	34	1	20	5	5	1	1	3	0	1	0	0	1
Ventura, CA	16	31	14	84	54	83	59	36	49	25	16	24	30
Wilmington-Newark, DE-MD	13	9	7	9	16	31	7	5	6	2	3	1	6

Excerpt taken from the National Transit Statistics Chart, tracked by USDOT.

As the list illustrates, all cities showed marked improvements. It would seem questionable to make a case with these data for massive public transit spending on the grounds of automobile air pollution. More relevant might be a switch of auto fuel sources and engine design.

Such data raise a question. If cars are reaching optimal levels of pollution control, what is the purpose of raising federal auto emissions standards to levels which cannot be met? "If ultimately implemented, the new ozone standard may more than double the number of counties in nonattainment" (Savonis, 2000, p. 4).

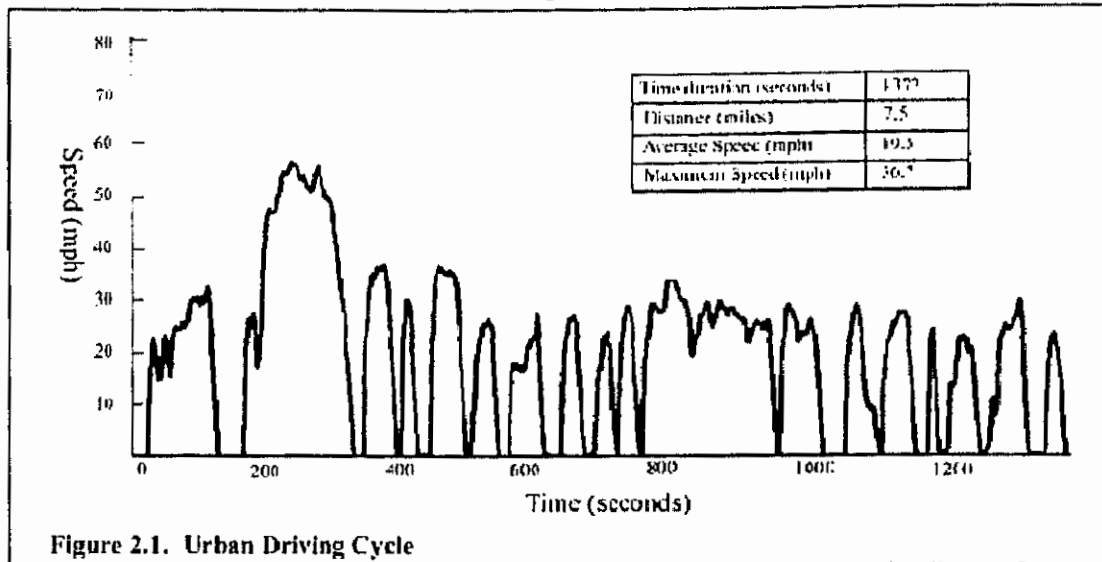
Cities Cause Autos to Pollute

Air pollution is not merely one thing. It is a variety of complex environmental interactions. Cities with higher temperatures and more sunny days are commonly known to produce greater amounts of ozone than similar cities with fewer such days.

Combustion engines are responsible for polluting the air, but that fact is highly influenced by driving conditions.

For instance, accelerating engines at low speeds have been found to create more pollution emissions than steady cruising engines at higher speeds. A University of Texas study entitled "1996 Emission Inventory," illustrates this. The average urban trip involves a number of stops, which are a contributing factor. Figure 3.2, the "Urban Driving Cycle," (below) illustrates how this works. As can be seen in the chart, the average urban driving trip of 1,372 seconds duration (about 22 minutes) involving numerous stops and starts, is represented by the multiple-spiked pattern in the graph. This average trip involves coming to a stop, and then re-accelerating, about 18 times.

Figure 3.2
Urban Driving Cycle

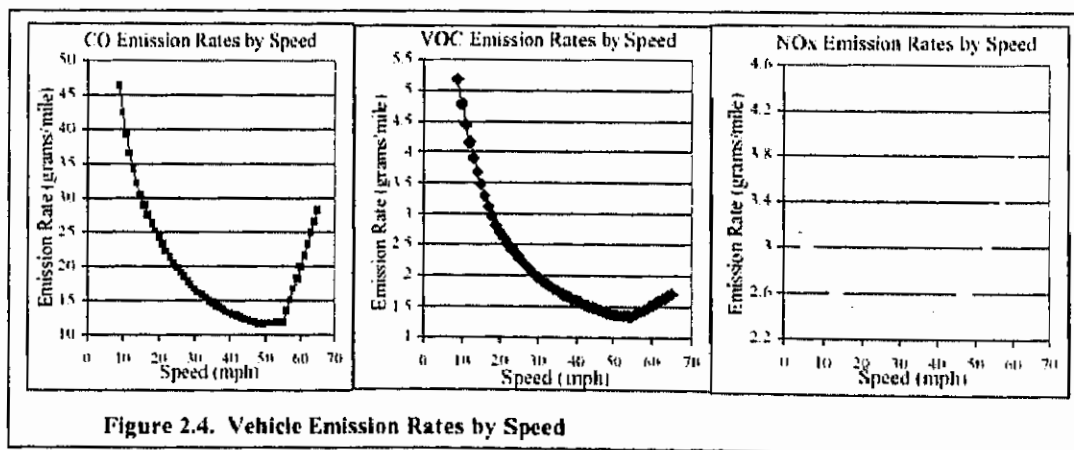


*Adapted from Transportation Energy Data Book, 1998.

The typical trip of 1,372 seconds long (about 22 minutes) involves numerous stops and starts (about 18).

The next figure (Figure 3.3 below) illustrates how the emission rates of the three major pollutants vary according to vehicle speed.

Figure 3.3
Vehicle Emission Rates by Speed



*Based on ITI overall emission factors with vehicle speed used in developing link-based (rather than HPMS-based) on-road emissions estimates for Travis, Bays, and Williamson counties

Emission rates are seen to be higher at slower speed. Data taken from the "1996 Emissions Inventory."

What can be seen here is that emission rates are generally *higher* at slower speeds. Both carbon monoxide (CO) and volatile organic compounds (VOCs) are highest at speeds of only 10 mph, and *fall* with acceleration to 55 mph (their lowest level of emissions) where they begin to rise again. Nitrous oxide (NOx) similarly is high at slow speeds, and lowest in the range of 20 mph to 50 mph (above that they skyrocket dramatically as speeds increase).

What this all means is that the highest polluting emissions generated in the urban automobile travel will recur at each stop-and-start in the cycle. This is because the automobile will move through its *highest* polluting speed ranges over and over again (about 18 times) in the typical trip.

Thus, the in-town vehicle generally pollutes far more than the highway vehicle cruising at 55 mph. Of course, congested freeways are certainly smog generators when traffic is moving at slow speeds. Viewed in this light it makes the threat of withdrawing federal highway funds from cities falling into non-attainment of air standards seem a non sequitur. Highways can help reduce air pollution by increasing mobility.

Even the Federal Highway Administration (USDOT, 1999, internet) noted an American Highway Users Alliance study estimating that "improving 167 bottlenecks around the U.S. would reduce travel delays by 19 minutes for each trip, also reducing the idle emissions generated in long queues."⁹

This is not the mindset of the contemporary environmental model of transportation, however. It is frequently argued that adding new roads only invites more

⁹ See "Alliance Calls for Help, Names Worst Bottlenecks." USDOT, FHWA. *Air Quality Update*, November 29, 1999. <http://www.fhwa.dot.gov/airquality/environment/aq112999.htm#3>

traffic, and exacerbates the problem. A “cleaner” alternative, and one which might “attract” automobile drivers from their cars, is the preferred light rail “alternative.”

Does Light Rail *Add* to Auto Pollution?

There is at least one caveat, which rises out of this discussion, and should be noted here. Light rail transit typically travels at “grade level,” that is, on the streets where it interfaces with automobile traffic. It is the cheapest way to build the system. This shared right-of-way, however, involves continually stopping traffic at street crossings as the train passes. To what degree might this add to air pollution itself by adding **more** stops to congested traffic?

This poses an interesting question for future research. Does any increase in air pollution caused by light rail equal any decrease in air pollution resulting from its riders who might have been seduced from their autos? In other words, could the presence of light rail cause about as much pollution as it eliminates?

Key investigative components for this hypothesis are these:

1. The typical number of automobile stops in the urban driving cycle has been measured (average of 18 stops).
2. The ratio of emissions to vehicle speeds is known
3. Light rail trains may add additional stops to this driving cycle

Therefore, if the train causes an **additional** 18 automobile stops along its route for every rider it carries who would have otherwise been driving an automobile, then the net reduction in air pollution must approach zero.

To understand this potentiality, consider a hypothetical scenario. A passing train crosses 50 streets along its route to the CBD.¹⁰ During rush hour it stops 20 cars (10 on each side) at every crossing. An additional 1000 stops would, therefore, have been added to the typical urban driving cycle ($20 \times 50 = 1000$), indicating a net *increase* in air pollution. If the train is carrying 150 riders, 53 of whom (35%)¹¹ might have otherwise been driving an automobile, then 954 automobile stops (53×18 average stops = 954) would have been eliminated from daily traffic due to these riders being on the train (this, of course assumes similar trip lengths). By this analysis the trade-off between *eliminating* pollution (954 automobile stops prevented) and *increasing* pollution (1000 automobile stops added) is about a wash. No pollution reduction has occurred. It should make for an interesting study.

Light rail as a reducer of air pollution seems a hard sell. The Orange County Grand Jury (1999, internet) investigating its local transit agency made the following observation:

Attracting riders from autos does not reduce air pollution. Of the few auto drivers attracted to light rail, many drive to rail stations (Park and Ride). The shorter trips to the stations may produce nearly as much pollution as the former longer trips. The shorter trips still entail cold starts and subsequent engine cool down. This portion of a driving trip generates the bulk of hydrocarbon emissions because of the auto's relative inefficiency and higher emission rates while warming up and higher gasoline evaporation rates while cooling down.

Savonis writes that, "New research will be critical if the transportation community is to identify cost-effective means to rise to the challenge inherent in the new standards" (Savonis, 200, p. 4). He would seem to be right. It may be that roads are not the problem; nor is auto-transportation. The problem is the combustion engine. One interesting

¹⁰ For comparison purposes Dallas DART crosses 66 streets; Sacramento crosses 86; San Jose 62.

¹¹ See Chapter 8 for a discussion of how this variable is derived.

observation comes from Savonis. He states that, "relatively little attention has been paid to the heavy-duty engines associated with bus and truck fleets. Research shows that these engines account for only 6 percent of the VMT [vehicle miles traveled] in the country, but they emit 40 percent of the oxides of nitrogen (NOx)" (p. 5). Public mass transit can do little about that.¹²

It can be concluded that transportation as a mitigator of air pollution is at best a questionable issue. Alan Pisarski propounds a simple and eloquent interpretation of transportation and society: "Most trips we make have economic transactions at their ends, and if not they have social interactions of great value to those making the trips" (2001, internet). To Pisarski modern urban traffic may not be well defined as a "problem." His is a perspective which might find resonance among the citizenry. "Congestion is people with the means to act on their social and economic aspirations getting in the way of other people with the means to act on theirs" (2001). To effect air pollution relief through systematic transportation planning, this key fact must be considered if drivers are to be somehow coaxed from their automobiles.

If they are not to be coaxed, then they are to be *regulated* out. The federal influence inherent in the setting and regulating of air quality standards carries a big stick for approaching this. The power of the federal influence leveraged against the local highway dollar becomes a forceful combination. It forms the next model of explanation in the approach to understanding modern transportation policy.

¹² It is true that public transit uses buses. But trains cannot replace these vehicles in locational values nor delivery utility. They do not even try. Indeed, there are buses waiting at every train station to help complete the travel needs of passengers.

Chapter 4

The Federal Influence

*

"The urgency is whether we keep that place in line (nationally for federal funds)..." Karen Rae¹

"A billion dollars has been spent in the lifetime of ISTEA compared with \$40 million in the previous 20 years." – James L. Oberstar, US Congress

*

The purpose of this chapter is to explore the relationship between metropolitan transportation policy and the influences of the federal government on that policy-making. The chapter provides an overview of the relationship rising out of the EPA emissions standards on the one hand and the availability of federal grant funds for select transportation directions on the other. The chapter discerns the distinguishing characteristics that go into making this a robust and influential model of transportation decision-making today.

Federal Role

Transportation policy is about federal influences regulating and setting a national agenda. For states and localities the federal government giveth, and the federal

¹ Quoted from an editorial by Karen Rae in the *Austin American-Statesman*, Oct. 13, 1999.

government taketh away. On the one hand federal transportation dollars are made generously available (since the ISTEA and TEA-21 legislative acts of the 1990s) for targeted purposes (such as inter-modal transport plans), and on the other hand federal environmental regulations threaten to stop the flow of federal highway dollars into smoggy cities for future highway building. This chapter will consider how local manifestations of these forces (e.g., the inexplicably ardent promotions of light rail transit without keen evaluations, and the simultaneously strident censure of the automobile) may be a result of these national influences.² There are “strings attached” to local transportation decisions using federal money. In other words, transportation policy today may be about the United States Government.

“The country’s efforts to reduce mobile source emissions continue to be driven by the legislative and regulatory framework laid out by the CAA [Clean Air Act of 1970]” (Savonis, 2000, p.1). This is the ant in the federal sugar bowl. The Clean Air Act (and its subsequent amendments) is no longer the lone voice in the legislative landscape. It is interlaced with newer legislation in the form of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), and the Transportation Equity Act for the 21st Century (TEA-21) in 1998, which replaced it. “ISTEA has led to dramatic improvements in the way our Nation plans and builds our great transportation systems” (Linton, 1996, p. 1). Linton, administrator of the Federal Transit Administration (FTA) explains that ISTEA has changed the way metro regions plan, finance and manage transportation systems by requiring that States take the multimodal approach. Thus, while highway funds may threaten to dry up, other federal dollars aimed at transportation “alternatives,” like rail

² Al Gore’s denouncement of the automobile in his book “Earth in the Balance,” may be an example in this vein from a prominent voice on Capitol Hill.

transit, are tantalizingly available³. The only problem might be with the crowd of municipalities lining up to grab at them.

Thus, the federal role in setting national policy directions includes both the carrot and the stick, coaxing on the one hand, compelling on the other. "In 1997 EPA promulgated new air quality standards for ozone particulate matter (PM-2.5). These standards pose large challenges for the nation as a whole and the transportation community in particular" (Savonis, 2000, p 4). Of the carrot (TEA-21) Savonis notes, "this exciting new program makes grants available to communities to demonstrate that sustainable transportation is more than an ideal" (pg. 3).

"It is important to recall that as late as 1956, the federal share of transit spending was virtually nothing" (GAO, 1999, [Luberoff] Appendix VI:0.3.1). Historically, federal highway funds (derived from the gasoline tax) have accumulated in the Highway Trust Fund in Washington, DC. "The most important initiative in TEA-21 was to take the trust fund off budget.... Spending is guaranteed" (GAO, 1999, [Oberstar] Appendix IX).

What this means then is more money for mass transit. "To reduce congestion or to mitigate choke points in urban areas, states and localities have used that flexibility to transfer \$4 billion from highway construction to transit projects" (Oberstar, Appendix IX).

For years highway-building was the *métier* of federal government. "If a road was eligible for Interstate funding, the federal government was going to pay 90 percent of the cost, regardless of the total cost" (Luberoff, Appendix VI:0.3.1). Now emphasis points to

³ The federal information website entitled "Tea-21 User's Guide" depicts a smiling citizen asking, "Golly! What should we do with all that money?" A smiling woman responds, "I hope we use it to build better communities and improve our quality of life!" See <http://www.istea.org/guide/guideonline.htm>

other alternatives. "Solutions may require a restructuring of the way we view transportation because our entire transportation network is based on the burning of fossil fuels" (Savonis, 2000, p. 6). National policy turns only by degrees. Yet, the direction is clear. In a March 17, 2000 press release, U.S. Transportation Secretary Rodney Slater announced that "84 projects totaling \$31.1 million will receive Federal Highway Administration (FHWA) funding." The program, TCSP (Transportation and Community and System Preservation Pilot Program), a result of TEA-21 legislation, is designed to "make America's communities more livable."

Making America More "Livable"

How will the federal transportation department contribute to livability in our cities? The stated goals of TCSP are: "improving transportation efficiency; reducing the negative effects of transportation on the environment; providing better access to jobs, services and trade centers; reducing the need for costly future infrastructure; and revitalizing underdeveloped and brownfield sites."⁴ In short, the program symbolizes a divergence from traditional automobile dominance and road building. It confers upon communities the seed-money for transportation "alternatives," which hope to counter the effects (and the effectiveness) of the single-occupant automobile. Consider the thematic phrasing:

- "reducing negative effects ...on the environment."

[Electric-powered rail transit does not generate the combustion emissions of fossil-fueled engines. Nor does walking and biking, for that matter.]

⁴ See, "U. S. Transportation Secretary Slater Announces \$31.1 Million in Grants To Help Make Communities More Livable," US DOT, March 17, 2000.
<http://www.fhwa.dot.gov/press/publicaffairs/fhwa0017.htm>

- “reducing the need for costly future infrastructure.”

[Rail transit has an *implied* virtue of countering “automobile-dominance,” thus, so the logic goes, reducing the need for autos and perhaps even additional roads. Further, rail transit is said to promote higher urban densities, which can counter suburban sprawl and its demands for ever-extended infrastructure in order to accommodate it. Finally, rail stations are expected to exert a “revitalizing” influence to dilapidated urban zones because of its influx of federal and private monies needed to build transit-oriented developments (TODs).]

Clearly, the expectations are high. The TCSP projects are selected by a panel which includes an Environmental Protection Agency (EPA) representative. The stated goal is to recognize “the close link between transportation and the environment.” A sampling of TCSP projects illustrates the wide range of emphasis and the many transportation alternatives.

- Fairbanks, AK: Riverwalk Centennial Bridge community connector project
- Denver, CO: Union Station Work & Entertainment Connection
- New Haven, CN: Trolley cars
- Knoxville, TN: Electric transit project
- Alington, VA: Pedetrian, bicycle access and transit improvements
- Putnam, WVA: Route 35 management plan
- Wash.DC: Traffic mitigation measures
- Green Bay, Wis: Pedestrian improvements

The Automobile-Enemy?

To some the automobile may not seem so egregious. James Dunn, professor of political science and public administration at Rutgers, and author of *Driving Forces: The*

*Automobile, Its Enemies and the Politics of Mobility*⁵ takes a more moderate view. He sees a decidedly critical, anti-automobile voice in the politics of transportation. "Many of the critics' policy recommendations are worse than useless because they are politically unpalatable to the majority of Americans. By making it appear that solutions to auto-related problems will require millions of Americans to give up their cars and their suburban lifestyles, they make it seem that nothing at all can be done to deal with the auto's negative side effects" (Dunn, 1998, p. 4)⁶. Dunn suggests that extremes of the debate often drive the political discussion. "They link the auto to as many of society's ills as they can" (p. 14).

Yet, the automobile seemed largely absent from discussions in 1990 when the federal government began nationalizing mass transportation policy. Under an initiative begun by President Bush, the National Transportation Policy (NTP)⁷ called for a new direction that would "increase the Federal transportation budget for research and technology projects, in coordination with the efforts of private industry, the academic community, and state and local governments." This new agenda would expand and maintain "the Nation's transportation system." By the year 2000, and under the leadership of a different administration, that vision may have undergone a metamorphosis.

Two important points arise here. First, what else, aside from the interstate highway grid and Amtrak routes, comprises the nation's transportation system? Today,

⁵ James A. Dunn Jr. was a member of the U.S. research team in MIT's International Automobile Program, and served as chairman of the South Jersey Transit Advisory Committee. He has authored a previous book entitled, *Miles To Go: European and American Transportation Policies* (MIT, 1981).

⁶ See at <http://brookings.nap.edu/books/0815719639/html/4.html>.

⁷ See "Advanced Public Transportation Systems, 1985-1991, A Bibliography With Abstracts," Advanced Public Transportation Systems, April 1992, USDOT—FTA. Part 1, page 2. "Report NC: UMTA-UT-06-0001-91-1," Jan. 1991. Previously available at: <http://www.bts.gov/NTL/subjects/lng/apts.html>

the federal government appears to view urban mass transit as a national issue. The suggestion makes sense in one respect: money. Since the completion of the interstate highway system the Highway Trust Fund has been overflowing with unused revenues coming from the gasoline tax. That money needs a purpose, and indeed, with TEA-21 it *must* be spent. Secondly, even if transportation policy seeks academic inclusion (as stated by initial NTP goals) that objective may have fallen by the way, especially when findings prove ideologically inconsistent with pre-established ideas. This suggests that objectivity is displaced by selectivity, that, indeed, some findings of the academic community are simply ignored.

