WIRED TO GO:
THE INFORMATION AGE
HITS THE STREETS

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EXECUTIVE SUMMARY

As we look to the future the next technology to change the shape of our communities and the way we travel will be information technology. As developments unfold, we find ourselves increasingly confronted with new access and mobility choices. With the passage of the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) and the 1998 Transportation Equity Act for the 21st Century (TEA-21), government agencies are asked to treat transportation as an interconnected system. The system would link people, land uses, and modes in new ways that address economic, social and environmental needs of our communities. This new approach was accompanied by another emerging framework – sustainable development. Combining the opportunities found in the new transportation policy agenda and the development of increasing use of information technology to try to reach the goals of building sustainable communities is what is examined in this report.

Applying information technologies systems to current transportation systems are already resulting in dramatic changes. Since 1992, the U.S. Department of Transportation has invested more than one billion dollars in intelligent transportation systems (ITS) research, pilot programs and public education. Many communities have integrated advanced communications information processing and other technologies with conventional operations in hopes of boosting highway and system performance, improving transit services, providing better traveler information, developing better planning techniques, and reducing consumer and environmental costs.

This report examines the use of ITS in three case studies and looks at how technology may increase accessibility for low-income employees. The goal of this research is to begin to determine how transportation and the information revolution can be used to help build sustainable communities. The cases included in the report – Santa Monica, the Midtown Greenway Corridor in Minneapolis, and the use of ITS on the Tappan Zee Bridge in New York – analyze various uses of ITS and how they might be more effectively used towards the goal of building sustainable communities.

In the case of Santa Monica the policymakers rejected the conventional attempts to purge auto congestion from its downtown and, instead, embraced ISTEA’s holistic approach: a “placed-based” strategy that seeks to use transportation (and urban design more generally) as a means to promote wider policy goals, such as local economic development, environmental quality, and the preservation of Santa Monica’s downtown “core” as a center of community.

The case of the Midtown Greenway Corridor of Minneapolis addresses a question rarely asked in relation to rail-trail projects: What are some of the ways in which information technology, including ITS and broader transportation-related technology applications, might increase the likelihood that the Midtown Greenway project will accomplish its multi-faceted goals? The Greenway project utilized technology as part of an innovative
planning and public participation process, addressing safety issues and providing real-time transit information. Geographic Information Systems (GIS) has already proven valuable as a tool for citizen-based transportation planning. GIS technology enabled data collected about Greenway-area resident perceptions of their neighborhood to be displayed visually, allowing an easy-to-understand source of information for both interested citizens and transportation planners.

The third case study explores the use of technology to address traffic congestion on the Tappan Zee Bridge, one of major “choke points” for traffic along the New York metropolitan area’s Interstate 287 corridor. Viewed in light of ISTEA’s holistic approach to transportation, results of using electronic collection systems such as E-ZPass has been a “mixed-bag,” at least in the way the technology has been used on the Tappan Zee Bridge and virtually everywhere else. On the one hand, ETC provides an immediate benefit to motorists in reducing substantially the amount of time spent idling at toll booths. And when used as a traffic management strategy to move vehicles more quickly, ETC is consistent with ISTEA’s holistic philosophy in providing increased highway system capacity while using fewer resources and causing less physical damage than would result from adding new lanes.

On the other hand, a technology used only to move traffic through toll booths more quickly is no panacea. ETC schemes such as E-ZPass, for example, do nothing to manage or affect travel demand. What ETC technology would enable on the Tappan Zee Bridge -- but, as of yet, has not been tried -- is a policy tool likely to be far more effective in reducing congestion and in addressing the environmental costs of driving. That policy is referred to as congestion pricing, or charging drivers a fee that varies with the level of congestion on a road (the higher the congestion, the higher the fee). Whether ITS is used primarily to speed traffic flow or also for broader applications will be a function of decisions made by political leaders, transportation policy “stakeholders,” and the broader public. So far, the politics of pricing surrounding the Tappan Zee Bridge has prevented the idea from being tested.

Following are the major lessons learned from the cases:

1) *View the continuing evolution of the information revolution as an opportunity to overhaul the transportation policy sector in ways that promote more livable communities.*

The first and most general lesson from the case studies is that traditional transportation policy solutions to a growing population and a growing economy -- more lanes, more roads and more highways -- are increasingly disappearing as options for transportation policymakers. ISTEA and its successor legislation, TEA-21, ensure that the future of U.S. transportation will involve more transit, more walking and biking, more emphasis on arranging land uses that minimize the need to travel, and more efficient use of the existing system of roads and highways.
2) *Focus on how transportation technologies can help create quality places, rather than just facilitate movement from place-to-place.*

The most promising examples from the case studies were those in which transportation technologies were part of comprehensive strategies focused on using transportation policy to create quality places -- the unique areas where people live, shop, work and participate in community life. This is a far broader approach to ITS and other transportation-related information technologies than one, which focuses solely on mobility or facilitating the movement of people and goods from place-to-place. Too much emphasis on making places easier to pass through will tend to create places where no one wants to be.

3) *Deploy transportation technologies within the context of a broad definition of “accessibility.”*

The way in which accessibility is defined can have important policy implications. The cases show that integrating transportation and information technologies not only improves the ability to move between places, but also to create places that are more livable and attractive.

The cases included in this report highlight some of the broader uses of ITS to help build sustainable communities that are more economically viable, environmentally sound, and readily accessible to all. However, more work needs to be done to learn about how to best utilize ITS in transportation policies that focus on places and accessibility rather than mobility. Following are several recommended steps to achieve a more effective use of ITS in the development of sustainable communities.

1. **Benchmark system performance using innovative technologies.**

2. **Develop linkages between transportation, telecommunications, and ITS planning.**

3. **Integrate information technology with community design.**

4. **Recognize the affects of innovative technology applications on travel behavior.**

5. **Conduct outreach and educational activities.**

These recommendations would help contribute to a better understanding of how to approach the transportation and community design problems for the next century. It is clear that new information technologies have a great potential in helping to address sustainable communities goals. Progress can be made by continuing to develop new projects at the community level where we can learn from the results of the experiences.
CHAPTER ONE

THE INFORMATION AGE HITS THE STREETS: THE SHAPE OF THINGS TO COME

“The shape, the fabric, the very essence of a city depends on the technologies that its builders bring to their task.”

James Trefil, A Scientist in the City

The story of civilization is often told as a chronicle of technological advancement. Each innovation presents people with new opportunities, and ultimately changes their lives. The growth of American cities illustrates this in a conspicuous and enduring fashion through the succession of transportation technologies. In the past, communities evolved along canals, railroad tracks and trolley car lines. Today, cars and highways define the way cities grow, the way we interact, the way our neighborhoods look. Transportation shapes our communities because it determines how we get around and perceive distance, space and time—all of which influences the design, pattern and positioning of streets, stores, houses and parks.

As we look to the future, the next technology to change the shape of our communities and the way we travel communities will not be a transportation mode, and it will not be particularly visible. Instead, it will be information technologies. Civilizations have always relied on information collection and sharing to survive and improve quality of life. Today, inexpensive microelectronics and telecommunications technologies can quickly and reliably store and transmit mind-boggling amounts of data. Their application appears to have no limit, as illustrated by the rapid proliferation of computing and communications devices and services which has spawned Internet shopping, a decentralized networked workforce, and global virtual communities. In many cases, these innovations allow us to access goods and services without requiring us to travel. As developments unfold, we will find ourselves increasingly confronted with new access and mobility choices that have a strong potential to induce changes in travel behavior, location decisions, freight movement and ultimately the need for new infrastructure.

Applying information technologies to current transportation systems are already resulting in dramatic changes. Since 1992, the U.S. Department of Transportation (US DOT) has invested roughly $200 million annually in intelligent transportation systems (ITS) research, pilot programs and public education. This investment encouraged hundreds of

1 Historian Philip Guedalla argues that “The true history of the United States is the history of transportation.” See his book, The Hundred Years.
2 However, some transportation agencies, such as the Minnesota Department of Transportation, have found it useful to treat telecommuting as an “alternative transportation mode.”
transportation agencies to integrate advanced communications, information processing, and other technologies with conventional operations in hopes of boosting highway and system performance, improving transit service, providing better traveler information, developing better planning techniques, and reducing consumer and environmental costs.\textsuperscript{5} Growing numbers of travelers already have access to real-time traffic conditions – even crash avoidance systems. Furthermore, the number and quality of Internet and other technology-driven travel services is increasing rapidly.

**Technologies as “Expressions of Human Intentions”**

As these technologies gain acceptance, doubts that they will transform our communities are fading. The question that remains is how—a question in which nearly everyone has a stake. As philosopher Langdon Winner argues, “Technological change is an expression of human intentions.” What matters now is whose intentions are honored, how to balance competing demands, and whether our transportation systems can keep up with the rest of society.

Today, an unprecedented array of economic, social, and environmental needs is driving innovation in the transportation sector. For households, top priorities include reducing the costs of transportation, shortening travel times, and improving safety—especially for working women who are commonly saddled with the bulk of household errands and child care responsibilities. For those who don’t drive, the biggest challenge is gaining access to basic needs, like jobs, education, medical care, shopping, and childcare.\textsuperscript{6} Local governments are struggling to reduce congestion, repair bridges, fill potholes, provide cost-effective transit service and revitalize depressed neighborhoods.\textsuperscript{7} For others, transportation’s environmental impacts take center stage, particularly with regard to energy consumption, air quality, land development, water quality and climate change.

To complicate things, many of these goals conflict with one another. How can we, for example, make driving even more convenient without undermining the appeal of transit and other travel modes? Similarly, how can we provide reverse commute services to low-income communities and expect to stimulate economic development in those neighborhoods? More generally, how can planners invest in long-term solutions like refurbishing Main Street and building a light rail system, when so many transportation problems seem to demand immediate, short-term action?

Even if communities strike the right balance between these concerns, decision-makers also have to deal with an ever-changing landscape of demands for access driven by private sector forces over which they have little or no control. An example of this is telecommuting and the growth of home offices, practices that could relieve peak-hour congestion but also may encourage more families to abandon central cities.

\textsuperscript{5} See *ITS Project Book*, U.S. Department of Transportation, 1997.
\textsuperscript{6} According to the Clinton Administration, only about 6% of welfare recipients own cars.
\textsuperscript{7} Researchers at the Texas Transportation Institute estimate that congestion costs the nation’s 50 largest cities over $50 billion per year in delays and productivity losses per year. They also found that commuters in one-third of these spend over 40 hours per year stuck in traffic (1993 data).
Changes in our population also require our transportation system to be more efficient and more flexible. Growth in the nation’s elderly population underscores this need. The fastest growing segment of older Americans is the over-85 group. As these individuals “age in place” in transit-deficient suburbs, they may find themselves ever more isolated as their driving skills deteriorate. Low-income individuals face a different set of problems. As transportation systems become increasingly sophisticated and costly for consumers, the gap between the mobility ‘haves’ and ‘have-nots’ may worsen. This persistent problem is illustrated by today’s struggle to move welfare recipients into meaningful work. But if mobility increasingly depends on in-vehicle navigational, tolling, incident-avoidance, and other technologies, the nation’s poor are likely to get stuck in traffic, or just left behind.

Finding a Framework for Transportation Technology

These are serious but not unprecedented challenges for the transportation profession. From 1991 through 1998, officials had to develop new methods for transportation planning in keeping with requirements of the Intermodal Surface Transportation Efficiency Act (ISTEA)—the law that governed surface transportation funding, planning and regulation in the United States. “Ice-tea,” as it is commonly called, asked government agencies to treat transportation as an interconnected system of people, land uses, and many linked modes—cars, buses, trains, bikes and walking, to name a few. Along with this systems approach, ISTEA also brought new economic, environmental, social, public health and safety considerations into the formal transportation planning process. It also provided a context for the balancing of these concerns by shifting decision-making authority to local and regional agencies. The new federal law that replaces ISTEA, the Transportation Equity Act for the 21st Century (TEA-21), continues the ISTEA approach.

This new approach to transportation planning has been accompanied by another emerging framework—sustainable development. Defined by the Brundtland Commission as “that which meets the needs of the present without comprising the ability of future generations to meet their needs,” sustainable development encompasses the many economic, environmental and social goals that transportation systems are now expected to support. As transportation planners implement TEA-21 programs like the Congestion Mitigation and Air Quality Improvement Program (CMAQ), they are finding the sustainable development paradigm to be useful for addressing issues ranging from assessing environmental impacts to determining the endurance of infrastructure. As information technologies and telecommunications shape the transportation field, sustainable development will continue to be a useful framework within which to assess benefits and avoid unintended harms, such as system inequities and inefficiencies, pollution, service gaps, and other consequences.

Still, the path to achieving the diverse goals of ISTEA and TEA-21 hasn’t been uniformly smooth. The challenges to plan better was a departure for many transportation agencies, which in the past were focused on building and expanding infrastructure for individual
modes. For one thing, many transportation professionals lack training and tools to tackle their new responsibilities, such as intermodal planning, public involvement, environmental protection, land use coordination and economic development. These tasks also require agencies to adopt new measures for performance, new analytical requirements and responsibilities for monitoring conditions, and new efforts to cooperate with nontraditional partners, all of which require new areas of expertise. Recent analyses recommend steps to address these shortcomings. A report by the U.S. General Accounting Office, for example, calls for more research and model development to help metropolitan planning organizations (MPOs) develop transportation plans that support federal air quality standards. And the National Research Council’s Transportation Research Board similarly recommends that federal research funds be devoted to developing better tools to help planning agencies meet new demands required of them by ISTEA and TEA-21.

Wired to Go: Preparing for Digital Communities
As the transportation field grapples with the Information revolution, it is increasingly apparent that we need to clearly define our transportation and societal goals, complete with trade-offs and balances. To accomplish our goals, we will need to work within a focused yet adaptable framework to guide decisions on technology applications. The successful use of technologies also depends on our ability to encourage learning within the transportation field—a task that is greatly facilitated through rapid information sharing, automated and more comprehensive data collection, and regular monitoring and feedback.

This won’t be easy. Our transportation system is being called upon to support economic prosperity and globalization, the preservation of our environment, and the access needs of all individuals. But in many ways, the groundwork for setting performance goals, developing a decision-making framework, and drawing lessons from our experiences already started with ISTEA and will continue under TEA-21. And now that sustainable development is beginning to shape our transportation decisions for the better, it’s becoming obvious that we need to continually ask these questions as information technologies and telecommunications increasingly transform our communities.

Insight into some of the questions we have raised may lie in the ways in which transportation agencies are already embracing information technologies—primarily in the arena of intelligent transportation systems and substituting travel with telecommunications. In this report, we examine these recent developments to assess how transportation systems can meet future societal goals, balance competing needs and

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8 GAO, 1996, op. cit., p. 36.
9 The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) calls for “...significant improvements in public transportation necessary to achieve national goals for improved air quality, energy conservation, international competitiveness, and mobility for elderly persons, persons with disabilities, and economically disadvantaged persons in urban and rural areas of the country.” Intermodal Surface Transportation Efficiency Act of 1991, Sec. 2: Declaration of Policy, Public Law 102-240, 102nd Congress.
remain flexible enough to adapt to evolving demands. We have chosen these issues because they are the part of the transportation-information revolution that is most rooted in the public sector, where it remains relatively visible and subject to a public discourse on goals and implementation. This analysis will allow us to speculate on future developments that lie more in the private sector and in the more distant future. Finally, we have chosen to develop our ideas within the framework of sustainable development, which is beginning to define the practice of transportation planning.

The report is divided into four broad sections:

- **An analysis of the institutional and operational challenges facing transportation agencies wishing to deploy new technologies. (Chapter Two)**

  This chapter looks at the transportation and telecommunications policy framework for determining how to apply new technologies to improve system performance and meet community needs. This chapter discusses methods of incorporating technology applications into the planning process. Part of this section identifies the technological potential to enhance conventional transportation practices, as well as some of the pitfalls that may be encountered. It also explores ways to connect transportation and telecommunications policy for innovative technological deployment.

- **An analysis of how intelligent transportation technologies can improve basic accessibility to jobs for low-income employees and people coming off of welfare. (Chapter Three)**

  This chapter examines the access and mobility needs of families in poverty and then compares those needs against the current research and technology program. This chapter also analyzes relevant emerging technologies, policy direction and allocation of resources. The chapter concludes with an assessment of potential affects ITS could have on welfare mobility and offers a set of recommendations for policy and further research.

- **Case studies of regions that have recent experience with information-based transportation technologies. (Chapters Four Through Six)**

  Three case studies report on community experiences with information-based transportation technologies. They are intended to illustrate the promise and dilemmas raised in the first part of the report. The first case study examines the integration of transportation and telecommunications planning in Santa Monica, California. It offers an account of deliberations by local elected officials and citizens who are trying to harness transportation technologies to improve their community. This example underscores the importance of careful planning by a diverse array of community stakeholders. It also assesses the synergies and gaps in trying to apply telecommunications and transportation toward the goal of community livability, with
examples of potential innovative urban design solutions that can be used to overcome these gaps.

The second case study describes plans to develop the Midtown Corridor in Minneapolis, a five-mile greenway developed from an abandoned rail corridor, which parallels a major artery crossing 15 diverse communities. This section examines opportunities for improving corridor functions through transportation technologies. It reports on the innovative use of Geographical Information Systems (GIS) to assess and visualize citizen perceptions and preferences for improvement of the corridor. It also looks at the potential use of ITS applications to support walking, bicycling and transit along the corridor, and reports on how the greenway might affect travel patterns, area jobs, housing prices and democratic participation.

The final case study examines New York’s Rockland and Westchester counties’ experiences with intelligent transportation systems. The implementation of automatic tolling (E-ZPass) and other technologies is intended to offer some relief for chronic transportation congestion in the New York metropolitan area. The case study assesses the challenges to implementing the E-ZPass system, providing insight into the opportunities and constraints for achieving a technologically enhanced congestion pricing system. It analyzes the institutional and political dynamics that confront both implementation of the technological system and subsequent attempts to introduce congestion pricing as part of the system. It also includes a discussion of revenues—particularly related to transit usage—and attempts to determine who benefits most from the use of ITS and how this will affect public welfare in the region. Part of this includes a look at how the area’s public transit service and use of technology still lags well behind gains made in other industrialized countries.

- A synthesis of these factors, including lessons learned and recommendations for decision making and future research. (Chapter Seven)

This final chapter synthesizes the lessons learned from the case studies. In particular, it revisits the report’s trends, goals, and obstacles outlined earlier and discusses them within the context of actual experiences reported in the case studies. Based on these lessons, this chapter makes a number of recommendations for transportation policy, planning and future research to better support the sustainable deployment of information-based transportation technologies.

[sidebar early in chapter 1]How Fast is the Internet Growing?
By the end of 1998, Internet traffic will overtake conventional telephone traffic, increasing the demand for high-speed access throughout our telecommunications systems. Internet commerce has also skyrocketed, roughly doubling in sales each year since 1995. Now that web surfers can shop for a growing array of goods from their homes, trips to the shopping mall or grocery store are being replaced by freight trips through mail and other delivery services.
Transportation constitutes more than 19 percent of total consumer expenditures.\textsuperscript{10}

The average cost of owning and operating a new car is now $6,723 per year.\textsuperscript{11}

\textbf{Who doesn’t drive?}

9.7 million of the nation’s elderly people
25 million people with disabilities
94 percent of the 5 million families who are making the transition from welfare to work

\textbf{Figure 1.}

\begin{figure}[h]
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\includegraphics[width=\textwidth]{u_s_transportation_trends_1970-1995.png}
\caption{U.S. Transportation Trends 1970-1995}
\end{figure}

“A city powered by steam engines is different in shape and character from one powered by gasoline and electricity, and both are different from one powered by chemical reactions in animal muscles.”\textsuperscript{12} (James Trefil)

\textsuperscript{10} Consumer Expenditure Survey, Bureau of Labor Statistics.
\textsuperscript{11} Your Driving Costs, American Automobile Association, 1997.
\textsuperscript{12} James Trefil, A Scientist in the City, New York: Doubleday, 1994.
CHAPTER TWO
INSTITUTIONAL AND OPERATIONAL CHALLENGES

Introduction
The transportation sector is undergoing two trends of fundamental importance as the next millennium approaches. The first is a shift in policy. For most of this century, U.S. transportation policy focused on accommodating the demand for travel and the needs of automobiles through the construction of roads and other transportation facilities. This policy reached its zenith with enactment of the Federal-Aid Highway Act of 1950, a federal plan that resulted in the construction of a 44,000-mile nation-wide system of Interstate highways. The Interstate program, with its emphasis on constructing roads in and around major U.S. cities, was controversial almost from its inception. Critics charged that highways and the “automobility” they enabled caused air pollution, ruined the aesthetic qualities of cities and rural areas, and resulted in irreparable damage to the integrity of communities.

The highway-centered emphasis of the Interstate era remained firmly rooted in urban transportation planning until 1991, when the federal Intermodal Surface Transportation Efficiency Act (ISTEA, pronounced “Ice-Tea”) fundamentally altered U.S. transportation policy. ISTEA made unprecedented efforts to balance traditional transportation policy objectives (i.e. mobility) with non-traditional objectives such as neighborhood economic development, environmental quality, and the preservation and enhancement of areas of cultural and aesthetic value. In doing so, ISTEA reflects the profound influence that a set of principles often labeled “sustainability” or “sustainable communities” has had -- and will continue to have under TEA-21 -- on the transportation sector.

14 See Mumford (1958) and Moynihan (1960) for some of the earliest critical appraisals of the Interstate Highway program.
Taking place alongside the policy revolution ISTEA engendered in transportation is a second, more fundamental societal revolution: the shift to an information society. The scope of the information revolution is immense, and most aspects of this societal transformation fall outside the scope of this report. The aspect we will explore, however, concerns the very profound implications the information revolution is having on the transportation system. Information technologies now form an integral and growing part of the transportation system, and the direct application of these technologies to transportation -- known as Intelligent Transportation Systems (ITS) -- uses advanced computing and telecommunications systems to perform functions such as synchronizing traffic signals, collecting highway tolls and providing real-time traffic information to drivers and traffic managers. And more specifically, to what extent might the changes the information revolution is making to the transportation system be, both in theory and in practice, consistent with ISTEA’s policy emphasis on creating sustainable communities?

Sustainability: Origin, Concept, and Application to Transportation
What is the origin of the term sustainability and what does it mean? The first question – the term’s origin – is easier to answer. It first appeared in the 1970s as “sustainable development,” and was widely circulated among environment and development professionals with the 1980 publication of the World Conservation Strategy. A 1987 United Nations-sponsored report entitled Our Common Future -- also known as the Brundtland Commission report -- popularized the term and provided its most widely known definition: [use definition as a pull-out]“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Other international documents have since elaborated on the term; most notably, Agenda 21, the action plan adopted at the 1992 United Nations Conference on Environment and Development (known as the Rio Conference or Earth Summit).

More difficult than identifying the origin of sustainability is determining what the concept means. At least 70 definitions of sustainable development are now in circulation, and several variants of the term – sustainable communities, livable communities, livability and others – are used to describe roughly the same construct. The sustainability concept thus remains ambiguous, and is particularly difficult to translate into practical action; as Ruttan (1993, 5) correctly notes, the popularity of the Bruntland definition stems in part from it being “so broad that it is almost devoid of operational significance.” And the term is indeed popular: at least 200 international conferences, professional meetings and scientific associations have used sustainability as the theme of their gatherings within the last decade.

Conceptual ambiguity notwithstanding, the U.S. transportation sector (or at least segments of it) is increasingly embracing sustainability as a meaningful policy guide, and the appearance of the term “sustainability” in mainstream policy circles in the 1990s is a

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17 IUCN et al 1980.
18 Tryzyna 1995.
notable development. The Institute of Transportation Engineers (ITE), one of the oldest and largest associations of transportation professionals, made “Transportation and Sustainable Communities” the theme of its annual international conference in both 1997 and 1998. Another example is a recent government-sponsored report that found sustainable development to be “a new goal that transportation planners throughout the nation are trying to achieve now.”20 Even President Bill Clinton, in announcing his Administration’s 1997 proposal for national transportation legislation, stated that his proposal would “build a bridge to sustainable communities that can last and grow and bring people together over the long run.”21

Yet these references to sustainability leave unanswered the most vexing problem associated with the concept, whether applied to transportation or other policy sectors: policy prescriptions that invoke sustainability are often more poetic than practical. Defining sustainability in relation to transportation requires an analysis of how the concept can be practically applied to the decisions that policymakers confront every day. We believe the best way to do this is to highlight the elements of TEA-21 -- the nation’s new federal transportation law -- that illustrate sustainability principles in practice. As we will show below, ISTEA’s and TEA-21’s vision of sustainability is a holistic policy approach to transportation that seeks to balance social, economic and environmental objectives with the traditional goal of mobility.

Sustainability in Practice: ISTEA and a Holistic Approach to Transportation
The essence of ISTEA’s and TEA-21’s holistic approach is evident in four reforms the law made to U.S. transportation policy:
1. explicit listing of non-traditional policy goals to be considered in transportation policymaking;
2. provision of strong financial and procedural incentives to carry out these non-traditional goals;
3. transfer of transportation policymaking authority to regional agencies known as metropolitan planning organizations (MPOs); and
4. advocacy of holistic policy approaches to transportation by federal agencies charged with implementing ISTEA.

ISTEA calls, first of all, for transportation planners to balance traditional transportation goals (i.e. moving people and goods) with numerous non-traditional goals through a device known as “planning factors.” Transportation projects that receive federal funds must be included in a comprehensive metropolitan transportation plan analyzed for how it will affect or be affected by each of the 15 factors listed below in Table 1. Interspersed throughout the 15 factors are several items that “address many of the ways that transportation relates to other aspects of society.”22 These include planning factors that

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20 ACIR 1997, iii.
21 Clinton 1997.
demand analysis of energy conservation (#2); of the consistency between transportation and land use plans (#4); of “transportation enhancement” activities (#5 -- “enhancement activities” will be described below); and of the “overall social, economic, energy and environmental effects” of transportation decisions (#13). These planning factors have been collapsed into seven factors under TEA-21.

Table 1: Metropolitan Transportation Planning Factors Under ISTEA

<table>
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<tr>
<th>Factor</th>
<th>Description</th>
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<tbody>
<tr>
<td>1) Preservation of existing transportation facilities and, where practical, ways to meet transportation needs by using existing transportation facilities more efficiently.</td>
<td></td>
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<tr>
<td>2) The consistency of transportation planning with applicable Federal, State, and local energy conservation programs, goals, and objectives.</td>
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<tr>
<td>3) The need to relieve congestion and prevent congestion from occurring where it does not yet occur.</td>
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<td>4) The likely effect of transportation policy decisions on land use and development and the consistency of transportation plans and programs with the provisions of all applicable short- and long-term land use and development plans.</td>
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<td>5) The programming of expenditures on transportation enhancement activities as required in section 133.</td>
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<td>6) The effects of all transportation projects to be undertaken in the metropolitan area, without regard to whether such projects are publicly funded.</td>
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<tr>
<td>7) International border crossings and access to ports, airports, intermodal transportation facilities, major freight distribution routes, national parks, recreation areas, monuments, historical sites, and military installations.</td>
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<td>8) The need for connectivity of roads within the metropolitan area with roads outside the metropolitan area.</td>
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<td>9) The transportation needs identified through use of the management systems required by section 303 of this title.</td>
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<tr>
<td>10) Preservation of rights-of-way for construction of future transportation projects, including identification of unused rights-of-way, which may be needed for future transportation corridors and identification of those corridors for which action is most needed to prevent destruction or loss.</td>
<td></td>
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<tr>
<td>11) Methods to enhance the efficient movement of freight.</td>
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<tr>
<td>12) The use of life-cycle costs in the design and engineering of bridges, tunnels, or pavement.</td>
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<tr>
<td>13) The overall social, economic, energy, and environmental effects of transportation decisions.</td>
<td></td>
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<tr>
<td>14) Methods to expand and enhance transit services and to increase the use of such services.</td>
<td></td>
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<tr>
<td>15) Capital investments that would result in increased security in transit systems.</td>
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</table>


In spite of this comprehensive list, the history of U.S. transportation shows that federal laws which merely list issues policymakers should consider may do little to ensure that
these issues are considered, and if they are considered, they are actually respected. So beyond simply listing the importance of policy goals other than mobility, ISTEA provides the financial and procedural incentives to integrate the non-traditional goals into the transportation policymaking process. In many instances including the Congestion Mitigation and Air Quality Improvement program (CMAQ) and Transportation Enhancements program, TEA-21 provides even stronger financial support.

Two well-funded programs, CMAQ program and the Transportation Enhancements program, dedicated roughly $9 billion over the life of ISTEA (federal fiscal years 1992 – 1997) to implement the non-traditional goals articulated in the planning factors. These two programs will be provided more than $13 billion over the six-year life of TEA-21. In states that violate federal air quality laws, CMAQ funds can only go to transportation projects with documented air quality benefits, and it appears that the CMAQ program is indeed reducing air pollution. The Enhancements program dedicates funds to “transportation enhancements,” activities “designed to strengthen the cultural, aesthetic, or environmental aspects of transportation or to encourage greater use of non-motorized transportation.” Included in the activities ISTEA and TEA-21 make eligible for funding are the development of bicycle and pedestrian facilities, historic preservation, and landscaping and other scenic beautification. The Enhancements program, like CMAQ, is producing measurable results.

Reinforcing the more integrated, multi-dimensional policy approach encouraged (and demanded) by the CMAQ and Enhancements programs are ISTEA’s provisions on public

23 Regulations following the Federal-Aid Highway Act of 1962, for example, also included a list of issues to consider in planning transportation investments, many of which were analogous to those listed in ISTEA’s planning factors mandate (i.e. land use, “social and community-value factors,” etc.). Yet analysts generally agree that the 1962 Act made little difference in practice, as federal and state transportation projects remained narrowly focused on highway construction and traffic efficiency. (See Leavitt 1970; T. Morehouse, “Artful Interpretation: The 1962 Highway Act;” in Michael N. Danielson, ed., Metropolitan Politics: A Reader, Second Edition, 1971; and especially M. Rose, Interstate: Express Highway Politics, 1939-1989, Revised Edition, Knoxville, Tennessee: The University of Tennessee Press/Knoxville, 1990.

24 An analysis of CMAQ’s effects on air quality concluded that the program leads to annual reductions of 52,135 tons of volatile organic compounds; of 336,349 tons in carbon monoxide; and of 62,406 tons in oxides of nitrogen. (U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation, “The Emission Reduction Potential of the Congestion Mitigation and Air Quality Program, Preliminary Assessment,” (Unpublished May 19, 1997 draft obtained directly from EPA).


26 The Enhancements program gets credit for the dramatic rise in federal funds for bicycle and pedestrian facilities since ISTEA. During the 18 years (1973-1990) prior to ISTEA, cumulative federal spending on pedestrian and bicycle facilities totaled roughly $40 million. Yet in just four years between 1992 and 1996, federal funding for such projects jumped to nearly $677 million (Rails-to-Trails Conservancy “ISTEA Reauthorization,” Unpublished report obtained from RTC, Washington, DC 1997).
involvement. ISTEA increased public involvement in transportation policymaking in several ways: public review and comment is required at all “key decision points,” the public involvement process must be inclusive, involving those “traditionally under-served by existing transportation systems;” and a process is required “for demonstrating explicit consideration and response to public input.” TEA-21 continues all these policies. ISTEA’s public participation requirements have profoundly democratized what was once the highly insular, “top-down” transportation planning process, and many public agencies believe that transportation policy decisions are “better” as a result.

Beyond dedicating money for programs and distributing more transportation policymaking authority to the public, ISTEA also redistributed policymaking authority between levels of government in ways that re-enforce its holistic policy approach. It did this by strengthening the transportation decision-making role of MPOs, previously somewhat obscure regional governing bodies that, prior to ISTEA, exercised little de facto influence on the policymaking process. ISTEA made MPOs in all urbanized areas with populations exceeding 50,000 responsible for devising short- and long-term transportation investment plans, for selecting which transportation projects to fund within their jurisdiction, and for ensuring that transportation investments are consistent with state air quality improvement plans.

The belief that MPOs are distinctly capable of carrying out ISTEA’s multi-dimensional policy approach is based on their member composition, scope of authority, and on their status as “non-modal” transportation agencies. Being regional organizations composed in part of local elected officials, MPOs are considered closer to the communities they serve than either federal or state transportation agencies. Yet at the same time, MPOs are not constrained by artificial city or county boundaries, thus enabling them to better manage the de facto boundaries of a regional transportation system (i.e. the entire metropolitan area). This, at least in theory, makes MPOs well positioned to balance the multi-dimensional “quality of life” concerns of particular communities with the entire region’s interest in an efficient transportation system.

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27 This and the other referenced public involvement provisions are found in ISTEA’s implementing rules, 23 CFR 450.212 et seq.

28 For example, one study found that MPOs believe that more public involvement produces “better” policy decisions in that “[transportation] plans and programs are more reflective of the public’s transportation needs and hence enjoy broader and stronger public support” (GAO 1996, 19).

29 Often referred to as “councils of governments,” MPOs are diverse, often organizationally complex entities that differ in size, technical capabilities, and degree of political independence (ACIR 1995). The roughly 339 MPOs designated under ISTEA (the number of MPOs changes as population changes) are generally alike in being intergovernmental organizations with representatives from the jurisdiction’s state, regional and local governments. All MPOs derive their authority under federal transportation planning mandates, but some possess additional state-conferred powers to address other regional issues such as growth management.

30 GAO 1996.
The way in which the MPOs’ scope and jurisdiction encourage a holistic approach dovetails with their status as “non-modal” transportation agencies. MPOs, not being stakeholders in a particular mode of transportation, may escape the biases of state Departments of Transportation (DOTs) (i.e. toward highway projects), of transit operators (toward transit projects), or of other mode-specific agencies (toward their particular mode). This should, once again, encourage MPOs to rationally analyze alternative transportation investments in ways that balance the interests of the region with those of the communities within it.31

Finally, ISTEA’s holistic policy approach to transportation is evident in the activities of federal transportation agencies charged with implementing it. The US DOT’s “National Partnership for Transportation and Livable Communities,” for example, builds, according to former Secretary of Transportation Federico Pena, “on the principles embodied in ISTEA...[by stressing] the connection between transportation and community livability.” In addition, the Federal Transit Administration (an agency of US DOT) is pursuing a “Livable Communities Initiative” in which it provides grants to grass-roots transportation projects that improve the social, environmental and economic conditions in communities.32 Besides funding actual projects, these USDOT activities are playing a role in shifting the nation’s transportation policy culture to one that embraces ISTEA’s holistic policy approach.33

The upshot of ISTEA’s reforms is that better transportation -- meaning improved connectivity between places -- is just one of several standards used to judge the comparative value of alternative transportation strategies. As the 21st century approaches, U.S. transportation policy is structured to serve numerous social, environmental, and economic goals in ways that it was not for most of this century. The multi-dimensional policy approach ushered in by ISTEA reflects one of the critical lessons learned in the era of interstate highway construction: too much emphasis on making places easier to pass through will tend to create places where no one wants to be. This realization bodes well for communities that will be spared the often socially and

31 Lyons (1995, 12) expresses this idea in describing why MPOs are (in theory) better suited than sub-regional governments to conduct transportation planning: “Although rigorous planning often [occurs] at sub-regional levels, the perspective and priorities of [sub-regional] agencies [are] often different from those of the overall region. For example, transit operators may use long range planning to make program decisions, but out of necessity their major concerns may be operational and financial -- to meet farebox recovery requirements, reduce deficits, or eliminate inefficient service. For transit operators, these concerns can take precedence over broader regional priorities, for example, assigning resources to the projects that most cost-effectively reduce air pollution, regardless of whether projects are transit, highway, or transportation control measures.


33 Discuss projects funded under livable communities initiative, nation-wide conferences and brochures
physically destructive effects resulting from a mobility-centered approach to transportation policy.

Yet ISTEA’s holistic approach comes with its own problems, not the least of which is determining precisely what results it should yield in practice. Basing policy on a holistic, multi-dimensional approach goes only so far in providing practical guidance for transportation policymakers. Richard Mudge\(^{34}\) describes the ambiguity surrounding current transportation policy as follows:

\[
\text{[Indent this paragraph.]}\text{Around the turn of the century, the clear goal [of transportation policy] was to get the farmer out of the mud. From 1956 on, the clear goal was to build the interstate system. There is no real goal now.}
\]

We see this statement as partly true; more accurate perhaps would have been to conclude “there is no one goal now.” The feeling expressed by Mr. Mudge is one of the things that made ISTEA implementation a slow process. Multi-objective planning is clearly a better approach than single objective planning, but it is also more difficult. There is no simple way out of his dilemma, no one-size-fits-all policy solution consistent with all the demands made on transportation policy in an era in which transportation must promote more sustainable and livable communities. The next section explores the potential link between the emerging generation of transportation tools -- information technologies and in particular intelligent transportation systems (ITS) -- and a holistic transportation policy focused on the creation of more livable communities.

**Intelligent Transportation Systems and Sustainable Communities**

In 1996, former U.S. Secretary of Transportation Federico Pena gave a speech expressing his vision of what the transportation system would look like in the year 2000 and beyond. Stating that he saw a future in which “many of the improvements to the transportation system will rely on the ability of private firms and public agencies to gather, process, analyze, and disseminate information.”\(^{35}\) Pena’s vision was of an information-intensive transportation system, a system in which performance improvements would depend on the quantity and quality of information rather than on more and wider highways.

The technological underpinnings of the future’s information-intensive transportation system are a blend of computing and telecommunications applications known as intelligent transportation systems. Most of ITS falls into three broad categories:

1. *Advanced traffic management systems* (ATMS), which use surveillance technologies to relay information on traffic conditions to a traffic-control center. This information is then used to re-time traffic signals, to direct traffic around incidents using electronic freeway message signs, and to take other measures that increase the carrying capacity of the transportation system;

\(^{34}\) Richard Mudge 1994.

2. **Advanced traveler information systems** (ATIS), which provide traffic information and route guidance to drivers, transit users, and other travelers, allowing them to alter where and when they travel in response to traffic conditions; and

3. **Advanced vehicle control systems** (AVCS), which seek to improve control of the automobile, either automatically or by assisting the driver. Fully automated highways represent the most ambitious -- and, from a sustainability perspective, the most controversial -- AVCS application.\(^{36}\)

Federally sponsored ITS-related research dates back to the late 1960s,\(^ {37}\) but not until ISTEAL initiated the federal Intelligent Transportation Systems (ITS) Program were these technologies a major U.S. transportation policy priority. Between 1992 and 1997, federal spending for ITS research and development totaled roughly $1.3 billion.\(^ {38}\) Supplementing these federal activities are many state and local government ITS programs, and private sector ITS investment is growing and predicted to be the primary source of ITS funding.\(^ {39}\)

That an aggressive ITS program arrived as part of ISTEAL raises important policy questions. Will ITS -- conceived and designed by transportation engineers largely in the pre-ISTEA era -- reflect the more traditional emphasis on moving traffic as quickly as possible? Or will ISTEAL’s placed-based principles serve to guide ITS investments? Opinion on this question, at least among environmental analysts, is decidedly mixed. One cautiously optimistic analyst argues that properly directed, “ITS could be the most important enabling technology driver in decades for reform and progress in American transportation, winning for our citizens sustainable high wage jobs, reduced traffic delay, more livable communities, and a healthy environment.”\(^ {40}\) By contrast, others view ITS unequivocally as an environmental and social Pandora’s Box. Despite promising a more efficient transportation system, such analysts often argue that “A principle objective of [ITS] -- to minimize total vehicle-hours of delay -- has little in common with the social imperative of reducing the environmental impacts of driving.”\(^ {41}\) Another critique of ITS goes even further: “The past 150 years [have seen] new transportation technologies stretch the envelope of urban development, raising per capita fuel consumption, consuming farmlands and open space, and dirtying air basins…The so-called Intelligent Transportation System stands to worsen this state of affairs by orders of magnitude.”\(^ {42}\)

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\(^{36}\) Diebold, 1995.

\(^{37}\) Chen and Ervin 1992.


\(^{39}\) The National ITS Program Plan (ITS America 1995) estimates that the private sector will ultimately pay 80 percent of the costs of all ITS investments. Private sector investment in ITS has focused to date on traffic information products and services, especially on navigational aids.

\(^{40}\) Replogle 1996, 59.

\(^{41}\) Gordon 1992, 24-25.

\(^{42}\) Cervero 1995, 93.
While evidence exists that supports both poles in this debate, we advance a more centrist position. We believe that there are indeed theoretical links between ITS and a more sustainable transportation system. Whether these links materialize in practice, however, will depend on how the technologies are used -- on how, in other words, the technologies are deployed. On the one hand, if ITS deployments remain outside of ISTEA’s policy framework, then it is possible to envision scenarios in which ITS facilitates an even more “auto-centric” culture and magnifies transportation-related problems such as air pollution and suburban sprawl. On the other hand, placed within the appropriate policy framework, ITS may be harnessed in ways consistent with ISTEA’s and TEA-21’s placed-based approach to transportation.

The Theoretical Links Between ITS and Sustainability
The potential link between ITS and more sustainable transportation stems from ITS’ ability to create a transportation system rich in information, or what might be called an information-intensive transportation system. An information-intensive transportation system raises two prospects. First, it means using information instead of new lanes, roads, and highways as a way to increase the capacity of the transportation system. In this sense, ITS “substitutes information for stuff,” resulting in capacity enhancements that use fewer material resources, consume less open space, and reduce the noise and community disruption related to new roads. ITS thus supports an underlying premise of sustainability thinking: that the Earth’s resource base has limits, that some of those limits are being approached, and therefore sustainable development depends on accommodating economic growth while consuming fewer resources.43

Beyond potentially substituting for physical elements of the transportation system, the information ITS provides may also enhance the system’s performance. Critical in the ISTEA era, however, is that “enhanced performance” be defined broadly to include greater traffic efficiency and a reduction in the transportation system’s negative externalities. ITS can contribute to this broader notion of enhanced performance by providing information that allows for greater operational control of the transportation system. Achieving more control of the system, in turn, increases the opportunities to address specific purposes, including broad social, economic, and environmental goals.

43 We take the phrase “substituting information for stuff” from Robert B. Shapiro, chairman and CEO of Monsanto Company. In a 1997 interview published in a Harvard Business Review article entitled “Growth Through Global Sustainability,” he underscored the indispensable role of information in promoting sustainable development: “Using information is one of the ways to increase productivity without abusing nature... A closed system like the earth’s can’t withstand a systematic increase of material things, but it can support exponential increases of information and knowledge. Sustainability and development might be compatible if you could create value and satisfy people’s needs by increasing the information component of what’s produced and diminishing the amount of stuff” (p.882).
Table 2 illustrates ITS applications that facilitate greater control of the transportation system by channeling information to system managers and users. “Remote sensing,” for example, can generate emissions data and assist air quality officials in targeting “gross polluters.” Another example is “congestion pricing,” or charging drivers a fee that varies with the level of traffic on a roadway. Congestion pricing conveys information (in the form of price signals) that alerts drivers to the overall social and environmental costs of driving, making them aware that driving imposes external costs while encouraging more environmentally benign travel behavior.45

<table>
<thead>
<tr>
<th>ITS Category</th>
<th>Application</th>
<th>Flow of Information</th>
<th>Contribution to Sustainability</th>
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<tbody>
<tr>
<td>Traffic Management</td>
<td>--Traffic signal synchronization</td>
<td>--traffic information to traffic managers allows re-timing of signals to optimize traffic flow</td>
<td>--reduces energy usage and emissions related to “stop &amp; go” traffic and congestion</td>
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<td></td>
<td>--Incident detection</td>
<td>--incident (i.e. freeway accident) information to traffic managers allows faster emergency response, re-timing of ramp meters, etc.</td>
<td>--reduces energy usage and congestion-related emissions</td>
</tr>
<tr>
<td>Traveler Information</td>
<td>--Pre-trip traveler information</td>
<td>--traffic information to traveler allows for shift in travel time, route, or mode</td>
<td>--reduces energy usage, congestion-related emissions and/or the # of trips/ SOVs</td>
</tr>
<tr>
<td></td>
<td>--En-route traveler information</td>
<td>--traffic information to driver allows shift in route</td>
<td>--reduces energy usage congestion-related emissions</td>
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<tr>
<td></td>
<td>--Congestion-sensitive road tolls (i.e. congestion pricing)</td>
<td>--information to drivers (in the form of price signals) that relays full social and environmental costs of driving</td>
<td>--reduces energy usage and emissions by reducing # of trips/ SOVs, reducing congestion, and perhaps encouraging less auto-</td>
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</table>

44 “Remote sensing” refers to technologies that can measure the exhaust emissions from vehicles as they pass a roadside detector.

45 One study of congestion pricing, for example, found that fees of between $.10 and $.15/ mile could reduce travel during that period by 10 percent to 15 percent (NRC 1994), thus reducing congestion-related emissions and perhaps leading to a net reduction in automobile use.
The Practicalities of ITS Deployment

Drawing conceptual links between ITS and principles of the sustainable communities epoch is one thing. Making those links in practice is another. Such links appear to be occurring in some cases: Minnesota’s Department of Transportation, for example, has initiated a Sustainable Transportation Initiative (STI) to implement ITS programs consistent with sustainability principles. And the federal ITS program -- having symbolically embraced a more holistic, less highway-focused approach by changing its name in 1994 from “Intelligent Vehicle Highway Systems” to “Intelligent Transportation Systems” -- lists environmental quality as one of its primary goals.\(^{46}\)

Yet federal spending priorities tell a somewhat different story. According to a Congressional Budget Office\(^ {47} \) report, only $5.6 million -- totaling 1.2 percent of federal ITS funds obligated through 1994 -- went to projects in which environmental concerns were the primary motive. This compares with $304.6 million (65.3 percent of federal funding obligated through 1994) spent on travel and traffic management projects. These data led the CBO to conclude that:\(^ {48}\)

[Indent this paragraph]Among the objectives [for the ITS program] set for by the Congress, the one that seems to have received the least attention is the environment. Although some of the travel management projects could benefit the environment, how they might do so is not entirely clear because short-term reductions in traffic and congestion could lead to greater numbers of vehicles on the road, resulting in even greater pollution.

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\(^{46}\) National ITS Program Plan 1995.

\(^{47}\) Congressional Budget Office, 1995.

\(^{48}\) Ibid, p. 44.
The CBO report rightly points out that funding for ITS projects does not necessarily represent an “either-or” scenario between promoting environmental goals versus those related to mobility. Nevertheless, some environmental analysts, wary that ITS investments will ultimately worsen pollution by encouraging more driving, believe the ITS program may be heading in the wrong direction. These analysts often point to continuing federal support of automated highway systems as evidence that the philosophy guiding ITS investments remains rooted in the Interstate era.

Not surprisingly, efforts to apply ITS to broader, holistic applications have been decidedly mixed. Their theoretical links to sustainability notwithstanding, ITS technologies in fact grow out of a traffic engineering community concerned most with moving vehicles. And as discussed earlier, the ultimate effects ITS will have on the transportation system -- and on society more generally -- will depend on how the technologies are applied. This raises an immediate question: How in fact are ITS technologies being applied in the U.S. transportation system? The next section addresses this question by presenting three case studies on how ITS and related information technologies are being used in three areas of the country.

**Dimensions for Advancement**

The ability of information technologies to promote a more sustainable transportation system will depend in part on stronger linkages being made in three areas: 1) planning; 2) community development; and 3) pricing. Each of these dimensions will be touched upon below, and will be explored in greater detail in each of the three case studies in subsequent chapters (see Table 3 below).

<table>
<thead>
<tr>
<th></th>
<th>New York</th>
<th>29th Street</th>
<th>Santa Monica</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology</strong></td>
<td>ETC → E-ZPass</td>
<td>GIS in mapping citizen perceptions</td>
<td>Kiosks Smart Transit ATIS/ATMS</td>
</tr>
<tr>
<td><strong>Sustainability</strong></td>
<td>Congestion pricing applications</td>
<td>Citizen input Alternative transportation</td>
<td>Livability Trip Reduction</td>
</tr>
<tr>
<td><strong>Institutional and/or Political Issues</strong></td>
<td>Historically confrontational &amp; non-responsive -- need for increased collaboration</td>
<td>Governance: must involve both government &amp; citizens</td>
<td>Disjointed planning</td>
</tr>
</tbody>
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49 Replogle 1995; Cervero 1995.
<table>
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<tr>
<th>Outstanding Issues</th>
<th>Equity Use of Revenue</th>
<th>Implementation linking transit &amp; economic development</th>
<th>Achieving linkages</th>
</tr>
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</table>

Linkages to Planning

Telecommunications and transportation must, first and foremost, be linked within a comprehensive planning process. All too often, however, transportation and telecommunications planning occurs in separate forums:

...Public forces [are] at work that encourage or restrict the evolution of both transportation and telecommunications systems. Rarely, however, are these two functions considered jointly and comprehensively.

...Regulators [of these two systems], set up in different agencies, rarely consider the implications of their decisions for the entire transportation system or the entire telecommunications system -- let alone their inter-system implications.50

The need for integrated planning in these areas is particularly important due to the uncertain nature of how telecommunications may affect the transportation sector. Until now, most the research on the transportation-telecommunications relationship has focused on the relatively narrow question of whether telecommunications might substitute for travel (i.e. eliminate trips).51 Applications such as telecommuting, teleconferencing and various forms of teleservices (i.e. on-line shopping, banking) have been widely mentioned in relation to the “substitution hypothesis.”52 What this research has shown, however, is that the substitution hypothesis only hints at the complexity of the transportation-telecommunications relationship. Depending on the circumstances, telecommunications can replace, generate or modify trips, as well as have second order consequences for land use that ultimately influence travel patterns.53

The complex, context-specific relationship between telecommunications and transportation has several implications for urban planners. Perhaps most of all, it should dispel any notion of telecommunications as a “magic bullet” for the problems of urban transportation. Indeed, there is no reason to assume that the interaction between transportation and telecommunications will necessarily create synergies that reduce

53 Again, Mokhtarian (1990) and Salomon (1986) provide the best reviews of the evidence on this topic.
traffic congestion, address transportation-related environmental problems, or positively contribute to various factors influencing urban quality of life. Such synergies are likely to result, instead, from policymakers actively coordinating transportation and telecommunications strategies to achieve a variety of goals, whether it be reducing the number of automobile trips or making urban areas more livable. For urban communities, then, the key to realizing the full spectrum of benefits from the transportation-telecommunications relationship is likely to be the formal and innovative integration of transportation and telecommunications planning.

The issue of formally integrated transportation and telecommunications planning is particularly salient in the case study of Santa Monica, California. Renowned for its innovative initiatives in transportation, technology, urban planning and citizen involvement in government, Santa Monica recently attempted to better integrate its transportation and telecommunications planning processes to pursue broad economic, environmental and community goals. Their experience in doing this provides lessons for other communities about the mechanics of such a process, particularly the challenges facing communities that attempt to formally integrate policies affecting transportation and telecommunications.

**Linkages to Community Development**

Transportation and new technologies must be linked, secondly, to the development of communities. Community development can have several dimensions -- economic, environmental and social. No matter which dimensions those deploying transportation and technology hope to address, however, community development can only be successful if it addresses the specific needs and conditions of a community as expressed by those within that community. This suggests two guidelines for the community development process: that it be inclusive, involving a diverse array of stakeholders from all segments of the community; and that it be adequately informed, meaning that every effort be made to understand what these community stakeholders perceive as their community’s strengths and weaknesses.

It is this kind of inclusive, informed community development process that is highlighted in the case study of Minneapolis’ 29th Street Corridor Project, also known as the Midtown Greenway project. Utilizing funding from ISTEA, the 29th Street Corridor Project is rehabilitating a five-mile abandoned rail corridor into a multi-purpose greenway that will serve as an alternative transportation corridor (i.e. for walking and biking), as a recreational amenity, and possibly as a catalyst for the economic revitalization of the area. To analyze the benefits the Greenway project could bring, and assess how residents of the neighborhoods adjacent to the Greenway perceive the project, this case study utilizes Geographic Information Systems (GIS) to analyze the travel behavior and community perception of Greenway-area residents. In addition to exploring the political dynamics of an ISTEA-funded transportation project attempting to achieve numerous goals that transcend transportation, this case study also showcases GIS as a means of using information technology to analyze spatial (location-specific) data to improve the quality of public participation in the policymaking process.
Linkages to Pricing
Charging drivers a fee that varies with the level of traffic on a road -- or what is more commonly known as congestion pricing -- has been recommended for years as probably the most effective means to reduce both traffic congestion and auto-related air pollution.\textsuperscript{54} Despite its potential benefits, congestion pricing remains politically unpopular.\textsuperscript{55} One of the main reasons for its unpopularity is the issue of equity. Equity, a concept roughly synonymous with fairness, refers to “the distribution of costs and benefits resulting form a policy decision.”\textsuperscript{56} This distribution of costs and benefits can fall in various ways, such as along geographic lines, over time, or along population subgroups (i.e. race, gender) or income categories. Transportation researchers debate whether congestion pricing is likely to be “fair.” On the one hand are those such as Giuliano,\textsuperscript{57} who argues that congestion pricing will most burden lower and middle income working households least able to make changes to their driving schedules. On the other hand, Elliot\textsuperscript{58} argues that many studies suggest both rich and poor will benefit from congestion pricing, and that “even the one percent of the poor who find full-scale emissions charges a burden could only be helped by congestion pricing programs [arranged in such a way to] give everyone a free alternative and...get everyone where they want to go faster.”

Irrespective of the scholarly quarrels about the equity congestion pricing, the public generally believes that pricing schemes of any kind are likely to burden certain populations.\textsuperscript{59} As a result, public officials have generally refrained from advocating such a policy. It is within this politically-charged context that the pricing issue comes to the fore in the case study of New York’s Tappan Zee Bridge. Some groups (and even some political leaders) are now considering congestion pricing as a viable option for the Tappan Zee Bridge, and the electronic infrastructure that would enable such pricing -- electronic toll collection -- is now in place on the bridge to collect conventional tolls. Whether the increasing technological feasibility of congestion pricing will improve its political prospects is a separate question, and this case study explores the pricing issue within the complex setting of New York’s regional transportation system.

\textsuperscript{54} Down 1994; Gordon and Richardson 1995; Gomez-Ibenez 1994.
\textsuperscript{55} Downs 1992; Rom 1994.
\textsuperscript{56} Giuliano 1994, 251.
\textsuperscript{57} Ibid.
\textsuperscript{58} Elliot 1995, 9.
\textsuperscript{59} Elliot 1994; Downs 1992.
CHAPTER THREE
SANTA MONICA: WORKING TO BALANCE REGIONAL AND LOCAL TRANSPORTATION GOALS


In 1958, at the height of America’s quest to connect its territory with a vast network of Interstate highways, city planning theorist Lewis Mumford wrote that in their zeal to build spectacular roads in and around major U.S. cities, planners had forgotten “that a city exists, not for the constant passage of motorcars, but for the care and culture of men.” This chapter describes how Santa Monica, California, leadership is trying to balance their vision for an accessible, human-scaled city with the demands of a car-congested region. Santa Monica’s policymakers are working to integrate transportation and telecommunications along place-based planning principles. Their experiences offer other cities lessons about the issues involved in this effort.

Santa Monica is a useful case study because it possesses a city government that, unlike most others, is an innovator in all the areas relevant to our inquiry: telecommunications, transportation, and its legacy of adopting place-based planning approaches in these and other policy areas. It received national and international attention in 1981 when a group of “progressives” (or “radicals,” as they were sometimes characterized) became the majority on its city council. Santa Monica has since received popular and academic scrutiny for its strict rent control, efforts to involve citizens in city government, attention to environmental issues, and emphasis on reconciling local economic development with a more human-scale urban setting. Santa Monica has also gained attention for its initiatives in both transportation and telecommunications.

While reading about the decisions that Santa Monica policymakers have made to make their community livable while offering ample economic opportunity, consider how they balanced the needs of their community with the reality of the conditions of the Los Angeles metropolitan region. Policymakers defined their transportation goals and their idea of accessibility knowing that other regional agencies did not necessarily share their vision. Their challenge is to make transportation and telecommunications investment decisions that promote their vision of a livable community and yet retain the support of transportation-related regional agencies.

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60 This case study was conducted from August 1997 to March 1998. Santa Monica’s transportation and telecommunications initiatives and policies were examined by reviewing city records including ordinances, planning documents, and minutes from meetings of the City Council and Planning Commission. To elaborate on the information gleaned from these documents, individual and group interviews were conducted with elected, appointed and staff officials from the City of Santa Monica, Santa Monica community/neighborhood representatives, and with regional experts and policymakers involved in transportation, telecommunications and environmental policy affecting Santa Monica. Each interview was structured around three broad questions described later in this chapter.

The Santa Monica experience also offers lessons about managing the separate processes of transportation and telecommunications planning. While reviewing this case, consider the following questions:

1. What are some of the key issues involved in trying to coordinate transportation and telecommunications planning?
2. What political and/or intergovernmental issues are involved in efforts by Santa Monica to better integrate projects related to transportation and telecommunications?
3. Can Santa Monica serve as a model in the way it has integrated transportation and telecommunications?

Current urban transportation planning, structured nationally under ISTEA, provides a template for integrating transportation and telecommunications planning. This case describes how Santa Monica is faring in its efforts to integrate these initiatives and that local policymakers are considering creative ways to coordinate transportation and telecommunications to pursue their social, environmental and economic goals.

A Profile of Santa Monica
Santa Monica is a city of roughly 90,000 people located just west of Los Angeles. Santa Monica is famous for its beach-side community where the environment is cleaner and more pleasant than any other section of the Los Angeles metropolitan region. Sometimes referred to as the “People’s Republic of Santa Monica,” it is a relatively affluent, well-educated community known to support environmentally-sensitive, alternative public policies. Santa Monica’s citizens have a sense of belonging to the community and the scale of the city is such that most people can walk or bike to school, the grocery store, work, the beach and the downtown area.

Transportation in Santa Monica
As part of the Los Angeles metropolitan area, Santa Monica is facing transportation problems similar to those in much of southern California: traffic is bad and getting worse. Currently, Santa Monica drivers experience daily gridlock in nine intersections and it is predicted that by 2005 this number will expand to 41 intersections.

What makes Santa Monica unique, however, is its strategy to manage this problem, particularly within its heavily congested downtown district. Santa Monica is not

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62 One of the nation’s busiest freeway -- the Santa Monica Freeway (Interstate 10) -- bisects the city, and, being the principle east-west route traversing the 15 miles between Santa Monica and downtown Los Angeles, presents Santa Monica commuters with a tedious journey both to and from work. Santa Monica’s city streets face traffic pressures as well, with street congestion expected to increase sharply over the next 10 years. For example, the number of signalized intersections considered unacceptably “jammed” in Santa Monica during evening peak traffic periods is expected to rise from 10 in 1995 to 35 by 2005 (City of Santa Monica 1996a).

63 From Claremont’s interview with city leaders.
attempting to build its way out of congestion by adding more physical capacity for automobiles, but is focusing instead on accommodating pedestrians, bicyclists and transit. The result of this strategy is to reduce the physical space given to the automobile. Santa Monica’s transportation policy is focused on a “placed-based” strategy that seeks to use transportation (and urban design more generally) as a means to promote wider policy goals, such as local economic development, environmental quality, and the preservation of Santa Monica’s downtown “core” as a center of community life.⁶⁴

Perhaps the best recent example of Santa Monica’s “placed-based” approach to transportation planning is the city’s Downtown Urban Design Plan. Adopted in July 1997, the Plan seeks to extend the economic success and pedestrian-oriented flavor of the city’s flourishing “Third Street Promenade”⁶⁵ to the entire 28-block downtown area. The Plan’s various components include:

- widening sidewalks throughout downtown;
- converting two one-way streets to two-way;
- creating more on-street parking (and thus removing one traffic lane) on a main downtown street;
- creating a downtown “Transit Mall” by converting two existing traffic lanes to transit-only and providing more sidewalk benches and bus shelters at a transit “hub;” and
- enhancing the aesthetics of the downtown streetscape with tree planting, new street lights, and public art.

The kind of community-oriented economic development Santa Monica is attempting to foster in its downtown is captured in a quote from a 1996 update of the land use plan for the area:

Downtown Santa Monica represents one of the few open air, pedestrian oriented, commercial and residential environments in an oceanfront community in Southern California that is designed to serve both local residents and visitors to the area who possess a range of interests, diverse social and economic backgrounds, and varied reasons for being drawn to the many activities available in the District. These distinguishing attributes provide a character and quality, or theme, which can and should be enhanced to continue to make the

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⁶⁴ Many of Santa Monica’s downtown urban design and transportation policies are applications of what are often labeled “neo-traditional” or “transit-oriented” development principles. The validity of these theories -- that neo-traditional land use and design provides a means to link transportation with broader environmental, social and economic goals -- is one of the central debates among urban planning scholars. For proponents of these theories, see Calthorpe (1993) and Ewing (1997). For critical appraisals, see Gordon and Richardson (1997) and Crane (1996).

⁶⁵ Third Street Promenade is a three-block pedestrian mall in downtown Santa Monica that is closed to automobiles. Since a major renovation in 1989, the Promenade has been one of the nation’s economically successful outdoor pedestrian malls. Roughly 4 million people now visit the Promenade annually, including two million tourists (Bayside District Corporation 1997).
[Downtown] a vital community center and an area which succinctly defines Santa Monica’s character.\(^{66}\)

The Downtown Urban Design Plan epitomizes Santa Monica’s attempt to integrate transportation with broader economic, environmental and social goals. This same kind of holistic, placed-based approach characterizes Santa Monica’s initiatives in telecommunications.