An example of this phenomenon is suggested in the Orange County Grand Jury's criticism of the local transit authority (1999, internet) for failing to adequately consider all sides of the light rail issue.

The national experience regarding the cost effectiveness and the efficacy of urban light rail systems to solve traffic congestion, air pollution and other urban problems has been poor. No mention of these performances has been found in OCTA Outreach literature or briefings.⁸

The Grand Jury, enforcing California *Penal Code* §933 and §933.05, required a response from the Board of Directors of the transit authority. In their reply that Board (OCTA Board of Directors, 1999, internet) addressed the criticism this way:

"All the sources of information cited in the Grand Jury bibliography are familiar to the OCTA Board of Directors and staff, and have been extensively analyzed and considered. In fact, some sections from the Grand Jury report are strikingly similar to research conducted by the Wendell Cox Consultancy (available at www.publicpurpose.com) and is information of which we are well aware. ...More importantly, the Board of Directors is kept well informed of public transit issues across the nation through industry journals and publications."⁹

⁸ See, Orange County Grand Jury Report, 1999, "Findings" section, <http://www.publicpurpose.com/lib-orcorail.htm>.

⁹ A copy of the Board response is available here: <http://home.earthlink.net/~malli/octaresp.html>

What the Grand Jury seems to have asked of the Board, however, was why the *citizens* were not equally informed of these negative findings, especially in light of the authority's mandate to "educate the public" as required by ISTEA (Linton, 1996, internet)?" By all appearances, the information was simply ignored.

Alternatives

The impacts of recent federal directions in transportation are unmistakable. As Gordon Linton, Administrator of the Federal Transit Administration (1996, internet) put it, "ISTEA has led to dramatic improvements in the way our Nation plans and builds our great transportation systems." ISTEA required the regional planning effort (such as CAMPO mentioned earlier), and a new "multi-modal" approach to address today's transportation concerns. The federal regulators of the EPA exert even more power with the threat of sanctions against offending cities. This has led to the observed response in many local transportation planning agencies around the nation toward "alternatives." That direction is clear.

Federal administrators often hold out large expectations for their mass transit alternatives. Linton (1996, internet) cited a list of transit projects resulting from "a total Federal investment of \$5.2 billion." Upon completion, he claimed these projects "will result in over 80 miles of new rail service which... will provide about 150 million annual transit trips." Federal programs speak in big numbers. What might the effects truly be?

Given what is known from the literature it is possible to formulate an investigative hypothesis. If 250 days represent working days in the year, and if 7% of

transit use occurs at rush hour,¹⁰ then it is possible to conclude that this \$5.2 billion “investment” has resulted in approximately 525 new peak hour passenger trips in the nation for every new mile of track (see Table 4.1 below). Is this a significant result? Indeed, given that the average light rail trip is 4 miles in length (Mallinkrodt, 1998, internet), it might mean that the \$5.2 billion has produced an approximate net benefit affecting only 2100 people across the country.

Table 4.1
Measuring the Benefit of \$5.2 Billion

• 150,000,000 trips / 250 days	= 600,000 new national passenger trips/day
• 600,000 trips/80 mi new track	= 7500 new national passenger trips/mile
• 7500 x 7% peak hour riders	= 525 new trips at rush hour/mile
• 525 x 4 miles each	= 2100 new people on light rail nationally

This shows how 150 million “trips” might mean only about 2100 people in the nation.

Federal Dollars

Is transportation policy really about transportation? The results of the federal influence model indicate it is at least about federal money. TEA-21 channeled “\$41 billion” of federal *highway* tax revenues into mass transit (APTA, 1998, pg. 5). “Authorized at \$217 billion, TEA-21 is the nation’s largest *ever* public works law”(Wormser, 1998, p. 10). This is important to local transit authorities because for the first time, it “guarantees” money for mass transit out of the Highway Trust Fund (Wormser, 1998).

Pietro Nivola (1999), writing of the governmental influence in shaping cities notes, “If, early on, American planners had followed, say, the British or French budgetary

¹⁰ Chapter 8 discusses the validity of these particular variables.

practice of allocating between 40 and 60 percent of their transportation outlays to passenger railroads and mass transit systems instead of highways, many U.S. cities quite probably would be more compact today" (p. 16). Of course, early U.S. cities looked little like European cities in terms of population densities and land-use. The United States was a frontier. How could it possibly mirror early British or French budgetary practices? And it may be hard to retrofit U.S. cities now toward such a similarity. Yet, that seems to be the hope. The point remains that the federal influence will try to manifest itself in local transportation decision-making toward that end.

Evaluation of such new transportation policies must measure results. The federal influence seeks to ease the ills of urban congestion. Thus, traffic congestion comprises another model of explanation of modern transportation policy. The next chapter examines this issue in detail.

Chapter 5

9 Transportation Policy, Traffic Relief and the Austin Setting

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"When I recruit business to our state, I want to be able to say, 'Come to North Carolina, you won't get stuck in traffic congestion.' We need regional rail and high-speed rail transportation to keep North Carolina moving." - Gov. James B. Hunt, Jr., North Carolina¹

"There is no such thing as a solution to the traffic congestion problem because it's not really a problem." – Downs (GAO, 1999)

*

This chapter explores the subject of traffic congestion as an explanation of modern transportation policy. Indications of an implied symbiosis abound. The condition of the modern U.S. city with its congested traffic seems to underlie the basis of current transportation debate. This chapter examines the traffic issue as one of the strongest justifications offered for new public transit infrastructure expenditures.

Public/Private Symbiosis?

The above illustrative quote from the governor of North Carolina tells us that public transportation policy is about traffic conditions. Rail transit is thought to be the symbiont of modern automobile travel in the future urban landscape. The literature reveals that traffic congestion is an oft-cited major reason for building light rail transit.

¹ <http://www.ctaa.org/pubs/dollars/section4.shtml>

Thus, the expectation is created in the public mind. A recent letter to the editor of the San Antonio Express News demonstrates this: "San Antonio needs a light rail system to cut the time we need to get to work," a reader wrote. "Everyday that I drive downtown from Culebra Road outside Loop 410 the traffic is unbelievable."² Modern transportation policy with its emphasis on rail transit is expected to address the big city ills of traffic.

It is not illogical that community leaders should hold these expectations, as well. It is reinforced from the highest levels in Washington D.C. A 1999 news release from former Vice President Gore's White House office announced the Clinton Administration's new "Livable Communities" initiative. It would provide federal money for building mass transit systems around the nation at "a record \$9.1 billion for the U.S. Department of Transportation to help ease traffic congestion and reduce pollution...." The federal government's transportation expectations are clear.

Indeed, the Federal Transit Administration (FTA), which channels funds to localities through various programs, includes the "Congestion Mitigation and Air Quality Improvement Program" (Linton, 1996, internet). How might the transit administration have dealings with automobile congestion and air pollution? Traffic congestion, of course, is commonly associated with smog, and mass transit (such as rail) is not. But the suggestion of a link between mass transit and reduced automobile usage, according to this review of the literature, is a hard one to clinch.

A Question of Mobility

The American Public Transit Association (APTA) in its 1999 "Transit Report Card" wrote that "meeting mobility needs" is one of public transit's greatest successes.

² "Letters to the Editor," *San Antonio Express News*, Sun. Apr 9, 2000.

The study notes that in 1998 transit passengers took 8.7 billion trips, “an increase of 4.6 percent over the previous year” (APTA, 1999, internet). These seem impressive numbers. Yet, transit expert Wendell Cox notes that “transit use in 1998 was lower than in 1989 among the five primary modes of public transit (buses, subways, light rail, commuter rail, and trolley buses). Furthermore, even if the NTD [National Transit Database] shows an increase in ridership for 1999 similar to APTA's, [those] boardings would still be at least 300 million below the 1984 peak” (Cox, 2000, internet)³. While both conflicting statements hold a “kernel of truth,” there is a glaring difference in perspective here. Data are obviously subject to interpretations in varying contexts.

In another example the APTA “Report Card” goes on to state that “new and expanded services are providing access to jobs for the people in 8 million households who have no car.” This seems a significant effect. Quantification, however, often opens the door to further questions. For instance, of those 8 million households (non-car owners), how many transit trips might they have consumed of the total 8.7 billion reported for 1998? Should not such a question be of keen interest to transportation policy analysts who seek a transit/automobile correlation? Stated in another way, could it possibly be that most transit users are *non-car owners* anyway? What might this measure indicate for mass transit as a reliever of traffic congestion? It is an intriguing question, which the literature does not directly address. But, there are ways to approach an answer.

Non-Car Owners in Transit – a Hypothesis

In 1991 a Los Angeles study published an observation that the average number of trips taken per household with “zero vehicle-ownership” was 4.63 trips per weekday

³ See “Report of Transit’s ‘Record’ Ridership Questionable,” Heritage Foundation.
<http://www.heritage.org/library/execmemo/em676.html>

(SCAG, 1993 p. 20). Since, transit “trips” are measures of “boardings” (as opposed to people), a single roundtrip becomes counted as 2 transit “trips” by the agency. Therefore, it would require that only 2 roundtrips be taken per household to account for 4 of the 4.63 average “trips.” Further, if only one roundtrip were taken by a member of a non-auto-owning household, and that trip required a transfer en route (i.e. from bus to bus, or bus to train, etc) that would also total 4 of the 4.63 trips. It is not difficult to see that one person can account for many such daily transit “trips,” even when only traveling to and from work. For instance, if a single mom took a daily bus trip which included a transfer to and from a light rail train, when she returned home in the evening (precluding any additional stops) she would have been counted as 6 transit “riders” (once when she boarded the bus, a second time when she boarded the train, a third when she boarded a final bus taking her to her workplace, and three additional times on her return trip back home in the evening). If she took the train to grab a sandwich at lunch-time, she would become 8 total “trips” at the end of the day. She would have taken far more than the average reported for Los Angeles in 1993.

If one uses this SCAG average (4.63 weekday trips) as a hypothesis of nationwide demography, would non-car owning families account for very much of that 8.7 billion “trips” cited by APTA? If we consider that a year consists of 250 working days,⁴ they would have, in fact, made a startling 9.26 billion transit “trips,” over half-billion *more* than was reported (see, Table 5.1 below).

⁴ Capital Metro uses 250 workdays in a year. See Chapter 8 and discussion of HLB, 1999, Technical Report 3, p. 15

Table 5.1
Hypothesis: Non-car Owners as Transit Users

8,000,000	=	Households (non-car owners) (APTA, 1999))
4.63	=	Hypothetical transit trips each household (SCAG, 1993)
250	=	Working days per year (HLB, 2000)

Hypothesis:

If 8,000,000 households took 4.63 trips each over 250 working days in 1998, that would amount to 9.26 billion transit trips taken. (APTA reported 8.7 billion.)

$$8,000,000 \times 4.63 \times 250 = 9.26 \text{ billion}$$

In fact, the formulary is possibly worse. If one were to include *weekend* travel, the numbers of transit trips consumed by the non-car-owning patrons expand further. Such suggestions drawn out of reported data are unsettling. It is obviously untrue that all transit riders own no car. We know this because transit agencies routinely post demographic trends defining their ridership, often citing the numbers of automobile owners who use their transit system. Austin's Capital Metro, for instance, notes that 54% of riders own at least one car.⁵ The St. Louis MetroLink makes similar claims⁶. Those huge numbers of "riders" reported by APTA, in fact, seem to tell us almost nothing.

⁵ From their website, <http://capmetro.austin.tx.us/abou.html>: "Household · At least one car: 54%"

⁶ See "Market Research Survey, Bus & MetroLink Customers, Winter 1993." Bi-State Development Agency. March, 1994, p. 9.

Transit's Inverse Affect on Traffic

Regardless, of how the numbers add up, an end-run is often made around these sorts of investigations. It takes the form of an inverse presumption. It is occasionally stated, for instance, that without mass transit, automobile traffic would be even worse than it is. Scott Bogren of Community Transportation Association made such a suggestion. He devised a measure of just how much current traffic congestion might swell if public transit were no longer available (Bogren, 2000, Executive Summary, internet). To do this he employs a methodology which simply “assumes that 100% of commuters who are riding public transit [will] switch to private vehicles” (Bogren, 2000, “Methodology,” pg. 1). He then transforms all transit commuters reported by the US Census Bureau (1990) into a new presence of automobiles added to the roads. In his “Table 1, Transit Relieves Traffic Congestion,”⁷ he lists 86 U.S. cities alongside his calculations of the traffic that would be added.

His point seems lost, however. Dallas, according to Bogren, would increase traffic by 40, 276 autos (a 2.9% increase). While Bogren’s methodology is illogical, still, it produces an interesting illustration. It says that only about 2.9% of Dallas commuter travel (according to his math) occurs on public transit. Given Bogren’s faulty methodology (e.g. not everyone will switch to automobiles, many don’t drive nor have access to one, others will quit work, some will carpool, some may move, etc.), just how much lower must that 2.9% actually go?

Regardless of the illogic, the notion is still widely promoted. A spokesman for APTA in testimony before the U.S. House subcommittee on transportation (Feb. 10, 2000) offered a similar version: “Mr. Chairman, there is no disputing the fact that traffic

⁷ See <http://www.ctaa.org/BasicPage/show/?location=/pubs/dollars/appendixi>

congestion in the U.S. has reached epidemic proportions. However, as bad as it is, imagine what it would be like without public transportation!"⁸ Paul Weyrich, a self-proclaimed "conservative" in favor of rail transit, and president of the Free Congress Foundation, promotes the same theme. "If you took the people who currently ride transit and put them in cars and put them in the center city at the time of rush hour, you'd see whether transit contributes to the reduction of congestion."⁹ The traffic congestion model of transportation, as explored by this paper, has its promotional, though nonsensical, appeal.

Noscitur a Sociis (*A word is known by the company it keeps.*)¹⁰

What is used to portend traffic relief in our crowded cities is "increasing ridership" in public transit, especially light rail systems, which purport an appeal to a wide base of select clientele. Reports of ridership increases are frequent. December 6, 2000 the *Salt Lake Tribune* reported, "TRAX to Increase Holiday Runs as Popularity Exceeds Expectations."¹¹ The article states, "Last month, TRAX averaged 20,000 riders a day, and December's average is expected to climb even higher." The Dallas Area Rapid Transit (DART) issued a press release December 21, 2000 claiming, "DART marks four straight years of ridership gains"¹² Such reports of increases are consistent with the traffic congestion model as an explanation of policy.

⁸ See February 10, 2000--Fiscal Year 2001 Transportation Appropriations (Transportation and Related Agencies Subcommittee) <http://www.apta.com/govt/record/aptatest/fy2001.htm>

⁹ Quoted in the *Denver Rocky Mountain News* (July 10, 2000). The illogic here astounds one, since only part of all transit use occurs a rush hour (7% to 10% see Chapter 8 for discussion), plus what has been previously discussed here about the nature of "ridership" numbers.

¹⁰ This maxim, *noscitur a sociis*, was expressed in the U.S. Supreme Court case of *Sweet Home Chapter v. Babbitt*.

¹¹ Story by Mark Eddington. See, <http://www.sltrib.com/2000/Dec/12062000/utah/utah.htm>

¹² Media relations contacts, Lyons and Heimberg. See, <http://www.dart.org/home.htm>

However, the use of terms such as “riders” and “ridership” in transportation parlance, is not always clearly defined, especially for the benefit of an unsuspecting public. APTA explains that these terms “relate to trips taken--not to people” (APTA, 2000, internet). In other words, since most transit trips are round-trips, the people taking them will be always counted as 2 “riders,” once each way. Only by converting transit riders into *people* might one logically approach an assessment of transit’s potential at effecting automobile traffic relief during target hours. The rush-hour measure of riders must be the essential unit of analysis, since that is when most commuters are locked in congestion. It is here that they look for relief. It is important, in trying to gauge the appeal of the light rail system at addressing that, to grasp the full meaning of the terms.

Transit officials occasionally allow terms to keep company with meanings they do not possess. A 1992 study reported by Austin Capital Metro stated that light rail would transport 18,000 riders a day, and would remove 10,800 cars from the freeway (Capital Metro, 1992, p. 259). Given a comprehension of the word “riders” this would seem a patent impossibility. To reiterate, if all 18,000 riders are making roundtrips, as most transit-users do, then no more than 9,000 people could be using the system. To remove nearly 11,000 cars from freeways, one wonders who among them might be driving two cars?

APTA has candidly delineated the true meaning of transit ridership:

A small proportion--perhaps 1% or 2% -- make only one transit trip (e.g., they ride transit to the airport and then fly out of town, or they ride transit in the morning to work, but ride home with a friend in an automobile at night). A somewhat larger proportion (primarily the transit dependent) take 4, 6, 8, or even 10 trips per day.

At most agencies perhaps 20% to 50% of riders must transfer to a second (and sometimes a third) vehicle to reach their final destination. Some transfer from bus to bus, from bus to train, from one agency's vehicle to another agency's vehicle, etc.; thus, there is a large amount of double-counting of people. APTA's

best estimate, taking these factors into account, is that the number of people using transit on any day is perhaps only one-third the number of trips reported.¹³

Seldom, if ever, will the interested citizen read this statement in the local newspaper, or find it in the public presentations of transit administrators seeking passage of a light rail referendum. "Ridership" is an inherently untidy constituent of the traffic congestion model. It promises far more than it can deliver when understood. Yet, it is very popular rationale.

Transit and Traffic Congestion

Transit agencies seem content to let projections of ridership "keep company" with public expectations of significant reductions in traffic. Addressing congestion seems the newest job of the modern transit authority by all appearances. For instance, Capital Metro has concluded that the public message to the agency resulting from their "Austin Area In Motion" program (AIM), includes the following directives (AIM, 1999, Executive Summary):

What Should We Do

- Provide public transportation options ("reducing congestion" and "benefiting the most people") that *improve the region's quality of life* that is being jeopardized by the impacts of rapid growth.
- Residents largely agree that CMTA needs to move forward to *fix the area's transportation infrastructure* (market survey respondents (68%) would support a referendum for light rail).¹⁴

¹³ See Appendix for a copy of this statement taken from the APTA website. As discussed later in the paper, APTA raised their estimate inexplicably to 45%. This paper analyzes the unlikely nature of this new assessment.

¹⁴ Emphasis included. From the AIM "Executive Summary" found at: http://www.capmetro.austin.tx.us/future/aim_index.html

Light rail and traffic congestion are inexorably linked in the minds of many, and are consistently reinforced by such stated goals. The phrases, “Reduce congestion,” “improve quality of life,” and “fix transportation,” all carry heavy implications of a traffic congestion model.

In 1999 Capital Metro’s General Manager, Karen Rae, speaking to the *Austin Chronicle* about the upcoming Austin referendum on light rail, said, “It’s easy to say ‘no’ to rail when you don’t know what the alternative would be.” That “alternative,” though unstated by her, would seem to gather full weight of measure from the context of Capital Metro’s many allusions to Austin’s worsening traffic, growing air pollution, and suburban sprawl. Understanding the substance of these implications requires an investigation into the language and methods of the agency.

Chapter 6

“Ridership” – Measure of Meanings and Misunderstandings

In 1976 the Texas Association for Public Transportation (TASP) proposed a light rail system for Austin that would produce:

- 19,000 daily passengers

In 1984 the same agency (TASP) proposed a light rail for Austin with the promise of:

- 28,300 daily passengers

In 1992 Capitol Metro projected a light rail for Austin with:

- ridership of 18,000 passengers per day

For the year 2015 Capitol Metro projects a light rail ridership in Austin of:

- 46,000 passengers per day

This chapter looks at the typical methodologies of transit agencies for measuring their efforts. It discusses how this measure is “allowed to keep company” with meanings it does not possess, and it explores the quantitative indications of what “ridership” might actually mean as a measure of transit significance.

Ridership Accounting

In his book, *Cadillac Desert*, Marc Reisner chronicled the history of a government agency (the Bureau of Reclamation) that evolved from its original purpose of irrigating the arid West for settlement early in the century to the building of hydroelectric dams all over the country. The bureau began a practice, after water projects became hard to justify economically, of using “river-basin accounting” (Reisner, 1993, p. 135). That technique allowed revenues from generated electricity to overshadow the waning benefits

of crop irrigation. It had the effect of keeping the bureau alive and building dams for decades. Reisner believes, it also allowed the construction of many bad projects.

A case might be made that today a new era of numbers-juggling has begun in public administration. Transit agencies in major cities around the country are allowing huge numbers ("ridership") to mask questionable feasibilities in their efforts to win public support for new light rail projects. What fuels this drive for expansion and growth among transit bureaus might be termed *ridership accounting*. In feasibility studies, especially for new light rail projects, a distinct treading on eggshells is discernible. Numbers are large, plucked from the future, and who knows what they truly mean?