**Telecommunications in Santa Monica**

Santa Monica is widely regarded as being among the *avant-garde* in municipal telecommunications. Much of this reputation is due to the city’s Public Electronic Network (PEN). Initiated in 1989, PEN provides free electronic services for those who live, work and attend school in Santa Monica, with many of these services being accessible to non-PEN subscribers via the Internet.\(^{67}\) PEN provides on-line access to city services where residents obtain permit applications and make fee payments. In addition, citizens can obtain city government information including meeting schedules and agendas, staff reports, and city ordinances on PEN. PEN also provides a forum for community discussion of issues between citizens, elected officials and city staff. PEN has not only improved the city’s ability to deliver government services, but some evidence suggests that its on-line forums buttress the sense of community among Santa Monica residents.\(^{68}\) Currently, about 60 percent of Santa Monica’s residents have a computer in their home and would have access to PEN.\(^{69}\)

**Sidebar:** Many cities have developed “freenets,” dial-up networks where residents can access information about their city and region at no cost. Many cities also provide public computers at libraries and community centers to ensure broad access to the information. Each community offers different kinds of information including:

- announcements of public housing and interactive applications forms
- Regional transit information presented on interactive maps
- Election returns
- Televoting or registering to vote
- Access to the public record
- Voting records, photographs and bios of city council members
- Recycling schedules and routes
- Local events calendar
- Government information, regulation and forms
- City job listings, applications and submissions filing
- Ability to file crime reports and requests for city service and repairs

\(^{66}\) City of Santa Monica 1996, 21.
\(^{67}\) City of Santa Monica 1996c.
\(^{69}\) From Claremont’s interview with city leaders.
\(^{70}\) Information obtained on the Internet @http://chebucto.ns.ca/~ab006/gff/comm_tel.html
Interactive maps to allow zone information on demographics, strategic plans, community-building organizations, zoning and vacant lots, police and other statistics. This kind of information sharing can, if widely used, enhance community building activities. [end of box]

Further distinguishing Santa Monica as a leader in municipal telecommunications is its Telecommunications Master Plan. With this plan, the city will assess Santa Monica’s current telecommunications infrastructure, future telecommunications needs, and potential ways to meet those needs. This makes Santa Monica one of the few California cities engaged in formal telecommunications planning.\textsuperscript{71} In addition to covering issues such as right-of-way management standards, antenna siting policies, universal access and a broad telecommunications ordinance, the Telecommunications Master Plan also explores the feasibility of a “Municipal Fiber Network” (MFN). As currently envisioned, the MFN would connect city facilities (including the planned downtown Transit Mall), local schools, city libraries and other key public institutions within Santa Monica via a fiber optic network.\textsuperscript{72}

**Initiatives Integrating Transportation and Telecommunications**
Santa Monica provides examples of initiatives that combine transportation, focussed on both cars and transit, and telecommunications. On the automobile side, the city’s SMART Corridor Extension project addresses Santa Monica’s chronic problem with traffic congestion, particularly within the city’s portion of the roughly 15 mile corridor connecting Santa Monica to downtown Los Angeles. The SMART Corridor project uses advanced telecommunications, computing and sensor technologies known as Intelligent Transportation Systems (ITS) to improve traffic flow along 3.3 miles of the Santa Monica Freeway (Interstate 10) and two parallel arterial streets. With the real-time traffic information this project provides, Santa Monica and other regional transportation agencies will be able, for example, to respond more quickly to congestion-causing incidents and to adjust the timing of traffic signals to optimize traffic flow. In theory, the traffic and route information provided to drivers during congested periods should reduce both congestion and congestion-related emissions.\textsuperscript{73}

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\textsuperscript{71} As of 1997, the only California city to devise and adopt a telecommunications master plan was Milpitas (City of Santa Monica 1997b). According to Graham and Marvin (1996, 63), “responsibility for regulating and developing slow-moving telecommunications infrastructures has traditionally fallen] outside the urban planners’ remit, resting usually with distant, centralized public bureaucracies or virtually autonomous public and private enterprises.” See also Webber (1968) and Moss (1987) for similar accounts of the traditional neglect of telecommunications by urban planning professionals, theorists and local governments in general.

\textsuperscript{72} City of Santa Monica 1998.

\textsuperscript{73} There has been a good deal of study and speculation about the environmental consequences of ITS. For a compendium of papers on the issue, see J. Thomas Hennessey and Thomas A. Horan, eds. 1994. *National Conference on Intelligent Transportation Systems and the Environment: Conference Proceedings*. Fairfax, Virginia: CASET Associates, Ltd.
Santa Monica integrated transportation and telecommunications for its transit system primarily in two ways. The city’s transit agency -- Santa Monica Municipal Bus Lines (SMMBL) -- utilizes the Internet extensively, making available a “clickable” bus system map, route and schedule information, points of interest served by the bus lines, as well as assistance in creating bus trip itineraries. In addition to the Internet, SMMBL uses telecommunications to improve its buses’ operational efficiency, having installed automated vehicle locator (AVL) and automated schedule systems that allow for real-time tracking of buses. Open-air information kiosks located in the downtown Transit Mall will open soon along with “smart” bus fare boxes that will accept a regional transit card. In addition, security cameras will be put on all buses.

These transportation and telecommunications initiatives provide an opportunity to learn about the issues involved in the integration transportation and telecommunications planning. It is to this analysis that we now turn.

**Tension Points in the Integration of Transportation and Telecommunications Planning**

Three issues surfaced in the city’s integrated planning efforts and are ones that seem likely to confront other local governments as well: 1) the tension between local and regional objectives; 2) differing notions of what constitutes improvements in accessibility; and 3) parallel planning processes.

**Regional versus Local Emphasis**

Santa Monica’s SMART Corridor Extension project is a perfect example of the kind of local-regional tension likely to surface within the context of local efforts to integrate transportation and telecommunications along “placed-based” principles. The likelihood of policy conflicts with transportation agencies focused more on regional mobility than on the livability of particular communities is almost certain.

As described earlier, the SMART Corridor project utilizes ITS technologies to coordinate traffic management functions (i.e. traffic signs and signals, traffic information, accident detection operations) on the Santa Monica Freeway with two parallel streets within Santa Monica city limits. Largely funded and promoted by federal and regional transportation agencies, the SMART Corridor is a very traditional transportation project, focused not on improving the qualities of place but on the movement of vehicles from place-to-place to create a more efficient regional transportation system.

While Santa Monica residents certainly benefit from improved regional mobility, the SMART Corridor initiative represents the antithesis of many of the city’s other major transportation projects. The Downtown Urban Design Plan, for example, attempts to alter the city’s street system to better accommodate pedestrians and transit, and, unlike

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74 SMMBL operates two bus systems, the main system being the Big Blue Bus, which in 1997 consisted of 135 buses and an annual ridership approaching 20 million (SMMBL 1997).
the SMART Corridor, is essentially an effort to slow automobiles down, not speed them up.\textsuperscript{75}

The integration of transportation and telecommunications may or may not support the broad quality-of-life goals emphasized by ISTEA’s “place-based” principles. The integration of transportation and telecommunications can serve numerous ends, whether it be creating more interesting and attractive places (as Santa Monica’s Transit Mall will do) or helping to move traffic as fast as possible (i.e. the SMART Corridor Extension project).

Whichever ends a community chooses to pursue, its chances of achieving them will improve dramatically if they thoughtfully coordinate their transportation and telecommunications investments and policies. And this coordination, we believe, will not simply materialize on its own, but is more likely to result from a formally integrated transportation and telecommunications planning process that brings together the relevant local and regional stakeholders.

Differing Notions of Accessibility
The regional-local tension discussed above often reflects a deeper philosophical conflict over what it means to improve “accessibility.” In fact, the way in which accessibility is defined can have important policy implications. For example, one common definition of accessibility is “the ease of connection between places.”\textsuperscript{76} This definition stresses connectivity: the ability of an area’s transportation and telecommunications system to connect people to places and opportunities. Such a definition tends to result in projects that, like SMART Corridor Extension, integrate transportation and telecommunications to improve the ability to move between places.

An alternative definition of accessibility -- “the ability of people to benefit from places and services”\textsuperscript{77} -- stresses the qualities of place: the ability of an area’s transportation and telecommunications system to provide connectivity and, just as importantly, to create places that are more livable and attractive. This broader notion of accessibility underlies ISTEA’s shift to “place-based” planning, and reflects the idea that too much emphasis on making places easier to pass through will tend to create places where no-one wants to be.

It is this second definition of accessibility that spawns projects like Santa Monica’s Transit Mall (and, outside of Santa Monica, Compton’s Televillage\textsuperscript{78}), which creatively

\textsuperscript{75} One interviewee acknowledged that although Santa Monica generally does “fairly well” in reconciling local and regional needs in relation to transportation, the SMART Corridor project was “clearly more of a regional project” aimed at speeding traffic flow in and out of Santa Monica (Jamal Rahimi, group interview, 11 September 1997).

\textsuperscript{76} Giuliano 1995, 1.

\textsuperscript{77} PTI 1998, 4.

\textsuperscript{78} The Compton Televillage, located in Compton, California, is a light rail and public bus station that has installed advanced telecommunications and computer equipment that is open to the public for a slight fee. The Televillage includes information kiosks that display information on public housing, transit and government services; hosts classes on computer literacy and Internet
combines transportation and telecommunications in the placed-based manner advocated by ISTEA. Not only is the Mall going to improve connectivity by upgrading Santa Monica’s transit services, but its electronic information kiosk, wide sidewalks, public art and other aesthetic features will make downtown Santa Monica a more unique, memorable and interesting place to be.

[pullout quote from Mayor O’Conner: “I see the central linkage between all these issues as exploring the world – discovery. …Hopefully, linking transportation, information technology and economic sustainability will allow residents of Santa Monica to better discover their community and enrich their lives as it has done mine.”]

Parallel Processes
A community’s success in integrating transportation and telecommunications planning will depend, at least in part, on the existence of a forum in which to consider these issues jointly and comprehensively. It is rare, however, that such a forum exists:

...Public forces[are] at work that encourage or restrict the evolution of both transportation and telecommunications systems. Rarely, however, are these two functions considered jointly and comprehensively...Regulators [of these two systems], set up in different agencies, rarely consider the implications of their decisions for the entire transportation system or the entire telecommunications system -- let alone their inter-system implications.79

Transportation and telecommunications policies, in other words, are usually formulated in separate planning processes. A key question, then, is how to better coordinate these processes: What, in other words, might a formally-integrated transportation and telecommunications planning process look like in practice?

One form could be a process aimed directly at finding the best ways to coordinate transportation and telecommunications. This would, in effect, create a new planning process from which a plan would emerge to guide a city’s transportation and telecommunications investments. A second form (which would probably be easier to initiate) would involve modifications to an existing planning process. For example, telecommunications applications could become part of the inventory of issues explicitly considered by transportation planners. Whichever form a locality might adopt, it is likely to bring together a set of stakeholders traditionally unaccustomed to working with one-another, such as transportation planners, city staff primarily responsible for telecommunications or “information systems,” as well as private sector telecommunications providers.

use; and is planning on providing telecommuting services through its Telework center. The Televillage arose out of a partnership that included the Los Angeles Metropolitan Transportation Authority and the City of Compton.

79 Schuler, 1992, 298.
Viewed against this notion of formally integrated planning, Santa Monica is a case study of a city whose integration of transportation and telecommunications has, until very recently, been largely informal. The city has no planning process aimed specifically at the integration of transportation and telecommunications. And Santa Monica’s most recent downtown transportation plan -- the Downtown Urban Design Plan (described earlier) -- does not mention the transportation-telecommunications connection. As a result, in projects where Santa Monica has integrated transportation and telecommunications (i.e. the SMART Corridor project, various transit activities), it has done so in a largely piecemeal and incremental fashion. The efforts have been undertaken without the benefit of a comprehensive plan or vision for how this integration might serve Santa Monica’s broader community goals.

It now appears, however, that Santa Monica is beginning to move toward a more formal process for coordinating their transportation and telecommunications planning efforts. What is seen in Santa Monica, then, are the prerequisites for a formally integrated transportation and telecommunications planning process. The city already has distinct transportation and telecommunications planning processes focused on making Santa Monica a more livable community. This makes it perfectly positioned to somehow combine or modify these processes to consider transportation and telecommunications in a more systematic, integrated manner. So while it may not yet have reached the “new world” of formally integrated transportation and telecommunications planning, Santa Monica provides others with a map to this still uncharted territory.

Conclusions
The two key findings of the Santa Monica experience are as follows:

- For urban communities, the key to realizing the full spectrum of potential benefits from the transportation-telecommunications relationship is likely to be the careful integration of transportation and telecommunications planning; and
- ISTEA provides a template for how communities can conduct such planning in a place-based manner.

It now appears that as America embarks on another large investment in infrastructure -- only this time in telecommunications -- Mumford’s legacy survives in technology theorists such as Mitchell, who reminds us that the important questions of the Information Age concern not the details of “broadband communication links” or “electronically deliverable content,” but instead involve fundamental questions of how the new technologies will contribute “to the kinds of lives that we will want to lead and the sorts of communities that we will want to have.”

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80 As described earlier, the City’s Telecommunications Master Plan calls for the construction of a “Municipal Fiber Network” (MFN) to connect major City facilities to a fiber optic network. The MFN is planned to connect to the Transit Mall area (i.e. for the travel information kiosk), and this connection may form the basis of what the City is calling an “Intelligent Transit System” (City of Santa Monica 1998).
What Santa Monica realizes, and what other communities will increasingly realize as well, is that at its best, the integration of transportation and telecommunications should help create vibrant urban places -- somewhere you want to be, either physically or virtually. Many things mitigate against this -- examples highlighted in this study include conflicts between local and regional priorities, differing notions of what constitutes “accessibility,” or bi-cameral planning approaches to transportation and telecommunications. And this is undoubtedly only a partial list, as local governments are sure to confront numerous other challenges when they adopt place-based approaches to integrating transportation and telecommunications. We believe, however, that cities that meet these challenges will take great strides toward improving the quality of urban life for their citizens.

Additional Related ITS Cases
ITS Improving Transit
Kitsap Transit, in Washington, serves commuters travelling to and from Bremerton, Bangor, Bainbridge Island and Seattle. Kitsap Transit connects its buses with car and passenger ferries going into and away from Seattle attempting to improve the flow of traffic in and around its service area. In the early 1990s the transit system decided to increase its level of services and reduce operational costs by augmenting its regular bus service with mini-buses, paratransit vans and commuter van pools. The smaller buses and vans offered consumers more services and the system had the flexibility to meet demand on smaller rural routes. In addition, the transit system began using the optical traffic signal preemption for all buses along the Bremerton routes. The service was in place for emergency vehicles, but by giving the buses this right of way, schedules are met and the signals have improved traffic flow for all road users. Pierce Transit serving Tacoma, Washington, and Community Transit serving the suburbs and rural area north of Seattle also being using the traffic signal preemption with similar good results.

Bellevue Smart Traveler
The Bellevue Smart Traveler (BST) is a test project operating in Bellevue, Washington, to address traffic congestion problems. Partners for this project include the Bellevue, Washington Transportation Management Association (TMA), the Washington State Department of Transportation (WSDOT), the University of Washington, Seattle Metro, PacTel Paging, Seiko, and the Federal Transit Administration of the USDOT. The project is using an Advanced Traveler Information System (ATIS) to help commuters make efficient decisions on departure times, routes, and travel modes by providing real-time information on travel alternatives.

The first phase of the program included examining other ATIS technologies and learning what commuters in the Bellevue area would need to reduce their reliance on driving alone (single occupancy vehicle SOV). The second phase was developing the Traveler Information Center, whose purpose is to encourage commuters to use transit, carpools and vanpools and making that the efficient choice. Three types of commuter information
is provided: dynamic ride-matching information, up-to-the-minute traffic congestion information, and accurate bus information. This information is available by telephone,
hand-held alpha-numeric pagers, and a kiosk. PacTel loaned up to 600 pagers for the project and offered weather, news and stock market information on the pagers as well. To acquire a pager a person must commit to ride or drive for a carpool three or more days per week. The use of pager was key to the success of the “instant” ridesharing program along with having a guaranteed ride home. Kitsap is also working to integrate the signal preemption with GPS real-time locating to improve timed transfers at ferry terminals and other transit centers as well as participation in regional transit and ferry smart card for fare collection.

**ITS and Transit in Other Cities:** Other cities are also using these ITS systems to improve traffic flow and/or encourage commuters to use transit and ride-sharing. Ann Arbor Smart Bus in Ann Arbor, Michigan, also uses ATIS, GPS and automatic vehicle location (AVL) systems to make “smart buses.” In Atlanta and Los Angeles, downtown kiosks provide highway and transit information and alert travelers of unusual conditions.

**Long Beach Commuter Bikestation**
Modeled after similar facilities in Europe and Japan, the Long Beach Commuter Bikestation is this country’s first full-service commuter bike facility. The Bikestation’s mission is to promote intermodal commuting. It is strategically located in downtown Long Beach on the Transit Mall, a key transit nexus for light rail lines into Los Angeles and Orange County, several bus lines and the local Runabout shuttle. It is adjacent to 33 miles of shoreline and river bike paths as well as the Pine Avenue historic retail district, a downtown mall, the convention and entertainment center, and a large redevelopment project. The Bikestation is a test of the feasibility of bicycle commuting in the Los Angeles area, and could lay the groundwork for a statewide system.

Bikestation’s amenities include guarded parking for 150 bikes, quality bicycle rentals and repairs, changing rooms, a gear and accessories shop, bike-transit information, an outdoor café and coffee bar, and a commuter bike club.

**Electronic Mainstreet: Blueline Televillage**
Compton, California, provides its citizens with an information infrastructure to allow them access to banking, education, shopping, government agencies and up-to-date information on jobs, housing and transit. The Blue Line Televillage, as it is called, is located at the Martin Luther King Transit Center at the convergence of a Blue Line light rail station, a Greyhound terminal and six major bus routes. Compton, California, Blue Line Televillage addresses a need for community-building, provides a central place to access community services, and reduces the need to drive.

It provides this low-income urban community with 12 computers that have Internet access; a work center equipped with computer, voice mail, fax and e-mail capabilities and a video conferencing system; and electronic kiosks. A public lecture hall with TV production capabilities; and a “Circuit Rider Program” allowing the community to interact with agencies including the county registrar and foster parent programs.
Recently, the focus of the Blue Line Televillage changed to one that is working not only to provide information, but also to build a stronger community. The Televillage has become a one-stop career and education center with an on-line school, and job training and education programs. The televillage provides an on-line school and job-training partnership with the housing industry. It continues to provide traffic demand management that helps reduce trips and community services such as day care, housing information, unemployment services. However, the televillage increasingly views its purpose as being a place that will help build and revitalize the Compton community.
CHAPTER FOUR
A NEW PARADIGM AT WORK: THE MIDTOWN GREENWAY EXAMPLE

Introduction
Transportation policy in the United States for more than thirty years focused on one policy objective—mobility through highway construction. The passage of ISTEA in 1991 marked a paradigmatic shift from a policy primarily emphasizing mobility to one that emphasizes a more comprehensive or holistic approach. The Transportation Efficiency Act for the 21st Century (TEA-21), passed by Congress in 1998, extends the holistic approach pioneered through ISTEA and gives even more emphasis to the issue of equity through transportation policy.

A sustainable transportation policy operates within an integrated framework consisting of four areas: community design, alternative transportation policy, greenspace development, and economic development. The diversity of policy options under ISTEA has led to new challenges for leadership, to increased opportunities for participation by local groups, and to greater local autonomy. In addition, Intelligent Transportation Systems (ITS) can also be paired with greenway development to address issues of safety, to improve transit, and to encourage linkages to transportation objectives.

The Midtown Greenway project of Minneapolis, Minnesota, can serve as a model for other communities, illustrating how the holistic policy paradigm has created a new set of transportation options and challenges for policymakers. (See Table 1)

The Midtown Greenway Project
The Midtown Greenway project involves the construction of a five-mile bicycle path along a rail corridor through several neighborhoods on the south side of Minneapolis, Minnesota. The corridor runs from affluent areas surrounding the lakes on the west side of Minneapolis to the Mississippi River on the east side of the city. The bicycle path provides an important east-west connection currently lacking in the Twin Cities’ extensive regional bikeway system. The Greenway is to be built in three segments, including one segment that will be constructed along a stretch of the rail line that is still in operation. Future possible uses of the rail corridor include light rail development. Groundbreaking for the first segment of the Greenway project occurred in July 1998.

82 This chapter has been drawn from a paper by William Fulton, Thomas A. Horan and Kara Serrano, entitled "Putting It All Together: Using the ISTEA Framework to Synthesize Transportation and Broader Community Goals." The paper is a synthesis of the results of a study of the Midtown Greenway conducted by the Humphrey Institute for Hennepin County and the Federal Transit Administration. The Humphrey Institute research team was directed by Lee Munnich, senior fellow, with critical research contributions by Lyn Kathlene, visiting professor, and Thomas Luce, assistant professor, as well as the paper authors.

83 Within this paper, greenspace development will at times be used interchangeably with urban recreational opportunities. The authors realize that greenspace development goes beyond recreational amenities.
Broadly defined, the corridor includes some 15 different neighborhoods stretching from the Minneapolis western city limits on the west to the Mississippi River on the east and from approximately Interstate 94 on the north to 36th Street on the south. Although these neighborhoods are in close proximity to one another, they have strikingly different physical and socioeconomic characteristics. The neighborhoods in the eastern portion of the corridor, close to the Mississippi River, are stable working-class districts made up largely of single-family homes with relatively little commercial activity. The neighborhoods in the western portion of the corridor, close to Lake Harriet, Lake Calhoun, and Lake of the Isles, are more affluent areas that include a combination of single-family homes and apartments, located in close proximity to recreational amenities and successful retailing areas. The neighborhoods in the central portion of the corridor are, generally speaking, distressed or transitional, though they have many pockets of vitality. The poverty rate in these central neighborhoods sometimes exceeds 50 percent of the total population.

These central neighborhoods are bisected by Interstate 35 and are connected by the once-vital Lake Street commercial district, which experienced decline from the 1960s through the 1980s. The Lake Street district contains an enormous, now-vacant Sears store, which straddles the below-grade rail corridor. In spite of the predominance of distressed areas, the central neighborhoods retain many large employers, including the Honeywell corporate headquarters and several hospitals, and also contain community amenities, including several attractive parks.

The Midtown Greenway project, a major transportation improvement funded largely by ISTEA, seeks to take advantage of the innovative implementation tools ISTEA has provided. By tying into the existing street and regional bike path networks, the project seeks to achieve both environmental and community goals, serving as an urban recreation opportunity and as a possible “clean air” bicycle/pedestrian commuter route. In addition, this project is an excellent example of local decision making and public participation, as local policymakers, neighborhood groups, and business owners played a key role in shaping the strategy for its development.

The complete success of the Greenway will require that local decision making and public participation are combined with other policy objectives, including transportation, design, economic development, and other forms of urban recreation. In fact, the addition of sculpted natural space by the Greenway’s construction is likely to be one of the most popular and unifying aspects of the project. As the mental mapping exercise among residents showed, residents -- no matter where along the corridor they live -- feel more positive about parks and green space than almost any other space in their community.

Transportation policy --even transportation policy, ISTEA-style -- is only part of the Midtown Greenway story. Both policymakers and community leaders are hoping that the Greenway will serve as a catalyst to improve and connect the neighborhoods in South Minneapolis in many ways that transcend transportation. For this reason, the Midtown Greenway is an excellent example of the implementation challenges ISTEA has faced.
Methodology and Data Collection
To more completely understand resident travel behavior and modal choice, some 200 randomly-selected corridor residents participated in a citizen survey panel and mental mapping exercise, and kept travel diaries. The mental mapping exercise, in which residents were asked to draw a map of their community, yielded information about corridor residents’ perceptions of community assets and liabilities. The travel diaries provided information about the places the residents frequent and about trip and destination choice in the corridor.

The data derived from the mental mapping exercise, surveys, and travel diaries were geocoded and then placed onto maps obtained from First Street. With the development of Geographic Information Systems (GIS), researchers have an even greater ability to analyze spatial data. Composite maps were created, as well as maps that divided participants by location. Maps were generated that divided the corridor into east-west sections to provide greater detail about travel patterns. Overall the maps illustrate more than statistical data, they provide rich spatial information about interrelationships in the corridor.

Community Design
Strengthening and Increasing the Value of Communities
As a “retrofit” piece of infrastructure in an existing urban area, the greenway can serve as a catalyst for community design approaches that reinforce the existing urban fabric rather than weaken it. Because of its multimodal orientation, the greenway serves as a model of a design of public improvements and real estate development in urban areas. This “New Urbanist” approach is one in which bicyclists, pedestrians, and transit riders are all accommodated, and the public realm is maintained and improved.

One measure of the attractiveness of a neighborhood is the selling price of homes adjacent to the corridor. Data indicate that neighborhoods can benefit from nearness to a bike trail when measured by increased land price. Professor Thomas Luce of the Humphrey Institute conducted a statistical analysis of how the Greenway bike trail might influence housing prices. Without controlling for differences between Minneapolis suburbs of Hopkins, Maple Grove, and Plymouth housing, Luce found that greenway bike trail development would have a significant affect on housing prices. Luce’s analysis predicts that being within 250 feet of the Greenway will be worth twice the value of a fireplace or equal to 200 additional square feet indoors. When controlling for differences between neighborhoods, the data continue to be robust, indicating that nearness to a bike trail positively correlates to the increased value of a house. Although it is not clear of the extent of the land increase, the data replicate other national findings. These finding indicate that there is potential for the Greenway to stabilize or add to local neighborhood value. Coupled with other area economic development, this can help to build the community.

84 Luce, 1997
New Urbanist principles are expected to play an important role in the greenway’s effort to revitalize the corridor. Urban infill projects are often highly compatible with the New Urbanism movement. Its focus on mixed use development, and its preference for fine-grained community design usually strengthens and reinforces the existing fabric of older urban neighborhoods, such as those along the Midtown corridor, which were built to similar principles before World War II.

According to New Urbanist principles, community design and the Greenway can mutually reinforce a series of important community goals including easy access for those without automobiles, strengthening of a distinctive urban fabric, and connectivity among the neighborhoods along the corridor. Already, one private developer is working with Minneapolis City Councilwoman Lisa McDonald on a proposed New Urban-style development project on a piece of land adjacent to the Greenway. The project would provide mixed-density housing options and a direct connection to the bike path.

Even while it strives to serve as an important regional transportation and recreation project, the Greenway must also forge successful relationships with the neighborhoods around it to succeed. This process has already begun. In April 1998, 300 residents of west Lake Street neighborhoods participated in a design charrette. The weeklong design workshop outlined ways of creating a balance between cars and other ways of getting around the Uptown and Lyn/Lake areas near Lake Street and the Midtown Greenway. These included a Metro transit station, the new urban village adjacent to the Greenway, shared parking lots and ramps to allow visitors to park once and walk, and new buildings on present underused land to create a more pedestrian friendly environment and slow down cars.85

**ITS and Safety Solutions for the Corridor**

Also significant will be the way the Greenway’s design creates connections to surrounding neighborhoods in a manner that enhances economic and social activity in those neighborhoods and, at the same time, assists bicyclists and other recreationalists from outside those neighborhoods to feel comfortable. Because the Greenway will traverse many different types of neighborhoods, it is expected that some recreational bicyclists will not feel safe, especially if they are from different neighborhoods along the corridor or from a different part of the Twin Cities metropolitan region. Results from the Citizen Survey Panel found that safety was a concern of potential users. Survey participants preferred the use of bike patrols and blue light phones located every two blocks to ensure safety. A strong majority preferred visible video monitors available for police use. Clearly, addressing the security concerns of these bicyclists must be an important part of the final design.

To address the safety concerns, the Minnesota Department of Transportation (Mn/DOT) funded a study through its Guidestar Program to explore how intelligent transportation

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systems (ITS) technologies and approaches could be used to improve safety in the corridor. A multi-agency team was formed, including representatives of the Minneapolis public works, police and parks departments, Hennepin County and Mn/DOT experts to work with a private engineering firm on safety solutions for the corridor. The research project drew upon the results of the citizens survey, available and affordable technology, engineering and design considerations, safety experience with other bike trail projects, as well as the knowledge and experience of the team members to address critical safety issues in the corridor. The design and technology improvements incorporated into the Greenway project as a result of the Guidestar project should help to address both the perception and reality of safety in the corridor, which should benefit the surrounding neighborhoods as well.

The Greenway might also strengthen an existing but tenuous affinity among residents from different neighborhoods along the corridor. Analysis of the “mental maps” of residents suggests a complicated sense of community identity. In mapping their perception of their communities, some who live in the affluent areas on the west end of the corridor, near the lakes, view only their immediate vicinity as part of their community and do not claim neighborhoods to the east as “theirs.” By contrast, people who live in the more distressed or transitional neighborhoods in the central part of the corridor have a much more expansive geographical definition of the community that includes the lakes to the west.

At the same time, however, analysis of the places which residents of these two areas frequent suggest that they have more in common than they might think. When the “frequents maps” are divided between residents who live east of Interstate 35 and residents who live west of the Interstate, analysis reveals that they frequent many of the same destinations on both sides of the freeway, including Calhoun Square, Target, and the lakes. It is important to note that, consistent with the “mental maps,” these “frequents” differ somewhat, even if the common destinations are the same. Those who live east of I-35 have a much more dispersed pattern of areas they frequent, which includes many destinations west of I-35. Those who live west of I-35 have a much more concentrated pattern of areas frequented, which include very few areas east of the interstate except the Target area at Lake and Hiawatha, a popular shopping destination.

On the one hand, these results suggest that while residents of the central neighborhoods would welcome a strong connection to the lakes district, residents around the lakes may not be receptive to a project that connects them more closely to the central neighborhoods. Yet at the same time, because they tend to frequent the same destinations, the Greenway could become an important and vital link joining these two groups of communities in a way that they do not currently enjoy.

**Alternative Transportation Benefits**

In keeping with ISTEA’s stated objectives, the Greenway has to expand multimodal transportation opportunities in South Minneapolis. But even this seemingly straightforward objective requires balancing many different interests. Among other
things, the project must seek to balance the potentially competing interests of hard-core bicyclists who will use the Greenway as part of their regional bicycle expressway with the local interests of commuters and pedestrians, who are likely to use it for local transportation. In addition, the Greenway must also be designed and constructed in a way that retains the option of a future passenger-oriented light-rail line without shutting off opportunities for pedestrians and bicyclists.

If successful, the Greenway will carry a wide variety of bicycle and pedestrian traffic, including local bicycle and pedestrian commuters, high-speed regional bicyclists, and pedestrians who may be walking for recreation at a different speed than bicyclists or other pedestrians. At the very least, the Greenway’s design must anticipate different traffic flows and separate them where appropriate. In addition, if the re-introduction of native plant species is to be successful, those species must be protected from damage by these varied traffic flows.

The potential for use of the Midtown Greenway as an alternative transportation mode is even greater as residents in that area commute to work either by walking or biking in higher numbers than in other Minneapolis areas. More than 56,000 jobs are located in the corridor, with the majority north of the Greenway. As with most travel to work data, the Luce data show that the majority of journey-to-work trips are by automobile; but what stands out is that within the corridor a sizable percentage of workers come by alternative modes. Within the corridor 35 percent of the trips are by bus (11.6 percent), bike (2.5 percent), and walking (21.2 percent). The pattern is much higher than the ten-county metro area where the alternative modal split is 8.7 percent.

Citizen Panel Surveys show that area residents are also likely to substitute non-work trips with Greenway use if proper incentives and security issues are addressed. Research conducted by Professor Lyn Kathlene with citizens in the area suggests that pedestrian and bicycle usage for non-work trips is also strong, and the potential exists for this usage to increase if the Greenway is built. Eighty percent of local residents indicated that they would use the Greenway for recreational walking activities and 75 percent indicated that they would use the greenway for biking recreation. For destination use the Greenway could serve as an alternative pathway for walkers who were most likely to go within a four to six block of Lake Street and bicyclists who would use the Greenway to access the area around Lake Street as well. This suggests that if paired with the proposed economic development of restaurants along Lake or 29th Street, local residents would use the Greenway to travel to and from these destinations. Among other things, anecdotal evidence from residents suggests that many are hesitant to bike or walk because of concerns about safety amid auto and truck traffic; the Greenway would provide a non-motorized safe alternative for area residents.

Significant improvements in the transit system within the Lake and 29th Street Corridor may offer a unique opportunity to promote and link transportation alternatives. Improvements include the development of an light rail transit (LRT) line and bikeway along Hiawatha Avenue, which intersects Lake and 29th in the eastern portion of the
corridor. During the 1998 session, the Minnesota State Legislature approved state funding for the LRT line along Hiawatha, linking downtown Minneapolis with the Minneapolis–St. Paul Airport and the Mall of America. Planning is currently underway and federal TEA-21 funds will be sought shortly to fund this first LRT link in the Twin Cities. A number of bus system improvements are also planned within or near the Lake Street/29th Street corridor, including a I-35W express bus transfer station and enhanced express bus service on I-35W, which intersects the middle of the corridor. There is also a proposed bus station for the redeveloped Sears site within the corridor.

The Minnesota Guidestar Program is supporting Metro Transit in providing intelligent transportation system (ITS) enhancements to the bus system on Lake Street. These ITS enhancements include working with 3M on an Opticom project for buses on Lake Street and equipping Lake Street buses with the Orion AVL in 1999. Thus, the Lake Street/29th Street Corridor will serve as a demonstration project for a range of ITS applications to encourage alternative transportation.

**Greenspace Development**

The Greenway also has to further the more conventional ISTEA goals of improving urban recreation opportunities and helping to restore natural systems in the area. But reconciling these goals with the goals above, and even with each other, will not be easy. As noted above, the expectations of recreational bicyclists might come into conflict with the needs of corridor-area residents who wish to use Greenway for local transportation. Tightly integrating the Greenway into the surrounding neighborhoods may alter -- or, in some cases, enhance -- the recreational experience bicyclists from outside the corridor are seeking. And while current plans call for re-introducing many native plants as part of the greenway, it may be difficult to maintain them in a highly urban setting where the greenway is used by many different groups of people for many different purposes.

If the Greenway is designed as little more than a “bicycle freeway,” it will fail to achieve several of its most important goals, including the goal of improving economic activity and connecting the different neighborhoods along the corridor. Any possible economic benefit will “whiz by” on the Greenway, and residents of different neighborhoods will come into little contact with one another. In short, the Greenway’s role as an urban recreation course must be leavened by design and community-oriented features and events that allow the neighborhoods to reach out to the passing bicyclists and invite the bicyclists into the neighborhood to engage in retail activity. In addition to an inviting approach to access (signage, off-ramps, etc.), this approach probably requires an expansion of such initiatives as murals and community-led efforts to enhance the Greenway. This can serve to enhance local pride in the corridor’s neighborhoods while at the same time introducing the community’s assets to passing bicyclists. Survey data indicate that local residents support the above recommendations with 81 percent indicating a preference for a diversity of streetscape improvements including fencing, lighting and paving to encourage and show off the greenspace.
In interviews local residents were asked to identify the locations they considered community “assets” and “liabilities.” Local residents were nearly unanimous in identifying “green” recreational areas, especially the lakes and Powerhorn Park in the central part of the corridor, as a community asset. (See Map 2) Indeed, the most striking aspect of these results is that residents respond far more positively to green spaces than built space. The Greenway could reinforce community identity for all residents along the corridor, no matter which neighborhood they live in, by providing an attractive recreational link to the lakes.

**Economic Development**

For most of its length, the Midtown corridor parallels the Lake Street commercial district, which was once one of Minneapolis’s most important commercial areas but is now struggling for survival. It also lies in close proximity to major institutions and private companies that provide employment to both corridor residents and the Twin Cities in general. Even though the corridor is below grade and is not well integrated with surrounding areas, the Greenway project will have to dovetail with economic development efforts designed to stimulate Lake Street and other surrounding retail and employment centers.

In some ways the revitalization of the area represents a two-prong approach. Development of small business opportunities is necessary for the success of the Greenway. Development of larger revitalization goals such as Lake Street must also incorporate the Greenway opportunities. The redevelopment of the Sears building that straddles the Greenway and contains more than two million square feet of space, is one example of a major redevelopment project that can be linked to the Greenway. The proposed multi-use redevelopment will provide parking for about 60 percent of the forecasted need. The hope is to encourage the other 40 percent to use alternative transportation means such as the Greenway, the bus, or a combination of options. These major redevelopment efforts when paired with smaller neighborhood initiatives can help to make the Midtown corridor a revitalized area.

There are signs that the economic redevelopment of the area will proceed successfully especially if area businesses and leaders encourage activities and development tied to the Greenway. Data from the Citizen Panel Survey indicate that 82 percent of area residents would use restaurants and cafes overlooking the corridor. This is the type of development that is being proposed for the area and would fit in with the existing land use patterns. The data also indicate that 51 percent of the residents will use the Greenway to walk to non-work destinations, further helping build traffic for nearby shops.

The parallel geography of the Greenway and the Lake Street commercial district creates a particular problem in this case. Although it is hoped that the Greenway will stimulate economic activity, the fact is that it is located below grade one to two blocks north of Lake Street, facing the backs of the commercial buildings. Although it might be possible to attract some activity to the Greenway -- restaurants and other retail shops that would appeal to bicyclists -- this activity could come at the expense of Lake Street if Greenway
users “turn their back” on Lake Street. To exploit the Greenway’s presence, strong connections to Lake Street should be made through the use of good signage and easy access from the Greenway to Lake Street’s storefronts, so that Greenway users will be enticed “up out of the ditch.” In addition, some Lake Street retailers whose buildings overlook the Greenway might be able to open up the back of their buildings to the Greenway, thus advertising Lake Street’s vitality directly to the Greenway’s users. This would not be possible in all locations, however, as Lake Street and the Greenway are separated by a roadway, 30th Street, in many locations.

In all likelihood, the Greenway will not dramatically alter access of residents in the corridor to jobs in emerging suburban employment centers, though some corridor residents might commute to suburban jobs using the regional bicycle network. However, the Greenway will likely provide a significant boost for the area’s residents in gaining access to jobs along the corridor and in downtown Minneapolis, especially if those residents are willing to commute by bicycle. Business attraction and retention efforts, especially along the corridor itself, should be coordinated with the expanded commuting opportunities created by the Greenway’s construction.

Besides encouraging people out of their cars in order to reduce the number of trips and help the environment, ISTEA enhancements are having a noticeable impact on community economic development. Although the impacts can be regional, for the corridor the most immediate and vital impact the Greenway can have is on Lake Street. The potential for business that would suit the needs of those using the Greenway is important. Currently Lake Street pulls people to either end leaving the businesses in the middle to struggle. The proposed bus link would help to create a viable alternative transit link with the Greenway and the street. By encouraging retail business that can cater to the needs of potential Greenway users such as restaurants and bike stores the potential to revitalize the area is apparent. Streetscape enhancements, entrances to the Greenway, signs and bike racks can all encourage Greenway users to use the adjacent areas as well.

Data and research from the corridor suggest that the Greenway project does, in fact, hold the potential to achieve multiple policy objectives. Like many inner-city areas in decline, the central neighborhoods still contain a large number of jobs. In addition, neighborhood commuting patterns suggest an unusually strong base of pedestrian and bicycle commuters on which the Greenway might be able to build.

**Governance**
The Midtown Corridor contains many different jurisdictions within its right-of-way. Options for governance of the area would lead to more efficient resource use by combining overlapping services and providing leadership for the many different constituencies through either a public private partnership or joint powers agreement. A public-private partnership, the Midtown Community Works Partnership, has been formed to involve area business leaders, include all local community groups, develop a sense of place, and attract investment. The benefit of this partnership will be the involvement of
local business leaders and their commitment to the overall goal of revitalization of the area.

A joint powers agreement is also being considered to address issues of joint governance. Through legislation a board would be created to oversee the development of the Greenway. As with the public-private governance structure, the joint powers agreement can provide an institutional structure and leadership for the development goals of the area.

Local community organizations interviewed felt the most important aspect of any governance structure would be the involvement of community organizations. For either governance structure it was argued at least 50 percent of the seats should be held by community organizations. Any development of the area would benefit from a leadership structure that sought to develop the community. The challenge for governance is to build coalitions among the various groups who participated in the new decision making structure under ISTEA.

**Conclusion**

*Active Community Participation*

The Greenway project has the opportunity to build on the strong community activism of the area. The survey indicates strong interest in developing a sense of place in the corridor and local community groups have been instrumental in developing the Greenway plans. The project has demonstrated that much can be done beyond the most passive of approaches. By creatively involving all stakeholders the project has been able to and will continue to encourage community revitalization and neighborhood redevelopment.

The citizen panel survey has been an important tool in understanding public perceptions about physical infrastructure, community amenities and services, as well as travel behavior. GIS technology provides a useful means of mapping this information so that policymakers, planners and citizens can make effective decisions about the future development of the corridor.

*Innovative Transportation/Transit Elements*

The Greenway project lies within one of the most heavily used transit corridors in the city. Linkages between the corridor and alternative modes of transportation are vital. Survey results suggest even more could be done to market transit in the corridor, such as developing a shuttle between the corridor and the local transit system. Intelligent Transportation Systems (ITS) can also be paired with Greenway development to address issues of safety, to improve transit, and to encourage linkages to transportation objectives.

Major employers in the area can help support alternative transportation use by providing incentives to employees who use alternative transportation modes. Within the corridor people use a variety of alternative transportation modes for journey to work trips in high numbers. A majority of the destination trips that were not work-related occurred in the corridor. By building on established modal patterns and linking transportation
alternatives so that citizens can safely and easily journey from place to place in the corridor, Greenway use and alternative transportation goals can be met.

**Integrating Greenway with Economic Development**
The success of the Greenway is closely linked to the economic development of the Lake Street corridor. The former Sears building redevelopment promises to invigorate the neighborhood, as does the partnership to bring other private sector representatives to the table. Encouraging a diversity of local business development also is important. Survey results indicate that Greenway users and local employees from major employers in the area would support the service and restaurant businesses that could be established in the Greenway area. Attending to related social issues can improve the business investment climate and addressing area liabilities such as crime can also lead to successful area redevelopment.

**Governance Model**
The Midtown Greenway is a strong example of effective local level decision making and involvement. The application for ISTEA enhancement monies represented letters of recommendation from a variety of coalitions in the corridor area from council members to biking advocates. Because implementation of projects under ISTEA has called for increased local participation, decision making, leadership, and coalition building among various groups, a governance structure that can address the needs of all constituencies has been important. As more groups become involved in the policy process, local leadership has been needed to build win-win situations and consensus among a diverse group of needs. A public-private partnership involving key corporate leaders such as Honeywell and Allina Health System, other businesses, and community representatives has been formed to provide such leadership for future development of the greenway.

The promise of ISTEA has been that by putting it all together, transportation improvements can do more than simply further transportation objectives. They can also help achieve a whole series of community and environmental goals in an integrated fashion that provides a better and more manageable pattern of daily living for urban dwellers. The Midtown Greenway is a project that holds promise to be a national example of how the promise of ISTEA, and now TEA-21, can be fulfilled in practice.

**Table 4: Integrated Policy Framework**

<table>
<thead>
<tr>
<th>Area</th>
<th>Definition</th>
<th>Impact</th>
<th>National Example</th>
<th>Midtown Corridor</th>
<th>Challenges</th>
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<tbody>
<tr>
<td>Community Design</td>
<td>Development of the community through the physical and social infrastructure.</td>
<td>Infrastructure can connect the community, bolster alternative transportation options, and encourage local</td>
<td>Aggie Village, Davis, CA: Development of a bike path adjacent to a New Urban development.</td>
<td>Urban Village, Minneapolis, MN: Development of a mixed used, multi-density living area with</td>
<td>Address issues of crime and security, and linkages to diverse communities.</td>
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<tr>
<td>Alternative Transportation</td>
<td>Development that helps to stabilize or improve the local environment and/or regional environment.</td>
<td>Benefits include meeting air quality standards, mitigating urban runoff, and providing tree coverage to reduce urban heat.</td>
<td>Cedar Lake Trail, Minneapolis, MN: Encourages using bikes for commute into downtown by providing a high speed bikeway.</td>
<td>Data indicate that alternative travel mode usage in corridor is high; within the corridor 35% of the journey-to-work trips are by bus (11.6), bike (2.5), or walking (21.2).</td>
<td>Encourage use of the greenway as alternative form of transportation to reduce impact of congestion and improve air quality.</td>
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<td>Greenspace</td>
<td>Development of greenspace for a variety of community uses.</td>
<td>Greenspace amenity provides community with recreational area and promotes civic engagement.</td>
<td>Confluence Park, Denver, CO: Illustrates the use of an urban park to provide a variety of amenities for multiple use purposes.</td>
<td>Strong community support by local groups; local residents overwhelmingly identified “green” recreational areas as a community asset.</td>
<td>Address conflicts over usage.</td>
</tr>
<tr>
<td>Economic Development</td>
<td>Strengthening of the local economy through business growth, building upon connections to the enhancement.</td>
<td>Revitalize an area that has seen local economic activity pulled to other areas; stimulate small business growth.</td>
<td>Minuteman, Boston, MA: Commuter greenway where local businesses such as restaurants opened back doors and new businesses such as Lake Street revitalization tied to greenway. Redevelopment of the vacant Sears lot will occur soon. Possible small business</td>
<td>Greenway links area rather than pulls development to ends.</td>
<td></td>
</tr>
<tr>
<td>Governance</td>
<td>Development of a governance infrastructure that meets the needs of the community.</td>
<td>Institutional structure that will oversee and guide development of the Midtown Greenway and overall area development.</td>
<td>Chattanooga, TN: Public-private partnership able to leverage fund for Riverpark project St. Anthony Falls, MN: Successful implementation of a joint powers agreement to develop historical resources.</td>
<td>Public-private partnership or joint powers agreement.</td>
<td>Involve all stakeholders.</td>
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</tbody>
</table>
More Cases of Alternative Transportation and Community Development

St. Louis’ TRACER Program
St. Louis and the state of Missouri are working to improve investment in urban core communities surrounding the Metrolink line, the light-rail system in the St. Louis metropolitan area. This sustainable development program is called TRACER, Transportation Corridor for Economic Renewal. Encouraged by the President’s Council on Sustainable Development, “we seek to coordinate economic, social, and physical investments so that some things must grow – jobs, productivity, wages, capital and savings, profits, information, knowledge and education – and others – pollution, waste, and poverty – must not.” The East-West Gateway Coordinating Council, which serves as the MPO for the St. Louis metropolitan area, is focusing its efforts on an 18-mile stretch of the MetroLink and is working with citizens, business leaders and policymakers to develop strategies that link and enhance community, economy and the environment. The project is still in the planning stages and several strategies are being developed based on the information gathered in community meetings during the spring of 1998.

Fruitvale Community Redevelopment Project
The redevelopment project in the Fruitvale community in Oakland, California, began when the University-Oakland Metropolitan Forum identified it as an area with potential for economic redevelopment and when the local subway system, BART, announced its decision to build a parking lot next to the Fruitvale BART station. The Spanish Speaking Unity Council (SSUC), one of the many non-profit organizations serving the primarily low-income Latin neighborhood, took the lead on the project.

People in the community questioned the value of a new parking facility to the neighborhood and let BART know this at the community meeting held by BART about its proposed parking facility. People were more interested in having a pedestrian-friendly atmosphere in the neighborhood and were worried about the safety around such a large parking lot. BART agreed to drop its plans.

SSUC won a Community Development Block Grant (CDBG) from Oakland and began plans to hold a community design forum to develop the kind of plans community service leaders, business leaders, residents, planners, architects, developers, and any other interested people wanted for the neighborhood. About 300 people attended the meeting where visual depiction of plans, expert panels and much discussion led to a total rejection of the original plans and the beginning of new plans based on the needs of the community.

The vision for the Fruitvale redevelopment includes: a pedestrian plaza connecting the BART station with the East 14th Street commercial district; new commercial space on the plaza; new and expanded space on the plaza for community services and non-profits including a child care center and a senior citizen center; an expansion of the Latin

American library; new affordable and moderately priced housing; and façade and street improvements on the East 14th Street commercial district.

**Chicago Green Line Initiative**

Like the Fruitvale community, the Lake Street El Coalition was formed and led this project as a result of the Chicago Transit Authority’s (CTA) announcement to close several stations on the Lake Street Elevated Train Line (El) due to a 30 percent decline in ridership. Upon hearing this news, West Side and west suburban area community and development organizations, business and industrial groups, local leaders and transit riders joined together to fight for the preservation of the line. What started as an effort to save the line quickly became an economic development project for the communities along the line.

The Center for Neighborhood Technology (CNT) and the Neighborhood Capital Budget Group convened the Lake Street El Coalition, area residents and community organizations to discuss potential strategies for maintaining the El. The approach the group decided to take was a transit-oriented development project to demonstrate how the El could serve as a catalyst for community revitalization. The main planning element for this project was a “Sustainable Kit of Parts,” which included perspective drawings of six different design projects and institutions representing options for housing type and density, commercial development, transit access, and bike and pedestrian facilities.

A “fast track” design and planning process consisted of six main meetings open to all. The community didn’t react to existing plans, but through these and other meetings helped develop a plan for themselves. Funding from a broad base of sources was another aspect of why this project succeeded. Funding for the project came from ISTEA’s CMAQ program, the Federal Transit Administration, the Federal Highway Administration, community banks, local efficient mortgages, the U.S. Department of Housing and Urban Development, the U.S. Department of Health and Human Services and the Clinton Administration’s Empowerment Zones.

The first projects, Pulaski and Lake neighborhoods, included: a mixed-use “town center” to service as a safe entry-point for the transit system; a pedicab or van shuttle to facilitate access to the El and nearby commercial district; new housing construction on vacant lots, to include “courtyard infill housing,” and reviving the industrial corridor, focusing on attracting recycling and other environmentally-oriented business.
CHAPTER FIVE
ITS and Traffic Management in the NY I-287 Corridor: Conflict and Collaboration

Introduction
This chapter explores the conflict and collaboration regarding transportation in one part of metropolitan New York. By looking at one particular transportation corridor in this large and complex context, it provides insights into what may be larger patterns in this evolving sector of the American economy. The chapter closes with speculation on potential ways that “smart transportation strategies” might find application in this region, promising a more sustainable framework for community management and development. With many highway capacity expansion proposals continuing to face strong opposition from local communities and environmental groups, new strategies for transportation management are gaining increased attention. Environmental advocates and transportation engineers are increasingly working together to explore how intelligent transportation systems (ITS) technologies can help make transportation more sustainable and support more livable communities.

Properly applied and integrated with demand management, growth management, and investments in alternative travel modes, ITS could sharply reduce the need for further expansion of highways and help curb sprawl development. Electronic toll collection, time-of-day toll incentive policies, real-time transportation information and paratransit services, enhanced transit priority treatment, and other innovations offer potential for reducing dependence on motor vehicles and cutting traffic growth. Yet many transportation bureaucracies continue to emphasize ways of increasing their system capacity without fully integrating travel demand management strategies. Indeed, if ITS technologies are deployed without attention to travel demand management, they are likely to spur more traffic growth and pollution, countering their other benefits. 87

Transportation in the New York Metropolitan Region 88
The New York metropolitan region and its I-287 corridor, north of the city, are key testbeds for ITS technology. The metro area is home to the world’s largest electronic toll collection system and it accounts for roughly half of all toll revenue collected daily across America.[pullout previous sentence] Metro area travelers are offered the largest and most comprehensive network of transit services in North America, which accounts for roughly half of the transit ridership in the nation. Traffic congestion is at times daunting in the region. At the regional core and in some older suburban centers, one finds highly walkable, transit-oriented communities. But metro New York’s recently developed exurban areas also exhibit automobile-oriented low-density sprawl development like anywhere else. As in so many other parts of the world, growing per capita use of motor vehicles simultaneously boosts mobility while threatening gridlock and community

livability. Continuing conflicts over how to manage or accommodate traffic growth and land development pressures form the fundamental framework for evolution of the community and regional system.

After decades of neglect, the New York metropolitan area, in the last 15 years, has invested about $23 billion to bring its public transportation infrastructure to a state of good repair. With about $32 billion programmed for roads, bridges, and transit in the next five years, rehabilitation should be largely completed. An annual investment of about $5 billion is needed to maintain the rebuilt system. Although there are still some proposals being advanced for regionally significant highway system expansion, there is general consensus among transportation agencies in the New York metro area that it is not feasible for the region to “build its way out of congestion.” The only mobility option for the New York region is to increase the carrying capacity of existing roads and transit through the introduction of ITS. The region’s planned investment over the next five years of more than $500 million of public funds in ITS is expected to leverage far greater private sector investment attracted by the potential for substantial user fee revenue.

A regional communications structure is being designed to greatly enhance the existing information network of principal transportation agencies, know as TRANSCOM. The region also participates in the I-95 Coalition, which coordinates information exchange on traffic conditions along this Interstate from Virginia to Maine, that in turn will be linked to a nationwide system. Multiple methods of providing more useful real-time information to travelers are being constructed. In the next five years, New York, New Jersey and Connecticut are planning to spend a total of about $550 million in the region, including $48 million in ITS planning studies, on the use of telecommunications to manage traffic flow, particularly by reducing the delay due to accidents. Of this New York will spend $221 million, New Jersey $105 million, and Connecticut about $20 million. This does not include the plans of the several roadway and transit authorities. The Port Authority of New York and New Jersey alone will spend $100 million on ITS in the next five years to equip its bridges, tunnels, and metro lines.

On a local level, traffic management is theoretically being automated with control of signal timing in response to changing vehicle flow, detected by loops imbedded in the road or other systems. In fact, signals are operated as fixed blocks that vary by time of day. New York City has a network of 6,000 computer controlled signals and 4,000 roadway sensors, and several dozen wide span video cameras and variable message signs. Real-time data are fed into a Traffic Management Center, where levels of service are calculated and unusual conditions transmitted to a Situations Room for emergency response and area-wide traveler information. The system can be expanded to 1,000 cameras, 9,000 signals, and 6,560 sensors. Adjoining suburban counties, including Westchester and Rockland, in the I-287 corridor have also developed computerized signal systems for arterial traffic management.

Since passage of ISTEA, the planning and decision-making process in metro NY has begun slowly to open to organized involvement of environmental and civic groups.
These groups, particularly through the Tri-State Transportation Campaign and its members, have demanded greater accountability in transportation decision-making and sought to shape how the region approaches transportation investment and operation, including ITS technologies. The result has been a growing discussion among elected officials, the public, and in operating and planning agencies about transportation choices and their effect on community livability, economic development, access to jobs, and the environment.

**Case Study Setting**
The I-287 corridor is an outer beltway around metropolitan New York that connects a string of older suburban centers with the region’s rapidly growing exurban edges. By changing the time and cost of access in the area, I-287 profoundly shaped long-term patterns of development, growth, and travel in metropolitan New York.

The New York State Thruway Authority began construction of I-287 in 1949 as part of the Thruway system connecting New York City to upstate New York. The six-lane three-mile long Tappan Zee Bridge portion of I-287 was open to traffic in late 1955, crossing one of the widest points in the Hudson River just over 25 miles north of New York City.\(^89\) The Cross-Westchester Expressway, a major circumferential freeway extension of the Thruway, was built during the late 1950s and early 1960s. Other portions of Interstate 287 in New Jersey were developed in the 1960s, with the final 20-mile Suffern Connection being complete only in late 1993, linking the New Jersey portion of I-287 to the Thruway and the New York I-287 system.

The Tappan Zee Bridge and Interstate 287 fundamentally transformed the surrounding area. Westchester County, New York, which grew up with multiple town centers organized around rail stations leading to New York City, gained a vital new axis for more automobile-dependent suburban office and commercial development. Closer-in rail-focused centers like Yonkers struggled with job losses and middle-class flight. Once isolated Rockland County, New York, became much more attractive as a suburban bedroom community and eventually as a suburban employment area itself as suburban job opportunities grew in the 1980s and 1990s. Prior to the completion of the Tappan Zee Bridge and construction of I-287, the lower Western Hudson Valley was fairly isolated from the lower Eastern Hudson Valley.\(^90\) Rockland County had more common ties with northern New Jersey than with Westchester County and New York City. Due to the isolation, the lower Western Hudson Valley was far less developed than the lower Eastern Hudson Valley. After the completion of the Tappan Zee Bridge and during the

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\(^{89}\) Many other bridges and tunnels in metro New York are operated by the Port Authority of New York and New Jersey (PANYNJ), which has a jurisdiction of 1,500 square miles centered on the Statue of Liberty. The TZB lies just outside its jurisdiction and therefore falls under the NYSTA domain.

\(^{90}\) The Lower Western Hudson Valley in New York State consists of Rockland and Orange Counties. The Lower Eastern Hudson Valley in New York State consists of Westchester, Putnam, and Dutchess Counties.
construction of I-287, both sides of the lower Hudson Valley experienced rapid population and economic growth rates.

Rockland County was the second fastest-growth county in New York State between 1960 and 1970. For the twenty years prior to the opening of the Tappan Zee Bridge, the average annual growth rate for Rockland County was 2.5 percent, but twenty years later, the average annual growth rate for Rockland County was 7.9 percent. By the 1980s several corporate giants, such as General Foods, Ciba-Geigy, and Nestle had relocated their corporate headquarters to Westchester County along the Cross-Westchester Expressway and surrounding arterial highways. For the twenty years before 1950, the average annual growth rate for Westchester County was 1.0 percent. Twenty years after the opening of the expressway, Westchester County’s average annual growth rate was 2.1 percent. The New Jersey suburban areas next to I-287 had similar experiences to Rockland and Westchester counties. Expanded automobile-dependent suburban bedroom communities, regional shopping centers, and office parks. I-287 attracted new growth and took advantage of underused rural road capacity in these outer areas.

Suburb-to-suburb traffic has grown sharply throughout the corridor in recent years. For many years after the opening of the Tappan Zee Bridge, the primary journey to work destination for Rockland County residents traveling outside of the county was Manhattan. But in recent years, the primary journey-to-work destination for Rockland County residents traveling outside of the county has become Westchester County. When the primary journey-to-work destination was Manhattan, Rockland County residents had the choice traveling through either northern New Jersey or Westchester County to reach Manhattan, with suburban express buses, and for some, rail services available as practical alternatives. For Rockland County residents commuting to Westchester County, travel across the Tappan Zee Bridge via I-287 is the only choice and for most trips requires use of a car. While transit services between Rockland and Westchester have grown significantly in recent years, transit does not easily serve Westchester’s sprawling employment centers. In 1990, only one percent of Rockland residents commuting to Westchester used public transportation to get to work, and only 11 percent carpooled.

Growing traffic congestion on the Cross-Westchester Expressway, combined with 1990s corporate restructurings, led to concerns by many large Westchester County employers that their edge city job sites would lose in the competition with newer suburban centers even farther outside New York City. Beginning in the mid-1990s, due to a low unemployment rate and continued growth, Rockland County employers were aggressively recruiting employees from outside of the county, spurring travel on I-287. In 1998, a new 1.8 million square feet Palisades Mall was built near the intersection of I-287 and Highway 303, a few miles west of the Tappan Zee Bridge illustrative of continuing forces spurring travel growth in the corridor.

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91 Rockland County population increased from 59,599 in 1930 to 89,276 in 1950 to 229,903 in 1970. 
92 Westchester County population increased from 520,947 in 1930 to 625,816 in 1950 to 894,104 in 1970.
Upon completion of the Interstate 287 loop with the Suffern Connection, the Tappan Zee Bridge and adjacent sections of I-287 truck traffic more than doubled in just three years, far exceeding the New York State Thruway Authority's projections. The widening of I-287 in the past several years in New Jersey, south of the Suffern Connection, combined with toll changes, further contributed to traffic growth in the corridor.

The result of these combined factors has been a large increase in traffic congestion in the Tappan Zee Bridge/I-287 corridor, mostly concentrated in morning and evening peak hours.

**Institutional Environment**

A complex tangle of transportation agencies, government bodies, and independent authorities own, operate, and manage transportation in metropolitan New York. Authority is fragmented between states, between modes, and between various facility operators, in institutions that are largely buffered from the market and operate through politicized bureaucracies. All this adds to the challenge of problem-solving and system integration, and often reduces efficiency and responsiveness to customer needs. In this context, many opportunities for entrepreneurial innovation are suppressed.

The major operating and management agencies that affect New York’s I-287 corridor include the New York State Thruway Authority, the New York State Department of Transportation, the Metropolitan Transportation Authority, the New Jersey Department of Transportation, NJ Transit, the Palisades Parkway Commission, the Port Authority of New York and New Jersey, the Bear Mountain Authority, the New York Bridge Authority, as well as dozens of local governments. Attempts to overcome interagency conflicts and to coordinate operating and planning strategies have been numerous over the years, and of varying success.

To a degree greater than is common elsewhere in America, independent authorities have evolved their own bases of power and capital in New York. These authorities have become increasingly favored in recent years because they are empowered to issue bonds without voter approval, which has made them attractive in a time of government downsizing and state budget problems. In the sphere of public transportation and in the urban core of the region, the Metropolitan Transportation Authority (MTA) is the dominant player. A fairly large network of roads, bridges, and tunnels are controlled by independent authorities, which are public corporations with boards that are appointed by elected officials of states in which they operate, in most cases by the governors. These include the New York State Thruway Authority, the Port Authority, the MTA’s Bridges and Tunnels Division (formerly known as the TriBorough Bridge and Tunnel Authority), and parkway authorities. Nevertheless in matters dealing with highways and the suburban fringe of New York City, the New York State Department of Transportation (NYSDOT) enjoys substantial power. In New Jersey, the state DOT, New Jersey Transit, and the Port

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Authority, as well as other independent authorities, share responsibility for managing and operating various aspects of the transportation system.