If modern transit policy is about traffic congestion relief, then its target is logically the commuter peak hour. To establish a practical linkage between mass transit and the traffic-jam seems an illogical amalgam. No matter how hybrid the effort, though, any attempt, supported by the literature, should be helpful in assessing that potential. Indeed, attempting to bridge the concepts is the only way to discuss a light rail proposition in any terms other than general ideology. A projected ridership of 40,000 a day, for instance, seems to indicate an awful lot of cars taken off congested roadways. But, is it?

Based on what is observable in the national experience, hypotheses can be formed which investigate the proposed effects of traffic relief in transit ridership. For instance, the St. Louis transit agency, Bi-State Development, reports a survey showing 53% of light rail riders are commuters in the city (Bi-State, 1994)¹. Similarly, a survey of the Dallas DART system reported that 35% of light rail riders are former automobile drivers (Cox, 2000, "DART," internet). Given these two distinct variables, one might ask the

¹ Also found at the Citizens For Modern Transit (CMT) website, "Where do MetroLink Customers Go?" <http://www.cmt-stl.org/metro/metro.html#who>.

question: if the same conditions hold true for Austin, what might the effects of the proposed light rail line be on existing traffic?

Using even such simplified quantifications (“surveys” are not the most objective measures), an estimate of potential effects of the Capital Metro proposed “starter rail” (the Green Line) can be calculated (see Table 6.1 below).

Table 6.1	
Austin’s Capital Metro Projected Starter Light Rail Line (Green line)	
•	Projected ridership = 4,084,620 yearly riders ²
•	4,084,620 / 250 work days ³ = 16,338 riders per work day
•	16338 / 2 trips per each = 8,169 people making round trips
•	8,169 x 53% (commuters) ⁴ = 4,329 commuters
•	4,329 x 35% (auto drivers) ⁵ = 1,515 people diverted from their autos

This table formulates an estimate of transit riders taken from automobiles due to the presence of Austin’s Capital Metro Green Line.

Table 6.1 indicates a different product to be found in “ridership.” It converts it to an estimated unit effect: a potential quantity of automobile drivers likely to be taken from the roadways. It is true the calculation is based on observations from other U.S. cities (Dallas and St. Louis). Yet, western U.S. cities possess commonalities, certainly enough to make comparisons valuable, and enough to allow relevant estimations. Indeed, it is

² This “yearly” estimate is taken from an HLB study (2000), published by Capital Metro, “Technical Report 3 – Affordable Mobility Benefits of Light Rail in Austin, Texas” (p. 15). See Bibliography and Appendix.

³ This average “workdays” is taken from an HLB study (2000), published by Capital Metro, “Technical Report 3 – Affordable Mobility Benefits of Light Rail in Austin, Texas” (p. 15). See Bibliography and Appendix.

⁴ From the St. Louis example above.

⁵ From the Dallas example above.

common practice for transit agencies to highlight other cities as examples of their own proposals for light rail.

Research of the literature brings a cursory analysis, such as that above, to an even keener point. Automobiles, for instance, carry more than one person. A typical ratio of 1.2 persons per auto is not uncommon⁶. Thus, of the 1,515 possible riders diverted from automobiles in the above example, the ratio of 1.2 per auto tells us that about 1263 autos ($1515 / 1.2$) were likely diverted from traffic. Further, if those peak hours represent 6 hours in the travel day⁷, then an estimated 211 autos ($1263 / 6$) might be expected to vanish from the average commuter-jammed corridor.

These are the types of logically deductive elements which might flow from agency “ridership” when fully understood. Here, too, is a foreign interpretation to the average ear. It says that the nearly 4.1 million “riders” a year may actually equate to only a few hundred autos removed from the average traffic jam. This is the fundamental unit of effect. And it writes a whole different story.

People on the System

“Ridership-accounting” produces another interesting phenomenon. Transit agencies typically track system-wide counts of boardings (known also as “unlinked passenger trips”). In other words, every ride on any of the modes (bus, rail, van pool, etc.) is counted in one pot. The basic premise of a reduced-traffic hypothesis must be that people, not “riders,” comprise the unit of analysis. The study of transportation typically does not measure people. It is far easier and efficient to count the “boardings,” the “riders,” or “trips” as they occur at the turnstile or in ticket sales. Such measures are

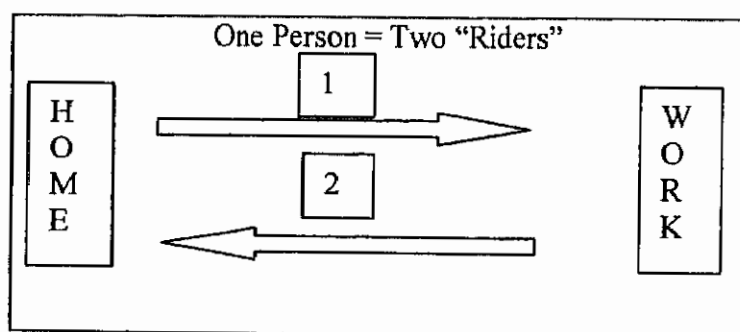
⁶ See Chapter 8 for discussion of this variable.

⁷ See Chapter 8 for discussion.

readily and cheaply obtained, yet constitute no real indication of the travel dynamics of a rush-hour population.

Further, “ridership” fluctuates with system configurations. An express route will have lower ridership (“boardings”) than a route requiring citizens to make transfers, even when both are carrying the same number of people. This is easily demonstrated in the below illustrations.

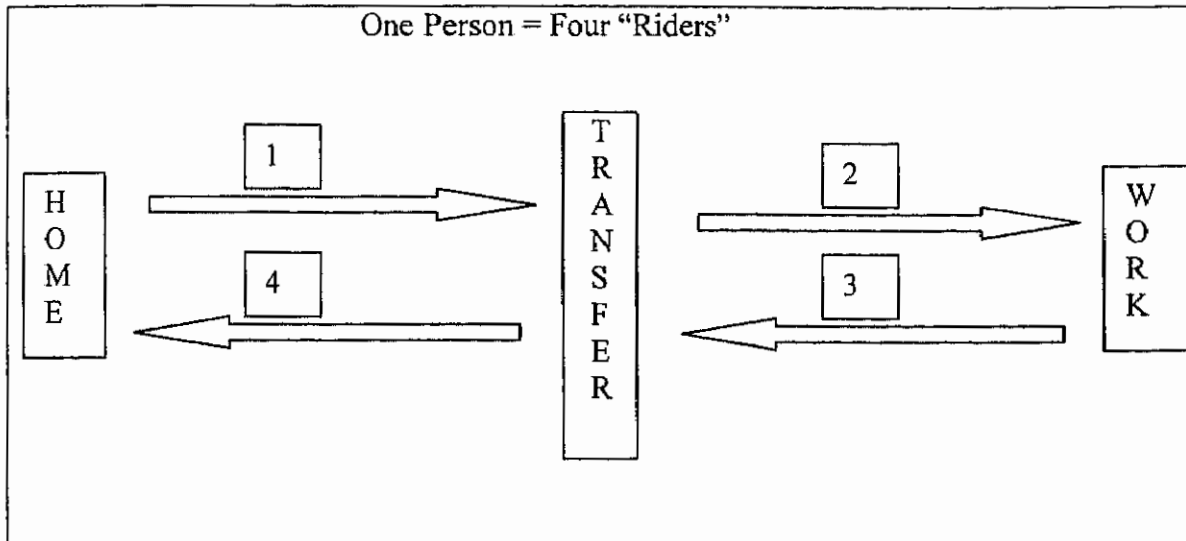
Figure 6.2. Round Trip Travel – Express Bus



In a roundtrip every passenger will be counted twice (once with each boarding).

In the example above, each roundtrip traveler will be counted twice, once each way. Figure 6.3 below, however, shows how each roundtrip passenger can be counted four times for the same travel when a single transfer is introduced en route. Thus, “ridership” is higher in the second instance though each carries the same number of *people*.

Figure 6.3. Round Trip Travel – Non-express, one transfer involved.



When a transfer is added in typical roundtrip travel each person is counted a total of four times.

Knowing the population of people taking the trips allows a better assessment of potential automobile reduction than knowing the numbers of boardings they make. This phenomenon is a key element of misunderstanding in the nature of transit “ridership” as an estimation of transit “success.” It comprises a Key Element important to this paper’s creation of a predictive model later on.

Key Element

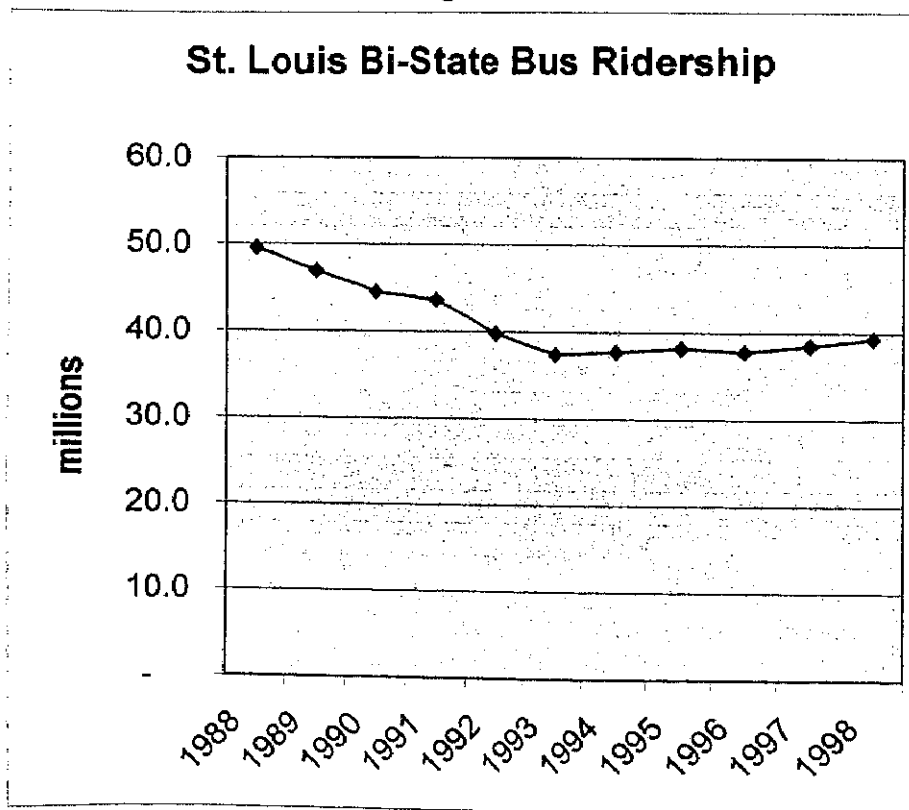
Adding new modes, such as light rail, tends to automatically increase system “ridership,” even when the transit population remains stable, or possibly *decreases*.

When a new light rail system is added many passengers become double and triple counted as they transfer from buses to the trains and back to buses again. This effect is exacerbated as existing bus lines are purposefully re-routed into “feeder lines” for the rail. Since, rail transit only serves general proximities within a city (buses are far better at getting people nearer their destinations) each rider must find other means of getting to

and from a station. This often involves a bus. That is the purpose, after all, of the feeder lines. Thus, system-wide ridership counts will naturally tend to rise when light rail is introduced. It is a by-product of the counting method.

The St. Louis Bi-State study (1994) illustrates this phenomenon in practice. The study noted increased bus transfer rates after opening its MetroLink light rail line in 1993. "This transfer rate reported by bus riders is an increase from previous years and may be the result of reroutes implemented as part of the bus-rail integration plan" (Bi-State, 1994, p 4). This effect can be seen reflected in the Bi-State ridership counts (See Figure 6.4 below).

Figure 6.4



St. Louis Bi-State bus "ridership" can be seen to increase after light rail is added to the system in 1993. How much was due to the rise in transfer rates?

This type tracking of transit's effect, while impressive to the agency, may tell little. It obscures the user population by counting only the number of times that population boards.

Numbers From a Hat?

The American Public Transportation Association (APTA), a pro transit group, has estimated the number of people using transit systems, as mentioned earlier, at about "one-third the number of trips reported." (APTA, 2000. "Number of People Using Transit"), due to multiple boardings and double counting. In the Fall of 2000 that estimate was inexplicably raised by APTA from one-third to 45%. It is questionable that the number should go this high for system-wide counts. Why? Because, the greater it becomes, the more it must mean a purely "roundtrip" function of travel (meaning, *no transfers*). If a full 50% of ridership were actual people on the system, then they must all be making roundtrips, or else, equal numbers of one-way trips. This is contrary to the literature and to national trends.

Transfers, in fact, must *increase* with today's policy directions calling for new modes, such as light rail with its off-shoot feeder-buses. A bus-rail integration will automatically mean greater likelihood of additional transfers, and thereby, higher "ridership" counts.

Further, APTA's increase to 45% is faulty by logic. The more public transit expands in the urban setting (as APTA promotes), the more transfers will become necessarily involved, and thus, the *smaller* the percentage of people who are actually

being counted. For instance, “ridership” is commonly influenced by a practice known as “free-fare zones.” This is a program designed to encourage use of light rail, typically in downtown settings. Ridership figures can be misleading in cities with free fare zones because riding the light rail for a sandwich at lunchtime becomes statistically equivalent to a long commute in from the suburbs. Yet, they serve two distinctly different purposes. In Pittsburgh it has been estimated that “20% of transit use is for short trips in the free zone” (Demery 1994, internet). This is a large portion of transit “ridership” that not only inflates the proportion of ridership to real citizen use, it will bear no impact on congestion reduction at the critical rush-hours.

Therefore, how many people might actually be represented by “ridership?” The question is easily investigated. The 1993 Bi-State study (mentioned above) provides a number of key observations which can help resolve the issue by example. Table 6.5 below lists the transfer rates bus customers reported in that study.

Table 6.5

Bi-State Bus Customers		
Transfers Required	*Percent of Travelers	Resultant Boardings
None	31%	1
Once	37%	2
Twice	22%	3
Three or More	10%	4 (at least)

*Taken from the Bi-State study (1994), “Transfer Rates” (p. 4). Resultant boardings are calculated by the author. Bus transfer rates reflect the numbers of boardings for *one-way* travel only.

This table shows that 31% of travelers made no transfer; 37% made one transfer, and so on. Given the four observations, a table can be constructed for converting the bus “ridership” into people (see Table 6.6, below). Using Bi-State’s reported bus ridership⁸ for 1994 as a sample (any year will do), Table 6.6 calculates what amount of that ridership resulted from travelers making transfers (and therefore, multiple boardings) at the above rates.

Table 6.6

Measure of "Riders's Converted into People Making Trips										
1994 Bi-State Riders (1,000s)	Multiple Boardings:								Total People (1,000s)	% of Riders
	People Making Four Trnsfrs	After Rndtrip Return =	People Making Three Trnsfrs	After Rndtrip Return =	People Making Two Trnsfrs	After Rndtrip Return =	People Making One Trnsfr	After Rndtrip Return =		
	10%	= 8 trips	22%	= 6 trips	37%	= 4 trips	31%	= 2 trips		
37,700	3,770	= 471	8,294	= 1382	13,949	= 3487	11,687	= 5844	11,184	30%

This table shows that with multiple transfers only about 30% of “ridership” equals people using the system the St. Louis scenario.

The table demonstrates that the *number of people* making the boardings comprise about 30% of total ridership ($11,184 / 37,700 = 29.67\%$).⁹ This is closer to APTA’s

⁸ See Citizens' For Modern Transit, "System-Wide Ridership." <http://www.cmt-stl.org/metro/metro.html#sys>.

⁹ Note that the study’s percentages of transfers are for one-way travel only. We know this because it would be impossible for the bus system to substantiate that 31% of its riders were making only *one* boarding with no return. Additionally, the “transfer” question (number “3”) in the survey was a continuation of two preceding questions addressing a one-way travel scenario. Here are the questions:

Q.1 Where are you going on this trip?

Q.2 If you are going home, where are you coming from?

Q.3 How many times will you need to transfer, either to a bus, van or the train, to get there?

original estimate of "one-third" and is far more logical and fitting than the unsubstantiated 45%.

Any transit agency can easily make these type assessments of ridership. As will be demonstrated later on, this is a key integer in the predictive model for estimating the numbers of automobiles likely to be removed from traffic due to a light rail system.

Types of Riders

For transit ridership to exert positive effects it will need to wield wide appeal among the traveling public. Light rail is expected to attract riders from large regions, not just within proximities of stations. Yet, this is inherently problematic. Because rail is fixed infrastructure with few stations (compared to bus stops), one has to select a means of getting to and from stations, i.e. walking, biking, driving, or taking a bus. This last option is the preferred agency scenario for rail transit (and high ridership). Rail is decidedly NOT built to serve only those in walking distance of stations. Few stations are built since stops hamper travel times. Thus, it is important that each station be fed by many other conduits. Hence, the bus-rail integration. Hank Dittmar, Executive Director of Transact, an information resource for transportation initiatives, notes the necessity that "successful rail systems depend upon successful bus systems and have not cut bus service to open a rail line. The right strategy reorients bus routes to feed the rail system" (Dittmar, 1995, internet).

The combination of new rail stations and an alteration of existing bus routes has potential side effects. The St. Louis the *Post-Dispatch* (May 2 1992) reported that the transit agency had plans "to help generate ridership on Metro Link, the light-rail line, by

Knowing this is one-way travel, the model assumes that everyone will be returning the same way, hence, doubling the net number of boardings each person will make.

eliminating many of the buses that go downtown." It shut down 12 express routes, forcing riders onto the rail line, or in search of other options, and prompting charges of racism¹⁰. St. Louis today has a system of feeder buses which route thousands of bus riders to light rail stations.¹¹

New Riders

Rail "ridership, of course, will include new riders. These riders, indeed, are the target group necessary for making LRT a success. It cannot rely solely on former bus patrons. If new rail riders use an automobile to access train stations they might defeat some part of the automobile reduction goal. Yet, if they have removed themselves, and their autos, from the crowded commuter corridors they will have contributed to a net reduction in congestion. This has its value, and, in the traffic congestion model, must be a goal. The question becomes how to gauge that value.

A graphic example of how "ridership-accounting" might portray it, serves to illustrate the continuing overall misinterpretation of rail transit's potentialities. The St. Louis transit agency (Bi-State Development) has graphed system "ridership" over a 10 year period which includes the new light rail system (put in service in 1993). (See Figure 6.7 below). This is the same data as that previously noted except light rail is added.

¹⁰ For information see "No Racism in Plan To Cut Bus Service, Bi-State Says," by Margaret Gillerman. *ST. LOUIS POST-DISPATCH*. Monday, June 21, 1993. Section: ILLINOIS. Edition: FIVE STAR.

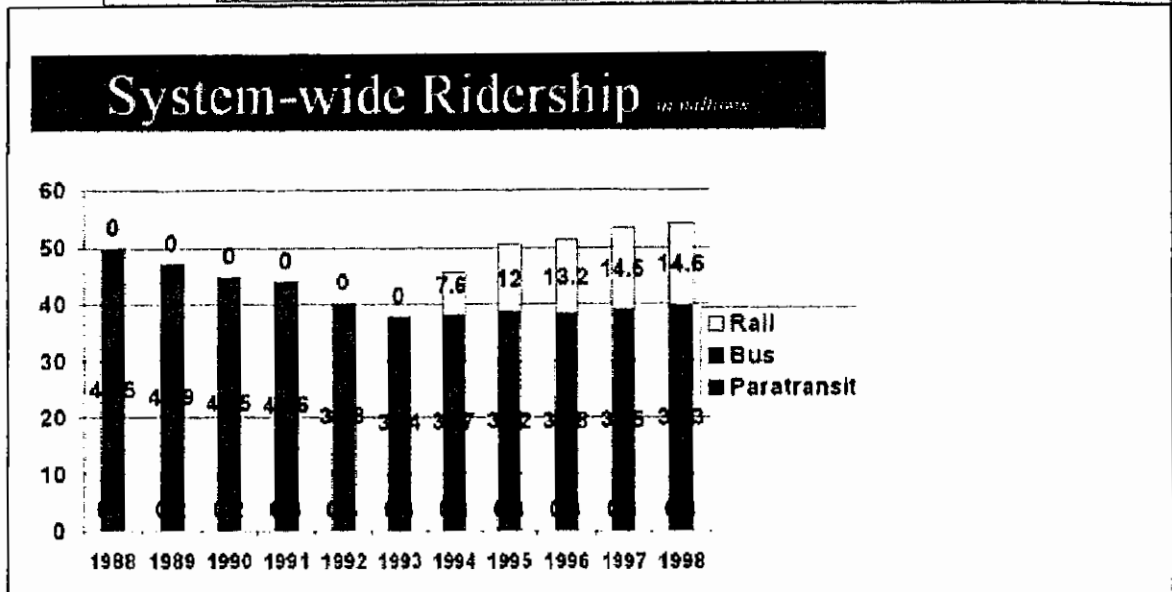
¹⁰ See, "Express Bus Lines Targeted Riders Directed To MetroLink By Mark Schlunkmann, Regional Political Correspondent. *ST. LOUIS POST-DISPATCH*. Saturday, May 2, 1992. Section: NEWS. Edition: FIVE STAR. Page 1A.

¹¹ See, "Express Bus Lines Targeted Riders Directed To MetroLink By Mark Schlunkmann, Regional Political Correspondent. *ST. LOUIS POST-DISPATCH*. Saturday, May 2, 1992. Section: NEWS. Edition: FIVE STAR. Page 1A.

"The Bi-State Development Agency plans to help generate ridership on Metro Link, the light-rail line, by eliminating many of the buses that go downtown. Under a tentative plan, 12 express routes - most of them beginning in north, northwest and west St. Louis County - would shut down when Metro Link begins running in July 1993."

Figure 6.7

Bi-State Development Agency Ridership



This Chart shows an upturn in overall St. Louis transit ridership after light rail was completed in 1993¹²

It can be seen from the graph that transit ridership has taken a significant upturn since opening the light rail line in 1993. Indeed, the MetroLink light rail appears to have effectively rescued a desperately sinking transit ridership in the city. One might interpret this chart as an unfurling success for Bi-State. Yet, what the chart might really illustrate is the dramatic effect of "double-counting." It has already been substantiated that transfer rates rose in Bi-State's bus ridership. How many of those same riders are now counted in the light rail columns as well?

¹² See Citizens' For Modern Transit, "System-Wide Ridership." <http://www.cmt-stl.org/metro/metro.html#sys>.

Chapter 7

Analysis of Austin Ridership Potential

The Austin example might shed some light on the process of counting riders. This chapter looks at the specifics of Austin's transit ridership. It explores a context of different meanings which emerges when large ridership aggregates become reduced to a single critical unit of analysis. It discusses, further, auto roadway capacities as a comparison in quantities of mobility. The chapter prepares the final groundwork for the empirical sections which follow, wherein Austin transportation policy is specifically examined and pertinent traffic reduction effects are estimated.

Austin's Measure of Riders

Capital Metro's weekday bus ridership is reported to be around 20.9 million trips per year.¹ This portends a good deal of mass mobility for the region. Yet, what is not indicated in this number is how much of that represents Austinites *en transit* during peak hours. With traffic congestion so critical to the transit equation today, that is a crucial measure. Most commuters experience a single rush-hour segment. For citizens to evaluate the relevant potential effects of a light rail system, that system must be evaluated in that hour. To approach this the literature allows some extrapolation by using what is known about "ridership." See Table 7.1, for instance.

¹ Taken from Capital Metro Fact Sheet 1999. <http://capmetro.austin.tx.us/abou.html>

Table 7.1

Determining People Using Capital Metro Buses at Rush Hour			
•	20,900,000 riders / 250 days ²	=	83,600 "riders" per workday
•	83,600 / 3 ³	=	27,866 people using the system
•	27,866 x 42% commuters ⁴	=	11,704 people during peak hours
•	11,704 / 6 peak hours in a day ⁵	=	1951 people per rush hour on the bus
This chart transposes Capital Metro bus "ridership" of 20.9 million a year into an estimated 1951 people per rush hour.			

In Table 7.1 it can be seen that Capital Metro's nearly 21 million yearly "riders" condenses to a lowly average of about 1950 peak-hour folks riding the bus system. How does this compare to actual Capital Metro counts? For one thing, Table 7.2 (below) lists the daily boardings reported by Capital Metro's "Top 5" bus routes (excluding the UT shuttle).⁶ In the adjacent columns, for this exercise, the boardings are converted into commuters, and then into average number of commuters traveling in peak hours.

Table 7.2

Riders Using Capital Metro Buses			
Top 5 Performing Routes (Weekday)	*Daily Boardings	**42% Commuters	**1/6 Per Peak Hour
1 North Lamar	6964	2925	488
2 Govalle Cross Tn	6251	2625	438
3 South Congress	4550	1911	319
4 Dove Springs	4396	1846	308
5 Congress Dillo	3206	1347	225
Totals:	25367	10654	1778

* Daily Boardings are taken from Capital Metro's "Fact Sheet."

** These columns have been calculated by author.

² Capital Metro uses 250 "workdays" a year.

³ This 1/3 is based on APTA's observations of ridership equaling people.

⁴ Reported for 1997 Austin "Peak Period Travel Percentage." See Chapter 7 for discussion.

⁵ As previously note, most transit experts estimate 6 "peak hours" in the day. Austin may really have only 4 peak hours.

⁶ The numbers are taken from Capital Metro's "Fact Sheet" <http://capmetro.austin.tx.us/about.html>. The shuttle is not considered simply because its aim is to transport students to and from campus.

It appears that most of Capital Metro rush-hour ridership occurs on one of its top 5 bus routes. Of the estimated 1951 people, about 1778 of them are riding one of these top performing routes. That leaves about 173 people to fill the remaining 55 or more bus lines over the rest of the city on Capital Metro's schedule.

What should the average citizen make of these "ridership" numbers? If the bus system in Austin is moving 27,866 people every workday (Table 7.1), how might this compare to automobile traffic on city streets? Indeed, if transit policy is about relief of traffic congestion, should not these comparisons be important for context?

Table 7.3 (below) lists examples of daily automobile traffic on several arterial streets in Austin.

Table 7.3
Daily Traffic Counts – Austin Streets

Street:	Daily Traffic Volume:	@ 1.2 People Per Auto:
BARTON SPRINGS ROAD (WEST OF LAMAR) 4/30/1996	27,885	33,462 People
BURNET RD. (SOUTH OF ANDERSON) 5/13/1994	26,897	32,276 People
CAMERON RD. (SOUTH OF US 290) /9/1996	21,248	25,497 People

Example traffic counts of Austin streets for 1996.⁷ The column "@ 1.2 People Per Auto" has been calculated by the author.

According to the above table, each of these city streets moves about as many people a day as the entire Capital Metro citywide bus system. Table 7.4 (below) lists daily counts of sections of Austin highways for further comparisons.

⁷ Taken from the City of Austin Transportation Division, 24 Hour Traffic Volumes. See Appendix 3.

Table 7.4
Daily Traffic Counts – Austin Highways⁸

<u>Highway Section:</u>	<u>Daily Counts:</u>
1) Loop 1 (Mopac) from US 183(N) to Far West Blvd	152,000
2) US 183 from Loop 360 to Loop 1(Mopac)	159,000
3) I-35 from US 183 to US 290	223,000

If public transit is to effect traffic relief, it would seem to have a mountain before it.

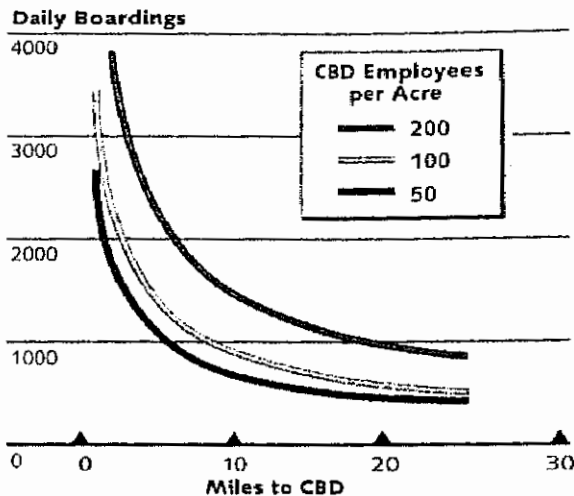
Downtown Traffic

Austin has a plan to build a new light rail. Like so many cities it will run from the outskirts of town to the CBD. Yet, light rail may not even be a suitable option for relief of suburban commuter traffic. One study looked at the differences in travel patterns between in-town and out-of-town locales. According to Davis and Seskin (1996, internet), light rail “is most effective at attracting passengers close to the CBD [central business district].” Commuter rail attracts passengers further out. Figures 7.5 & 7.6 depict these differences.

⁸ Taken from “Austin Metropolitan Area Traffic Volumes.” <http://www.ci.austin.tx.us/ats/98txadt.xls>

Figure 7.5

Light Rail Station Boardings



Constants:

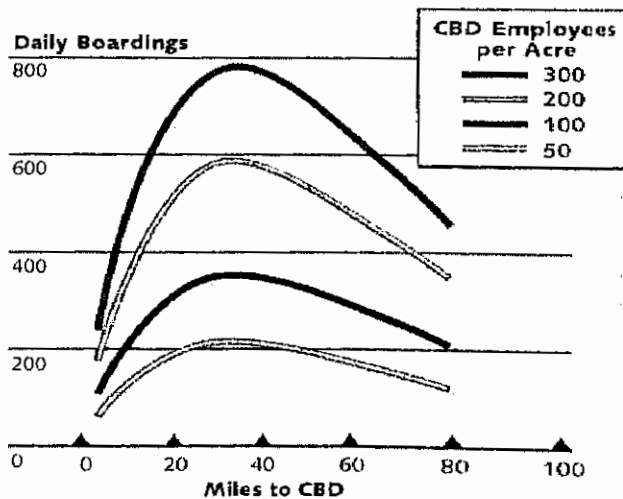
- 100,000 CBD employees
- 1 mile between stations
- 5 persons per residential acre
- Feeder bus service available

SOURCE: Parsons Brinckerhoff et al., forthcoming 1996.

Graphed by Davis and Seskin. This shows that boardings fall rapidly the further away light rail is from the CBD.

Figure 7.6

Commuter Rail Station Boardings



Constants:

- 5 persons per residential acre
- \$52,000 household income
- Park-and-ride lot available

SOURCE: Parsons Brinckerhoff et al., forthcoming 1996.

Graphed by Davis and Seskin. This shows that ridership increases as commuter rail distance increase from the CBD.

According to this study, light rail and commuter rail “serve distinctly different markets and land use patterns.” If light rail functions best closer to downtown, this might not bode well for rush hour traffic relief along those jammed suburban freeway corridors.

Given an understanding of ridership accounting in the public transit venue, and observing the differences between what ridership numbers tend to imply and what they might more closely mean, raises the question of motivations—the basis of the research query in this paper. What is transportation policy really about? A way to approach that has been to examine if such policy is about what it says it is, that is, transport of people?

This paper has examined the transportation literature in light of four commonly found models of explanation: (1) traffic congestion, (2) air pollution, (3) urban sprawl, and (4) federal influence. Next, the paper will examine the local agency, Austin’s Capital Metro, in hopes of gaining insight into what that organization says transportation policy is about.

Chapter 8

Methodology

The purpose of this chapter is to describe the methodologies used in the empirical analyses of the paper. The question of Austin's transportation policy is approached through a content analysis of a videotape. This chapter discusses the strengths and weakness of that methodology and describes the collection strategies used for obtaining the empirical evidence. The conceptual framework of the rival explanatory models guides the collection of the data.

Secondly, the paper creates a predictive model for analyzing the specific suggestion of traffic relief resulting from light rail ridership. The model compiles pertinent empirical findings from the literature review and observed variables from existing light rail systems around the country, and synthesizes these into a mathematical formulation yielding a predictive coefficient that will easily calculate the estimated result. Key to this approach is the condensing of transit agency "ridership" into the single unit of analysis, the average rush hour. The transportation issue must be assessed at this level of impact if it is to agree with its purposes.

A Test of Theories

Theories of inquiry are commonly derived by two scientific methods: *inductive* and *deductive* reasoning (Babbie, 1995, p. 4). *Deductive* method begins with principle theory and broad observations to arrive at specific conclusions and law-like correlations. Thus, transportation theory might hold that because mass transit provides greater *capacities* for moving human subjects, than do automobiles, it promises the superior "solution" to automobile traffic

congestion. Causality is not determinable by the correlation, however (p. 4). Volume facility alone will not guarantee that people choose to access it. Such a concept begs pertinent testing.

The *inductive* method of inquiry seeks to observe and to measure phenomena. It deals with the concrete. This is not to suggest that *deductive* methodologies are the weaker of the two. Much inductive thought is sparked by deductive reasoning (p. 4). These different approaches form the general establishment of theory. They focus on different dimensions of the same phenomenon. What is wanted, according to some scholars of public administration, is the broader perspective of one, in order to make sense of observed empirical findings in the other, and to allow subjective debate of the implications.

A Mix of Quantities and Qualities

There is inherent value to be found in "interpretation and critique" (White, 1999, internet). A "pragmatic usefulness" (Box, 1992, internet) imbues the approach for many practitioners, and may prove of greater value than the ability to measure phenomena. Box has argued that "conceptual writing," that which "mixes concepts of empirical observations" has made substantive contributions to the advancement of theory (1992).

Multiple implications in social research require rigorous thinking and can add a degree of richness to case study analysis. Robert Yin notes that, "case studies can be based on any mix of quantitative and qualitative evidence" (Yin, 1994, p. 14). As an application to evaluative research Yin writes that "most important is to explain the causal links in real-life interventions that are too complex for the survey or experimental strategies. In evaluation language, the explanations would link program implementation with program effects" (p. 15). This mix can be an important approach to investigating empirical subjects.

A Call for New Methods

The methodology of the predictive model in this paper is a non-standard approach to transportation analysis. Yet, it directly links to the most relevant and logical question: “What might be the result of the proposed policy?” The model addresses this question and simultaneously highlights the need for more current and relevant data in future evaluations. The transportation field has acknowledged such a need exists, and notes the limitations in current transportation research methodologies.

Weyrich and Lind call for improved measurement of transit. “A measurement that allows us to calculate better the importance of transit – present and potential – is transit competitive trips. We need to ask not what percentage of total trips transit carries, but what percentage it carries of trips for which it can compete. (Weyrich and Lind, 1999, part 2, internet). Bhat and Lawton note that the “need for realistic behavioral representations in travel demand modeling has been well acknowledged in the literature for some time” (Bhat & Lawton, 2000, p. 2). The authors reinforce many current beliefs that new modeling techniques and innovative approaches are needed. Cervero notes the slim empirical knowledge-base encountered in trying to build land/transportation forecasting models, for instance. “Few metropolitan areas have enough sophisticated and robust regional forecasting models to capture the often subtle relationship between land use and transit” (Cervero, 1999, APA National Planning Conference, internet).

Today’s travel-demand models, for the most part, continue to use individual trips as the unit of analysis. As demonstrated in this paper, there are severe limitations to this approach. Lacking an ability to more keenly examine the complexities in individual travel behavior, it relies heavily on group assumptions. Bhat and Lawton recognize and defend the “multi-stop” travel counts, though, as necessary for understanding locational values in trip generation (Bhat &

Lawton, 2000, p. 2). It is a good point. But to correlate transit travel with automobile travel for the purpose of extrapolating an estimate of congestion relief would seem to require a measure of people in each. It is in the specific context of individual commuter trips that such a measure is important, not merely a generalized tallying of daily "trips".

Bhat and Lawton call for a "more realistic model of people's adaptation to a changing travel environment" (p. 2). The authors note that the need for new methodological techniques "has led to the adoption of relatively nontraditional (in the travel analysis field) estimation methodologies" (p. 4).

"Transportation data collection is literally a moving target. It is difficult to think of instances where it has been measured well" (Tate-Glass, et al., 2000, p. 1). According to the Tate-Glass review of evaluation methods, "the one often followed for budget reasons, leads to a '*data-free analysis zone*' in which decisions are made without the benefit of sound data" (p. 6) (emphasis added).

Alan Pisarski, Chairman of the Committee on National Transportation Data Requirements and Programs, writes of the "need to quantify the value of transportation to our communities" (2001, p.3). He notes, "Many performance measures in transportation fail the relevance test, either because the performance measure is not readily linked to real-world experience, or because the measure fails to capture the desired concept" (p. 3). Pisarski suggests that future analysis will need to focus on objectively describing what exists and how transport relates to the other elements of society and economy. Therefore, "transportation policy and planning is as much about other subjects as it is about transportation" (p. 5).

Research Purpose 1 – The Videotape Analysis

A content analysis was selected as the method of data collection for this project. The evidence was tested against the theoretical propositions formulated in the four rival models. The strength of the content analysis method has been well discussed by Babbie (1995, p. 320). It has inherent advantages and disadvantages.

The content analysis method allows examination of recorded documentation without exerting effects on the agency being studied. It brings a “concreteness of materials” to the research effort, which, as Babbie notes, potentially “strengthens the likelihood of reliability” (p. 321).

There is the potential weakness of an “unspoken,” perhaps underlying, philosophy within organizations, which may exert a meta-conceptual influence on content (p. 321). This can prove hard to identify or even to assess in analysis. In other words, significance may reside not only in content (what is said) but also in the *context* (how, where and under what conditions the message is relayed). The caveat is noted for this research effort. An analysis of a video-taped meeting, such as that undertaken by this study, may feel the imprint of the organization’s meta-conceptual weight. It is for this reason that the content will be examined closely for patterns of qualifying language. It is the final strength of the content analysis method, as Babbie observes, that “you can always code and recode and even recode again.” (Babbie, 1995, pg. 321).

Finally, Babbie discusses the potential problem of “validity and reliability” (p. 320). These suggest possibilities of subjectivity in the selection of the measuring criteria in a research effort, the coding technique, and even the representative value of the chosen document(s).

Document Validity

This paper was careful to address these concerns. The videotape chosen for analysis was the event of July 17, 1999, Capital Metro's AIM presentation ("Area In Motion"). The AIM presentation can best be summed up by using the general manager's own words, when she first introduced the concept to the Capital Metro Board of Directors on March 17, 1999¹:

As you know we're going out into the community, anything from Rotary Club to community organizations, committees, neighborhoods, etc and there are many environments where people ask us to frame the issue about what Capital Metro is attempting to do here. Some just want to talk; some just want to exchange information. But one of the things we're repeatedly requested to do is to frame the issues that we're facing as a community.

So Carlos is here today to run thru a format that you will be able use as board members if you'd like to; we'll be using as staff as appropriate; or can be used in the community at large for any of the outreach efforts that we're doing. And with that Carlos, I'll hand it off to you and I'll let you go thru the presentation.

Operationalizing the Videotape Analysis

The July 17, 1999 AIM presentation was analyzed to look for evidence that the explanatory models are propelling policy. The videotape was transcribed and coded for measurement.

The logic of the measurement was to categorize each declarative statement according to its emphasis and fit to one of the models. A fifth category was added called "Admin" in order to collect statements not fitting model codes. Since the videotape was of an open meeting it was expected that certain content would refer to procedural matters. These statements would be captured in "Admin."

¹ Transcribed from an archived videotape.

Research Purpose 2 – The Predictive Model

The videotape analysis provides a general overview of the policy paradigms at work in the agency. The predictive model in the second part of this paper's empirical effort seeks to answer the specific question of just how many automobiles might be removed from traffic congestion due to the presence of a light rail system.

It is accepted practice to use known analytical coefficients in preparing transportation forecasting models. Professor Robert A. Johnston of UC Davis made this point recently in a statement refuting an Environmental Impact Statement (EIS) justifying a new highway.² His observations provide insight into the practice:

"The DOT and modeling agencies should have borrowed mode choice coefficients from a region with a mixed system of rail and busses, such as Seattle. This is standard practice in all urban regions modeling the rail mode without rail trips in the data set on which the local models are estimated.

The operationalization of the predictive model employs this use of borrowed data analyses. Further, to combine variables into a working coefficient, the "multiplication principle," which commonly calculates probabilities (Paulos, 1988, p. 22) is used. Collections of observations (data) can be useful in formulating explanatory approaches to phenomena, Paulos notes. "Most explanatory social research uses a probabilistic model of causation" (p. 78). The multiplication principle allows for such expressions as a combination of independent events (p. 27).

² See "Comments of Robert A. Johnston on the Legacy Parkway DEIS"
<http://www.stoplegacyhighway.org/expert.htm>.