New York State Department of Transportation
The NYSDOT, established in 1967, is delegated the primary responsibility for planning and co-ordination of all transportation modes in the state, including public transport, walking and cycling, regulation and rate-setting for motor carriers, operations of a few airports, and for allocating state and federal funds. In the metropolitan area of the state, project plans and decisions are made largely by three regional offices, which work with the MPO, the New York Metropolitan Transportation Commission.

Metropolitan Transportation Authority
The Metropolitan Transportation Authority (MTA) is a public corporation, which operates commuter rail, rapid transit (metro) and bus service. The governor appoints the directors with the advice and consent of the State Senate, but seven are recommended by the chief executives of the suburban counties, four by the Mayor of New York. The governor names the Chair and five directors on his own. In 1995, the state legislature added representatives of transit users and labor unions. The governor also names the four voting members of the Capital Program Review Board, who must unanimously approve programs. One member is recommended by the Mayor (and can only vote on New York City Transit and Staten Island Railroad programs), one by the majority leader of the Senate, one by the Speaker of the Assembly. MTA is the largest public transportation provider in the western hemisphere.

New York State Thruway Authority
The New York State Thruway Authority is a public corporation, whose three directors are appointed by the governor to nine-year terms. Funded by toll receipts, it operates the 641-mile Governor Thomas E. Dewey Thruway (the largest toll highway system in the United States) and the Tappan Zee Bridge, a major Hudson River crossing into the metropolitan area. In 1992 the Thruway Authority’s powers were expanded, giving it control over the operation and development of the state’s 524-mile canal system, as well as construction and economic development projects along the Thruway’s corridors.

Local Governments
A variety of local governments play a role in transportation in the I-287 corridor. Both Westchester and Rockland counties have developed their own bus systems to provide local services. Westchester’s system is among the largest of suburban transit operators in the nation with more than 300 buses operating on more than 50 routes, carrying 30 million passengers annually. The counties maintain an extensive network of local roads. Municipalities below the county level, which have elected local governments, regulate zoning and land development. County governments are engaged in the mid-Hudson south region’s metropolitan transportation planning process. City and town governments are more intermittently engaged in that process and often work through their state and county legislative delegations and relationships with state and county officials, business, civic, and environmental groups to effectively influence decision-making.
Smart Highway Operations: A NY Success Story
Overcoming Interagency Fragmentation

In the past decade the region has been relatively successful in developing interagency and interstate coordination of operating agencies to manage traffic incidents and traffic information. In 1986, a small group of regional transportation agencies under the direction of key personnel created the Transportation Operations Coordinating Committee (TRANSCOM), in response to regional infrastructure renewal that was to take place during the mid-1980s.  

TRANSCOM began as response to an issue of infrastructure construction and overtime has evolved to address issues related to ITS implementation and coordination. It is a virtual organization that provides a cooperative, coordinated approach to regional transportation management through communications networks that facilitate rapid sharing of information, while recognizing differences in organizational cultures.

TRANSCOM attempts to improve the mobility and safety of the traveling public by supporting its member agencies through interagency communication and the enhanced utilization of their existing traffic and transportation management systems. TRANSCOM successfully managed traffic incidents in the tri-state region through linked information systems and resource coordination among member agencies. The key to TRANSCOM's success has been its ability to coordinate information and share resources among member agencies while leaving on-site operational issues to the individual member agencies.

TRANSCOM’s Operations Information Center (OIC) collects and disseminates real-time incident and construction information for more than 100 member agencies and affiliates. It also serves as the interim communications center for the I-95 Corridor Coalition, which includes the major transportation agencies in the Northeast, from Virginia to Maine, through which that heavily-traveled motorway runs. TRANSCOM’s Regional Construction Co-ordination Program helps member agencies to co-ordinate construction schedules to facilitate traffic flow. TRANSCOM’s Technology Development Program conducts operational tests and other technology applications to improve the quality, timeliness, and dissemination of transportation information.

TRANSCOM is currently a coalition of 14 transportation and public safety agencies in the Tri-State Metropolitan Region. The member agencies of TRANSCOM are: Connecticut Department of Transportation, Metropolitan Transportation Authority, New Jersey Department of Transportation, New Jersey Highway Authority, New Jersey Transit Corporation, New Jersey Turnpike Authority, New York City Department of Transportation, New York State Department of Transportation, New York State Police, New York State Thruway Authority, Triborough Bridge and Tunnel Authority, Palisades Interstate Park Commission, Port Authority Trans-Hudson Corporation, Port Authority of New York and New Jersey. It is governed by a board consisting of the chief executives of its member agencies.
The TRANSCOM Regional Architecture will co-ordinate and integrate advanced transportation management and information systems, an Interagency Remote Video Network (IRVN), and consolidated, multi-modal, multi-agency transportation information system, available to individual travelers. One part of that system, TRANSMIT, uses road side detectors of vehicles equipped with electronic toll-collection transponders to determine travel times and speeds and any abrupt changes which can signal an incident. The video exchange among agencies is being extended to enable every agency to access any camera in the region. This is one feature of the integration of ITS systems that is being designed under a $20 million ITS Model Deployment Initiative (MDI) funded by USDOT and private system developers. The MDI will create a regional communications system that will transmit real-time multi-modal traveler information delivered by numerous modes. It is expected to include personalized incident alerts to subscribers by phone, fax, email, and pager. User fees are necessary to attract private sector capital and support operations.

**E-ZPass: Electronic Toll Collection**

Congestion at toll booths is a long-standing irritant to drivers in metropolitan New York, a source of delay, congestion, and added travel costs. Early on, New York highway authorities began exploring electronic toll collection as a way to reduce these problems and cut toll collection costs.

One of the largest accomplishments that can be attributed to TRANSCOM is the adoption and implementation of E-ZPass automated transponder-based toll collection technology across most of the New York metropolitan region. With E-ZPass, an individual’s vehicle is equipped with a small electronic device (tag) which transmits information. The data is processed and the appropriate toll is charged to an individual’s account. Vehicles using the E-Zpass lanes must slow to five miles per hour to use the system. The adoption and implementation of E-ZPass increased the efficiency of the region’s transportation system, and opened the door to more widespread adoption of E-ZPass technology for toll facilities from New England to Virginia and beyond, facilitated by the I-95 Corridor Coalition and federal DOT encouragement.

The Thruway Authority, the original pioneer in the region, introduced the E-ZPass automated transponder-based toll collection system to maximize the capacity of its toll plazas at the Tappan Zee Bridge (TZB). With toll and marketing incentives for E-ZPass use, they quickly won a high level of adoption of this new technology, effectively doubling the amount of traffic that could get through their tollgates. Today, nearly eight of ten commuters on the TZB use an E-ZPass to pay their toll.

In 1994 the Thruway Authority extended their use of E-ZPass statewide. In 1997, the Port Authority of New York and New Jersey and the Metropolitan Transportation Authority’s Bridges and Tunnels, cooperating through TRANSCOM, joined in using this technology. As a result of the joint venture, E-ZPass has become the largest electronic toll collection system in the world with more than a million vehicles already equipped with automatic vehicle identification tags. More than 20,000 new tags are being issued
each week. The increase in use and growth of the system has exceeded the expectations of the three agencies. Transportation agencies in New Jersey are working to adopt E-ZPass on their infrastructure and are expected to come online in 1999.

Real-Time System Monitoring and Traveler Information
As use of E-ZPass grew, and as other tolling agencies in the region adopted the technology, the Thruway Authority and its partners in TRANSCOM use E-ZPass equipped vehicles as anonymous probes in traffic. In addition, they have pioneered real-time freeway travel speed monitoring on a growing network of highways in the region, starting with I-287 in New York. These have enabled more effective incident management, with more timely clearance of accidents, rerouting of traffic during major disruptions, and new kinds of traveler information systems. This project is called TRANSMIT (TRANSCOM’s System for Managing Incidents and Traffic). Through the early detection of incidents, emergency services can be dispatched in an appropriate and timely manner. TRANSMIT has lead to less down time for clearing incidents and diverting traffic in the corridor which has lead to less traffic congestion when incidents occur.

Now, when a truck tanker explodes during rush hour and takes out a bridge, shutting down the New York Thruway, as occurred in 1997, other operating agencies can quickly adjust their traffic operations to reroute traffic, encourage use of transit, and provide information to the public. This minimizes delays and increases the efficiency of system operations.

Starting with 19 miles of the New York State Thruway and Garden State Parkway, TRANSMIT now covers more than 150 miles of both toll and non-toll roadways in Westchester, Bronx, Kings, Queens, and Richmond counties in New York and Hudson, Middlesex, and Union counties in New Jersey. Now it also includes a major transit element for bus and facility management along the NJ Route 495/Lincoln Tunnel corridor into the Port Authority Bus Terminal.

TRANSMIT has been found to be useful for several other purposes.

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95 TRANSMIT is a Federal Highway Administration-funded operational test to determine the feasibility of using automatic vehicle identification (AVI) technology and electronic toll and traffic management (ETTM) equipment for traffic monitoring and detection of incidents. TRANSMIT uses vehicles equipped with transponders for electronic toll-collection as probes on roadways, for real-time determination of travel times and speeds and the detection of incidents. Transponder readers are installed along roadways at approximately 1½-mile intervals to collect transponder ID’s. The TRANSMIT system scrambles the ID’s for privacy, and notes each ID with the time and date that it was read. As transponders are detected by successive readers, TRANSMIT compiles data on speeds, travel times, and the number of non-arriving vehicles (expected vehicles not yet detected by the next reader downstream). By comparing this information to historical data, TRANSMIT can detect incidents.

96 The portion of Interstate 287 beginning at the Tappan Zee Bridge going west through Rockland County and then south through northern New Jersey.
• Identify bottleneck areas to facilitate development of responses.
• Determine the level of staffing required at tollbooths by time of day and type of day.
• Augment responses to citizen or legislative inquiries with specific transportation data.
• Increase agency understanding of how their systems operate on a daily and hourly basis, by providing objective data.

TRANSMIT has the potential to be used for many other purposes.

• Assist with the development of strategic and/or tactical measures to reduce the occurrence or duration of incidents.
• Assess the effectiveness of implemented traffic management strategies.
• Measure the impact of diversion messages on traffic flow.
• Management of transit and vehicle fleet.
• Link the travel information into highway advisory radio (HAR) and variable message sign (VMS) systems.
• In-vehicle signing.
• Help facilitate freight movement through automated truck clearance and related uses.
• Determine travel patterns with origin-destination data.
• Estimate traffic volumes to identify problem locations.
• Two-way vehicle-to-roadside communications (VRC) for travelers en route.
• Provide robust data for regional travel model development and validation, including observed speed and volume estimates.

Transportation Planning: Struggling Towards A New Framework

Regional Planning

The region has been less successful in achieving interagency and intergovernmental planning and coordination with local government, although efforts to address these needs continue. For many years, the Tri-State Transportation Commission served as a regional planning body for the New York-New Jersey-Connecticut metropolitan area. The New York Metropolitan Transportation Council (NYMTC) is the Metropolitan Planning Organization (MPO) for the New York City Region.97 Separate MPOs have been established in New Jersey (the North Jersey Transportation Planning Authority) and in southwestern Connecticut (where five mini-MPOs can be found) as successors to the Tri-State Transportation Commission. The Dutchess County Transportation Council and Newburg/Orange Transportation Council also act as MPOs in the mid-Hudson Valley of New York for these outer suburbs.

NYMTC is an association of governments made up of member agencies. NYMTC attempts to provide a coordinated approach to regional transportation planning and decision making. NYMTC's members are chief local elected officials and heads of

97 New York City, and the counties of Nassau, Putnam, Rockland, Suffolk, and Westchester comprises the NYMTC Region. The Tri-State Regional Planning Commission, the predecessor of NYMTC, was a multi-state compact that served as the MPO for the Tri-State Region until 1982 when member states pulled out of it.
federal, state, and local transportation and environmental agencies from the Tri-State Metropolitan Region. Through the promotion of the "3C" planning approach (coordinated, comprehensive, and continuing), NYMTC attempts to gain consensus among local governments, regional agencies, and the state. NYMTC was established as a weak confederation of three subregional transportation coordinating councils. It is generally seen as a weak agency that has been caught between the state DOT, which provides its administrative home for personnel and contracting purposes, and the MTA. It lacks its own dedicated revenue sources. Involvement of local elected officials in NYMTC is low. NYMTC’s capacity to collect, manage, and analyze data to support regional decision making has been weak. Cumbersome state contracting and hiring rules and political interference in recent years hampered management from filling vacancies and assuring progress in basic institutional capacity-building needed to meet ISTEA requirements.

As a result of these problems, USDOT took the unusual step of withholding NYMTC’s planning certification for six months in 1996 to press for major reforms. NYMTC’s greatest success has been in providing collaborative forums, which have led to somewhat greater interagency coordination. Filling of long-vacant senior management posts with capable staff, resolution of state contract freezes that had held up all progress on developing long-overdue information and analysis systems, and continued discussions about alternative agency host relationships offer prospects for addressing NYMTC’s weaknesses, but many remain skeptical. NYMTC may yet prove itself able to provide sound information and analysis to help hold agencies and officials accountable to the regional impacts of local transportation and land use decisions and provide a framework for the exploration of transportation and land use alternatives and their implications. But it has a tough task ahead.

ISTEA’s and TEA-21’s transportation planning process assigns the initial responsibility for planning to MPOs. However, the real impetus occurs outside the MPO framework. Increasingly, long-held agency plans are being overtaken by political forces, especially in the rejection of new motorway lanes. The most powerful impetus for a project usually is the personal interest of a governor, a member of Congress, or the mayor of New York City, such as rail access to the region's airports. TEA-21 contains one billion dollars in specific projects for the region that were added by members of Congress on behalf of a particular constituency, rather than going through the MPO. Increasingly, public interest advocates are able to rally political support for concepts they developed outside the official planning process. Two examples: $18 million to study and design a tunnel to replace an elevated road in Brooklyn; and unlimited-ride bus and metro passes, backed by New York Governor Pataki. The passes were promoted by riders' groups based on the

98 New York State Department of Transportation, the Metropolitan Transportation Authority (MTA), the New York State Thruway Authority, the Port Authority of New York and New Jersey, New Jersey TRANSIT, the New Jersey Transportation Planning Authority, the New York State Department of Environmental Conservation, the Federal Highway Administration, the Federal Transit Administration, and the United States Environmental Protection Administration are all members of NYMTC.
success of their campaign for free transfers with use of an automated fare card, itself, an idea introduced 15 years ago by a citizens advisory group to the MTA.

State plans set categories of priorities. New York State’s, for example, calls for: returning existing facilities to a state of good repair and maintaining them better; maximizing service from existing facilities; minimizing expansion of travel capacity and giving priority to transit over highways when capacity must be increased; improving management and increasing attention to the potential of new technology; promoting economic development and relating transportation to land-use goals.

The NYMTC long-range plan sets the same priorities as the state plan: repair and maintain, reduce the number of single-occupant vehicle trips by increasing public transport's share of trips; increase the usefulness of existing facilities, for example, through demand management and incident management (such as responding rapidly to accidents) and more bike and pedestrian facilities; improve mobility for those who can't drive; and improve access to the airports.
Land Use Planning

Land-use decisions are made principally by the region's 780 municipalities, through the issuance of building permits, zoning, and approval of large developments. New Jersey and Connecticut have state land use plans, but generally have not enforced them on municipalities. Counties also have planning agencies that, in many cases, have adopted a detailed land-use plan.

Transportation plans of an MPO, which must be shown to be consistent with land use plans, generally assume continuation of current land-use and demographic trends. Even where states have adopted land use plans, they have not significantly affected decisions on individual transportation projects. New York has no land-use plan. Most transportation investment is made in response to travel demands of residents and businesses that result from uncoordinated real estate development approved by individual municipalities based on local zoning codes. While private sector or municipal projects that are at variance with local zoning are subject to elaborate environmental review, state agencies are generally exempt from municipal ordinances. State agencies are, however, subject to development controls mandated by state and federal laws that protect coastal areas, wetlands, and habitats of endangered species.

Public Involvement

Federal law and regulations require public involvement in transportation planning and decision making. Both MPOs and state DOTs are required to provide “reasonable opportunity to comment” and, at the very least, public hearings are required for adoption of long range plans, Transportation Improvement Projects (TIPs), fare and toll increases, and environmental impact statements. However, because effective participation often requires more technical knowledge than most citizens have, many agencies question whether the participants represent a true cross-section of the affected public. In any case, ultimate decisions are made through the usual machinery of government, often ignoring the carefully produced plan and the priorities listed in the TIP. Consequently, many public-interest advocates bypass an agency’s elaborate mechanisms for seeking input and turn, instead, to the media and elected officials.

Subregional Planning and Public Involvement

NYMTC operates largely through three subregional Transportation Coordinating Committees (TCCs) -- Hudson Valley, Long Island, and New York City – which predate the creation of NYMTC.99 The TCCs are an attempt to encourage participation in the planning process by local agencies, the private sector, and the public. Each has a different character shaped by the institutions with power in its sphere of action.

The Mid-Hudson South Transportation Coordinating Committee (MHS-TCC), which covers the I-287 New York corridor, is unique in that it is the only TCC with a Mobility Advisory Committee (MAC) to facilitate public involvement in the planning process.

99 The TCCs were left intact after the dissolution of the Tri-State Regional Planning Commission.
The MAC was set up in 1992 to advise the MHS-TCC on ways to reduce vehicle miles traveled while addressing mobility needs. The MAC includes representatives of environmental and civic groups, auto users, employee commuter alternative programs, local governments, as well as transportation agencies. It is divided into four sub-committees: Land Use, Transit Service Development, Travel Alternatives, and Capacity/Pricing.

The MAC has been successful in developing innovative and often multi-modal projects stressing involvement of localities and the private sector and played a major role in initiating and guiding the development of an incentive time-of-day toll pricing project on the Tappan Zee Bridge.

MAC encouraged the TCC and its members to use ITS strategies to better support transit priority treatment and toll incentives for HOV and off-peak travel, and traveler information services. It pressed TCC member agencies to improve transportation analysis methods so they might better consider how demand management, pricing, transit, information, and growth management strategies might meet access needs with less traffic growth. Progress has been slow but positive, punctuated with conflicts between stakeholders and agencies, political and bureaucratic maneuvering, media campaigns, and efforts by advocates to shape public opinion.

Non-Governmental Organizations Involved in Transportation
The Regional Plan Association (RPA), established by concerned citizens in 1929, focuses on what has grown to be the 31-county tri-state region. Funded by private and corporate contributions and government contracts, RPA recommends policy improvements and investments, fosters co-operation among government and private organizations, and involves the public in considering and shaping the region’s future. RPA’s research includes land use planning, transportation, economic development, environment, governance, and social policy. From offices in each of the three states, RPA attempts to influence decisions affecting the tri-state region at all levels of government based upon its research and planning.

In 1996, RPA completed its Third Regional Plan, with recommendations in five major categories: improving mobility; concentrating growth in centers, large and small; investing in a competitive workforce; creating a regional greenway; and reforming governance. RPA recommended substantial improvement in the region’s rail system, integrating the three commuter systems so rail passengers can easily go through Manhattan, not just to it, integrating some subway lines with commuter rail service, and bringing rail to the New York City airports. Most of the expanded service would use existing underused rights of way. Additionally, the Plan includes improving highways and freight movement. The cost of the transportation improvements is estimated at $47 billion, spread over 20-25 years.
The Tri-State Transportation Campaign (TSTC), established in 1993 as a non-profit, coalition of public interest groups, engages the New York-New Jersey-Connecticut metropolitan region's transportation agencies in policy dialogue and influences transportation decisions. A weekly newsletter, distributed by fax and e-mail, is read by transportation decision-makers throughout the region. The Campaign came together through the efforts of public interest and planning organizations concerned about the economic and environmental costs of growing dependence on private cars, the loss of open space by highway-generated sprawl development, and the lack of options available to move goods and people efficiently in, and through, the tri-state region.

Current TSTC campaigns include pedestrian and transit advocacy, land use, diesel pollution, highway alternatives, and corridor collaboratives. TSTC receives the majority of its funding from foundations. The Campaign includes a core group of 13 environmental, planning, transit advocacy, and public interest groups, with approximately 100 affiliated organizations and individuals. TSTC members most active in the I-287 corridor are the Environmental Defense Fund (EDF), Scenic Hudson, and Regional Plan Association. The Federated Conservationists of Westchester County (FCWC) is an affiliated organization that has provided much leadership in this corridor. EDF is a national, New York-based non-profit environmental group, representing more than 300,000 members, that links science, economics, and law to create innovative, economically viable solutions.

I-287 Traffic Management: A History of Conflict and Innovation

Identification of Strategies

Traffic congestion problems in the I-287 corridor have been the subject of public scrutiny for many years. A July 1982 NYSDOT and Thruway Authority study focused on operational problems on the Tappan Zee Bridge and short term (10-15 year) needs. This study considered ridesharing, time-of-day and HOV toll pricing incentives, parking limitations by employers, ramp metering, and flexible work hours. In May 1983 these agencies recommended construction of a fourth lane west of the TZB on I-287, a seventh lane on the bridge, and added toll plaza lanes, along with new park-and-ride lots.

No New Bridges for I-287 Hudson Crossing

A Tappan Zee Corridor Study undertaken between 1984 and 1987 by NYSDOT with technical analysis by NYMTC examined longer-term (20-30 year) strategies. The existing bridge cannot be widened for engineering reasons. Intense community opposition to creation of a second Hudson River bridge crossing to relieve the TZB was voiced by all local governments in the area. An analysis of alternatives also found that such investments would be very expensive for the benefits offered. This led authorities to drop further planning for added bridge capacity, although NYSDOT’s 1995 draft EIS for the Cross-Westchester Expressway raised the possibility that a new bridge would be needed if demand management and transit measures were not successful. The 1987 NYSDOT report recommended immediate implementation of Transportation Systems Management (TSM) strategies to foster carpooling and express bus service development. It also recommended construction of a high occupancy vehicle lane from Rockland
County to eastern Westchester and a revision of TZB toll pricing to encourage higher vehicle occupancy.100

**TDM Recommended as Best Alternative**

The 1987 report estimated that discontinuation of the commuter discount could reduce 2010 AM peak hour travel demand on the Tappan Zee Bridge by 10 percent alone, at no cost. In conjunction with transit measures, it could reduce demand by 18 percent with high-cost effectiveness. Addition of an HOV lane (on the TZB alone) combined with elimination of commuter discount and improved transit was estimated to remove a further two percent of this traffic, with still high-cost effectiveness compared to a new bridge, a ferry, or new trans-Hudson rail service. In the wake of this study, there was quick progress on the easy recommendations, such as park-and-ride lot construction in the corridor, slow but eventual progress in developing some bus service in the corridor, but no apparent effort by operating agencies to move forward with planning for toll changes.

In 1987, as today, regular TZB commuters, including single occupant cars, get a large subsidy or discount from the cash toll, paying the same $1 a crossing they paid in 1958. As cash tolls have been raised over the years, from $2.50 in 1987 to $3.50 in the early 1990s, to $4.00 in 1997, the commuter toll has remained flat. This gives the biggest discount to those traveling most frequently in the most congested time, increasing traffic delay in the corridor. As critics of the commuter discount have noted, “This is equivalent to the phone company giving a discount for calling during business hours, even though it would result in overloaded phone lines, trouble getting a dial tone, and deteriorated service.”101 The 1987 study recommended on the basis of analysis, interagency consultation, and public comment, “that the Transit/TSM strategies [including congestion pricing to encourage higher vehicle occupancy and parking restrictions in corridor employment centers] be pursued and implemented without delay.” But little progress was made.

**Progress in TSM**

Another effort followed in 1988-89, as the “I-287 Suffern to Port Chester High Occupancy Vehicle/Transportation System Management (HOV/TSM) Task Force” was organized to “develop a TSM plan to support a high occupancy vehicle lane(s) in the NYS Thruway - Tappan Zee Bridge – Cross-Westchester Expressway Corridor.” The HOV/TSM Task Force again examined a range of alternative strategies, including building another bridge across the Hudson River. The study concluded that Express Bus/TSM measures, including elimination of the commuter discount on the TZB, would be the most cost-effective traffic congestion reduction strategy. As a result, new ridesharing and express bus services were initiated, a Transportation Management Organization was established to expand information and incentives for employer-based

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travel demand reduction programs, and a variety of incident management and motorist information services were initiated.

New transit services have shown steady growth of riders. The Transport of Rockland (TOR) operates five different TAPPAN ZEExpress bus routes weekdays across the Tappan Zee Bridge from Spring Valley and Nyack to the Tarrytown railroad station and White Plains, with more than 1,000 riders per day. A new private ferry service from Haverstraw to Ossining started in 1998. There are no special bus lanes (or carpool lanes) on the bridge or in the corridor. Integrating the TAPPAN ZEExpress service with Westchester County’s extensive Bee Line bus routes could make the service more effective. Extending new bus lines and introducing new paratransit and shuttle services and new ferry services could fill continuing major service gaps that leave many travelers in the corridor with no choice but driving.

While progress on pricing has lagged, the NYS Thruway Authority has employed world-class traffic engineering and information technology to meet the growing traffic on I-287 and the Tappan Zee Bridge. In 1987, a seventh lane was added on the Tappan Zee Bridge, replacing the median and breakdown lanes with a fourth east bound lane. As congestion grew further, this was augmented in the early 1990s by making the fourth lane reversible, using a movable barrier system to shift traffic capacity between the AM eastbound peak and PM westbound peak traffic directions. This enabled the bridge to absorb more traffic with less delay. The E-ZPass innovations pioneered by the Thruway Authority have enabled them to double throughput at toll plazas and clearly laid a foundation for future innovations in toll incentives, incident management, and traveler information services.

Cross-Westchester Expressway HOV
In the meantime, with the provision of dedicated demonstration grant funding in the 1991 ISTEA law, NYSDOT accelerated work on an Environmental Impact Study for a proposed Cross-Westchester Expressway (CWE) reversible $365 million, 8-mile I-287 HOV lane, connected to a further HOV add-a-lane widening on I-287 in Rockland County. Local opposition to this project, however, grew in tandem. Opponents, including business, community, local government and environmental groups, pressed for more progress in improving transit services in the corridor and adopting time-of-day toll incentives to manage traffic, as had been recommended years before.

The Mid-Hudson South Mobility Advisory Committee (MAC), after a promising start, became enmeshed in conflict in 1994, as opposition to the proposed CWE widening project grew. Stopping the CWE project became a top priority of the Federated Conservationists of Westchester County (FCWC), the Tri-State Transportation Campaign (TSTC), and Environmental Defense Fund (EDF). Large employers, represented by the Westchester County Association, also joined in opposition, fearing long-term traffic delays and wishing fast progress on toll incentives. However, NYSDOT saw the project as long overdue, representing a compromise from a general purpose road widening, and eligible for special dedicated ISTEA demonstration grant funding that was authorized,
although never appropriated. Construction unions, the Automobile Club of New York, and the Westchester Chamber of Commerce, representing small business interests, favored HOV lane construction.

Project opponents in 1993 asked NYSDOT and NYMTC to perform a Major Investment Analysis for the project to consider whether pricing, transit, land use, ITS, and demand management strategies might not provide a more cost-effective alternative. NYMTC and NYSDOT deemed the project to be exempt from this ISTEA requirement due to earlier corridor planning efforts.

Members of the MAC, including FCWC, TSTC, and EDF in 1994 pressed NYSDOT to undertake a least-cost transportation analysis study of the project as part of the EIS; make available to the public the analysis data and models being used to evaluate alternatives. And to assure consideration in the EIS of a comprehensive TDM alternative including time-of-day toll incentives on the TZB and transit improvements in the corridor, including transit-oriented ITS, pedestrian, and bicycle enhancements. These requests were spurned and legal action was threatened to challenge any final record of decision on the project. With consensus on these issues elusive, MAC members formally agreed to set aside all further discussion of the CWE within the MAC framework and to focus on those issues where some consensus and potential for collaboration existed.

Many other strategies were being developed or considered in Westchester and Rockland counties to handle the transportation needs of corridor workers and residents and these provided ample opportunity for continued MAC collaborative activity. The Employee Commute Option program was off to a good start as a voluntary program. The “TransitChek” employer commute incentive program was growing and federal tax laws for "cashing-out" employer travel subsidies were being progressively refined, with involvement from several MAC representatives.

The MAC continued to discuss ways to expand the attractiveness and utility of transit with better services and through better pedestrian, bicycle, feeder shuttle, bus, and automobile access. Planned reconstruction of the deck of the TZB, which was anticipated to require selected lane closures led to a major contingency planning effort that looked at how TDM, transit, and information could be used to reduce traffic during construction. The MAC engaged in discussions with the managers of several ITS studies in the region. And the MAC’s Capacity and Pricing Subcommittee played a major role in prompting the New York State Thruway Authority to reapply for a Congestion Pricing Pilot Program grant in 1995 to study time-of-day pricing options for the TZB.

The campaign to stop the CWE HOV expansion continued to build momentum following release of a draft EIS in May 1995. The TSTC, RPA, and EDF issued a report in December 1995, Mobility for the Interstate 287 Corridor, rejecting the HOV proposal and describing an alternative strategy to address chronic congestion problems in the corridor through construction of road improvements to deal with ramp and weaving problems and TDM. The TDM package included: changes in work schedules; transit
service improvements; transit passes for employees; time-of-day toll incentives on the TZB; use of the reversible TZB lane as a dedicated HOV lane; parking management and pricing incentives; a truck traffic relief program including toll incentives; interchange improvements on a more northern truck route across the Hudson at Newburgh; and other measures to improve walking, bicycling, transit, and ridesharing. These were estimated to produce a combined 35 percent reduction in long-term traffic growth by 2021, compared to the 17 percent growth in traffic forecast by the EIS.

The final EIS issued in July 1997 ignored calls for including evaluation of demand management and transit alternatives in the official planning process for the CWE. Opposition increased among local leaders, business, civic, and environmental groups, fueled by concerns that the project would spur more traffic growth, tie up the corridor for years in construction delays, and ultimately fail to reduce traffic congestion. Westchester County legislators voted 14-0 against the proposal in 1996. When the Republican and Democratic candidates for the open Westchester County Executive seat joined in the opposition, it proved fatal to the project. On October 20, 1997, New York Governor George Pataki ordered the NYSDOT to end plans to build the proposed reversible HOV lane project.

In an attempt to bring the entire community together to address the traffic problems, Governor Pataki formed a task force to be headed by Metropolitan Transit Authority Chair Virgil Conway to foster a consensus on how to improve transportation, promote economic development, and protect the region's environment. Members of the task force include local and state officials, civic, business, and environmental representatives. The task force is considering travel demand management, congestion pricing on the Tappan Zee Bridge, enhanced mass transit service, other roadway improvements, and advanced technology to increase mobility. Recommendations are expected in 1999.