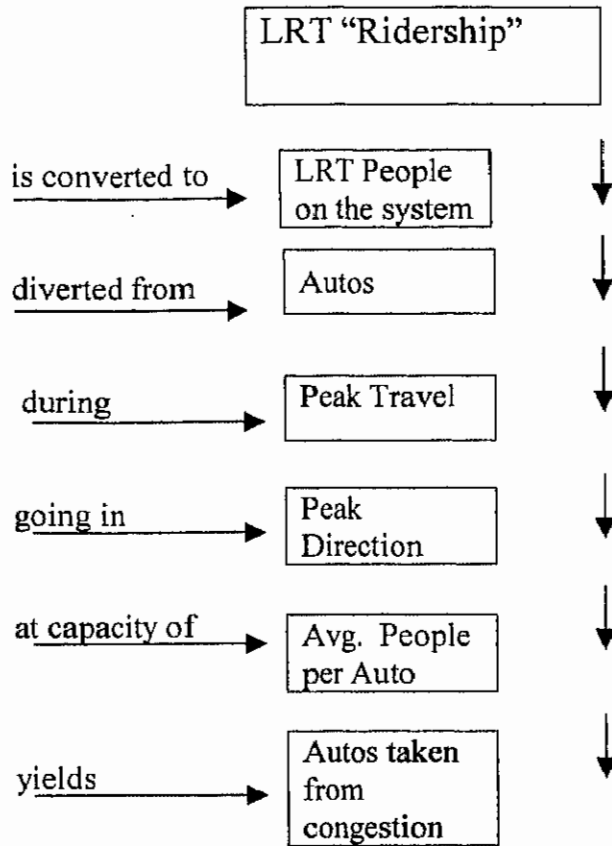
The predictive model, therefore, calculates an estimated effect by combining the key empirical elements which go into defining that potentiality. It is a formulation of both site-specific and "borrowed" coefficients, which, when combined, yield a "multiplier," a constant number (tailored to the individual city) which will perform that function. Such a reduced-traffic constant, when multiplied against any agency projection of light rail ridership will easily answer the pertinent question of potential automobiles removed. Given the emphasis on traffic (at both national and local levels), this is an important question, and one which deserves an answer.

The Reduced-Traffic Constant

A summary of the steps involved in deriving such a "constant" are illustrated in Table 8.1 below.

Table 8.1

Components of the Reduced-Traffic Constant.
To convert transit “ridership” into automobiles removed from traffic:



The formulary requires quantifying the several component variables. Linkages between these variables and the literature are graphically presented in Table 8.2, below. A discussion of each component follows.

Table 8.2.
Variables to Operationalize the Reduced-traffic Model

Variable:	Literature:
1) People using the transit system	APTA, 2000 HLB, 2000 Bi-State Development Agency, 1994
2) Peak travel	Schrank & Lomax, 1999 Apogee Research International, 1995
3) Peak direction	Gordon, et al. 1999
4) People diverted from autos	Cox 2000 OCTA 1999, internet HLB 2000 Cox 2001 Cuneen 1995 Richmond 1996
5) Auto vehicle capacity	Lomax and Schrank (TTI) 1999

Variable1. People on the System

How many “riders” are people? It is an important question. If transportation policy is to exert “ameliorative effects on *traffic congestion*” as the Capital Metro study suggests (HLB, 1999. p. ii) it must remove automobiles from congested roadways by inducing drivers to switch to transit. The common measure of transit (“boardings” or “trips”) is inherently ambiguous at determining this potential. Transportation experts routinely use vehicle-miles traveled (VMT) and person-miles (also known as “passenger-miles) to derive conclusions about transportation³. This research paper, however, seeks to measure a more specific unit of analysis: automobiles removed from average rush hour of traffic. To approach this it is important to estimate how many *people* are in the measure. .

Further, as has been noted, “free-fare zones” are commonplace and tend to skew expectations of ridership’s meanings. A commuter who drives in from the suburbs only to park in or near downtown and take a light rail line the rest of his trip will have served little toward reduction of congestion.

A traffic reduction model as an explanation of transit policy must, therefore, determine a good estimate of how many people are in the transit system under key conditions. The predictive model in this paper, therefore, will use the original APTA estimate of “one-third” (as reinforced

³Transportation experts such as Cox and Mallinckrodt believe passenger-miles (or person-miles) of travel make a better gauge. The Texas Transportation Institute at Texas A&M uses person-miles in calculating their Congestion Index (see “Chapter 4, Selecting Mobility Measures³). Person-miles has advantages. “Aside from being unambiguously self-defining it solves the problem that the car trip is not the same as a transit boarding or unlinked-trip. An average trip to work (or most other destinations) is one auto trip but two or three transit boardings” (Mallinckrodt (From correspondence:

Subj: [transport-policy] Re: (Understanding Ridership) DECLASSIFIED!
Date: 11/9/99 11:37:28 AM Central Standard Time
From: malli@earthlink.net (Jack Mallinckrodt)
Reply-to: transport-policy@egroups.com
To: transport-policy@egroups.com)

by the discussions in Chapter 6 of this paper), as an acceptable and reasonable estimate of the number of people in a transit system. Thus, variable 1 is defined:

VARIABLE 1
1/3 RIDERSHIP = PEOPLE

Variable 2. Peak Travel

An important aspect in the effectiveness of LRT at reducing traffic is how well it addresses the peak hours of urban travel. Agencies often laud the utility of rail transit at handling special events traffic, and rail lines are often routed to stadiums, theme parks and convention centers. To be considered an effective congestion tool, however, the light rail system must be evaluated for potential effects at the crucial times of the day.

Such data are available. The Texas Transportation Institute (TTI) quantified the "percentage of daily travel in congested conditions" for Austin at 41.5% (Schrank & Lomax, 1999, internet⁴). Peak travel spans many hours of the day, however. It is important to understand this spread in the concept of measuring transit as relief for traffic congestion. Peak travel is comprised of two distinguishing characteristics: (1) that percentage of travel occurring during peak hours; (2) the number of peak hours in the day.

Peak hours consist of three to eight hours in the day, depending on the size of the city and the percentage of congested traffic. A recent TTI study concluded that peak travel is increasing. "On average, the percentage of daily traffic in the congested periods in the 68 urban areas has

⁴ For peak travel discussion see http://mobility.tamu.edu/2001/study/congested_period.stm

increased from 32 percent (about 5 hours per day) in 1982 to 45 percent (about 7 hours per day) in 1999."⁵ Austin is considered a "medium average" sized city (between 40% and 45% of traffic in the "congested period") and, thus, experiences about a 6 hour "congestion period," according to TTI

What this tells us is that with 41.5% of all travel occurring during these 6 congested hours, then about 7% of daily travel in Austin is peak-hour travel ($41.5\% / 6 = 7\%$). This provides a general characterization of the average rush hour in Austin.

How might these findings compare to the national experience? Robert A. Johnson, Professor of Environmental Planning at the U.C. Davis, in a refutation of an Environment Impact Study (EIS) recommending a new highway in Utah made this observation of common practices:

"Last, I wish to comment on the use of fixed peak-hour traffic factors. The authors of the DEIS used a fixed 9% of daily trips assigned to the peak hour (I-26). The use of a fixed factor is not correct [in this instance], as the peak will "spread" due to the higher levels of congestion, especially in the No Build case. A lower factor, such as 7%, would be much more reasonable." (Johnston, 2001, internet).

A 7% factor representing peak-hour travel in Austin should not be considered an unreasonable estimate, and will be included in the model:

VARIABLE 2
Peak Hour Travel = 7%

⁵ See, "2001 Urban Mobility Study, Has The Congested Period Lengthened?" http://mobility.tamu.edu/2001/study/congested_period.stm

Variable 3. Peak Direction

Not all traffic flows in the same direction. To evaluate light rail as a traffic reliever, an estimate of the percentage of traffic occurring in peak direction is necessary (in-bound traffic in the morning and out-bound in the evening). This is the typical rush hour element affecting most commuters. Peak direction is pertinent to determining potential relief effects.

Gordon, et al (1999, internet) notes that ridership is a *bi-directional* measure. The 1999 study estimated that 60% of peak travel is moving in peak direction⁶. The Oregon Transportation Institute (a non-profit organization) conducted a study of Portland's Westside MAX in June of 2000. The study counted peak-hour boardings (6 – 9 A.M.) at the Washington Park Station in order to measure people entering and leaving the Sunset corridor (OTI, 2000, internet)⁷. The measurement found that eastbound riders amounted to 1,145; westbound counts were 4,014. Total peak period ridership (3 hours A.M.) equaled 5,159. Peak direction in this case (westbound) can be calculated as a percentage of the total (4,014 / 5,159), which equals approximately 78%.

Peak direction is not an easy number to get even with direct measurement. The Apogee analysis spoke to this phenomenon (Apogee, 1995, chapter 4, internet):

"In reality, while the majority of traffic is traveling at this speed, some proportion is traveling at a higher speed in the non-peak direction. The peak/non-peak direction ratio

⁶ See, Gordon, Peter, Moore, James E.II, Poole, Robert W. Jr., and Rubin, Thomas A. 1999. "Improving Transportation in the San Fernando Valley." Reason Public Policy Institute. Appendix: "Maximum Theoretical Capacity." January 1999. "Improving Transportation in the San Fernando Valley." <http://www.rppi.org/ps249.html> Pertinent text:

"If we assume a ratio of average weekday:peak hour ridership of 9:1 (which is approximately MTA's recent experience), this suggest under 3,000 peak hour riders. However, this is bi-directional ridership and, even for peak period peak direction travel, some trips will not pass the peak load point. If we assume that 60 percent of peak period ridership passes the peak load point in the peak direction, then we are talking well under 2,000 riders past a point in the peak hour."

⁷ See <http://www.hevanet.com/oti/westsidemaxcounts00.htm>

would vary considerably by segment. Many segments, especially those closer to the downtown, would probably be fairly close to the assumed 50%:50%.”

For lack of a better measure, this model will use an estimated 60% peak direction.

VARIABLE 3
Peak Direction = 60%

Variable 4. Riders Induced from Autos

This is, of course, a key component. It is not an easy number to come by. It is not tracked by transportation agencies. It has been estimated by surveys, such as that in Dallas reporting, “DART surveys indicate that approximately 35.5 percent of light rail riders would be automobile drivers if they were not on light rail” (Cox 2000, internet)⁸. Other sources include:

- The Orange County grand jury noted in their findings that “approximately 20% of Washington, D.C. rapid rail ridership formerly drove autos for their trips, while 25% of San Diego's light rail riders were former auto drivers” (OCTA 1999, internet).
- The HLB Technical Report 3, a study commissioned by Capital Metro of the Austin region, estimated (without substantiation) that 46% of LRT ridership on the Capital Metro proposed light rail would be diverted from automobiles (p. 14). (This estimate is higher than any other finding in the literature.)

⁸ See, “DART Light Rail (Dallas) Peak Hour Ridership.” <http://www.publicpurpose.com/ut-dartpkhr.htm>

- Wendell Cox in testimony before the Texas State Senate about light rail transit stated that “on average fewer than 25 percent of light rail riders are former automobile drivers.”⁹
- Cuneen (1995, p. 1) found that 1/3 of Portland’s MAX ridership was reported by the agency to come from former auto drivers.
- Richmond, citing the Southern California Association of Governments stated: “A November 1990 on-board study (the most recent cited by MTA, 1996b) found, furthermore, that only 21 percent of Blue Line passengers had previously driven, while 63 percent had taken the bus” (Richmond, 1996 p. 5).

Given this array of observations the predictive model will use the generous estimate that 35% of light rail riders will be drawn come from former automobile use.¹⁰

VARIABLE 4
Riders from autos = 35%

Variable 5. People per Auto

Not all auto users are drivers. To understand how many cars might be removed from traffic as a result of an aggregate of people seduced from their use requires an understanding of

⁹ See “Refuting the 6-Lane Myth.” 2001. <http://www.publicpurpose.com/index.html>.

¹⁰ It should be noted here that some claims can be found that 79% of MetroLink riders were former auto drivers drawn to the light rail system. The literature review makes plain that no transit agency in the country would make such a claim. Correspondence by this researcher with Bi-State officials confirms this. It is simply an inaccurate extension of the 1994 Bi-State Market Survey (mentioned previously) that was conducted a few months after the light rail line opened. Indeed, the survey notes the high incidence of exploratory riders: “First, the rail system was only four months old at the time of the survey and it would be natural for residents to try out the system for atypical tripmaking. Secondly, the survey was conducted at the beginning of the Christmas holiday season, which could cause a higher-than-usual amount of shopping and casual travel.”

average capacities. The industry averages vary from 1.6 people per auto in highway studies to 1.1 in some transit agency models. The TTI "Mobility Study" calculates vehicle occupancy at 1.25 persons per automobile¹¹. Thus, each vehicle represents approximately 80% of the total number of auto users (1 / 1.25). This number will be accepted for use in the predictive model.

VARIABLE 5
Auto Capacity = 80%

Calculating the Reduce-Traffic Constant

Western US cities share remarkable similarities, as noted earlier. It is common practice to compare them for growth data and measurement variables. Using such variables as those above derived from the national experience, the predictive model of this paper can calculate a Reduced-Traffic Constant (RT), thusly:

$$\begin{aligned}
 & \text{People} \times \text{Pk Travel} \times \text{Pk Dir} \times \text{Auto Drivers} \times \text{Auto Capacity} = \text{RT constant} \\
 & .33 \times .07 \times .60 \times .35 \times .80 = \boxed{0.00388}
 \end{aligned}$$

See Conclusion, Chapter 10 for further discussion of this and Capital Metro's published claim that "80 percent of light rail passengers in St. Louis... switched from cars to rail for their commute."

¹¹ See "Constants:" <http://mobility.tamu.edu/study/PDFs/constants.pdf>

Predication

This model predicts that the key unit of effect is derived by use by the RT constant. It estimates that the amount of automobile reduction during peak travel times for the Austin area can be reasonably expected to comprise about .388% of *light rail ridership*. Thus,

$$\boxed{\text{"Ridership"}} \times \boxed{\text{RT Constant}} = \boxed{\text{Autos removed}}$$

The results of the content analysis outlined in this chapter and the predictive model above, which yields a reduced-traffic constant, are discussed further in the following chapter.

Chapter 9

Results

The purpose of this chapter is to summarize the findings of the content analysis and the predictive modeling. The four explanatory models formed the guideposts for analyzing the agency's message about the transportation issue in Austin. The predictive model quantified the phenomenon of assumed rush hour traffic relief due to light rail transit. This chapter discusses the results of these analyses and provides an overview assessment of the validity and accuracy of the results.

I. The Content Analysis

The content analysis examined an archived videotape of Capital Metro's AIM presentation (July 17, 1999). The AIM program was chosen for its informational value. It was designed by Capital Metro to serve as a concise explication of the Austin transportation issue. It was presented to the public by the general manager of Capital Metro, Karen Rae. The particular presentation analyzed was chosen because it was available. The general manager's presentation was part of a larger Transportation Workshop which included many other elements, discussions, and feedback. Only the general manager's presentation part of that workshop was analyzed for its content.

The presentation consisted of 62 declarative sentences accompanied by a series of overhead graphic projections. It was about 20 minutes long. Often the statements were bulleted or summarized in the graphics.

For examination by this research each declarative sentence was transcribed and coded. A total of 69 statements in 62 sentences were recorded. Any interrogative sentence encountered was combined with the following declarative sentence (usually designed as the rhetorical answer). As an example, these two sentences are counted as one statement: "What's the problem? Everybody liked it so much that..." etc.

The coding was done by examining each sentence for intent. Those meeting any of the four suggested models were coded to the appropriate model. All other statements were counted in the miscellaneous category labeled "Admin." Thus, the key consisted of five coding groups, the four models and Admin. The full coded transcript is found in the Appendix. The results of the analysis are presented below.

First Results

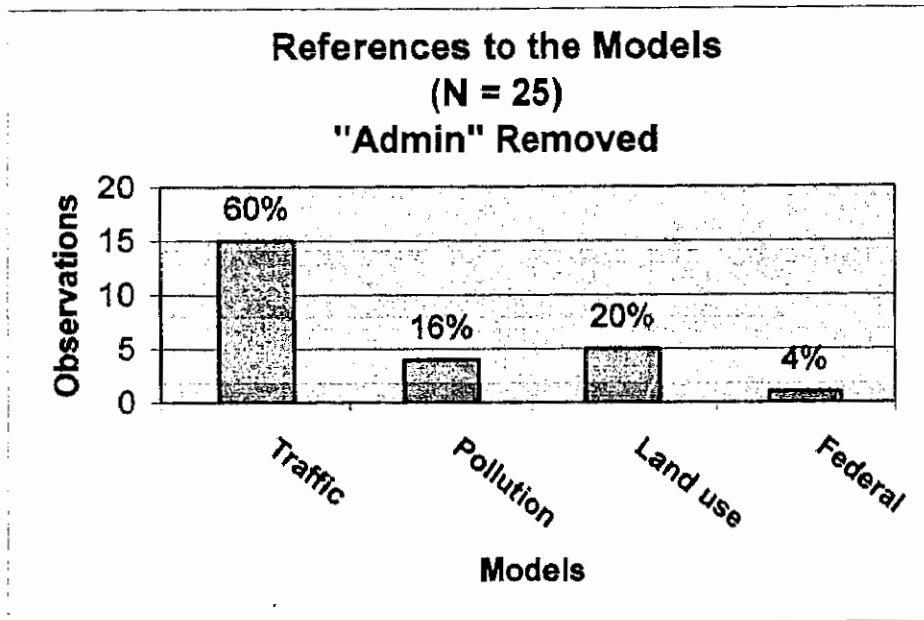
The results of the first coding effort are shown in Table 9.1 (below). It can be seen that 22% of the General Manager's presentation generally referred to traffic issues in Austin. This is a far greater percentage of the total content than any of the other explanatory models. Air Pollution registered fewer than one-third as many references as Traffic. Land Use received fewer than one-fourth. The Federal Influence model received only one mention in the presentation.

Table 9.1
Summary of the Videotape Analysis

Research Purpose 1: Explore the Austin transportation policy, as articulated by the transportation agency's General Manager in the AIM program.			
Original Coding			
4 Transportation Models plus Admin.			
Measured Declarative Statements:		62	
Measured messages:		69	
Code:	Observed: Percentage		
Traffic	15	22%	
Pollution	4	6%	
Land use	5	7%	
Federal	1	1%	
Admin	44	64%	
	Totals:	69	100%

As can be seen, references to the subject areas represented by the four models, and predicted by the literature review, comprise fewer percentage of the statements that Admin. The four models added together total only 36% of the AIM content (22% + 6% + 7% + 1%). The miscellaneous category, "Admin," received the far greater number of observations, 64% of content. Removing the Admin category (see Figure 9.2 below) allows a comparison of performance among the four models. Here traffic received the greater preponderance of references.

Figure 9.2
Comparison of the references to the models.



It is notable that among the model categories the Federal influence garnered the least attention. This was a surprise. As discussed earlier, this one area is conceivably the most powerful determinant acting on transportation policy today. To reiterate the point, non-attainment status of federal EPA air emissions standards threatens the loss of regional federal highway dollars in cities in non-attainment. The government, simultaneously, seeks to influence expansions of public transit facilities ("multi-modes") by holding out federal dollars to cities planning such. This means additions and expansions of systems such as light rail, HOV lanes, and busways. Federal transportation policy, therefore, seeks influence by both fear and desire. Why might this model have been the least mentioned in the presentation?

Re-coding the Content

To answer this question, and others, the videotape was closely re-examined for re-coding. By far the largest percentage of messages fell into the miscellaneous "Admin" category. It was expected this category would cull general comments, background and procedural matter out of the analysis. Yet, it turned out that most procedural overview commentary occurred in the introductory statements prior to the General Manager's presentation (other procedural matter followed it). Thus, the presentation represented a fairly pure body of transportation-related commentary.

If in fact, the Admin category contained other information, what might comprise its nature? Further examination revealed that much of the commentary was of a qualitative nature. For example, in the following series of statements those comments pertaining to the explanatory models are evident, yet the last sentence (#12) refers to none. It clearly illustrates, however, a *qualifying* nature:

6 What's the problem? Everybody liked it so much that we're dealing with both the challenges and opportunities of a population explosion, including increased traffic congestion, but also increased air pollution, and what brings with it – the new Federal regulations that are potentially on our horizon.

8 We are experiencing increased traffic congestion.

9 Nobody needs to be reminded of that more than everyone who commutes in and out in the morning.

10 And to just give you a quick idea, these numbers show the growth in just the last five years along the key corridors ranging from near 60% increase in traffic to 30% increase in traffic over 5 years--significant increases, even exceeding the population Growth that we have seen.

12 And guess what? No matter what we do it's going to get worse before it gets better.

Such messages, if sufficient, might produce a thematic resonance throughout the presentation. An underlying meta-conceptual influence belonging to the organization, as discussed in Chapter 8 (see Babbie) might be discernible. Two further examples illustrate grounds for this suggestion.

7 So, there are a lot of things...; while we're sitting here four people an hour are moving to Austin, Texas and the region surrounding us—thirty to thirty-five thousand people a year.

35 We're updating our technical information, and we're trying to amplify how important this decision is in the general public.

These statements make it plain that the agency wishes “to **amplify**” the importance of the issue to the public (statement 35) and that something will **need** to be done soon (7).

To test for an underlying organizational influence animating these statements, the content was recoded. The following new categories were added for testing: “Urgency,” “Quality” (of life), and “Choice.” The results of this recoding effort are shown in Figure 9.3, below. As can be seen, it is plain the new codes received a high degree of attention. The Admin category fell to 18 statements (26%).

Table 9.3
Recoded Results (Admin included)

Coding Results		
4 Transportation Models plus Admin.		
3 Qualitative Categories Added		
Traffic	15	22%
Pollution	4	6%
Land	5	7%
Federal	1	1%
Quality	11	16%
Urgency	5	7%
Choice	10	14%
Admin	18	26%
Totals:	69	100%

To analyze the relationship of the new codes with the research models, the Admin category is removed below (see Table 9.4).

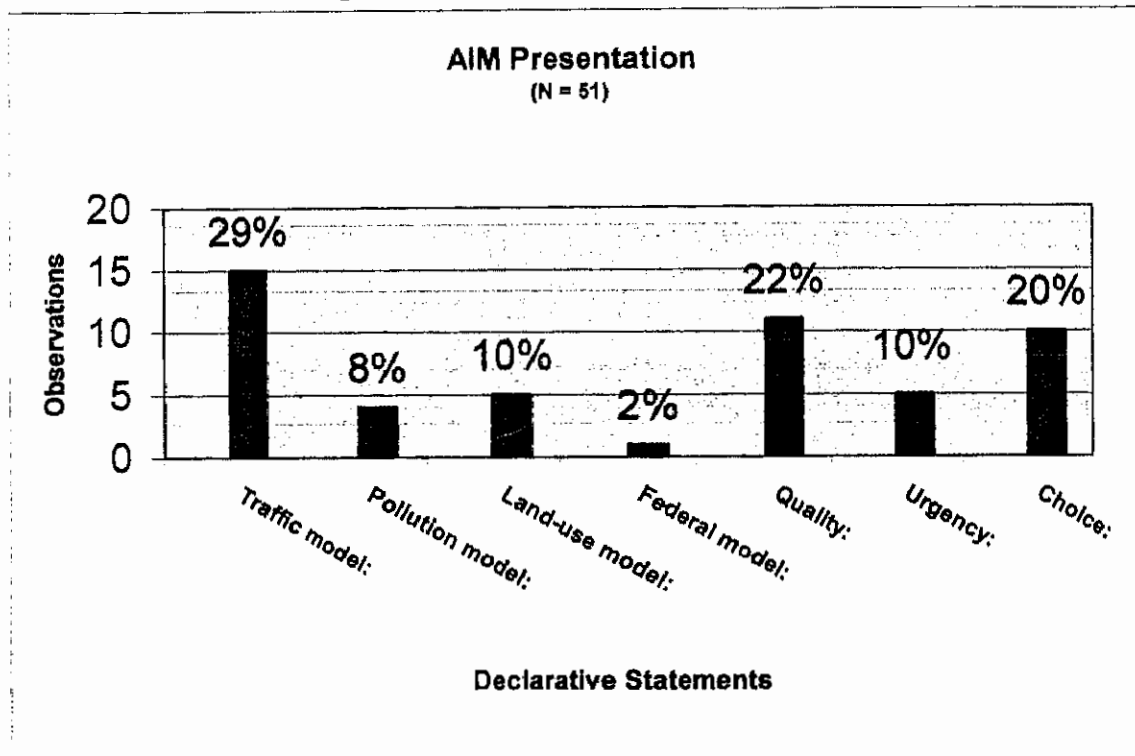
Table 9.4
Recoding Results (Admin removed)

Re-Coding		
4 Transportation Models (Admin. Removed)		
3 Qualitative Categories Added		
Traffic	15	29%
Pollution	4	8%
Land	5	10%
Federal	1	2%
Quality	11	22%
Urgency	5	10%
Choice	10	20%
Totals:	51	100%

By far the greatest occurrence of referents still went to the Traffic model (29%). Yet two of the new qualitative categories, "Quality" and "Choice" followed very closely

behind. Figure 9.5 below graphs these results. It appears that among all referents the strongest message made by the agency about Austin transportation pertained to traffic.

Figure 9.5
Graph of Recoded Content



The AIM presentation is clearly about the Austin traffic condition¹. It promotes traffic congestion relief as a major theme in its message to the public. This is a *quantitative* issue, measurable by the predictive model presented in this paper.

¹ It should be noted that single-occupancy vehicle travel (which comprises over 95% of travel) lies outside the purview of the transportation authority. Capital Metro deals in mass transit, which means any number larger than single occupancy.

The Qualitative-vs-Quantitative Issue

The suggestion of the presence of a meta-conceptual influence raises the question of qualitative versus quantitative methodologies in evaluation. The content of the Capital Metro presentation is strongly distinguished by a large percentage of qualitative content. Table 9.6 below illustrates the comparison.

Table 9.6

Qualitative vs. Quantitative Approaches in Capital Metro's AIM Message to the Public		
Categories:	Observed:	Percent:
Quantitative-based models	25	49%
Qualitative-based	26	51%
Administrative (removed)		
N =	51	100%

The four quantitative-based research models, when measured against the qualifying statements in the agency content, barely hold their own. The strength and number of qualitative referents seem to pose rival models to this research design.

Assessment of the content analysis, and the re-examination, led to the suggestion of an organizational meta-concept at work in the agency. An example below serves to illustrate this:

61 We really are at a critical point about what we want Austin to look like and where we want to live, as Carlos says, for the next several years, decades, and what Austin we want to leave to our children.

Such qualitative references form a body of statements in the presentation, which equal or rival the significance of the empirical-based models derived from the transportation literature.

II. The Predictive Model

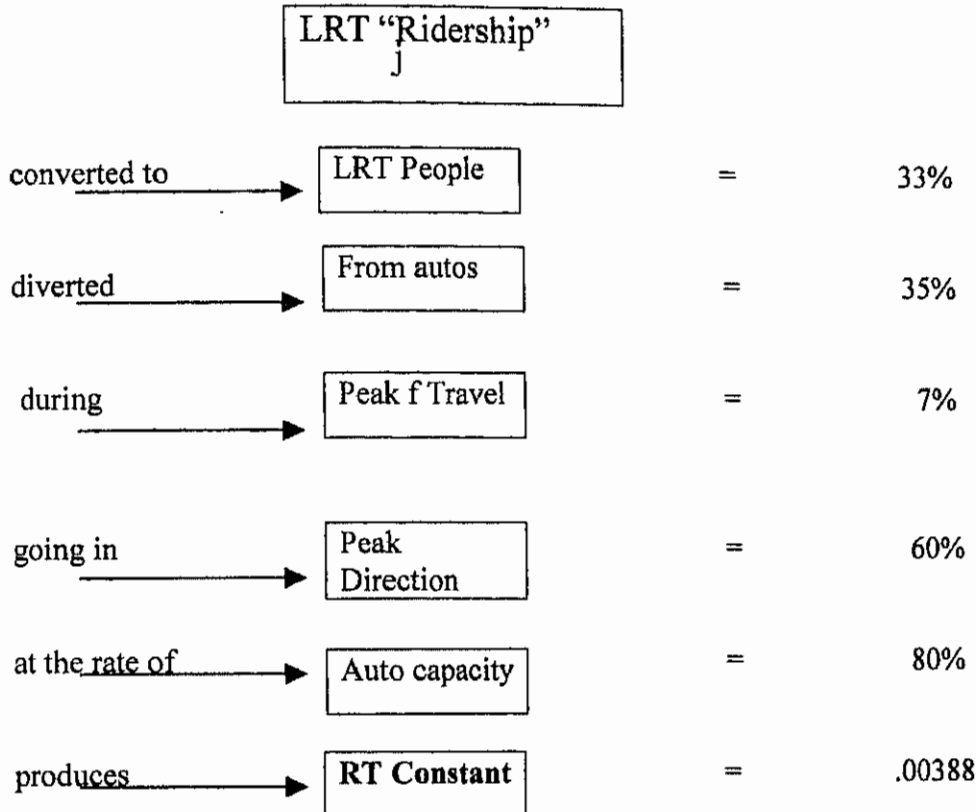
This section examines the results of the predictive model. Using the mathematics of a predictive formula (the RT constant), an estimate of the number of automobiles likely to be removed by a light rail system in Austin is calculated.

The Reduced-Traffic Constant

The components which go into this formula, as discussed previously, are seen in Figure 9.8 below.

Figure 9.8
Components of the Predictive model.

Components of algorithm for converting transit "ridership" into automobiles removed from traffic congestion:



The formula, stated mathematically, calculates the Reduced-Traffic Constant below:

$$.33 \times .35 \times .07 \times .60 \times .80 = .00388^2$$

² Note that this constant can be tailor made to fit any city. It merely requires plugging in the appropriate variable measures pertinent to that city in the above the formula. The result allows quick prediction of potential traffic relief based on projections of "ridership".

Demonstrating the Model

What might this predict for Austin's proposal of a new light rail line as a means of traffic relief? The RT constant allows a quantitative assessment of this question. Capital Metro's projected ridership for the proposed "starter line," McNeil to CBD (the Green Line) calls for weekday ridership of 32,100 in the year 2007. The RT constant makes the following prediction of effect:

$$32,100 \times .00388 = 125 \text{ cars likely to be removed from peak traffic}$$

Significance of the Finding

The presumptive hypothesis resounding from the "ridership" projections used by public transit advocates is that huge numbers of autos will be taken from the crowded roadways. What else explains such public comments as that made by the Capital Metro's general manager, Karen Rae, to a local news editor in reference to a projected 46,000 riders on a certain proposed light rail segment: "I can tell you that if most of those 46,000 trips a day are coming out of cars, that this becomes a more viable option, even three-quarters of them."³

There is a wide difference between such hopeful commentary and the predictive quantifications derived above. One purpose of this chapter has been to explore the potential of such expectative, predictive impacts as those promoted by the agency. This paper concludes that if Capital Metro builds the starter rail (Green Liner), it is logical to

³ See "Getting Around: The Transportation Plan." Austin-American Statesman. October 13, 1999. A-10.

predict that only a few hundred automobiles will be eliminated from key traffic conditions based on empirical findings in the literature.

The predictive model created in this paper to derive such estimation is easily adapted to site-specificity. It is a debate over the components of this formulation that should rightly be engaged in, not any homiletic fervor and dreamy expectation, if honest assessment of potential is the goal. In exploring the effects of this model the question might be asked, just how many autos *should* be removed from traffic to justify an expensive proposition?

As a way of approaching an understanding of this question, suppose that **all** riders on a light rail line are simple roundtrips (50% people), that **half** are coming from automobiles (50%). Allow a **10%** peak hour percentage rate to exaggerate the possibility, and add a full **90%** peak direction use (an unheard of optimism). Table 9.9 below predicts the result that a ridership of 32,100 (Austin's proposed Green Line) will then yield the removal of 578 autos from peak conditions. Will this justify the proposition of building light rail? It is *the* pertinent question, especially in light of the dominant explanatory model: traffic relief.

Table 9.9
Inflating the variables to seek justification.

				Proposed Ridership>	32,100
People on system	50%	0.50	=		16,050
% from autos	50%	0.50	=		8,025
Peak Travel	10%	0.10	=		803
Peak direction	90%	0.90	=		722
Automobile capacity	1.25	0.8	=		578
RT Constant:		0.01800	Autos Removed:		578
(32,100 x .018 = 578)					

It should be noted that such evaluations are key to understanding system-wide transit numbers and those huge “ridership” pronouncements. Evaluations of potential transit effects should be corridor specific, as well. The individual commuter is sitting in only one traffic jam. It matters little at that moment how many “riders” the transit system claims per day. What is pertinent for the traffic relief scenario is just how many of those automobiles come out of serious traffic jams.

Implications of the Research

This research paper suggests that such a question can be answered in any city using light rail as a proposed aid in traffic relief. The following table uses data reported by U.S. transit agencies to the American Public Transit Association (APTA). It lists rail systems *by corridor*. Appended to it, for the purposes of this paper, are columns predicting automobiles removed by use of the above RT constant (see the shaded areas). It should be noted that the RT constant is modifiable to each city, as suggested, should local experts desire to do so. This is an illustrative example, using the research model. Based on the assumptions of that model and the RT constant, Table 9.10 predicts the numbers of automobiles likely to be removed from each corridor’s average rush hour. This is a key indicator of effects that voters will likely be hoping to achieve in passing rail referenda. (Note, the table lists both heavy rail [“HR”] and light rail [“LR”], but only the light rail entries are calculated.)

Table 9.10

New US Rail Ridership by Downtown Oriented Corridor

New US Rail System Ridership by Corridor 1998: First Quarter						Predictive Model:	
Rank	Location	Type	Daily Boardings	Corridors	Boardings per Corridor	Reduced-Traffic Constant:	Light Rail Peak Hour Autos Removed/corridor:
1	Washington	HR	686,300	9	76,256	N/A	
2	Baltimore	LR	45,500	1	45,500	0.00388	177
3	Atlanta	HR	242,300	6	40,383	N/A	
4	Los Angeles	LR	31,800	1	31,800	0.00388	123
5	Portland	LR	30,900	1	30,900	0.00388	120
6	Buffalo	LR	25,100	1	25,100	0.00388	97
7	Miami	HR	47,700	2	23,850	N/A	
8	Los Angeles	HR	69,800	3	23,267	N/A	
9	San Diego	LR	69,400	3	23,133	0.00388	90
10	St. Louis	LR	40,200	2	20,100	0.00388	78
11	Sacramento	LR	26,400	2	13,200	0.00388	51
12	Dallas	LR	35,300	3	11,767	0.00388	46
13	San Jose	LR	22,100	2	11,050	0.00388	43
14	Denver	LR	16,700	2	8,350	0.00388	32
15	Baltimore	HR	22,900	3	7,633	N/A	
16	Los Angeles	CR	25,900	6	4,317	N/A	
17	San Diego	CR	3,700	1	3,700	N/A	
18	Washington	CR	5,900	2	2,950	N/A	
19	Miami-Ft. Lauderdale	CR	8,500	3	2,833	N/A	
20	Dallas	CR	1,800	1	1,800	N/A	
Heavy Rail			1,069,000	23	46,478		
Light Rail			343,400	18	19,078		
Commuter Rail			45,800	13	3,523		
Total			1,458,200	54	27,004		
* Corridor: Downtown (CBD) oriented corridors. Data from the American Public Transit Association and the USDOT National Transit Database							

Table taken from <http://www.publicpurpose.com/ut-usrcorridor.htm>

As can be seen, when evaluated by corridor, the findings appear hugely controversial for the starkness of their limited effects. It should be alarming from a public policy standpoint to think that multi-billions of dollars might reap so little, if traffic, smog and sprawl are indeed the explanatory rationales.

Checking for Accuracy and Validity

The predictive constant can be checked by many means. For instance, the controversial HLB report (for Capital Metro) that estimated 46% of LRT riders would be diverted from autos in Austin (including car-pools) can be used toward assessing the model. If HLB's estimate is used in place of the 35% (taken from Dallas) in the model, what might the effect be? The following table calculates the RT constant to be .0051 with a result of approximately 163 autos removed from peak conditions.

Table 9.11
Hypothesizing the HLB suggestion of LRT riders taken from autos

People on system	33%	0.33
% from autos	46%	0.46
Peak Travel	7%	0.07
Peak direction	60%	0.60
Automobile capacity	1.25	0.8
RT Constant>>		0.00510
Result:		
32,100 x .00510 = 163 autos likely removed		

The suggestion of an alternate variable (in this case, 46%) produces a healthy debate. Significance in the difference between 125 autos and 163 (if any significance exists) can be pondered. It is precisely these type components which define the success,

or lack of it, to be found in a proposed traffic/transit synergy. It is logically here that the discussions should revolve.

Chapter 10

Conclusion

The purpose of this chapter is to provide an overview of the research purpose and the evidence gathered and analyzed. When the agency boasts multi-millions of transit riders a year, the citizen might rest in the honest belief that a goodly effect has accrued to the public. Yet, when such majestic-sounding numbers are reduced to the key unit of analysis, the average peak traffic jam where most commuters are locked in a sea of slow-moving vehicles emitting their highest levels of pollution, then it might become a different matter. What good are eight million proposed light rail riders a year (32,100 x 250 workdays), when the unit effect might mean only a few hundred rush-hour automobiles taken from a throng of thousands? That is the evaluative problem in the new transportation schematic, which is not directly addressed by agencies proposing new rail transit.

The purpose of this research is not to diminish the transit agency, but to attempt to understand it. If citizens are to make confident decisions at the polls, they must be candidly and roundly informed. This paper suggests this is not happening. Future researchers may ponder why.

The conclusions of this research paper are two:

- 1) The transit agency's message is predominately concerned with the negative impacts of traffic conditions in Austin, but relies on all other models with a candid sprinkling of qualitative (subjective) modifiers.

- 2) The empirical examination of ridership finds that no such relief (in traffic, smog or sprawl) is likely obtainable according to the agency's rationale.

Did the Agency's Message fit the Research Models in the Paper?

The content analysis categorized the agency's voice on the issue. A key document of evidence was chosen for analysis (the AIM videotape). The results of that analysis indicated that many statements were made about *qualities* (choice, quality of life, and urgency) as vague ideals, and that quantitative-based supportive research was lacking. Did the four rival models used in this analysis miss their mark as an evaluative tool for assessing the agency's message?

The logic of the research was suggested by what is commonly expressed about the issue, as can be found demonstrated in news media coverage. To gauge whether these models were ill-suited to the task of understanding Capital Metro, as it presented its positions to the public, more information might help. A look at the Capital Metro Mission Statement offers some additional insights:

Mission Statement:

We envision a multimodal transportation system which provides ease of mobility throughout the Austin Metropolitan area and which contributes to clean air and water, a sense of community, preservation and enhancement of all our neighborhood/business and activity centers, and which promotes healthy economic development.¹

The Mission Statement, when compared against the four explanatory models of the research, indicates that every model is represented in the articulation (see Table 10.1).

¹ See website, <http://capmetro.austin.tx.us/abou.html>

Table 10.1 Comparing the Research Models with the Capital Metro Mission Statement

Austin transportation policy is about..?	Research Models	From Mission Statement:
	<ul style="list-style-type: none"> • Traffic issues • Land use • Pollution • Federal policies, grants and regulations 	<ul style="list-style-type: none"> • “ease of mobility throughout” • “community preservation, and enhancement of neighborhoods” • “clean air and water” • “multimodal system, economic development, & clean air”

There should be every reason to believe that Austin’s transportation policy is about just what the Mission Statement above says.

Traffic Relief?

Is Austin’s transportation policy, therefore, about traffic? The content analysis evidenced that it leans heavily on the traffic congestion model of explanation. The emphasis is unmistakable in the AIM presentation. It is found in the agency’s Mission Statement. The transportation proposal for a new light rail system is promulgated based on the need for traffic relief.

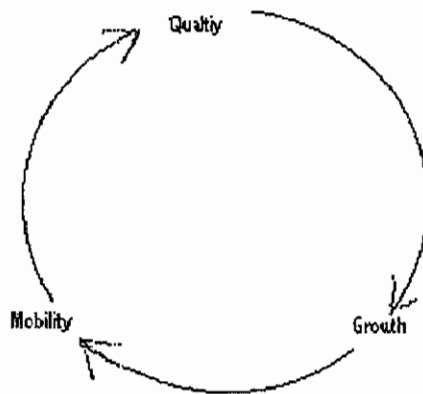
The predictive model in this research paper has estimated that potential as low.² What accounts for this disparity between an agency's stance and the empirical record? The content analysis suggested the presence of an organizational meta-concept within the agency's message. Qualitative themes were detected and measured. The presence of these qualifiers compared to empirical statements constituted a set of powerful rival models of their own. It suggests motivations outside the expected framework of measuring proposals against targeted results.

The control of traffic congestion has its appeal in a crowded city. The agency draws on this to weave an ideological patchwork highlighting urgency, quality, and choice. It is a circular logic that bends upon itself. It says that Austin has an attractive *quality* of life. Because of that, the city is growing rapidly. This *growth* in turn threatens the quality of life due to increased congestion. Therefore, *mobility* solutions are needed to restore Austin's quality of life.³ This argument is easily represented in the classic "Hermeneutic Circle" (Figure 10.1).