**Tappan Zee Bridge Incentive Toll Study**

The Westchester County Executive and Rockland County Executive and other local officials in 1994 and 1995 requested that the Thruway Authority undertake a Toll Incentive Study to evaluate the effect of specific TZB toll incentives on traffic congestion and Thruway revenues, and consider how transit and other improvements would be publicly accepted. Delays starting the study, caused by a change in leadership at the Thruway Authority following funding approval in 1995, prompted environmental and civic activists to organize even greater support for toll incentives. Effective communications between state and local elected officials, civic and environmental leaders, and the new Thruway Authority leadership helped keep the study on track.
In parallel with the conflict over NYSDOT’s project planning for the CWE, municipal elected officials in the I-287 corridor in Westchester and Rockland counties joined together in 1996 to form the Hudson Valley Conference. This effort focused on organizing village and township board members, town supervisors, and mayors to work together to influence transportation decision-making, ignoring the bureaucratically-focused MAC and the official planning process. Thruway Authority officials were invited to the initial meeting of 80 local elected officials from the area and took this effort seriously. The Thruway Authority eventually responded to concerns raised jointly by this group and environmental, civic, and business leaders, by inviting these groups to sit on an advisory committee to the Thruway, which still meets periodically with the Authority’s chairman outside of the official planning and decision-making process. This effort was instrumental in demonstrating local support for toll incentives and helped get the long-delayed toll incentive study back on track.

In 1997, the Thruway Authority began the Tappan Zee Corridor Congestion Relief Study, which involves focus groups, stated and revealed preference surveys of bridge users, modeling, and analysis. The study will determine the effects of varying time-of-day and vehicle class toll differentials, in combination with improved transit options, on time-of-travel, travel mode, and congestion. The study is also investigating if changes in toll policy could encourage commercial vehicles to use less congested routes or travel in off-peak periods. The Thruway Authority is expected to issue its findings in late 1998.

In July 1997 the Thruway Authority introduced a Congestion Relief Pricing program involving major toll change for commercial vehicles at the Tappan Zee Bridge. Truck tolls on the Tappan Zee Bridge, which had been half as much as on the George Washington Bridge, the nearest alternative Hudson River crossing, were doubled. But commercial vehicle users with E-ZPass accounts were given a 50 percent non-peak period discount. Cash paying truckers were offered no toll incentive, except to switch to the E-ZPass. Preliminary findings from the Thruway Authority’s survey of truckers indicate that this program is working correctly and commercial travelers are responding. Offering an off-peak toll incentive for truckers who use the E-ZPass transponder for electronic toll payment system has lead to wider use of the E-ZPass, a shift of some truck traffic out of the most congested time of day, and a shift of truck traffic to other routes. Each of these changes has contributed to reduced peak period congestion in the Tappan Zee Bridge corridor, as well as more efficient use of the region's roadways. This suggests promise for more widespread application of toll incentives for non-commercial travelers on the Thruway's facilities, as is now under study.

Since the July 1997 implementation of congestion relief pricing for commercial vehicles, overall commercial traffic on the Tappan Zee Bridge appears to be decreasing. But other NYSTA facilities and other major roads and bridges in the region experienced commercial traffic increases between 1996 and 1997, suggesting the cause of the decrease is due to trucks changing their route in reaction to the toll changes. The toll incentive
program appears to shift traffic from the peak and shoulder periods to other times of the day.

It appears greater efforts are needed to raise awareness of the Congestion Relief Program among commercial travelers and the companies they work for if the program is to realize its full potential. Awareness of the program remains low, even among E-ZPass users. Marketing efforts need to focus on those who make decisions about toll payment systems, trip timing, and trip routing. A well designed multi-media marketing and information campaign is needed to assure that both E-ZPass users and cash customers are educated on how they could save money by changing when or where they travel.

The success of the congestion relief pilot project on the Tappan Zee Bridge suggests that more widespread application of time-of-day pricing incentives for commercial vehicles on all the region's toll facilities could be an effective congestion management strategy. The need to design and integrate a marketing campaign with the Congestion Relief Program for commercial vehicle users suggests lessons for the potential introduction of toll incentives for non-commercial travelers in this corridor. To be most effective, congestion relief pricing requires a high level of awareness among those affected by it along with a heightened understanding of the choices they have available to them. Where incentives are combined with awareness and knowledge of alternatives, modest shifts in travel behavior on congested transportation facilities can lead to significant reductions in overall congestion and delay.

There appears to be widespread support among local elected officials, the media and the public for time-of-day toll incentives in the I-287 corridor. But state and authority officials remain cautious about moving forward. Key questions need to be resolved before implementation of more widely applicable toll incentives. Will frequent bridge users still get some discount from the regular toll? Will any toll change be revenue neutral? How can transit alternatives in the corridor be enhanced concurrent with a change in toll incentives to expand customer choices?

Many advocates of toll incentives in the corridor support would like to see equity impacts addressed in the program design, with improved transit, lifeline pricing for low-income travelers, or other strategies. Many advocates of toll incentives view these as one piece in a larger bundle of services and incentives that are needed for effective travel demand management. If peak single-occupant vehicle tolls are raised sharply without giving travelers added travel options, this could generate unneeded opposition to sensible pricing reform.

There is a question whether Thruway Authority bond covenants would permit them to use any toll revenues to pay for improved transit services in the corridor. A preliminary analysis of bond covenants by the Environmental Defense Fund suggests no such limitation. A large share of the toll revenues collected on the seven New York City bridges and two tunnels run by the MTA have been used to subsidize buses and subways of the Transit Authority, and cover about one-sixth of the MTA’s $1.3 billion annual
operating deficit. The Port Authority of New York and New Jersey uses tolls generated by its four bridges and two tunnels for the PATH subway system and bus terminal in Manhattan.102

According to the General Revenue Bond Resolution issued by the Authority along with its 1992 bonds, the authority is authorized to pay out from its operating fund “free and clear of the lien and pledge” amounts for reasonable and necessary operating expenses. The authority is required to fix and collect tolls, fees, and charges for the use of its facilities, as are required in order that net revenues are at least 1.2 times the aggregate debt service. Tolls may be based on any “reasonable vehicle classification, use or occupancy,” and also may be modified for congestion pricing. All traffic must be charged a fee for the use of the facilities, but reduced rates are permitted for frequent users, congestion pricing strategies, high occupancy vehicles, or for those who use the electronic tolling system. The Authority has been authorized to construct, operate, and implement ferry service between Rockland and Westchester and Manhattan, although this project has faced substantial local opposition especially in Nyack, near the base of the Tappan Zee Bridge, due to concerns about local traffic.

From this analysis, it appears that opportunities may exist for using congestion relief toll revenues to assure successful operation of time-of-day toll incentive programs, including services and provisions to address potential equity impacts and marketing efforts to build public acceptance for system changes. The TEA-21 Value Pricing Program is also available as a source of funds to support implementation of an incentive toll program, and could include a comprehensive marketing and customer service package to help assure successful implementation. The MAC and TCC members will provide the implementation framework for any supporting elements for incentive toll implementation that go beyond the Thruway Authority’s scope of activities, such as providing enhanced transit services in the corridor.

**Smart Transportation in the I-287 Corridor: Finding a Way Forward**

Transportation innovation is clearly no stranger to the I-287 corridor and the transportation agencies that work there. But many believe there is great opportunity for these agencies to work more effectively together and to adapting innovations from other communities for smart growth and transportation. In that spirit, several organizations103 organized a “Smart Transportation” conference in Westchester and Rockland Counties in June 1997 to try to help build further consensus for progress while setting aside as yet unresolved conflicts over the CWE project. Forty elected, appointed and staff officials from the region, community representatives, and regional transportation and environmental experts came together to talk about innovations in technology, land use

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103 The Hudson Valley Conference hosted the conference, with particular support from the Town of Orangetown, the Town of Greenburgh, and the Federated Conservationists of Westchester County, along with Public Technology, Inc, Environmental Defense Fund, Humphrey Institute for State and Local Policy at the University of Minnesota, the Environmental Protection Agency and Federal Highway Administration.
management, and transportation pricing, drawing on experts from across the US and Europe. They discussed successful innovations and how they might be adapted to address the Lower Hudson Valley's transportation problems.

Strategies discussed included the design and marketing of the successful I-15 San Diego High Occupancy Toll lanes, the development and marketing of the Trondheim, Norway, toll cordon ring, transit marketing in Boulder, Colorado, route deviation bus services in Prince William County, Virginia, and growth management in Montgomery County, Maryland.

The conference discussed barriers to adoption of these innovations, including the institutional fragmentation of the region, analysis systems that fall short of giving local officials good information support, and the hesitation of infrastructure management and development agencies to actively shape public opinion about their services and pricing. Intergovernmental cooperation was flagged as a key issue for developing effective transportation strategies.104

Nine major recommendations for further regional action were discussed and generally agreed upon at the "SMART TRANSPORTATION" Conference. These will all require further interagency cooperation:

- Build support for innovative transportation systems with local transportation and elected officials. The benefits of ITS, pricing, land use, transit priority and transit marketing need to be conveyed to key decision-makers. Many of these innovations do not have a large price tag but need champions in order to move forward.
- Explore new funding sources and creative uses off existing funding sources.
- Expand public education and involvement in order to build political support for innovative strategies. There is a need to build upon existing local programs and initiatives and develop key messages.
- Develop more rigorous analysis of the success and failure of new transportation initiatives. Understanding the potential of many of the new strategies requires the adoption of better models for projecting impacts on travel behavior, land use, revenue potential, and the estimation of full costs.
- Increase coordination and cooperation of regional transportation agencies in promoting a comprehensive package of smart transportation innovations. Establish written agreements defining agency responsibilities and resource sharing arrangements.
- Target innovations to particular customer markets. The region is quite varied in its land use and travel patterns. As a result, there is a need to encourage a range of new strategies aimed at decreasing travel demand and increasing system efficiency.

• Strengthen the consensus on the goals of congestion pricing on the Tappan Zee Bridge and how such a policy would be linked to a comprehensive package of smart transportation innovations.
• Explore low-cost techniques for providing transit travel time advantages.
• Ensure that all studies and plans fit the context of the region's transportation improvement program, long range plan and state development plan.

These recommendations are being considered in continuing MAC and TCC discussions.

A Vision for the Future
Transportation operating agencies working in the I-287 corridor have come a long way in developing state-of-the-art ITS applications and overcoming barriers to interagency communications and cooperation. But the full potential for smart, sustainable transportation is far from realized. What is a realistic vision of how this could change?

There are several key areas where more progress, innovation, and effort appears warranted to help make transportation more sustainable in the I-287 corridor and the greater New York metropolitan area:

• High speed toll collection with toll incentives
• Automated billing of non-E-ZPass users
• Link E-ZPass to motor vehicle registration
• Smart transit operations
• Smart paratransit and ridesharing operations
• Improved transit access planning and services
• Improved marketing and public information
• Linking transportation data collection and monitoring to planning analysis and decision-support systems
• Re-engineering transportation organizations for performance, accountability, and the new market place

High Speed Toll Collection
The Thruway Authority has again shown leadership by recently stating its intent to experiment with high-speed non-stop, toll-barrier-free toll collection for commercial vehicles using the E-ZPass at the Spring Valley Toll Plaza in Rockland County, eight miles west of the Tappan Zee Bridge. This innovation could ultimately transform toll collection and traffic management across the New York region.

The experience in southern California on I-15 and SR-91 demonstrate that E-ZPass-type transponders work as well at 60 mph as at 5 mph if lanes and overhead readers are appropriately configured. Separate HOV bypass lanes on SR-91 in Orange County allow free HOV passage and opportunity for enforcement of the HOV-3 requirement for non-toll paying users of the High Occupancy Toll (HOT) lanes. Overhead variable message electronic signs alert single occupant vehicle users of the I-15 HOT lanes in San Diego about what toll they can expect if they use that facility. Prices are adjusted dynamically
every 15-minutes, depending on traffic congestion in the corridor and can go as high as $10 during the peak 15-minute period, but are more typically in the $3-5 range during commuter hours. The lanes are free to carpools.

As now deployed in NY, E-ZPass gets more vehicles through toll plazas with less delay, but electronic toll-payers must slow their vehicles to 5 mph to pass through the toll barriers because plazas have not been reconstructed to take full advantage of the E-ZPass technology. Two factors are cited as impediments to change: (1) Toll collectors must walk across the plazas to get to their stations and fear for their lives. (2) Toll collectors and their unions fear loss of their jobs. However, high-speed toll collection has tremendous potential to further reduce traffic delay, air pollution, and customer inconvenience. If coupled with introduction of time-of-day toll incentives, it could reinforce the perception of added value for drivers who might be asked to pay more under time-of-day pricing. Labor issues should be addressed through attrition, by offering toll collectors buy-outs, job retraining and other positions. At a minimum, toll barriers should be reconfigured so E-ZPass users can bypass plazas and the number of toll gates should be reduced. If necessary, overhead walkways or special traffic signals could be used to allow safe access for toll collectors to their workstations.

Customer-Friendly Automated Billing of Non-E-ZPass Users

The constraints on road pricing administration imposed by inefficient toll plazas are formidable. A new, customer-friendly approach would be for TRANSCOM agencies to adopt the technology and automated customer billing strategy used by the 407 Express Toll Route (E-407) outside Toronto.

On the E-407, those with an E-ZPass-type transponder pay the usual per mile charge, based on the time-of-day and vehicle class, and those who lack E-ZPass have their licenses imaged to identify the address of record for the motor vehicle, just like the Thruway and other TRANSCOM agencies do. The E-407 operator simply adds to the standard toll a $1.00 (Canadian) per transaction processing fee.

The image recognition technology is only a bit more advanced that that now used by the Thruway Authority and other TRANSCOM agencies and recognizes license plates on non-E-ZPass equipped vehicles as they enter and exit the freeway at ordinary ramp speeds. About 75-80 percent of non-transponder equipped vehicles are automatically processed, and the remainder go through a secondary screening with human computer operators and added filters used to identify the tag number and state, with fewer than ten percent being unrecognizable. At a $1 per transaction processing fee, the toll operator is making a reasonable profit. This approach contrasts with the customer-hostile punitive approach NJ DOT is taking where they anticipate paying for the installation of the automated toll collection system by charging high penalties for people driving through E-ZPass lanes without E-ZPass tags.  

For more information on the E-407, contact Isabelle Frati, Communication Services Manager, ETR Operations Center, Woodbridge, Ontario, Canada, 905-264-5221 or Frank Switzer,
**Link E-ZPass to Motor Vehicle Registration**

Another way to increase market penetration of the E-ZPass to allow eventual elimination of toll plazas would be to use federal, state, or other transportation funds to pay for a new program in which New York and New Jersey and Connecticut issue E-ZPasses to all motor vehicles (at least in the extended metro area) as part of the vehicle registration process. A marketing approach would give everyone $20 of free value on the E-ZPass to get them to try it, and use image recognition and billing for the rest of the vehicles passing through.

With widespread E-ZPass use, authorities could implement a program in which automated high-speed toll collection gradually replaces toll barrier systems throughout the region, eliminating many delays and paving the way for much more widespread adoption of time-of-day road pricing. With the elimination of toll plazas, it would be much easier to fine-tune road prices, replacing one-way tolls with two-way tolls on bridges and tunnels for better traffic management by hour-of-day, introducing smaller point-to-point and area toll charges in place of lumpy single point charges. By reducing traffic congestion and delay, such innovation could increase the attractiveness of the region’s economy to new investment and commerce, as well as improving air quality and traveler choice.

**Smart Transit Operations**

ITS is being used in metropolitan New York to improve transit performance and increase convenience of transit travel, but the region has been slower to make investment in this area than in highway ITS applications. Train schedule information is displayed on video monitors, financed by advertising, on the PATH metro between New Jersey and Manhattan and at one Long Island Railroad station. Digital signs to display arrival times are being developed for New York City Transit stations in spite of the lack of automatic signal systems. Fares are paid electronically on New York City Transit services by a growing number of users of the METRO Card. Starting in mid-1998, the system enables free transfers between buses and subways for riders on much of the system. However, the stored value METRO card is not easily integrated with other transit services in the region.

Fleet operations and performance are being improved through a wide range of in-vehicle communication and monitoring systems that enable dynamic rerouting of buses, data collection on fares, and generate diagnostics on vehicle condition. New York City Transit is testing an advanced GPS-based vehicle locator on two bus routes in the canyon-like streets of Manhattan. In addition to the data being used to optimize bus flow, it will be converted to arrival times, which will be displayed either digitally or on video monitors and kiosks at 34 key stations en route. Decisions on system-wide application depend on the evaluation, scheduled for completion in late 1999.

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The TRANSMIT traffic condition monitoring system is being used to detect conditions on bus routes in New Jersey and on a four-mile exclusive bus lane on I-495 entering Manhattan that carries about 60,000 riders in about 1,600 buses in the AM peak. In the future, this information will be used to manage the dispatch of buses in the Manhattan terminal.\textsuperscript{106} The Westchester County bus system was among the earliest in the region to equip its vehicles with vehicle location monitoring capability. In a region with multiple transit operators, the focus of TRANSCOM is to provide in the future integrated route, schedule and on-time performance information to travelers, by any origin and destination anywhere in the region, via Internet, kiosks, and telephone. The ITS plan that NJ TRANSIT completed in 1996 and the plan being developed by the MTA are emphasizing the system wide-integration of transit vehicle management and customer service measures.

Despite this progress, much greater investment is needed in transit priority measures and ITS for transit. There are hundreds of locations in the region where significant volumes of buses move through congested streets and highways in mixed traffic and could benefit from traffic signal preemption, queue jumper lanes, and spot priority treatments. Additional dedication of lanes for buses in both urban and suburban centers could boost transit productivity, cut costs, boost ridership, and cut delays. A recent Westchester County study suggested that dedicated bus lanes might be warranted in both downtown White Plains and Yonkers. The region’s extensive railways warrant greater investment in information systems to aid both efficient operations and passenger services.

**Smart Paratransit and Ridesharing Operations**

In the extensive low-density automobile-oriented outer suburbs of New York, beyond the towns and villages on rail and express bus lines, most residents and workers have no choice but to use a car for all travel, unless going to the urban core. In the outer boroughs of New York City, informal sector “gypsy” cabs and van services often fill the gaps in transit services. These need to be recognized for their value and given a chance to operate legally.

Incentives should be provided for new, more flexible shared-ride taxis, route deviation buses, and neighborhood shuttles, especially in areas lacking other good transit options. Integrating these into transit passenger information systems could help extend mobility to far more of the region for more hours of the day for a reasonable cost in time and money. Improved access to jobs in the suburbs, including late night services, is vital to increasing the success rate for those thrown off of welfare. Information and communications technologies are key to devising more effective and economical shared ride shuttle services and ridesharing services. Advance reservation service discounts and higher cost service-on-demand strategies for ridesharing and shuttles offer potential to extend the reach of today’s mostly suburb-to-core transit network. Little investment or planning is

apparent in these areas in metropolitan New York. Private transportation providers and new forms of paratransit need to play a larger role.

**Improved Transit, Pedestrian, and Bicycle Access Planning and Services**
The most cost-effective transit access is by foot, but increasingly jobs and housing are beyond walking distance of transit, especially in outer suburban areas like the I-287 corridor. Park-and-ride is a valuable but expensive way to spur home-to-transit access, and does little to aid transit-to-workplace egress in dispersed suburban employment corridors. Shuttle services can fill some of this gap, but need close coordination with transit schedules if they are to attract riders who have the ready choice of driving to work. Transit-serving ITS technologies that provide real time operations management and passenger information capabilities can help such services cut costs and increase their attractiveness.

But the costs of such options need to be weighed with other options for improving intermodal access to serve low density travel suburb-to-suburb movements. Improved bicycle access to and from transit, with well-designed interconnected bicycle networks (both dedicated paths, lanes, and low-traffic volume/speed bike-friendly streets) and secure overnight bike parking, can make these options effective for many. Improving bike access to transit is usually a fraction of the cost of expanding park-and-ride or feeder bus/shuttle services and can often better serve transit-station-to-work/school egress by allowing users to keep a cheap bike at their destination station. In California’s Silicon Valley, more than 40 percent of the bike locker users at Southern Pacific Rail stations leave bikes overnight at stations for their connection to work in the morning and evening. A fifth of Dutch transit users complete their journey to work by using a bike to get from a rail station to their workplace or school, using secure overnight bike parking.107

Smart transportation planning and service design needs to consider all travel options – motorized and non-motorized – in evaluating potential door-to-door mobility services. Gaps in those services now filled only by the automobile need the close attention of planners and operating agencies if traffic growth is to be better managed. And consideration of total system and user costs of alternative options for increased access need to be considered in investment and service planning. This will require breaking out of the confines of modal service delivery and fragmented facility/service planning. Perhaps adapting and building on the TRANSCOM model that has enabled highway agencies to work across boundaries using new information and communication systems, agencies can find ways to reorient planning and transit service delivery to encompass the full travel experience, regardless of jurisdiction, facility, or service manager. Information on the quality of the pedestrian and bicycle environment must be gathered and integrated into ITS, planning, and travel information services if customers are to be given more effective alternatives to driving. Seamless intermodalism that expands access while reducing traffic growth can be achieved with appropriate investments.

107 For more information see Replogle, Michael and Harriet Parcells, Linking Bicycles with Transit: Case Study for National Bicycling and Walking Study, 1992, Federal Highway Administration, Washington, DC.
Improved Marketing and Public Information
Marketing and information services need to be fully integrated into travel demand management and transportation operations and planning to realize the most effective use of existing infrastructure and services while better satisfying customer needs. Increased private investment in transportation services is likely to accelerate trends in this direction, but public authorities and agencies also need re-engineering to reorient their culture and capacity towards flexible service delivery for highly segmented markets. The flexible multi-modal information systems that MTA, NJ Transit, and TRANSCOM are poised to develop could provide an outstanding foundation for better understanding customer needs, creating new services to meet emerging and under-served markets, and integrating transit with pedestrian, bicycle, and paratransit access services and planning.

The experience with E-ZPass toll incentives for truckers shows the need to evaluate what users know about incentives, understand who makes travel decisions, and then tailor information and marketing to each market segment with clear objectives and performance measurement. This will require a broader skills mix at transportation agencies or contracting out for appropriate services of marketing, communications, behavioral research, and other social scientists, economists, and media-savvy professionals. These elements of delivering responsive customer service should be elevated to their rightful place in organizations and budgets as they are as essential to success in the information age. Engineers and bureaucrats alone seldom do these jobs well.

Linking Transportation Data Collection and Monitoring to Planning Analysis and Decision-Support Systems
ITS is delivering a wealth of data that is being used to support better traffic operations, but much of this is lost in the disconnect between operations and planning. While steps are underway to address the problem, the New York metro region still suffers from seriously deficient decision-support and analysis systems for transportation planning and evaluation.

It is vital that ITS traffic and transit monitoring data be sampled and archived for future use in model development and calibration. It provides data that can be processed into much better information on traffic speeds, flows, and composition, and other aspects of travel demand, than now available to most transportation planners in the region. With ITS data, the highly variable nature of day-to-day and hour-to-hour network performance can be for the first time evaluated at low cost.

Funding is needed to accelerate research and development of data mining and evaluation tools to link operational and planning data structures and models. Given the billions of dollars spent on transportation in the region, the amount now dedicated to planning and decision-support tools is grossly inadequate. If run by the private sector, the regional transportation system data collection and planning systems would be substantially upgraded. Given ISTEA and Clean Air Act mandates and the need to assure economic competitiveness of the region, the public sector agencies need to devote sharply higher
levels of funding for these activities. TEA-21 funding is flexible and can be used to support such work.
Re-engineering Transportation Organizations for Performance, Accountability, and the New Marketplace

The information age has transformed how corporations do business, how shoppers buy groceries, how people communicate, and how we entertain ourselves and get information. So far it has had relatively little affect on our transportation systems. ISTEA helped begin the transformation with modest steps to support ITS development, requirements for accountability for long-term transportation impacts and management systems, incentives for innovation in transportation pricing, and programs to encourage greater use of private capital in areas of transportation largely dominated by public agencies.

[put in a box in this chapter] American drivers now burn over 120 billion gallons of gasoline per year, which releases more than 1.2 billion tons of carbon dioxide into the atmosphere–nearly one-third of the nation’s annual CO\textsubscript{2} output. This energy consumption generates over half of all U.S. air pollution, and the Environmental Protection Agency estimates that roughly 46 million Americans continue to live in places that do not meet federal air quality standards.

[Metropolitan Planning Organizations] are required to conform their transportation plans to air quality goals. However,...standard models are not available for the MPOs to use in identifying the effects of transportation on air quality.” (GAO) end of box

The pace of change fostered by the information revolution in America’s transportation sector is increasing. It will inevitably bring about the overhaul of our transportation operating, planning, and service delivery agencies and organizations. There are many challenges for these organizations. They need to reorient themselves towards providing access and mobility services and alternatives at lower economic, social, and environmental costs, not just delivering infrastructure and service management. They need to increase accountability for meeting system performance requirements, ranging from air quality requirements to congestion management objectives. They face a growing need to integrate information, incentives, and demand management if they are to meet these demands. Services need re-engineering to adjust to the changing needs and demands of customers, to link with the complementary and competitive access and mobility elements provided by other organizations, and to control costs for suppliers and customers alike.

Transportation agencies and organizations need to consider new ways of packaging mobility services for the information age, linking with vehicle leasing and maintenance firms, goods delivery firms, and those who can package and market bundles of new services effectively in an increasingly competitive information-rich marketplace. The relatively stable institutional environment for transportation of the past several decades is clearly poised for greater instability and change in the next several decades. The information revolution, fiscal pressures on government, demands for accountability for environmental and other effects, and the changing nature of our increasingly
dematerialized economy within a dynamic growing global trading system all point to a massive, if gradual, change ahead.

Within this framework of change, conflict over growth, investment, pricing, and technology choices is essential to making better choices. This case study of the New York I-287 corridor would suggest that old conflicts can be managed and used creatively to foster new collaborations and that these may help us guide the information revolution towards development of smarter and more sustainable communities.

**Traffic Management and ITS in Other US Cities**

**Houston TranStar**

The TranStar system integrates the transportation and emergency management operations for the Greater Houston, Texas, area, which is 5,436 square miles with a population of about four million people. TranStar manages the following components:

- 160 mile freeway management system, out of a projected 300 miles
- Freeway and arterial street incident management
- Flow signals at 53 ramps
- Closed circuit television surveillance
- Variable message signs
- 63 mile HOV lane system, out of a projected 105 miles
- Regional traffic signal system of 2,800 signals
- Intelligent Transportation Systems programs
- Emergency management operations for evacuations and disasters

Houston TranStar is fully integrated both in its systems and daily management personnel and work functions across jurisdictional boundaries. The operation is headquartered at the Transportation Management Center. The executive director of the TranStar reports to an executive committee comprised of a representative from each of the agencies involved. Each agency contributes to the annual operating budget of the center on a prorated basis relative to their occupancy and utilization of the building components.

One ITS program of TranStar is Smart Commuter, a project that helps North Houston residents with their daily commute. When a commuter participates in the program, he or she is given the free use of a mobile mini computer which gives them the latest in traffic conditions, travel times, HOV lane activity and transportation options, including bus schedule and fares. To participate the commuter must: normally drive to work at least three days a week, have a workday that occurs between 5:00 a.m. and 9:00 p.m. weekdays, and have a work schedule that allows the commuter to select different travel modes when traffic conditions make them quicker or more convenient than driving.

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108 Information obtained on the Internet at http://traffic.tamu.edu/central2.html
San Antonio’s TransGuide System

TransGuide, the Texas Department of Transportation’s (TxDOT) uses computer technology to help drivers anticipate traffic conditions in an effort to increase safety, reduce congestion and reduce air pollution to meet Clean Air standards. The project, which will monitor traffic conditions, control traffic signals and allow rapid response to accidents and emergencies, began in San Antonio in 1993.

Recently, the San Antonio, Texas, TransGuide system expanded to include seven major high-tech components. These new components are being integrated into the city’s existing ITS network to better serve the 1.2 million residents of the city. The new components are:

- EMS Video which will link ambulances and paramedics at accident sites with hospital trauma centers.
- Buses which will be linked to TransGuide for vehicle location and rider safety.
- On-board navigation by installing almost 600 computers in public vehicles (emergency, law enforcement, school buses and others) showing the quickest route to a desired location.
- Kiosks with forty touch-screen computers are being installed at transit points, colleges, malls, hotels, and other public places to provide traffic, weather, travel directions, bus and airport information and maps.
- Sensors on rail tracks alert motorists to avoid train crossing delays.
- 78,000 windshield tags on cars will expand TransGuide’s traffic monitoring capabilities to highways and streets not covered in the system’s road sensors and overhead cameras.
- Mapping data is expanded to include specific traffic data including accidents and construction delays.

Information found at the ITS America homepage at http://www.itsa.org
CHAPTER SIX
Getting Smarter About Low-Income Mobility: Can Intelligent Transportation Technologies Improve Basic Accessibility to Jobs?

Introduction
On August, 22, 1996, President Clinton signed the Personal Responsibility and Work Opportunity Act, changing a social welfare policy that had been in place since the New Deal era. What made this law such a departure from past policy was its unprecedented employment requirements which force welfare recipients to engage in work, community service, or educational programs within two years after receiving benefits. As states and localities implement the new law, they have found that this part of “welfare reform” is fraught with problems, largely because people simply can’t get to work or keep their jobs because of the lack of reliable, convenient, and affordable transportation services. As a result, government agencies have had to search for new solutions to the age-old challenge of improving access and mobility for the working poor.

Part of the response has been the initiation of “welfare-to-work” programs that either:

- boost conventional transit mobility,
- provide reverse commute services from poor inner-city neighborhoods to suburban job centers,
- better coordinate existing human services transportation,
- help people purchase vehicles, or
- create jobs in or near low-income communities.

Numerous states have already devoted millions of dollars to aid such efforts. TEA-21 provides up to $150 million per year to support low-income mobility programs (mostly transit) over the next five years. But despite this funding support, recent studies have determined that the relative scarcity of jobs in low-income communities will continue to make it difficult for a large percentage of welfare recipients to get to work (and daycare, shopping, health care, education, and other needs). This has forced many officials to search for other innovative ways to facilitate the transition from welfare to work.

Welfare-to-Work: Exploring a Role for Information Technologies
The purpose of this chapter is to examine one set of access and mobility innovations that have yet to be fully applied to aid low-income mobility: intelligent transportation systems (ITS). ITS has tremendous potential to transform our communities, infrastructure, and the means with which individuals gain access and travel. Already, federal and state transportation agencies are devoting millions of dollars to ITS research in hopes that these investments will help relieve the problems and limitations of our current transportation

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110 Appendix A contains a summary of the law’s main features.
111 See Appendix B for a summary of selected welfare-to-work mobility programs.
112 This funding is part of the reauthorization of the Intermodal Surface Transportation Efficiency Act of 1991.
system. Because of its urgency and scope, boosting low-income mobility offers a valuable opportunity for ITS implementation and experimentation.