² It should be noted that the price of fuel (both marketplace and fee-based) and congestion pricing policy ideas (implementation of tolls and fees) have not been addressed in this paper. These are external and unpredictable factors. It is hard to know, for instance, how much weight they might exert on transportation habits should auto costs rise dramatically, nor is it known if the U.S. government will even *allow* such effects. For instance, the Gulf War was a direct aggressive action designed to protect U.S. interests in oil. How eager will political leaders be to allow gas prices to sky-rocket in this country? Additionally, if billions of tax dollars are spent on rail transit, and then fees are additionally instituted against road and highway use in order to channel citizens into mass transit systems, it seems doubly punitive, and likely to prove unpopular. These are questions of a different nature from this particular research.

³ This is a paraphrase of comments made July 17, 1999 by Capital Metro staff (Carlos), following Ms. Rae's AIM presentation. See Appendix.

Figure 10.1
Capital Metro Logic and the Hermeneutic Circle.



The hermeneutic circle is intuitively supportive of the use of meta-concepts. Its strength lies in the call upon the powers of interpretation and imagination.⁴ Its weakness is that it need not evoke empirical analysis. It rests on the strengths of presumption.

It was suggested in the Introduction of this paper that the agency message is ambiguously defined. This study bears that out. The data are only *selectively* presented by the agency in its official documentation, public comments, and in the AIM presentation designed for educating the public. Certain qualities of the light rail mosaic are highlighted, while others are ignored. Only some empirical findings are presented; others are left out.

As an example, light rail runs at an average speed of about 15mph according to APTA studies (APTA, 2000, Table 90). What is not explained is that this is worse speed than major arterial traffic under “congested” conditions, which occurs when speeds fall to

⁴ The term derives from the winged messenger Hermes, interpreter of messages from the gods.
<http://www.ai.mit.edu/people/jcma/papers/1986-ai-memo-871/memo.foot.html#263>

25 mph, almost twice what light rail averages normally. Further, the rail is much worse than freeway traffic which is not “congested” until its speeds fall to 35 mph (CAMPO 2000, p. 5-1)⁵ over twice the speed of light rail’s average. This might prove unattractive to large numbers of riders.

Despite the agency’s promotional designs, research shows that the urban transportation problem of traffic congestion will be little affected by a light rail alternative.

The Land Use Solution?

Is Austin’s transportation policy about land uses? The land-use issue in the transportation context is at least two-pronged. First, transit development calls for increasing urban densities. Second, it calls for preserving urban settings.

It is the purpose of public transit to move masses of people. It is suggested this will relieve traffic congestion. The promulgation of mass transit, however, when examined hopes to essentially trade congestions in kind, i.e. roadway congestion for foot congestion. It is inherent in the design of mass transit that only quantities (of riders) leads to efficiencies. Therefore, the better the system, the more people it will have standing in the aisles. This may lead to a different interpretation of quality of life.

Secondly, the land-use model of explanation contains an attitude of preservation over modernization. It is essentially an anti-automobile sentiment that says, “Buildings

⁵ Chapter 5 of the CAMPO report defines congestion for freeways as “speed less than 35 mph,” and for

should not be replaced by roads.” The European experience often underlies this theme. It is pleasant to think of our cities as walkable museums in the European tradition. Light rail transit as an implementer of this, however, is only idealistically fed. It is based in a rationale that we need no restructuring of our cities to better channel mobility (i.e. build roadways), but rather need only change ourselves. There is a universal appeal to this.

It is also rife with implications. It speaks of social themes, such as “responsibility.” (It is better for us all if we do a little less driving.) It speaks of the value of our cultural heritage. (What will we leave our children if we tear down our cities?) It calls for the philosophical embrace of a strong social/political paradigm. (We must occasionally force others to do what is right.)

Europe serves as the example of preservation of history, architecture, and culture intertwined with modernity. Yet, Europe is seldom seriously suggested as a model for the United States. It offers several sticky difficulties. For instance, European cities were built and densified long before the advent of the automobile, unlike most U.S. cities which were built around it and for the purposes of including it. It is, therefore, a different urban form. The idea of preserving history, architecture and culture, however, adds a robust symbolism to the rail transit idea.

A practical theme for approaching urban mobility, which calls for increasing road capacity, is not a popular one. Defining urban form by its functionality and utility is not pleasant, as defining it by its architecture and aesthetics seems to be. This latter is most befitting the light rail argument. As the research concludes, light rail speaks of “qualities,” and how we want things to look. Therefore, by most indications it is not a

major arterials at “less than 25 mph.” APTA lists average LRT speed as 15.4 mph.

“mobility solution,” may hardly even be a mobility issue. It seems more rightly belonging to the architectural/design discussions. Light rail becomes, therefore, important as a municipal amenity, such as the sports arena, the convention center, or a zoo.

The Federal Issue?

It is undeniable that the federal emission standards (set by the EPA) bode ill for major metropolitan areas. Even though the automobile has gotten progressively cleaner, it seems the rising air standards are aimed at locking-down automobile growth through constriction. It is a significant cause of concern. The Federal presence in the transportation issue is discernible in the Capital Metro’s Mission Statement. Yet, it is hardly mentioned in the AIM presentation.

It could be argued that transportation policy is strongly about government influence. This one model might explain the presence of so much qualitative language in the agency presentation. It could be that the Federal influence is so strong that policy “proposals” are already predetermined. Thus, it is a given, regardless of citizen voting results, that the light rail issue will return to the ballot until it is passed. It becomes, hereby, not an issue of public deliberation, but really a matter of public persuasion.

If true, the sounding themes of “traffic congestion” and “quality of life” are to act as biasing agents. The hopelessness of traffic frightens many toward embracing a new idea. The quality of life theme of light rail offers this outlet.

This hypothesis would further explain the lack of empirical integrity. What need is there? Predetermined policy requires only the public signature. The AIM presentation was

the preliminary signing ceremony. The implications of this in a political arena (where “no-holds-barred” is the norm) is one thing; but for public administration where codes of behavior, ethics, and service are norm, is entirely another. This study suggests that Austin transportation policy is at least largely about organizational meta-conceptual influence.

Dr. Shields has written about the “policy imprint” that occurs “when public administrators take mandates and translate them into working programs” (Shields, 1996, pg 392). That offers an explanatory framework, but it also raises the hairy questions of ethics and responsible stewardship when the methods become questionably incomplete. The “pragmatic” theme might be this: “The government wants us to build urban rail transit, therefore, we must find a way to get the citizens to go along with it.”

Is that what Austin transportation policy is about?

A Political (Administrative) Change?

Is transportation policy, therefore, really about transportation at all? It is a complex question for a variety of considerations. One might conclude that if it were **strictly** about transportation, freeways and arterials would be the choice modes of expansion. They move rivers of people, and citizens like to use them. But transportation is not an isolated issue; it is the central nervous system of urban form.

It touches on most everything. Large interests take a stance. Politicians, land reformers, environmentalists, capitalists, and social equity defenders all have a unique view. If the question were strictly about transportation, the wrecking ball would re-apply itself with vigor to urban landscapes, as it once did (in the 50s and 60s). This time it would *expand* those existing roadways and add on double-decks to freeways. But, today’s

political/environmental consciousness does not easily admit this heavy approach anymore.

The voices of early environmentalism and the new-urbanist pioneers may have born the cultural flower of modern times. While the 50s and 60s seemed to fully embrace the post-war themes of modernization and upward progress (the promises of a “space-age” future) political leadership today has changed. The environmentalist philosophy has begun to stick. It has taken root in the statehouses of the country, and within the D.C. Beltway. It is a philosophy which denounces blind consumerism, and seeks a slowing of the capitalist’s rendering of progress with its continual consumption of natural resources. It is a whole different vision.

Transportation policy has been pulled into it. From a leadership standpoint, then, it can be concluded that transportation, is NOT the constrictive issue it might otherwise have been—the movement of people in urban settings. The policy now embraces preservationist philosophies. It rejects blind “modernization.” The call is for a balance of the two.

Transportation policy today, therefore, is about *qualities*. This paper demonstrates that. The decision has been made to build capacity (mass transit), and not convenience (mobility) despite what may be said. Only time can judge this decision. It must stand in the light of its other issues (not fully being debated), such as per-capita costs of resource consumption, the debatable nature of mass transit’s real effects, and the potentially exorbitant restrictive costs it may impose on future automobility (whether fossil-fueled or otherwise). The possibility is that it may squelch some cultural advancements rather than enhance them, by instituting a system with high subsidy-demand and little real effect.

demand and little real effect. These are questions requiring vigorous investigation, and should not be steam-rolled in the name of *urgency*.

The degree to which this policy decision is a subversion of the democratic process becomes a whole different question. It is traditionally acceptable in the American schematic that one might take to the stump and proclaim anything, might even be elected to hold office by it. Yet, this must be seen as a different and altogether new paradigm for public administrators to practice.

Clearly, different theoretical frameworks can be used to apprehend the research issue. If the imprint of the agency is to “do what works” (a practical definition of PA pragmatism) in order to implement presupposed policy, then given the body of contrary evidence it must skirt the borders of questionable ethics. It will require additional research to investigate this.

APPENDICES

Appendix A: Capital Metro's AIM Presentation: July 17, 1999 Karen Rae, General Manager										124
<u>Declarative Statements:</u>										
<u>Key Referent Categories:</u>										

	CODING:							
	Quantitative			Qualitative				
	Traffic	Pollution	Land-use	Federal	Quality	Urgency	Admin.	Choice:
the morning.								
10 And to just give you a quick idea, these numbers show the growth in just the last five years along the key corridors ranging from near 60% increase in traffic to 30% increase in traffic over 5 year--significant increases, even exceeding the population growth that we have seen.	1							10
11 Air quality? As you know we've gone through several years very close to non-attainment on the ozone levels--very important to this community; both from a pride standpoint, more importantly for our environment.		1			1			11
12 And guess what? No matter what we do it's going to get worse before it gets better.						1		12
13 The solutions we're talking about today (and we need to frame them over the next several months) will be the only chance of maintaining the current quality of life, and not letting it get worse than it is now.					1	1		13
14 We're making decisions that are really going to frame what this community and this region will look like forever.			1		1			14
15 Your transportation and infrastructure decisions guide the development that the community will follow.				1				15
16 Critical to know, that the decisions of the next several months will basically be a blueprint for this community for centuries to come.			1					16
17 How do you address a solid transportation system? Well we have to pull in very diverse interests and find consensus:							1	17
18 The environmentalists, mobility advocates, employment and some of our larger employers, the economic development and real estate groups.	1	1	1					18
18 We need to deal with neighborhoods openly and honestly, and we need to deal with the issue of social equity in our transportation plan.					1			18

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		CODING:							
		Quantitative		Qualitative					
		Traffic	Pollution	Land-use	Federal	Quality	Urgency	Admin.	
19	The new cap metro? I just need to say here, trying to do this... regain your trust, build pride in our organization through increasing ridership, customer service, more efficient taxpayer dollars.					1			19
20	And we think we're showing progress, but we also recognize we still have a long way to go.					1			20
21	We have regional transportation partners we're trying to work closely with.							1	21
22	Everyone from CAMPO, who is represented here today, city of Austin, the corridor council, TxDOT, Federal Administration, to name the bureaucratic partners.							1	22
23	But we have partners that are here today: the neighborhoods, the businesses and those that represent the general public.							1	23
24	Our commitment is to reach out and understand all parts of this important decision: conducting market research; having public opportunities for comments and interface, updating our technical and financial information so everyone can understand the issue.							1	24
25	That includes me by the way, when I can't understand something I seem to have a hard time communicating it.							1	25
26	Commence serving as honest brokers in this transportation decision.							1	26
27	I call it the three-legged stool.							1	27
28	And no good program that I've ever seen or been a part of didn't have these three components: good technical data, good financial data, but most important, broad based input from the community.							1	28
29	Because without that leg, we know where the project goes.							1	29
30	So, we're here today to talk to you about what are you thinking?							1	30
31	The AIM process which was kicked off officially I think... shortly after I got here, is to							1	31

		CODING:							
		Quantitative			Qualitative				
		Traffic	Pollution	Land-use	Federal	Quality	Urgency	Admin.	
	reach out and get your information and input on what are the best combinations of transportation solutions.								
32	The big myth: light rail alone, roads alone, bus alone, are not going to be the solution for Austin's extraordinary growth.								1 32
33	We're getting feedback through this process by expanding community involvement.							1	33
34	We've been to thirty-plus organized meetings and had hundreds of other meetings over the last several months.							1	34
35	We're updating our technical info, and we're trying to amplify how important this decision is in the general public.							1	35
36	Essentially, the market research is done.							1	36
37	We are moving into the next phase, which is to begin to look at our alternatives.								1 37
38	And basically that's where we are today, as we begin to take the public input and then build on that, as we look at what are the viable public transit alternatives in the context of the CAMPO plan.								1 38
39	And the last will be to voice a preference about the preferred plan and eventually of course to bring this plan to the voters of this region for a decision on or before Nov 2000.							1	39
40	So, it takes more than one option.								1 40
41	We've attempted to give you a picture.							1	41
42	HOV lanes, which are lanes dedicated to those vehicles that carry more than one person, function effectively in some communities.	1							42
43	Light rail, an electrified service that would run with designated starts and stops, more frequently spaced stations, usually in an urban corridor, about a mile apart, further apart as you move out in the community.								1 43

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		CODING:							
		Quantitative		Qualitative					
		Traffic	Pollution	Land-use	Federal	Quality	Urgency	Admin.	
44	Enhancing, and improving our roadways. What do we need to do to make roadways more effective?	1							44
45	Utilizing our natural resources and our extensive network of bike and ? trails.								1 45
46	Also, there is the commuter rail option, connecting regionally the major growth areas.								1 46
47	And of course we have all our core services. Rob will talk about how we enhance and make our bus service more effective and a more viable option.							1	47
48	Other areas that we're looking to work with in our mobility solution is incident management, that is, making sure that when there is an accident on the highway it is cleared as quickly as possible.	1							48
49	Bus-ways.	1							1 49
50	HOT lanes, which are HOV lanes with tolls.	1							50
51	No-drive zones and pedestrian zones.					1			51
52	Improved signaling.	1							52
53	Rideshare and vanpool.	1							53
54	Flexible work hours, tele-commuting and company organized drive-sharing, all part of the toolbox for solutions for this community potentially.	1							54
55	What did we hear in our first phase? We heard that people are really focused on reducing commute times.					1			55
56	Reducing vehicle emissions came in second.		1						56
57	Improving traffic safety is gaining importance.	1							57

APPENDICES

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Future Transit Options. Let's Clear the Air.

CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

Light Rail

Proposal: Improved bus service and a new light rail system.

It's ironic that the laid back quality of life that has made Austin so famous is the very thing that has led to our biggest problems - traffic congestion and air pollution. People are moving to the Austin area at a rate of more than 30,000 newcomers per year. Meanwhile,

70 percent of our residents say traffic congestion is the most serious problem due to rapid growth in the Austin area. Increased traffic also contributes to the region's deteriorating air quality, which may fail to meet federal clean air standards in July 2000.

What is Light Rail?

Electric. Reliable. Clean. Quiet. Light rail operates with electricity on a fixed railroad line. The Capital Metro system would be designed with light rail serving as the backbone, complemented by improved bus routes as the connecting system.

Why is Light Rail Being Proposed for the Austin Area?

Austin spoke and we listened:

- Austin area residents rated light rail as the highest priority investment needed as a transportation solution.
- 68 percent of residents said they support light rail.
- 60,000 households are located within one mile of the proposed initial system. (source: HLB Decision Economics, 1999)

Federal funding available. Capital Metro is competing with other cities for federal government grants that would share the costs to build the system. Capital Metro received a "Recommended" rating from the Federal Transit Administration in its Light Rail New Starts proposal.

No new taxes will be needed to fund light rail. Capital Metro's existing cash reserves, future revenues, and federal grants can fund light rail.



BREATHE EASIER with Light Rail

Less air pollution.

Many people would choose to leave their cars at home and try transit. ~~Nearly 80 percent~~ of light rail passengers in St. Louis and 41 percent in Dallas switched from cars to rail for their commute. (source: MetroLink, DART)

Relax. No traffic or parking worries.

One light rail train allows 420 passengers to leave the stress of gridlock behind. The search for a downtown parking space would be a thing of the past.

Money savings on auto related costs.

Riding light rail means your vehicle uses less gas. You can also save on vehicle maintenance and insurance. (source: HLB Decision Economics, 1999)

Reliable on time service.

Light rail offers a reliable arrival time. From McNeil Road to downtown, riders would save an estimated 8 minutes per trip in door-to-door travel time. (source: HLB Decision Economics, 1999)

Safety.

Light rail is 500 times safer than driving a car along congested freeways. (source: F.L. Jennyson and Texas Association of Public Transportation)



Bibliography

AIM, 1999. "Executive Summary. Austin Area in Motion." Capital Metro Transportation Authority. Austin, TX. <http://www.aim99.org>. [currently inactive]

AIM Report. 2000. NuStats Research and Consulting. [See Appendix].

Anas, Alex. 1998. "Transportation and Land Use." *Land Lines*. Lincoln Institute of Land Policy. July.

Apogee Research International. 1995. "A Policy Instruments Working Paper on Reducing Carbon Dioxide Emissions from the Transportation Sector in Ontario." Prepared for: Environment Canada, National Round Table on the Environment and the Economy, Ontario Ministry of Environment and Energy, Ontario Round Table on Environment and Economy. November.
<http://www.web.net/ortee/transportation/report9/index.html>

APTA (American Public Transportation Association). 2000. "Number of People Using Transit." [Http://www.apta.com/stats/ridershp/people.htm](http://www.apta.com/stats/ridershp/people.htm).

APTA (American Public Transportation Association). 1996. "Mobility for the 21st Century, A Blueprint for the Future." October.
<http://www.apta.com/info/online/m21final.htm>

APTA (American Public Transportation Association). 1998. "TEA 21, Transportation Equity Act for the 21st Century." <http://www.apta.com/govt/legis/tea21/index.htm>
A-Train. 2000. "The Facts About Anti-Rail Claims." <http://www.austinatrain.org/>

APTA (American Public Transportation Association), 2000. "TABLE 90, Light Rail National Total Data, Fiscal Year 1999." <http://www.apta.com/stats/modesumm/lrsum.htm>

Austin Transportation Study. 1997. "Public Opinion Survey of Austin Metropolitan Area Residents Regarding Transportation Issues." CAMPO. April.

Babbie, Earl. 1986. *Observing Ourselves*. Wadsworth Publishing Company. Belmont, CA.

Babbie, Earl. 1995. *The Practice of Social Research*. Wadsworth Publishing Co. Belmont, CA.

Beimborn, Edward and Horowitz, Alan. 1993. "Measurement of Transit Benefits." National Transportation Library, Final Report. June.

[Http://www.bts.gov/NTL/DOCS/638.html](http://www.bts.gov/NTL/DOCS/638.html) .

Beimborn, Edward & Horowitz, Alan. 1993. "Measurement of Transit Benefits. Final Report. University of Wisconsin-Milwaukee. Prepared for Urban Mass Transportation Administration. June. <http://ntl.bts.gov/DOCS/638.html>

Bhat, Chandra R., and Lawton, T. Keith. 2000. "Passenger Travel Demand Forecasting." Transportation Research Board. The National Academies. January 4. <http://www.nationalacademies.org/trb/publications/millennium/00083.pdf>

Bickel, Richard G. 2000. "Key Issues Confronting Public Transportation Planning and Development." Transportation Research Board. The National Academies (TRB). January 4. <http://www.nationalacademies.org/trb/publications/millennium/00094.pdf>

Bi-State Development Agency. 1994. "Market Research Survey, Bus & MetroLink Customers, Winter 1993). St. Louis, MO. (see Appendix)

Bi-State Development Agency. 1994. "Market Research Survey, Bus & MetroLink Customers, Winter 1993." March.

Bogren, Scott. 1997. "Myths and Realities of Public Transportation" *CT Magazine*. Community Transportation Association of America (CTAA). Washington, DC. July 8. <http://www.ctaa.org/pubs/dollars/section2.shtm>

Bogren, Scott. 2000. "Methodology Notes." Community Transportation Association. <http://www.ctaa.org/pubs/dollars/methodology.shtml>

Bogren, Scott. 2000. "Appendix II, Transit Relieves Traffic Congestion." Community Transportation Association. <http://www.ctaa.org/pubs/dollars/appendixii.shtml>

Bogren, Scott. 2000. "Executive Summary." Community Transportation Association. <http://www.ctaa.org/pubs/dollars/execsumm.shtml>

Box, Richard C. 1992. "An Examination of the Debate Over Research in Public Administration." *Public Administration Review*. Jan/Feb.

Burgess, Patricia. 1998. "Revisiting 'Sprawl': Lessons from the Past." The Urban Center. Maxine Goodman Levin College of Urban Affairs. January 30.