This analysis of ITS will begin by looking at the access and mobility needs of families in poverty and will then compare those needs against the current research and technology program, analyzing relevant emerging technologies, policy direction and allocation of resources. This chapter will conclude with an assessment of potential impacts ITS will have on welfare mobility and a set of recommendations for policy and further research.

The Challenge and Practice of Improving Welfare Mobility

The bulk of the welfare-to-work mobility problem can be attributed to the fact that most “workfare” individuals do not live close to available jobs -- a phenomenon that academicians refer to as “spatial mismatch.”\(^{113}\) Demographers have found that roughly three-quarters of welfare recipients live either in central cities or rural areas, with urban poverty growing at the most rapid rate.\(^{114}\) The majority of job openings, however, are located in suburban areas. In some regions (Chicago, Cleveland, Dayton, Detroit, Greensboro, Louisville), suburban job growth accounted for 100 percent of overall metropolitan job growth during the first half of the 1980s.\(^{115}\) Today’s job growth trends continue to reflect this, as over two-thirds of today’s new jobs are created in suburban areas.\(^{116}\)

Given these trends, efforts to improve welfare mobility generally share some combination of the following goals:

- support efforts to bring jobs to low-income communities,
- improve access to remote locations,
- increase affordability and travel choices,
- facilitate coordination with other family needs, and
- make agency implementation easier and more efficient.

Getting people to jobs is layered with complexities, as every mode of travel presents a different set of trade-offs. There is no doubt that public transit is a lifeline for millions of America’s poor. Roughly 40 percent of America’s public transit riders are low-income people. But most transit systems don’t get people everywhere they want to go. Even in

\(^{114}\) Between 1960 and 1990, for example, the central city share of the nation’s poor has grown from one-third to one half, even though its share of total population is roughly 30 percent. See Current Population Survey, U.S. Department of Commerce, Bureau of the Census, 1997.
\(^{116}\) Many central cities have lost jobs during the past several decades. For example, Detroit lost 100,000 jobs in the 1980s, while its suburbs gained 250,000 jobs. Of the 19 million jobs created in the 1980s, 70 percent were in the suburbs. (Commuting in America II, Eno Transportation Foundation, 1997).
places with excellent services, welfare recipients still face serious mobility problems because jobs are increasingly located in areas that lack the population and activity densities that justify transit routes. Researchers at Case Western Reserve University, for example, found that only 8 to 15 percent of transit-dependent welfare recipients in inner-city Cleveland can commute to jobs within 43 minutes.\textsuperscript{117} In Boston, researchers studying entry-level job openings determined that no potential employers in the region’s high-growth areas could be reached by welfare recipients using transit within a 30 minute commute, and only 14 percent could be reached within an hour.\textsuperscript{118} In the Atlanta area, researchers have found that only 48.8 percent of entry-level jobs in metropolitan Atlanta are located within a quarter-mile of a public transit route, with almost no employment opportunities accessible in the jobs-rich Cobb and Gwinnett counties (3.9 and 2.1 percent, respectively).\textsuperscript{119}

The lack of reliable mobility choices also hurts people who are trying to balance job demands with family responsibilities. For adult welfare recipients, this means juggling day care, education, training, work (often shift work) and other duties, all of which require individuals to be assiduously prompt. The service industry shift work that many welfare recipients are able to secure often demands non-standard schedules which are incompatible with day care services and transit schedules. This is especially difficult for rural welfare recipients, where transit services run less frequently and are subsidized more heavily.

[PUT IN A BOX]

\textbf{Characteristics of Adult Welfare Recipients} \textsuperscript{120}

Less than 84 percent have some college education.

Most work at or near minimum wage in service industry jobs.

88 percent are women.

50 percent have children less than 5 years old.

Only part of these needs can be handled by conventional transit services. Special transit programs, however, attempt to pick up the slack. Many of these are public/private partnerships such as the Department of Housing and Urban Development’s four-year Bridges to Work Program the Welfare to Work Partnership, which has attracted more than 300 companies. Other officials are placing greater emphasis on boosting the efficiency of transportation services to meet the mobility needs of low-income people. They point to successful examples of coordinating transportation services, such as those


\textsuperscript{120} Lacombe, \textit{op. cit.}
provided by human service drivers. Such programs also benefit from shrewd cost allocation accounting and service coordination at the state level.\textsuperscript{121}

**Current Shortcomings Drive Innovation**

Together, these efforts appear considerable, but problems still abound. Fewer than half the states met all of the new welfare law’s requirements on October 1, 1997: While most were able to get 25 percent of all families into jobs, most were unable to place 75 percent of two-parent families, which are considered the easiest cases.\textsuperscript{122} Transportation has been cited as part of this difficulty. In one survey, roughly 45 percent of welfare officials argued that transportation prevented job-ready participants from getting jobs, while another 30 percent opined that transportation was a moderately serious obstacle.\textsuperscript{123} Similarly, a recent survey conducted by the US Conference of Mayors has 84 percent of survey cities reporting that transporting welfare recipients to work has been a problem, mostly due to a lack of accessible job opportunities. In addition, 92 percent of survey cities reported a shortage of jobs to accommodate the new welfare workforce. Other major obstacles include coordination with childcare, housing programs, training, and other services.\textsuperscript{124}

These problems aren’t just limited to the welfare program. As officials strive to meet short-term mobility needs, many recognize that the ultimate challenge is the broader issue of mobility for low-income people. After all, the number of families in poverty continues to increase despite shrinking welfare rolls. Therefore, a strategy that merely fulfills the requirements of the new welfare law falls far short of meeting the needs of individuals who are poor but do not or no longer qualify for welfare.

But this goal may be difficult to achieve. In searching for more permanent improvements, officials have expressed worry that many new mobility programs are vulnerable because they are dependent on recent infusions of funds fueled by the current zeal to implement the new law. Instead, many are seeking systemic changes—ones that will ensure more reliable means of getting people to work and other destinations. This is one of the most compelling reasons to examine transportation technologies, because their application is expected to have system-wide impacts on our communities and transportation system within the next several years.

**The Promise of Intelligent Transportation**

The application of information technologies to transportation has tremendous potential, particularly with regard to the information-hungry tasks of managing traffic, matching

\textsuperscript{121} Best Practices in Specialized and Human Services Transportation Coordination, US Department of Transportation and US Department of Health and Human Services, July 1989.


customers with services, improving safety measures and monitoring system performance. But how it affects access and mobility for society’s most vulnerable populations depends largely on how it is funded and implemented. Any analysis requires an understanding of the types of technologies currently under development, as well as the amount of resources backing their deployment. Though widespread adoption of ITS is several years or perhaps more than a decade away, we are currently able to offer a preliminary sketch of what the program will yield.

The current ITS program is divided into modal applications, mostly for highways, transit, freight modes, and assorted safety programs. There are also system-wide intermodal applications such as pre-trip traveler information services. Federal classifications are evolving (mostly because of ISTEA reauthorization), but general categories are listed below. And although a precise accounting of funding breakdowns for these activities does not exist, the US DOT Joint Program Office has estimated the amount of funding devoted to each.

Figure 2. Total Federal ITS Funding, FY 1992 - FY 1997

<table>
<thead>
<tr>
<th>ITS Program Category</th>
<th>Types of Activities (some overlap between modal administrations)</th>
<th>Total Funding (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Highway Administration</td>
<td>Travel and Traffic Management, Commercial Vehicle Operations, Automated Highway Systems, Multimodal, Smart Roads, Electronic Tolls, Emissions Control</td>
<td>$1,223,570</td>
</tr>
<tr>
<td>Federal Transit Administration</td>
<td>Advanced Public Transportation Systems (a.k.a. Public Transportation Operations), Multimodal</td>
<td>$13,200</td>
</tr>
<tr>
<td>Cross-Cutting Activities</td>
<td>Evaluation/Program Assessment, Planning and Mainstreaming, Architecture and Standards Planning</td>
<td>---</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$1,268,315</td>
</tr>
</tbody>
</table>

Source: Federal Highway Administration, Joint Program Office

Obviously, some of these technologies, such as Commercial Vehicle Operations (CVO), do not have much direct relationship to low-income mobility and access. But nearly all of the rest do. Travel and Traffic Management, for example, is a broad umbrella for traffic management, pre-trip traveler information programs, navigational aids, roadway pricing, rural technology deployment, priority corridor initiatives, and a host of other efforts. These generally apply information technologies to provide more detailed, often real-time information to aid traffic managers with the task of keeping traffic flowing and helping travelers find their way. Together, they command roughly 40 to 50 percent of federal ITS
program funding (estimates are very approximate because of overlapping intermodal programs).  

Advanced Public Transportation Systems (APTS) are often grouped within Traffic Management programs, and are the most relevant to welfare-to-work efforts because so many welfare recipients rely on transit. They are designed to improve on all aspects of service delivery, and are commonly divided into the following categories:

- fleet management
- traveler information
- electronic fare payment
- transportation demand management.

Fleet management refers to technologies employed by transit agencies to deliver higher-quality service to their customers. These include technologies that improve communications, automatic vehicle location systems, automated data collection technologies, transit operations software, and geographic information systems. These, coupled with traveler information systems (pre-trip, in-terminal, kiosk, in-vehicle, multimodal) can make transit trip-taking easier for people who are unfamiliar with routes, schedules, fare, and other information. Electronic fare payment technologies are designed to simplify fare payment and create universal billing for different transit services and even different modes (i.e. roadway tolls). Demand management technologies include collecting and providing real-time information to facilitate ridesharing, linking travelers with available transportation options, and HOV-lane enforcement. Roughly one to five percent of federal ITS funds are devoted to APTS.

The private-vehicle-oriented programs, such as Advanced Vehicle Control and Safety Systems (AVCSS) and the Automated Highway System (AHS), are less pertinent to low-income mobility, owing to the low percentage of welfare recipients who drive and the added cost of AVCSS and AHS-equipped vehicles. However, according to the Nationwide Personal Travel Survey, the number of poor workers who drive is increasing, so these categories ought to be examined. AVCSS covers mostly in-vehicle technologies that alert drivers of oncoming hazards, aid with crash avoidance, and other methods of reducing human error. The AHS is a program designed to automate highway travel, where the human tasks of steering, acceleration and navigation are taken over by electronic sensors and a centrally-coordinated traffic management agency. AVCSS and AHS receive roughly 30 to 40 percent and five to ten percent of federal ITS funds, respectively.  

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126 The amount of money devoted to Automated Highways is in dispute. Some argue that a large proportion of funds spent on traffic management and safety are directly applicable to Automated Highways. Researcher Deborah Gordon has estimated that roughly two-thirds of all ITS funding supports the development of AHS technologies. Personal Correspondence, 1/22/97.
Other programs, such as architecture, planning, mainstreaming, and evaluation, cover the institutional issues associated with deploying ITS programs. These efforts are supposed to ensure compatibility between vehicles and ITS systems nationwide, integrate ITS into the local transportation planning process, and provide feedback on the performance of such systems. Together, they constitute roughly 10 to 20 percent of federal ITS funds.

**The Potential Benefits and Caveats of Applying ITS to Welfare-to-Work Efforts**

To assess ITS’ potential to aid welfare-to-work efforts, the following questions must be answered:

1. What welfare-to-work needs can be aided by ITS and information technologies?
2. What is the likelihood that such technologies will be developed and adopted?
3. Do ITS and information technologies allow the transportation sector to pursue new strategies for welfare mobility?

To answer these questions, this analysis examines a range of conventional welfare-to-work transportation strategies including:

- vehicle purchase and use,
- transit improvements,
- paratransit and other special services,
- coordination of existing services, and
- job creation in low-income communities.

**Private Vehicle Access for Welfare-Dependent and Low-Income People**

Although only 6 percent of the nation’s welfare dependents own vehicles, researchers have found that the number of poor people who own vehicles has increased steadily over the past several decades. And furthermore, researchers at the University of California at Berkeley have found in numerous studies that in the short-term, low-income people who have access to vehicles tend to work more regularly, have more opportunities, and make more money. This makes driving less a matter of choice than a matter of survival.

Most current welfare-to-work efforts aimed at boosting auto ownership focus on providing loans to welfare recipients for vehicle purchase or repairs (see Appendix B). Although a multitude of ITS technologies are designed to aid drivers (e.g. traffic management, safety, automation, navigation, pricing, and traveler information), few are specifically designed to make driving more affordable. In fact, they will more likely raise the cost of driving because of the in-vehicle devices and infrastructure upgrades they require. If these costs are prohibitive for low-income individuals, higher-income drivers will enjoy most of the benefits of these technologies.

This does not dismiss other benefits that private-vehicle ITS can offer to low-income people. Some efforts, such as Pennsylvania’s Wheels for Work program, could gain from more sophisticated handling of information about donated vehicles and eligible
recipients. Also, some transportation control measures, particularly ridesharing, can be enhanced with real-time information about prospective passengers. However, such programs depend on the existence of incentives and penalties that make ridesharing attractive, such as HOV lanes and tolling, corporate rideshare policies, welfare-to-work programs, and others. Furthermore, most ridesharing occurs along established commute patterns originating in wealthier communities.\footnote{127}

**Boosting Transit Performance**

For many, the easiest way to reduce transportation expenses is to manage without a vehicle. Current research reveals families living in less automobile-dependent or “location-efficient” neighborhoods can save roughly $500 per month in transportation costs.\footnote{128}

Welfare officials would like to see non-driving welfare recipients retain these savings. The mobility demands of the new work requirements have led many to call for ways to improve transit services. An entire class of ITS technologies, Advanced Public Transportation Systems (APTS), covers public transit, and nearly all have the potential to improve low-income mobility so long as transit fares remain affordable and services aren’t scaled back. In fact, one recent US DOT report on welfare-to-work concludes that:

“...technology innovations such as flexible routing, advanced paratransit services, and other applications of information technology offer real, if limited, solutions to improving transit service to low-density suburban areas. These technology-based solutions also may facilitate service innovations, including extended schedules, express routes in key corridors, modified routes, and day care services at transit stations.”\footnote{129} (author’s emphasis)

In addition to general transit service improvements, low-income people—and welfare recipients especially—have specific needs that may be facilitated with better information. To begin with, welfare recipients typically have to navigate unfamiliar transit service areas in getting to and searching for different types of work because low-income people hold jobs for shorter periods of time relative to the rest of the workforce.\footnote{130} Furthermore, the new law’s work requirements allow a variety of time-limited activities to count towards compliance (e.g. up to six weeks of job hunting, up to one year of vocational training, etc.), which means that many workfare individuals routinely switch travel patterns. Meanwhile, welfare recipients still have to fit these activities into daily trips to welfare agencies, childcare, education, and other places.

\footnote{127} In the Washington, DC region, for example, an informal ridesharing system has evolved into a complex culture known as “slugging.” But it follows the traditional suburban-to-urban commute pattern because it is driven by HOV access.  
\footnote{129} Lacombe, op. cit.  
\footnote{130} According to the Institute for Women’s Policy Research, most welfare mothers (88% of adult TANF recipients) cycle between low-wage work and welfare.
Technologies that improve navigation, such as information kiosks, in-vehicle traveler information systems, and route-mapping aids, can facilitate these activities. Numerous localities such as Atlanta and Los Angeles have installed downtown kiosks to help travelers make choices between alternative routes and modes depending on travel conditions. Other programs, such as New Jersey Transit’s automated transit information system, have been enhanced with new technologies to reduce response times on automated phone calls.\textsuperscript{131}

Another transit challenge facing welfare recipients is the need to be timely. If transit vehicles run on schedule, this isn’t as much of a problem. However, when delays occur there is no conventional means of determining how late one might be. Vehicle location technologies coupled with traveler information systems can provide this information, which could enable a worker to better plan their trip, or at least contact their employer with their estimated time of arrival.

Cost is another impediment for low-income mobility. And welfare agencies and employers sometimes subsidize individuals with monthly transit passes and fare cards. In most metropolitan areas, however, there are a variety of transit agencies -- some urban, some suburban. Thus the task of providing transit passes becomes more difficult, short of coordinating various agency payment media or handing out cash (a practice that is not permitted in many states). Again, ITS may help agencies overcome this problem with electronic fare media that provide universal payment methods for customers.

Cost is also a concern for transit agencies. Given recent cutbacks in federal transit operating and capital funds, ITS technologies may appear to be a diversion of resources away from providing basic services and maintaining existing infrastructure and vehicles. In particular, if the adoption of ITS technologies leads to higher fares, their ability to accommodate low-income riders dwindles accordingly. To add to their worries, agencies must also phase in new service enhancements evenly, thanks to recent civil rights lawsuits over discrimination in the quality of transit service for different groups of people.\textsuperscript{132} But ITS boosters are hopeful that investment in technologies will eventually pay for itself and provide better service.

**Paratransit and Other Special Transportation Services**

Many transit agencies are hopeful that ITS measures will enable them to improve their conventional services. However, few believe that such technologies can ever make fixed-route transit overcome its difficulty in serving customers in low-density communities in the nation’s rural and suburban areas. These regions have been more appropriately

\begin{itemize}
\item \textsuperscript{131} *Intelligent Transportation Systems: Real World Benefits*, Federal Highway Administration, US DOT, January 1998.
\item \textsuperscript{132} The Los Angeles Metropolitan Transit Authority, for example, was forced to rescind a fare increase for bus riders because a law suit charged that it discriminated against low-income people of color.
\end{itemize}
serviced by paratransit, dial-a-ride, reverse-commute, and other services that usually cover specific clients (e.g. the elderly, disabled, welfare recipients, etc.).

These services tend to pick up and deliver customers depending on where and when they need to travel. Numerous such services rely on communications technologies (radio transmitters, etc.) to provide information on riders, vehicle location, destinations, delays, and other factors. As such, they could be significantly fortified with cost-effective ITS technologies. Successful pilot programs have been implemented in Winston-Salem, North Carolina and Northern Virginia, and more projects are underway.

But welfare-to-work efforts have attained a greater level of complexity than most paratransit services. For example, paratransit systems tend to service community-sized areas, typically between known destinations (community centers, senior housing, educational facilities, etc.). Workfare riders, however, often have to travel long distances from one community to another, ruling out the possibility of door-to-door service for most people. Some agencies have been able to address this problem by matching concentrations of workers and jobs and providing reverse commute transportation, as the Bridges to Work Program has done. Still, paratransit and reverse commute services for low-income and welfare workers are not common, and would require a substantial increase in funding and coordination to become widespread.

Coordination of Transportation Services
Absent increases in funding for transit, paratransit, and reverse commute services, many policymakers will encourage agencies to make do with what they already have. Unfortunately, the reality is that it is quite rare for social service agencies to coordinate with each other, let alone transportation agencies. This is attributable to differing agency missions, funding streams, accountability, and institutional practices. However, the new welfare law has heightened the urgency for such coordination, again raising possibilities for ITS applications.

The task of coordinating welfare services alone is daunting. As the General Accounting Office reported recently, welfare services delivery is plagued by numerous problems. For example, there are dozens of welfare programs, and many of them overlap, are inefficient, and are administratively burdensome. Feedback measures to track the performance of job placement and other services are virtually nonexistent. Merging welfare services with transportation would make these efforts even more complicated, with regard to both human services transportation and services provided by transit agencies. Since current information systems on welfare recipients and their needs are so poor, transportation providers may have difficulty serving the needs of all workers.

Still, many agencies have managed to successfully integrate their transportation activities using a variety of techniques. Among these are transportation “brokerages” which act

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133 Welfare Programs: Opportunities to Consolidate and Increase Program Efficiencies, U.S. General Accounting Office, GAO/HEHS-95-139, 05/31/95.
like multimodal travel agents; creating regional transportation authorities; hiring innovative non-profit organizations; enlisting volunteer drivers; and maintaining careful accounting of service costs. The brokerage and regional models may benefit from ITS technologies that can make sense of large volumes of real-time information on riders, destinations, shifts, fares, vehicle locations, delays and other factors. The burgeoning use of Geographic Information Systems, coupled with transportation planning and programming has great potential to assist brokers who are trying to match customers and services and locations. In fact, many current welfare-to-work programs have a GIS planning component. Such activities rely heavily on the reliability of rich and accurate data, which can also be improved with ITS technologies that offer enhanced data collection (Automated Fare Payment, Traveler Information Systems, etc.).

Creating Jobs in Low-Income Communities

Despite their promise, all of these ITS-enhanced mobility measures are merely ways to cope with the absence of jobs in places where most welfare recipients live—inner cities and rural areas. They are also vulnerable to funding cuts and rely on the wishful hope that services won’t be cut and fares won’t be raised. Some have even criticized reverse commute programs, for example, for resembling apartheid, where workers are shipped in to provide services at low cost then later shipped back to their distressed communities.¹³⁴

As such, few regard these measures as self-sustaining permanent solutions, even though they are the means with which states and localities have chosen to meet the short-term deadlines imposed by the welfare law. Revitalizing depressed neighborhoods and stimulating job creation is regarded as a much more difficult, long-term goal to which today’s mix of ITS applications may contribute little.

On the optimistic side, transit system and paratransit/reverse-commute advances in low-income neighborhoods may certainly buoy prospects for investment and job creation. Furthermore, tools developed in the telecommunications field, such as telecommuting from satellite offices, transit televillages (e.g. Blue Line Televillage in Compton, CA), and other forms of electronic access, may also provide a boost for jobs in these communities. However, such efforts are highly dependent on the decision-making process, regional economic development priorities, and numerous factors that will affect the location of ITS technology deployment.

In this regard, ITS technologies raise more questions than they appear to answer. When ITS technologies are finally deployed, it is likely their adoption will be influenced by the level of public investment in their research and development. Currently, the US DOT’s Joint Program Office estimates that roughly 80 percent of ITS federal funds are devoted to roadway and private vehicle-based technologies. Furthermore, the APTS office within the Federal Transit Administration has been subject to gradual budget reductions during the course of the ITS program, eventually being incorporated into an office of the Federal

Highway Administration. This has seriously compromised the transit industry’s ability to disseminate information on APTS.

These factors raise concerns about what an ITS phase-in will look like on a community scale. For example, assuming (as ITS practitioners do) that some technologies will be deployed by private/public partnerships, who and what will determine the location of ITS infrastructure? If the majority of applications are indeed roadway and vehicle improvements, will these be installed to serve all neighborhoods, or will they exist where the demand is greatest—heavily traveled highways, perhaps? What areas will bear the brunt of potential negative impacts of ITS deployment—rerouted vehicles avoiding automatic toll collection, urban bottlenecks where intelligent highways meet “dumb” city streets, and increased automobile dependence?

These nagging questions speak to one of the inevitable outcomes of our automobile-oriented economy and landscape: the widening gap between transportation ‘haves’ and ‘have-nots.’ As a powerful set of tools, ITS technologies have the ability to influence this gap by either leveling the playing field or accentuating the inequities in the current system. The same goes for the task of revitalizing communities and stimulating job growth.

**Conclusion: Powerful Tools Need Vision and Powerful Leadership**

This paper argues that ITS and APTS applications, traveler information services, safety improvements, and other technologies certainly have the potential to improve the quality of life for welfare recipients and low-income communities. But this optimism should be tempered with the understanding that other forms of ITS technology—especially those that make driving more attractive—have the potential to undermine low-income mobility. Also, since APTS funding remains at roughly $3 million per year or just over one percent of the total ITS program, widespread adoption of transit-enhancing technologies is unlikely unless a concerted effort is made to promote them.

It is still too early in the ITS implementation process to speculate further on community impacts. Short of more data from operational tests, those concerned with low-income mobility and access should devote attention to the manner in which ITS technologies are adopted. The most important development will be whether they are integrated into the existing transportation planning process, which seeks to strike a balance between the mobility and access needs of all individuals. Within such a planning context, practitioners should not expect ITS technologies to “fix” existing problems in transportation, especially in the transit field. While such measures may enable agencies to deliver better services in a more cost-effective manner, these should not be used as excuses for continuing to decrease public investment.

Over the next several years, we will be able to witness whether our nation’s welfare recipients are willing and able to make the transition to regular meaningful work. Ironically, they are not the only ones who will have to take “personal responsibility” in order to succeed. Federal, state, and local officials, along with a whole host of
community groups and individuals, will also have to take responsibility for major reforms in the current system. And while many have deplored “welfare reform” for its projected impacts on hunger, homelessness, and childhood poverty, one positive aspect is the way this law forces all actors to take part in making welfare work.
CHAPTER SEVEN
SUMMARY AND RECOMMENDATIONS

What Have We Learned for the Future?
Case Study 1: Santa Monica, California

The potential for telecommunications to substitute for travel (i.e. eliminate trips) has been the subject of considerable research for more than two decades. Applications such as telecommuting, teleconferencing and various forms of teleservices (i.e. “on-line” shopping, banking) have been widely mentioned in relation to the “substitution hypothesis.” What this research has shown, however, is that the substitution hypothesis only hints at the complexity of the transportation-telecommunications relationship. Depending on the circumstances, telecommunications can replace, generate or modify trips, as well as have “second order” consequences for land use that ultimately influence travel patterns.

The complex, context-specific relationship between telecommunications and transportation has several implications for urban planners. Perhaps most of all, it should dispel any notion of telecommunications as a “magic bullet” for the problems of urban transportation. Indeed, there is no reason to assume that the interaction between transportation and telecommunications will necessarily create synergies that reduce traffic congestion, address transportation-related environmental problems, or positively contribute to various factors influencing urban quality of life. Such synergies are likely to result, instead, from policymakers actively coordinating transportation and telecommunications strategies to achieve a variety of goals, whether it be reducing the number of automobile trips or making urban areas more livable. For urban communities, then, the key to realizing the full spectrum of benefits from the transportation-telecommunications relationship is likely to be the formal and innovative integration of transportation and telecommunications planning.

The potential benefits from such integrated planning raise a fresh set of research questions about the transportation-telecommunications relationship: What are the issues involved in integrating transportation and telecommunications planning at the local level? Do any models exist on how to conduct such planning? What benefits might result from the integration of transportation and telecommunications planning, particularly broad “quality of life” benefits that transcend the narrow question of whether telecommunications can substitute for travel?[^3]

[^3]: Nilles et al 1976; Saloman 1986; Mokhtarian 1990. Analysis of the potential of telecommunications to substitute for travel began in earnest with Nilles et al. (1976), and has continued since then (i.e. SCAG 1996). For highly optimistic endorsements of the substitution hypothesis in what are often labeled “futuristic” works, see Toffler (1981) and Negroponte (1995).

[^4]: Again, Mokhtarian (1990) and Salomon (1986) provide the best reviews of the evidence on this topic.

[^5]: Our focus of analysis -- “planning” -- refers to the process by which public agencies develop policies in specific areas, such as housing and land use (W. Fulton, Guide to California Planning (Point Arena, CA: Solano Books, 1991). For analytical purposes, social scientists often divide the
The case study of Santa Monica, California, a city of roughly 90,000 people located just west of Los Angeles, sought to answer these questions. As part of the Los Angeles metropolitan area, Santa Monica is facing transportation problems similar to those facing much of southern California: traffic is bad and getting worse. What makes Santa Monica unique, however, is its strategy to manage this problem, particularly within its heavily congested downtown district. Santa Monica is not attempting to “build its way out of congestion” (i.e. add more physical capacity for automobiles). The focus, instead, is on accommodating pedestrians, bicyclists and transit, and the by-product is likely to be a net reduction in physical space afforded the automobile. In other words, rather than attempting to purge auto congestion from its downtown, Santa Monica’s transportation policy embodies ISTEA’s holistic approach: it is instead a “placed-based” strategy that seeks to use transportation (and urban design more generally) as a means to promote wider policy goals, such as local economic development, environmental quality, and the preservation of Santa Monica’s downtown “core” as a center of community life.

Santa Monica’s attempt to integrate transportation with broader economic, environmental and social goals epitomizes the ISTEA and TEA-21 philosophy. This same kind of “holistic,” placed-based approach characterizes Santa Monica’s initiatives in telecommunications. Santa Monica is widely regarded as being among the avant-garde

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139 One of the nation’s busiest freeway -- the Santa Monica Freeway (Interstate 10) -- bisects the city, and, being the principle east-west route traversing the 15 miles between Santa Monica and downtown Los Angeles, presents Santa Monica commuters with a tedious journey both to and from work. Santa Monica’s city streets face traffic pressures as well, with street congestion expected to increase sharply over the next 10 years. For example, the number of signalized intersections considered unacceptably “jammed” in Santa Monica during evening peak traffic periods is expected to rise from 10 in 1995 to 35 by 2005 (City of Santa Monica, Master Environmental Assessment, Final 1995/1996 Update, Technical Appendices, 1996a).

140 Many of Santa Monica’s downtown urban design and transportation policies are applications of what are often labeled “neo-traditional” or “transit-oriented” development principles. The validity of these theories -- that neo-traditional land use and design provides a means to link transportation with broader environmental, social and economic goals -- is one of the central debates among urban planning scholars. For proponents of these theories, see P. Calthorpe, The Next American Metropolis (New Jersey: Princeton Architectural Press, 1993) and R. Ewing, “Is Los Angeles-Style Sprawl Desirable?” Journal of the American Planning Association, 63 1, 1997. For critical appraisals, see P. Gordon and H. Richardson, “Are Compact Cities a Desirable Planning Goal?” Journal of the American Planning Association 63 1, 1997 and R. Crane, “Cars and Drivers in the New Suburbs: Linking Access to Travel and Neotraditional Planning,” Journal of the American Planning Association 62 1, 1996.
in municipal telecommunications. Much of this reputation is due to the city’s Public Electronic Network (PEN). Initiated in 1989, PEN provides free electronic services for those that live, work and attend school in Santa Monica, with many of these services being accessible to non-PEN subscribers via the Internet. PEN provides on-line access to city services (i.e. permit applications, fee payments), city government information (i.e. meeting schedules and agendas, staff reports, city ordinances, etc.), and provides a forum for community members to discuss issues with each other, elected officials and with city staff. PEN has not only improved the city’s ability to deliver government services, but some evidence even suggests that its on-line forums buttress the sense of community among Santa Monica residents.

Further distinguishing Santa Monica as a leader in municipal telecommunications is its Telecommunications Master Plan. This plan (nearing completion at this writing) is assessing Santa Monica’s current telecommunications infrastructure, its future telecommunications needs, and potential ways to meet those needs. This makes Santa Monica one of the few California cities engaged in formal telecommunications planning. In addition to covering issues such as right-of-way management standards, antenna siting policies, universal access and a broad telecommunications ordinance, the city’s Telecommunications Master Plan also explores the feasibility of a “Municipal Fiber Network” (MFN). As currently envisioned, the MFN would connect City facilities (including the planned downtown Transit Mall), local schools, city libraries and other key public institutions within Santa Monica via a fiber optic network.