Campion, Douglas R., Lawin, Thomas F., Schmnann, John W., Wolsfeld, Richard P. Jr. 2000. "Light Rail Transit, Future Opportunities and Changes." Transportation Research Board. The National Academies. January 4. <http://www.nationalacademies.org/trb/publications/millennium/00066.pdf>

CAMPO, 2000. "The Capital Area Metropolitan Planning Organization Transportation Plan to the Year 2025." August 7. <http://www.ci.austin.tx.us/ats/>

Capital Metro, 2000. "DART: Transit Development in Motion." Presentation to the Downtown Austin Alliance, April 5, 2000.
<http://www.capmetro.austin.tx.us/FUTURE/DARTDAAPres/DARTScript.htm>

Cervero, Robert. 1983. "Perceptions of Who Benefits From Public Transit." Transportation Research Board (Record "936"). [Out of print.] See Abstract here: http://www.dcddata.com/dbtw-wpd/exec/dbtwpub.dll?AC=GET_RECORD&XC=/dbtw-wpd/exec/dbtwpub.dll&BU=http%3A%2F%2Fwww.dcddata.com%2Ftrb%2Ftrb.htm&TN=trb&SN=AUTO10417&SE=669&RN=5&MR=20&RF=Table&DF=Full&RL=1&DL=1&NP=0&ID=&MF=WPEngMsg.ini

Cervero, Robert, and Gorham, Roger. 1995. "Commuting in Transit Versus Automobile Neighborhoods." *Journal of the American Planning Association*. 61(2): 210-225. Spring.

Cervero, Robert. 1999. "Estimating Ridership and Economic Benefits of Coordinated Transit and Urban Development in Charlotte-Mecklenburg: A Heuristic Approach." APA National Planning Conference. Sponsored By AICP Herberger Center for Design Excellence, Arizona State University Online Planners Forum.
<http://www.asu.edu/caed/publications/proceedings99/AVIN/PAPER2.HTM>

CMT (Citizens For Modern Transit). 2001. "Where do MetroLink Customers Go?" <http://www.cmt-stl.org/metro/metro.html#who>.

CMT (Citizens For Modern Transit). 2001. "System-wide Ridership." <http://www.cmt-stl.org/metro/metro.html>

Clark-Madison, Mike. 1999. "Capitol Metro's Leaders AIM Toward Middle of the Road, Which Way Do We Go?" *Austin Chronicle*. May 21.
<http://www.auschron.com/issues/vol18/issue32/pols.capitalmetro.html>

Cope, Glen Hahn and Davis, Vivian Witkind. 1991. "Diffusion of Innovations in State and Local Government: Cognitive and Affective Influences in Recent Award Winners." Paper presented at the Annual Conference of the American Society for Public Administration. Washington, D.C. March 24-27.

Cox, Wendell, 1991. "Urban Transport: From Theory to Reality." Address to the Transit New Zealand Land Transport Symposium. Wellington. August 13.
[Http://www.il.net/~policy/nz1991.htm](http://www.il.net/~policy/nz1991.htm).

Cox, Wendell, 1992. "Public Transit, Air Pollution and Traffic Congestion: The Imperative for Reform." Address to the Ohio Transportation Users Conference. Columbus, OH. November 20. [Http://www.il.net/~policy/ohio-hu.htm](http://www.il.net/~policy/ohio-hu.htm).

Cox, Wendell, 1993. "The Competitive Future of Urban Passenger Transport." A paper presented to The Third International Conference on Competition and Ownership in Public Transport, Toronto, Ontario. September. <http://www.il.net/~policy/t3-1.htm>.

Cox, Wendell, 1996. "Light Rail in Milwaukee: Much Ado About Nothing." Address to the Public Policy Forum—Transportation Committee, Milwaukee. June. <http://www.publicpurpose.com/ut-milw.htm>.

Cox, Wendell, 1998. "The Predominance of Highways in U.S. (and European) Transport." 25th Annual Meeting, Asphalt Emulsion Manufacturers Association. <http://www.publicpurpose.com/21st-fl.htm>

Cox, Wendell, 1999. "The Impact of Transit on Urban Growth in Texas." The Texas Public Policy Foundation. <http://www.tppf.org/lightrail.htm>

Cox, Wendell, 1999. "The President's New Sprawl Initiative: A Program In Search Of a Problem." The Heritage Foundation. Washington DC. March 18. <http://www.heritage.org/library/backgrounder/bg1263.html>

Cox, Wendell. 2000. "Report of Transit's 'Record' Ridership Questionable." <http://www.heritage.org/library/execmemo/em676.html>

Cox, Wendell. 2000. "Urban Rail: Uses and Misuses, Policy Statement." No. 36. March. <http://www.publicpurpose.com/pp-railpol.htm>

Cox, Wendell, 2000. "Metropolitan Transit Authorities in Texas, Testimony of Wendell Cox, Senior Fellow, Texas Public Policy Foundation to the **Senate Committee** on State Affairs." February 22. <http://www.publicpurpose.com/ut-txtest00.htm>

Cox, Wendell. 2000. "International Public Transport Service Intensity by Geographic Area: 1990" *Urban Transport Fact Book*. <http://www.publicpurpose.com/ut-intl-geointense.htm>

Cox, Wendell. 2000. "DART Light Rail (Dallas) Peak Hour Ridership." <http://www.publicpurpose.com/ut-dartpkhr.htm>

CTA (Community Transportation Association). 2001. <http://www.ctaa.org/pubs/dollars/section4.shtml>

CTE (Center for Transportation Excellence). 2001 <http://www.cfte.org/transit/transit.htm>

Cuneen, Michael J. 1995. "What Did Portland's East Side Max Line Change? Trip Behavior After Light Rail, A Preliminary Report." Cascade Policy Institute. <http://www.cascadepolicy.org/> [no longer available. See Appendix for copy].

Davis, Judy S., & Seskin, Samuel. 1996. "Effects of Urban Density on Rail Transit." *Land Lines*. Volume 8, No. 3. May. <http://www.lincolnst.edu/landline/1996/may/transit.html>

Demery, Leroy, W., Jr. 1994. "Supply-Side Analysis and Verification of Ridership Forecasts for Mass Transit Capital Projects". *American Planning Association Journal*. Summer.

Ding, Chengri, Hopkins, Lewis, & Knaap, Gerrit. "Does Planning Matter? Visual Examination of Urban Development Events." *Land Lines*. Vol. 9, No. 1. January. Lincoln Institute of Land Policy. <http://www.lincolnst.edu/main.html> and <http://www.urban.uiuc.edu/projects/portland/lincoln.html>

Dittmar, Hank. 1995. "From The Director's Chair: Making Transit Work." *Transact*. <http://www.transact.org/progress/sept95/making.htm>

Dunn, James A. Jr. 1998. "Driving Forces: The Automobile, Its Enemies, and the Politics of Mobility." <http://brookings.nap.edu/books/0815719639/html/>

Edmondson, Brad. 1998 "In the Driver's Seat." *American Demographics*. March. http://www.demographics.com/publications/ad/98_ad/9803_ad/ad980330.htm

FTA (Federal Transit Administration). 1996. "1996 Report: An Update." <http://www.fta.dot.gov/library/policy/96/index.html>

Fuguitt, Glen V. and Beale, Calvin L. 1996. "Recent Trends in Nonmetropolitan Migration: Toward a New Turnaround?" *Growth and Change*. Spring, pp. 156-174.

Garreau, Joel. 1991. *The Future of Edge City*. Internet: <http://www.speakeasy.org/eastsideweek/edgecity.html>

GAO. 1999. "'Surface Transportation: Moving into the 21st Century" (Staff Study). GAO/RCED-99-176. May 1. <http://frwebgate.access.gpo.gov/cgi-bin/useftp.cgi?IPaddress=162.140.64.88&filename=rc99176.txt&directory=/diskb/wais/d/ata/gao>

Gordon, Peter and Richardson, Harry W. 1997. "Are Compact Cities a Desirable Planning Goal?" *Journal of the American Planning Association*. pp. 95-106. Winter.

Gore, Al. 2000. "VICE PRESIDENT AL GORE ANNOUNCES ADMINISTRATION WILL SEEK \$211 MILLION FOR NEW TRANSIT SYSTEM WORK IN 12 URBAN REGIONS" White House Release. Office of the Vice President. February 4.
<http://www.dot.gov/affairs/fta9900.htm>

Gomez-Ibanez, Jose A. 1996. "Big-city transit, ridership, deficits, and politics." *Journal of the American Planning Association*. 62(1): 30-50. Winter

Gomez-Ibanez, Jose A. 1999. "Essays in Transportation Economics and Policy: A Handbook in Honor of John R. Meyer." Brookings Institution Press. Washington, D.C.
<http://brookings.nap.edu/books/0815731817/html/index.htm>

Gordon, Peter, Moore, James E.II, Poole, Robert W. Jr., and Rubin, Thomas A. 1999. "Improving Transportation in the San Fernando Valley."
<http://www.rppi.org/ps249.html>

Guess, George M. 1994. Georgetown University. "A review of *Estimating Capital and Operating costs in Urban Transportation Planning*, by Aurelio Mendez (Westport, CT: Praeger, 1993)." *Public Administration Review*. Sept/Oct .

Hanna, Joe B. and Drea, John T. 1998. "Understanding and Predicting Passenger Rail Travel: An empirical study." *Transportation Journal*. 38(1): 38-46. Fall.

Haack, Susan. 1997. "Science, Scientism, and Anti-Science in the Age of Preposterism." *Skeptical Inquirer*. Vol. 21, No. 6, November/December 1997.
<http://www.csicop.org/si/9711/>

Henry, Lyndon. 1976. "Preliminary Plan for a Light Rail Transit Demonstration Line." Texas Association for Public Transportation.

HLB Decision Economics Inc. 2000. "Capital Metro, The Benefits of the Light Rail Alignments and Route Segments in the Austin Region." 1010 Wayne Avenue, Ste 300, Silver Spring, MD. 20910. [See Appendix].

Horowitz, Alan and Beimborn, Edward. 1993. "Measurement of Transit Benefits." University Research and Training Program, Office of Technical Assistance and Safety, Urban Mass Transportation; Administration. Washington D.C. 20590. June.
<http://www.bts.gov/NTL/DOCS/638.html>

Hayward, Steven. 1993. "'Growing Pains': The NGA's Flawed Report on Sprawl," Backgrounder No. 1393., Heritage Foundation. Washington, D.C. September 13, 2000.
<http://www.heritage.org/library/backgrounder/bg1393.html>

- Ingersoll, Richard. 1992. "The Disappearing Suburb." *Design Book Review*. Fall. http://riceinfo.rice.edu/~lda/Sprawl_Net/List/Reviews/INGEdisappe92.html
- ISTEA. 1991. "Intermodal Surface Transportation Efficiency Act of 1991, Full text of Public Law 102-240." http://iti.acns.nwu.edu/clear/infr/istea_1st.html
- Jacobs, Jane.. 1961. *Life and Death of Great American Cities*. Random House. NY.
- Linton, Gordon J. 1996. "Statement of Gordon J. Linton Before the Subcommittee on Surface Transportation." The National Transportation Library. June 18. <http://www.bts.gov/NTL/DOCS/testimon.html>
- Littman, Todd. 2000. "Our Approach to Problem Solving." Victoria Transport Institute. May. http://www.vtpi.org/0_vtpi.htm.
- Majone, Giandomenico 1988. "Policy Analysis and Public Deliberation." *The Power of Public Ideas*. Edited by Robert B. Reich. Ballinger Publishing. Cambridge, Mass.
- Mallinckrodt, Jack. 2000 "Critique of Austin Capital Metro Report 'Technical Report 1. - Congestion Management Benefits for Alternative Alignments of Light Rail in Austin Texas.'" <http://home.earthlink.net/~malli/austin.html>
- <http://home.earthlink.net/~malli/austin.html>
- Mallinckrodt, Jack. 1999. "Comparing Roads to Rail." *AJM Engineering*. Nov. 19. [Http://home.earthlink.net/~malli/fwy2lr.html](http://home.earthlink.net/~malli/fwy2lr.html)
- Mallinckrodt, Jack. 1998. "Transit's Tiny Fraction of Urban Travel." *AJM Engineering* Nov. 14. <http://home.earthlink.net/~malli/transf.html>
- Messenger, T Ewing, R. 1995. "Land-Use Impacts on Transit Ridership." Transportation Research Board. Washington D.C. <http://www.bts.gov/tmip/abstracts/Policy-Analysis/lu46.html>
- Moore, James E. 1995. "Revised Statement Regarding Light Rail Funding." Testimony published by Cascade Policy Institute. [Http://www.cascade.policyorg](http://www.cascade.policyorg).
- Mootchnik, David. 1998. "Where's the Debate in the Planning of Light Rail?" *LA Times, Orange County Edition*, Metro Part B. p 11. Dec. 6.
- Myers, Dowell and Kituse, Alicia. 1999. "The Debate Over Future Density of Development: An Interpretive Review." Lincoln Institute of Land Policy Working Paper.
- Nivola, Pietro. S. 1999. "Laws of the Landscape: How Policies Shape Cities in Europe and America." Brookings Metro Series. Brookings Institution Press. Washington, D.C. <http://brookings.nap.edu/books/0815760817/html/index.html>

- Nolan, James F. 1996. "Determinants of productive efficiency in urban transit." *Logistics & Transportation Review*. 32(3): 319-342. Sep.
- OCTA, 1999. "Report of the Orange County Grand Jury, May 27, 1999, ORANGE COUNTY TRANSPORTATION AUTHORITY AND LIGHT RAIL PLANNING" <http://www.publicpurpose.com/lib-orcorail.htm>
- OCTA Board of Directors, 1999. "OCTA Board of Directors' Response to Grand Jury Report." June 4. <http://home.earthlink.net/~malli/octaresp.html>
- Olson, Robert L. 1996. "Mobility for the 21st Century, A Blueprint for the Future." Prepared for the American Public Transportation Association's Mobility for the 21st Century Task Force. October. [Http://www.apta.com/info/online/m21final.htm](http://www.apta.com/info/online/m21final.htm)
- Oppel, Richard A. 2000. "Fighting Gridlock: Making the Right Choices." Editorial. *Austin American-Statesman*. Sunday, February 6.
- Orange County Grand Jury Report. 1999. "Orange Country Transportation Authority and Light Rail Planning." May 27. Available: <http://www.publicpurpose.com/lib-orcorail.htm>
- OTI (Oregon Transportation Institute). 2000. "Portland West Side Light Rail Peak Period Ridership - 2000." <http://www.hevanet.com/oti/westsidemaxcounts00.htm>
- O'Toole, Randal. 1997. "ISTEA: A Poisonous Brew for American Cities." Cato Policy Analysis No. 287. November 5. <http://www.cato.org/pubs/pas/pa-287.html>
- O'Toole, Randal and Scheller, Tiaré. 1997. "Portland Transit: Forward into the Past." *Different Drummer*. Thoreau Institute. [Http://www.teleport.com/~rot/transit.html](http://www.teleport.com/~rot/transit.html)
- O'Toole, Randal and Scheller, Tiaré. 1997. "A Choice of Visions." *Different Drummer*. Thoreau Institute. [Http://www.teleport.com/~rot/transit.html](http://www.teleport.com/~rot/transit.html)
- Paulos, John Allen. 1988. *Innumeracy, Mathematical Illiteracy and Its Consequences*. Vantage Books. NY.
- Peterson, Richard L. 1984. "Population Density Considerations for Urban Rail Transit Systems." *ITE Journal*. 33-35. April.
- Pisarski, Alan. 2001. "Transitions." Presented to the American Highway Users Alliance, 1776 Massachusetts Avenue N.W. Suite 500, Washington D.C. 20036. Jan. 11 <http://www.highways.org/news/pisarskispeech.html>
- Pisarski, Alan. 2000. "National Transportation Statistics." Jan. <http://www.nationalacademies.org/trb/publications/millennium/00077.pdf>

- Rae, Karen. 1999. "Getting Around: The Transportation Plan." *Austin American-Statesman*. Editorial. Oct. 13.
- Reisner, Marc. 1993. *Cadillac Desert*. Viking Penguin Books. NY.
- Richmond, Johathan, E.D. 1996. "The Mythical Conception of Rail Transit in Los Angeles." Forthcoming *Journal of Architectural and Planning Research*. Vol. 15, No. 4. Winter 1998: 294-320 Available:
[Http://the-tech.mit.edu/~richmond/professional/myth.html](http://the-tech.mit.edu/~richmond/professional/myth.html).
[Link now obsolete. See Appendix for copy].
- Savonis, Mike. 2000. "Strategic Plan for Transportation and Air Quality Research, 2000–2010." Federal Highway Administration. Committee on Transportation and Air Quality. Georgia Institute of Technology.. Jan. 4.
<http://www.nationalacademies.org/trb/publications/millennium/00119.pdf>.
- SCAG. 1993. "1991 Southern California Origin-Destination Survey" 1993 by the Southern California Association of Governments
<http://www.bts.gov/ntl/data/91scods.pdf>
- Semmens, John. 1998. "A Critique of "Dollars and Sense: The Economic Case for Public Transportation in America." Reason Public Policy Institute. August.
<http://www.rppi.org/es243.html>
- Semmens, John. 1998. "Light Rail: the worst the public has to offer."
<http://lpaz.org/StopThatTrain/>
- Semmens, John. 1997. "Public Transit, A Worthwhile Investment?" Arizona Issue Analysis No. 144. Goldwater Institute. April.
<http://www.goldwaterinstitute.org/azia/144.htm>
- Southern California Association of Governments. 2000. "Draft 98 Regional Transportation Plan." <http://www.scag.ca.gov/rtp/draft98htm.htm>
- Schrank, David L. & Lomax, Timothy J. 1999. "The 1999 Annual Mobility Report: Information for Urban America." <http://mobility.tamu.edu/study/>
- Sierra Club. 1999. "Solving Sprawl, The Sierra Club Rates the States."
<http://www.sierraclub.org/sprawl/report99>
- Staley, Samuel R. 1999. "The Sprawling of America: In Defense of the Dynamic City." Reason Public Policy Institute. Policy Study No. 251. <http://www.rppi.org/ps251.html>
- Stone, Deborah. 1997. *Policy Paradox, The Art of Political Decision Making*. W.W. Norton & Company. NY.
-

Tate-Glass, Martha J., Bostrum, Rob, and Witt Greg. 2000. "Data, Data, Data—Where's the Data?" Transportation Research Board. The National Academies. January 4. <http://www.nationalacademies.org/trb/publications/millennium/00027.pdf>

Texas Justice Foundation. 2000. "Texas Court Requires San Antonio Transit Agency to Tell Both Sides in Light Rail Election." April 13. <http://www.publicpurpose.com/ut-sanjudge.htm>

Texas Justice Foundation. 2000. "Citizens Ask Court To Stop VIA'S Political Advertising." April 4. <http://www.txjf.org/index2.html>

US Census. 1990. "Means of Transportation to Work." <http://www.census.gov/population/socdemo/journey/usmode90.txt>

US Census Bureau. *Commerce News*. "Growth in Single Fathers Outpaces Growth in Single Mothers, Census Bureau Reports." 1998. Dec. 11. <http://www.census.gov/Press-Release/cb98-228.html>

US DOT. 1998. "Air Pollution Trends in Selected Metropolitan Statistical Areas," Table 4-41. Bureau of Transportation Statistics. Sept. 8. <http://www.bts.gov/programs/btsprod/nts/chp4/tbl4x41.html>

USDOT. 1999. "Alliance Calls for Help, Names Worst Bottlenecks." FHWA. Air Quality Update, November 29. <http://www.fhwa.dot.gov////////environment/aq112999.htm#3>

Vantuono, William C. 1998. "TEA-21: An Ounce of Preventive Maintenance is Worth a Pound of Capital." *Railway Age*. 199(11):16. November.

Vantuono, William C. 1998. "TEA 21: Uncomplicated Answers For Complicated Questions." *Railway Age*. 199(9): 16. Sep.

Vuchic, Vukan R. 1999. "Alternate Route: Toward Efficient Urban Transportation. Source." *Transportation Journal*. 38(3): 68-70. Spring.

Sam Bass Warner, Sam Bass. "Streetcar Suburbs: The Process of Growth in Boston (1870-1900)."

Weyrich, Paul M. and Lind, William S. 1999. "Does Transit Work? A Conservative Reappraisal." Free Congress Research and Education Foundation & APTA. Washington DC. May. <http://www.apta.com/info/online/weyrich2new.htm>

White, Jay D. 1992. "Taking Language Seriously: Toward a Narrative Theory of Knowledge For Administrative Research." *American Review of Public Administration*. June.

Wright, Frank Lloyd. 1932. *The Disappearing City*.

Wright, Robert R. 1994. *Land Use in a Nutshell*. West Publishing Co. St. Paul, Minn.