Santa Monica also provides examples of initiatives that combine transportation and telecommunications. These initiatives focus both on automobiles and transit. On the automobile side, the city’s SMART Corridor Extension project addresses Santa Monica’s chronic problem with traffic congestion, particularly within the city’s portion of the roughly 15 mile corridor connecting Santa Monica to downtown Los Angeles. The SMART Corridor project uses advanced telecommunications, computing and sensor technologies known as Intelligent Transportation Systems (ITS) to improve traffic flow

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142 City of Santa Monica, Request for Proposals for a Strategic Telecommunications Plan, 1996c.
144 As of 1997, the only California city to devise and adopt a telecommunications master plan was Milpitas (City of Santa Monica, Minutes from an Organizing Meeting of the Telecommunications Working Group, 2 July 1997b). According to S. Graham and S. Marvin, Telecommunications and the City: Electronic Spaces, Urban Places (New York: Routledge), 1996, 63, “responsibility for regulating and developing slow-moving telecommunications infrastructures [has traditionally fallen] outside the urban planners’ remit, resting usually with distant, centralized public bureaucracies or virtually autonomous public and private enterprises.” See also M. Webber, “The Post-City Age,” Daedalus, Fall 1968) and Moss (1987) for similar accounts of the traditional neglect of telecommunications by urban planning professionals, theorists and local governments in general.
145 City of Santa Monica, Presentation Notes from Santa Monica Telecommunications Master Plan Public Workshop, 9 February, 1998.
along 3.3 miles of the Santa Monica Freeway (Interstate 10) and two parallel arterial streets. With the real-time traffic information this project provides, Santa Monica and other regional transportation agencies will be able, for example, to respond more quickly to congestion-causing incidents and to adjust the timing of traffic signals to optimize traffic flow. In theory, the traffic and route information provided to drivers during congested periods should reduce both congestion and congestion-related emissions.\(^{146}\)

With respect to transit, Santa Monica integrated of transportation and telecommunications primarily in two ways. The city’s transit agency -- Santa Monica Municipal Bus Lines (SMMBL)\(^{147}\) -- utilizes the Internet extensively, making available a “clickable” bus system map, route and schedule information, points of interest served by the bus lines, as well as assistance in creating bus trip itineraries. In addition to the Internet, SMMBL is also applying telecommunications to improve its buses’ operational efficiency, having installed automated vehicle locator (AVL) and automated schedule systems that allow for real-time tracking of buses. Telecommunications and information technology applications soon to be operational will include an open-air information kiosk located in the downtown Transit Mall, “smart” bus fare boxes that will accept a regional transit card, and security cameras on all buses.

Case Study 2: The Midtown Greenway, Minneapolis, Minnesota
The rise of the “rails-to-trails” movement in the United States is one of the significant land use stories of the 1990s. The number of “rail-trail” conversions, which refers to the conversion of abandoned rail lines to multi-purpose paths serving as both recreation areas and corridors for non-motorized forms of transportation (i.e. biking, walking), has risen dramatically in the last decade. It took 45 years -- from the opening of America’s first rail-trail conversion in 1939 until 1984 -- for the nation’s total number of rail-trails to reach 100. There are now roughly 1,000 trails totaling over 10,000 miles (Rails-to-Trails Conservancy 1998), and soon a network of such trails will connect the entire (contiguous) United States.

What has enabled the explosion of rail-trail conversions during the 1990s is the unprecedented availability of federal money available for such projects. This money has come from ISTEA --mostly from the “Transportation Enhancements” program discussed earlier in this paper -- and is yet another example of ISTEA’s placed-based approach to transportation. Again, TEA-21 continues to fund these types of projects. One of the manifestations of this approach is the sharp increase in the number of federally-funded “transportation” projects in which better transportation -- meaning improved connectivity between places -- is but one of several social, economic and environmental objectives

\(^{146}\) There has been a good deal of study and speculation about the environmental consequences of ITS. For a compendium of papers on the issue, see J. Thomas Hennessey and Thomas A. Horan, eds. 1994. National Conference on Intelligent Transportation Systems and the Environment: Conference Proceedings. Fairfax, Virginia: CASET Associates, Ltd.

\(^{147}\) SMMBL operates two bus systems, the main system being the Big Blue Bus, which in 1997 consisted of 135 buses and an annual ridership approaching 20 million (Santa Monica Municipal Bus Lines Service Plan 1997).
meant to improve the quality of life in communities. Rail-trail conversions, because they almost always encompass these varied policy objectives, embody the multi-dimensional policy approach brought about by ISTEA. They are, all at once, transportation projects that connect places while providing an alternative to auto use; recreation projects that provide communities with a unique resource for walking, biking and exploring; environmental projects that encourage non-polluting forms of travel, preserve open space and often provide inviting natural settings; and economic development projects that can attract visitors, stimulate commerce and even increase nearby land values. Rail-trails are, in short, as much or more about the creation and preservation of quality places than merely about ways to connect places.

This case study highlights one such rail-trail project -- the 29th Street Corridor Projects, also known as the Midtown Greenway -- located in the urban setting of Minneapolis, Minnesota. Utilizing funding from ISTEA’s Transportation Enhancement’s program, the Midtown Greenway project is rehabilitating a five-mile long abandoned rail corridor into a multi-purpose greenway. The project is a classic ISTEA effort to combine several social, economic and environmental goals within the context of one transportation project. The project will provide, for example, an important transportation corridor solely for non-motorized (and thus more environmentally benign) forms of travel. The Greenway’s planned bicycle path would provide an important east-west connection currently lacking in the Twin Cities’ extensive regional bikeway system. Moreover, roughly 56,000 jobs are currently located within the Greenway corridor, and studies indicate that Greenway-area residents might bike or walk to work more often when the project is completed.

In addition to its transportation and environmental objectives, the Greenway project contains economic objectives as well. Part of the five-mile Greenway traverses economically distressed neighborhoods of urban Minneapolis, including a once economically vital commercial sector known as Lake Street. The hope is that an improved Greenway can assist the surrounding economy in two ways: first, by stabilizing and even increasing home prices and property values in areas close to the Greenway; and second, by attracting visitors (i.e. bicyclists) to the area who might stimulate Lake Street’s ailing retail sector. Data suggests that the Greenway project could contribute measurably to both these economic objectives.

In discussing the multi-dimensional Midtown Greenway project, this case study also addresses a question rarely asked in relation to rail-trail projects: What are some of the ways in which information technology, including ITS and broader transportation-related technology applications, might increase the likelihood that the Midtown Greenway project will accomplish its multi-faceted goals? While still in the planning stages, the Greenway project has already both envisioned potentially useful technology applications and actually utilized technology as part of an innovative planning and public participation

149 Luce, 1997.
process. In terms of potential technology applications in the Greenway, ITS could play a role in addressing concerns over safety (i.e. crime) by making remote surveillance and policing of the Greenway possible. ITS technologies could also provide real-time transit information and thus make demand-responsive shuttle buses a viable alternative on Lake Street and other areas adjacent to the Greenway. And while these ITS applications hold promise for the future of the Greenway, an innovative application of Geographic Information Systems (GIS) has already proven valuable as a tool for citizen-based transportation planning. GIS technology enabled data collected about Greenway-area resident perceptions of their neighborhood to be displayed visually, allowing an easy-to-understand source of information for both interested citizens and transportation planners.

Case Study 3: Tappan Zee Bridge, New York
The third case study explores the use of technology to address traffic congestion on the Tappan Zee Bridge, one of major “choke points” for traffic along the New York metropolitan area’s Interstate 287 corridor. Located roughly 25 miles north of New York City, the three-mile long Tappan Zee Bridge crosses the Hudson River in New York state’s Westchester County just below the border with New Jersey. The bridge opened in 1955, and, like countless other transportation corridors in major metropolitan areas, has grown increasingly congested with the rise in population, economic activity and the number of automobiles. Vehicles now move at what traffic engineers classify as a “level of service F” -- the lowest rating given for traffic flow -- during morning and evening peak hours and through much of the day.

The policy response to this congestion, at least up to now, has followed the traditional pattern of freeway widening and various traffic management techniques. In 1987, for example, a seventh lane was added to the bridge. And in 1994, a movable barrier was placed in the median (i.e. the center) of the bridge; the barrier is moved twice daily to change the direction of traffic in the center lane to accommodate the morning and evening commute.

The use of information technology to address this congestion -- again, at least up to this point -- has similarly focused on incremental efficiencies through traffic management. This has taken the form of introducing one of the most common ITS technologies: electronic toll collection or ETC. E-ZPass enables motorists crossing the bridge to pay the bridge toll without stopping at a toll booth. E-ZPass works by equipping a vehicle with a small electronic device called a “tag”. The tag is scanned electronically as the vehicle passes the toll booth area, deducting the toll amount automatically from a pre-established account. Currently more than 70 percent of the toll transactions conducted during the morning peak traffic period are conducted using E-Zpass.\(^{150}\) And while no formal study has been done to measure of the effects of E-ZPass on Tappan Zee Bridge

\(^{150}\) New York State Thruway Authority, 1997.
congestion, transportation officials report that far more vehicles are now processed per hour than was the case prior to using E-Zpass.\textsuperscript{151}

Viewed in light of ISTEA’s holistic approach to transportation, results of using electronic toll collection systems such as E-ZPass has been a “mixed-bag,” at least in the way the technology has been used on the Tappan Zee Bridge and virtually everywhere else. On the one hand, ETC provides an immediate benefit to motorists in reducing substantially the amount of time spent idling at toll booths. And when used as a traffic management strategy to move vehicles more quickly, ETC is consistent with ISTEA’s holistic philosophy in providing increased highway system capacity while using fewer resources and causing less physical damage than would result from adding new lanes. Furthermore, ETC does, at least in the short-term, reduce air pollution related to traffic congestion: studies show that ETC at toll booths reduces hydrocarbon emissions by up to 83 percent “per affected mile.”\textsuperscript{152}

Yet on the other hand, a technology used merely to move traffic through toll booths more quickly is no panacea. ETC schemes such as E-ZPass, for example, do nothing to manage or affect travel demand. Indeed, E-ZPass and similar ETC systems may do just the opposite by spurring what is known as “latent” or “induced demand” for highway use. Latent demand refers to “the additional, unanticipated vehicles that appear on roads because people switched routes, modes, or travel times, or because they decided to take trips they had previously not taken. Latent demand is present when congestion is severe enough to deter people from taking trips using their most preferred routes, modes, or times of day…”\textsuperscript{153} The concern is that ITS applications such as ETC would effectively increase highway capacity which, in turn, would lead to more driving by unleashing latent demand for highway use.\textsuperscript{154} More driving would increase vehicular emissions, and the increased highway capacity may even encourage continued development of outlying suburban areas (i.e. “sprawl”).

Yet the potential applications of ETC, of the Tappan Zee Bridge and in other transportation corridors, go far beyond merely easing congestion at toll booths. What ETC technology would enable on the Tappan Zee Bridge -- but, as of yet, has not been tried -- is a policy tool likely to be far more effective in reducing congestion and in addressing the environmental costs of driving. That policy is referred to as congestion pricing, or charging drivers a fee that varies with the level of congestion on a road (the higher the congestion, the higher the fee). Advocated for decades by policy experts as a remedy (perhaps the only remedy) for traffic congestion and other problems caused by excessive reliance on automobiles,\textsuperscript{155} the Tappan Zee Bridge’s electronic toll collection infrastructure makes congestion pricing an increasingly practical policy option. A far different question, however, is whether technological practicality will translate into

\textsuperscript{151} New York State Thruway Authority, 1995.
\textsuperscript{152} US Department of Transportation (US DOT), 1996.
\textsuperscript{153} Kanninen 1994, 2
\textsuperscript{154} Ostria, 1995.
\textsuperscript{155} Downs 1992; Giuliano 1994.
increased political support for the idea of congestion pricing. So far, the politics of pricing surrounding the Tappan Zee Bridge suggests that large-scale congestion pricing remains an idea whose time has not yet come.\(^{156}\)

The controversy over congestion pricing on the Tappan Zee Bridge thus illustrates a key point made earlier in this paper: that the social and environmental consequences of ITS and other transportation-related information technologies are not fixed or pre-ordained. Their effects will depend, instead, on how the technologies are applied. Whether ITS is used primarily to speed traffic flow or also for broader applications will be a function of decisions made by political leaders, transportation policy “stakeholders,” and the broader public. The Tappan Zee Bridge experience shows that politics will, in some instances, determine whether ISTEA’s holistic approach serves to guide ITS investments.

**Case Study Findings and Policy Implications: Paths to Successful Policy in the Next Millennium**

The case studies illustrated several different ways in which ITS and other information technologies are being incorporated into transportation policy and planning. Discussed below are several policy implications suggested by the case studies.

1) *View the continuing evolution of the information revolution as an opportunity to overhaul the transportation policy sector in ways that promote more livable communities.*

The first and most general lesson from the case studies is that traditional transportation policy solutions to a growing population and a growing economy -- more lanes, more roads and more highways -- are increasingly disappearing as options for transportation policymakers. ISTEA and its successor legislation, TEA-21, ensure that the future of U.S. transportation will involve more transit, more walking and biking, more emphasis on arranging land uses that minimize the need to travel, and more efficient use of the existing system of roads and highways.

This new era in transportation policy highlights the need for new tools consistent with ISTEA’s holistic approach, and it is this niche that ITS and other information technologies are poised to fill. The creative industrial-era engineering that built the current system of roads and highways must, we believe, give way to creative information-era engineering and policy solutions that use new and emerging information technologies capable of pursuing a holistic approach to transportation. Various projects and planning

\(^{156}\) The New York State Thruway Authority -- the New York metropolitan area transportation agency who owns and operates the Tappan Zee Bridge -- is currently conducting a study of the potential benefits and costs of congestion pricing on and around the Tappan Zee Bridge. Called the “Tappan Zee Corridor Congestion Relief Study,” the study began in 1997 and is studying how various levels of time-of-day toll differentials would affect regional travel patterns. The Thruway Authority has yet to take an official position on congestion pricing in the Tappan Zee Bridge area, and considerable controversy currently exists over how any potential congestion pricing revenues would be used. Environmental organizations, for example, want assurances that congestion pricing revenues will be used to improve local regional transit services; under current law, the revenues could be used for any public works project (Tri-State Transportation Campaign 1997).
efforts highlighted in the case studies -- Santa Monica’s use of technology to make its downtown more pedestrian and transit friendly, the use of GIS to improve the quality of public participation in the Midtown Greenway planning process -- are harbingers of the kinds of innovative, holistic applications of information technology to transportation.

2) Focus on how transportation technologies can help create quality places, rather than just facilitate movement from place-to-place.

The most promising examples from the case studies were those in which transportation technologies were part of comprehensive strategies focused on using transportation policy to create quality places -- the unique areas where people live, shop, work and participate in community life. This is a far broader approach to ITS and other transportation-related information technologies than one, which focuses solely on mobility or facilitating the movement of people and goods from place-to-place.

In Santa Monica, for example, the city’s Downtown Urban Design Plan is a comprehensive effort to use transportation investments to improve the quality of a particular place (in this case, downtown Santa Monica). The Plan seeks to make downtown Santa Monica more pedestrian and transit oriented through various infrastructure and aesthetic improvements that include widening sidewalks, converting several one-way streets to two-way, creating a Transit Mall at the very center of downtown that will form a high-profile hub of city’s transit service, planting trees along sidewalks and adorning downtown streets with public art. Information technology is contributing to the plan by providing several open-air information kiosks in the transit mall area to provide real-time transit information and trip planning services.

The upshot of all the elements of the plan will be to make downtown Santa Monica a more unique, memorable and interesting place to be, as stated in a City of Santa Monica City staff report describing the Plan:

Santa Monica’s desire for a strong downtown is the guiding idea behind the Downtown Urban Design Plan. One of the main principles behind the Plan is the understanding that congestion is a fact of life in successful urban places, and the Plan begins with the recognition that a certain level of congestion is both appropriate and desirable to a thriving downtown...The Plan contains a series of trade-offs which when combined together, create a vibrant, mixed-use, street-oriented urban district busy with people, cars, bicycles, and buses. Thus the aim of the Plan is not to do away with congestion, but to manage it in a way that enhances rather than disrupts the downtown environment.  

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157 City of Santa Monica 1996, 1-2.
What Santa Monica’s plan reflects, then, is one of the central lessons of the interstate highway era incorporated into ISTEA: that too much emphasis on making places easier to pass through will tend to create places where no one wants to be.

The place-based use of transportation technology in Santa Monica’s Downtown Urban Design Plan can be contrasted with the use of technology to address traffic congestion on New York’s Tappan Zee Bridge. Up to now, the primary objective in using technology on the bridge has been to focus narrowly on facilitating movement from place-to-place through the E-ZPass electronic toll collection system. Given the severe traffic congestion on the bridge, E-ZPass seems a sensible, incremental step in addressing the congestion in the short-term. And as was discussed earlier, E-ZPass and other ITS technologies meant to improve traffic flow tend to be less expensive, less environmentally damaging means on increasing roadway capacity than is the traditional approach of adding new lanes. Yet viewed in light of ISTEA’s and TEA-21’s holistic philosophy and the kind of place-based approach to transportation technologies being taken in Santa Monica, the “mobility-centered” policy currently governing the use of ITS on the Tappan Zee Bridge appears as only a partial solution. The missing component comes to the fore by asking the question, “What ITS applications on the Tappan Zee Bridge might, first and foremost, contribute to improving the quality of the places surrounding the bridge?” Asking this question could shed new light and re-frame the debate surrounding the best approaches to traffic congestion (i.e. the use of pricing strategies) on the Tappan Zee Bridge and in congested urban corridors across the nation.

3) Deploy transportation technologies within the context of a broad definition of “accessibility.”

The way in which accessibility is defined can have important policy implications. For example, one common definition of accessibility is “the ease of connection between places.”\(^{158}\) This definition stresses connectivity: the ability of an area’s transportation and telecommunications system to connect people to places and opportunities. Such a definition will tend to result in projects that, like E-ZPass on the Tappan Zee Bridge, integrate transportation and information technologies to improve the ability to move between places. Yet a separate definition of accessibility -- as “the ability of people to benefit from places and services”\(^{159}\) -- stresses the qualities of place: the ability of an area’s transportation technologies to provide connectivity and, just as importantly, to create places that are more livable and attractive. It is this second definition of accessibility that spawns projects like the Midtown Greenway in Minneapolis, in which a transportation project is simultaneously an urban recreation project, an economic development project, and perhaps a setting in which Greenway-area residents might develop closer community ties and a stronger sense of place.

\(^{158}\) Giuliano, 1995, 1.
\(^{159}\) Public Technology, Inc. 1998, 4.
Conclusion
The general question examined in this report is how transportation and the information revolution can build more sustainable communities. The most common use of ITS thus far is to maximize traffic flow, which does not necessarily result in higher quality communities and, in many instances, creates sterile places where people become isolated from spending so much time traveling alone in their cars. The cases included in this report highlight some of the broader uses of ITS to help build sustainable communities that are more economically viable, environmentally sound, and readily accessible to all. However, more work needs to be done to learn about how to best utilize ITS in transportation policies that focus on places and accessibility rather than mobility.

Recommendations
This report indicates that policymakers, transportation professionals, urban designers and all those who are involved in development in the 21st century must learn to think more broadly about ways to use ITS. Following are several recommended steps to achieve a more effective use of ITS in the development of sustainable communities.

1. Benchmark system performance using innovative technologies.

   The first recommended activity is to develop new ways to measure accessibility. Now when transportation planners and policymakers are considering options to make relieve congestion, address economic needs of their communities and pursue development that is efficient and affordable, they have no tools to compare place-based transportation decisions with traditional flow and mobility transportation policies.

   Public participation is critical when developing measures and indicators of sustainable communities. Demonstration projects would be undertaken to work with communities to decide what indicators should be used to measure increased accessibility and higher quality of life in a community. If communities had tools to measure their success, then it would be help spur the use of these tools all across the country.

2. Develop linkages between transportation, telecommunications, and ITS planning.

   Developing accessibility measurements would lead to increased linking between transportation, telecommunications and ITS planning. Communities would use technological tools including GIS, telecommunications, the Internet, and others to carefully plan to maximize the social, economic and environmental benefits potentially afforded by these trends. While research shows that telecommunications does not necessarily serve as a substitute for transportation, synergies are found in the Santa Monica experience. The Santa Monica experience shows the need for and value of integrated planning.

3. Integrate information technology with community design.
“Community design” refers to community development through both physical and social infrastructure. ISTEA spurred a wave of new thinking about transportation’s contribution to community design, and much of this new thinking has manifested in efforts to create more livable communities. TEA-21 will continue to support this new thinking. While differing in their specifics, livable communities initiatives tend to emphasize the revitalization of traditional downtown cores as a center for entertainment, commerce and social interaction. This can involve the creation of a more pedestrian-friendly atmosphere, re-arranging downtown traffic circulation and improving transit services, as well as mixing residential and commercial land uses. Ideally, this approach can serve numerous economic, social and environmental goals.

Increasingly, the creation of livable communities will depend on their ability to integrate information technology into their community planning efforts and right now not many communities have done this. Again, the Santa Monica case presents the difficulties associated with integrated planning, but it also shows the potential of how information technology combined with transportation and telecommunications planning can enhance a community. In addition, the Greenway experience in Minnesota shows how a community can use information technology tools to help decide how to plan a community to fit the needs of its residents.

4. **Recognize the affects of innovative technology applications on travel behavior.**

Altering patterns of personal travel has been a major element of federal, state and local transportation policy since the 1970s. Policymakers are now studying ways in which information technology might assist in managing travel behavior and managing congestion. The case describing the experience of using ITS to manage traffic in the Tappan Zee Bridge region of New York shows that various technologies provides relief in the short-term, but does not effectively change people’s travel patterns. In fact, the electronic toll collection creates additional traffic.

Additional data is needed to determine how electronic toll collection can be used to initiate a congestion pricing program that may change personal travel behaviors and contribute to a more environmentally-sound transportation system.

5. **Conduct outreach and educational activities.**

Part of the research undertaken for the production of this report included extensive outreach and educational activities. The goal has been to disseminate research findings and gather feedback from a wide array of stakeholders. Now these outreach and educational activities must be expanded to include information learned to date about the potential of ITS and transportation.

Section 1221 of TEA-21 provides the US Department of Transportation with $120 million over the six years that can be granted to state, local and regional agencies that
partner with non-profits, private sector interests and each other to bring together transportation and land use decisions. The program, called the Transportation and Community and System Preservation Pilot Program, offers planning grants and “implementation grants” to fund cross cutting research. This program may be useful to fund community-based demonstration projects that use information technologies to help communities create systems to make transportation and land use decisions that help result in sustainable communities.

These recommendations would help contribute to a better understanding of how to approach the transportation and community design problems for the next century. It is clear that new information technologies have a great potential in helping to address sustainable communities goals. Progress can be made by continuing to develop new projects at the community level where we can learn from the results of the experiences.

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Appendix A
Highlights of the Personal Responsibility and Work Opportunity Act of 1996

Work Requirements
- All able-bodied adult welfare recipients must work within two years of receiving benefits. Work activities include subsidized or unsubsidized employment, on-the-job training, work experience, community service, up to 12 months of vocational training, providing child care for other welfare recipients, and up to six weeks of job hunting.
- No recipients receive assistance for more than five years (cumulative).
- By FY 1997, 25 percent of families in each state must be off welfare rolls or engaged in work activities. This percentage increases to 50 percent by 2002.
- Single parents must work 20 hours/week during their first year of work. This increases to 30 hours/week after 2000.
- Two-parent families must work 35 hours/week by 1 July 1997.

Supplemental Benefits
- $14 billion in child care is provided over six years.
- Female recipients get health care.
- After leaving welfare rolls, families may receive one year of transitional Medicaid benefits.

State Responsibilities
- State officials are required to assess individuals’ skills and training and education needs.
- States must maintain a minimum annual spending level of at least 80 percent of FY 1994 expenditures. If states spend annual amounts equal to FY 1994 levels, they may have access to a $2 billion contingency fund designed to help states coping with high population growth or a sluggish economy.
- States must spend a minimum of FY 1994 or FY 1995 (whichever is greater) expenditures on child care. Additional funds are accessible only by states that exceed this amount.
- States may create jobs by transferring welfare savings to community service or subsidized employment opportunities.

Federal Responsibilities
- Federal agencies and non-governmental organizations will determine the criteria for access to a $1 billion performance bonus fund.
- Agencies have established a comprehensive child support enforcement system to crackdown on “deadbeat dads,” including a National Directory of New Hires.
### Appendix B: Selected State and Local Welfare-to-Work Mobility Efforts

<table>
<thead>
<tr>
<th>Location</th>
<th>Project/Agency</th>
<th>Goals</th>
<th>Methods</th>
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<tbody>
<tr>
<td>Capitol Region Council of</td>
<td>Welfare-to-Work Transportation Access Work Group</td>
<td>Define gaps in transportation services and develop solutions.</td>
<td>Converting welfare savings to programs that provide bus and van service from Hartford to suburbs during regular and extended service hours; extending paratransit services.</td>
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<td>Government (Connecticut)</td>
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<tr>
<td>West Florida Regional Planning</td>
<td>Van Pool Program in Pensacola area</td>
<td>Provide van pool service to job centers.</td>
<td>Coordinates agencies, nonprofit corporations, private carriers; offers Guaranteed Ride Home; advertises through job fairs and other venues.</td>
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<td>Council</td>
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<tr>
<td>Georgia</td>
<td>Peach on Wheels</td>
<td>Fund vehicle purchases.</td>
<td>Relies on revolving fund; inspiration for Tennessee’s “Wheels for Work” program.</td>
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<tr>
<td>Chicago, Illinois</td>
<td>Suburban Job-Link Corporation and PACE</td>
<td>Establish programs to ease transition from welfare to work.</td>
<td>Reverse commute programs; van pools; employment services; training and support facilities; express bus; shuttle services; ridesharing; coordination of transit agencies; employer outreach.</td>
</tr>
<tr>
<td>Kentucky</td>
<td>Kentuckiana Regional Planning and Development Agency</td>
<td>Develop reverse commute programs</td>
<td>Coordinated with Transit Authority of River City; established express transit service between inner city Louisville and Bluegrass Industrial Park.</td>
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<tr>
<td>Kentucky</td>
<td>Empower Kentucky</td>
<td>Guarantee transportation to all TANF recipients.</td>
<td>Provides transit to 28 rural counties that have no regular transit service; establishes 16 regions that transportation companies can bid to serve.</td>
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<tr>
<td>St. Mary’s County, Maryland</td>
<td>Department of Social Services</td>
<td>Identify welfare mobility needs.</td>
<td>Using GIS software, map location of welfare recipients, jobs, services and existing transport services to aid mobility.</td>
</tr>
<tr>
<td>Baltimore, Maryland</td>
<td>Historic East Baltimore Community Action Council</td>
<td>Establish programs to ease transition from welfare</td>
<td>Helps get people jobs in the Baltimore-Washington International Airport area; provides door-to-door van rides to job sites; serves as ride broker for job seekers and trainees.</td>
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<tr>
<td></td>
<td>Bridges to Work</td>
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</tbody>
</table>

Sources: US DOT, Community Transportation Association of America.
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<thead>
<tr>
<th>Location</th>
<th>Program</th>
<th>To work.</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Michigan</td>
<td>Project Zero (Part of the State Welfare Program, “To Strengthen Michigan Families”)</td>
<td>Eliminate the number of public assistance households in pilot areas.</td>
<td>Allowed extension of transportation service hours and locations; provided rides to day care and job interviews; allowed children to ride on MichiVan vehicles; provided over $1 million in state funds for transit.</td>
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<tr>
<td>Detroit, Michigan</td>
<td>Operation Able, Southeast Michigan Area Rapid Transit</td>
<td>Establish programs to ease transition from welfare to work.</td>
<td>On-site computer terminals to help coordinate agencies and services (officials can serve as brokers) public education and outreach; marketing; planning; ensuring high-quality service.</td>
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<tr>
<td>Minneapolis, Minnesota</td>
<td>Destination Jobs</td>
<td>Reverse commute services</td>
<td>Initiated by Eden Prairie Chamber of Commerce; Hennepin County offers Emergency Ride Home.</td>
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<tr>
<td>St. Louis, Missouri</td>
<td>East-West Gateway Coordinating Council Bridges to Work Program</td>
<td>Establish programs to ease transition from welfare to work.</td>
<td>Co-sponsored by US DOT, HUD, Center for Mobility to Work, MO state agencies, Annie Casey Foundation, Business Service Opportunities (training); targets broad low-income population.</td>
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<tr>
<td>New Jersey</td>
<td>Work First New Jersey</td>
<td>Establish programs to ease transition from welfare to work.</td>
<td>Programs include “Get a Job, Get a Ride” program; planning fund; GIS planning; financing demonstration projects in Gloucester and Monmouth Counties. Additional funding is close to $4 million.</td>
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<tr>
<td>Zuni, New Mexico</td>
<td>JOBLINKS</td>
<td>Rural mobility program</td>
<td>Provides access for job training and employment; got commitment from agencies; developed volunteer network.</td>
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<tr>
<td>Buffalo, New York</td>
<td>Hublink</td>
<td>Coordinate Transportation Services</td>
<td>Led by Niagara Frontier Transit Authority; provides late night service; reverse commute service.</td>
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<tr>
<td>North Carolina</td>
<td>Work First</td>
<td>Establish programs to facilitate transition from welfare to work.</td>
<td>Programs include public education; transit commuter benefits; rural vanpooling; job fairs; ride along program; coordination of transit and human services transport; and coordination of school bus network.</td>
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| Ohio                             | Ohio Works First                                                        | Establish programs to facilitate                                       | Up to $5 million set aside for improving welfare mobility. County officials develop mobility plans. State
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<thead>
<tr>
<th>State</th>
<th>City/County</th>
<th>Organization</th>
<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
<td>Glendale/Azalea, Oregon</td>
<td>Glendale-Azalea Skills Center</td>
<td>Provides rides to jobs and training center</td>
<td>Relies on volunteer drivers; marketing; public education; idle school buses; coalition of local agencies.</td>
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<td>Pennsylvania</td>
<td>Workshop on Wheels</td>
<td>Mobile job search service</td>
<td>Matches employers with prospective workers; coordinated with day care.</td>
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<td>Pennsylvania</td>
<td>Wheels for Work</td>
<td>Aids vehicle purchase</td>
<td>Berwick Area United Way matches donated cars with needy workers.</td>
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<tr>
<td>South Carolina</td>
<td>Department of Social Services’ Office of Family Independence Welfare-to-Work Program</td>
<td>Analyze transportation needs; outline solutions; implement plan.</td>
<td>DSS coordinated with SC DOT and Interagency Committee on Coordinated Transit.</td>
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<tr>
<td>Tennessee</td>
<td>Families First</td>
<td>Programs to facilitate welfare to work transition</td>
<td>Creates regional transportation brokers; establishes “Wheels for Work” program (revolving load for vehicle purchase); coordinate unused school buses.</td>
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<tr>
<td>Virginia</td>
<td>Department of Social Services</td>
<td>Programs to facilitate welfare to work transition</td>
<td>DSS released $2.5 million in contracts to provide transportation services for welfare mobility. Established Ridefinders, a GIS mapping tool.</td>
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<tr>
<td>Wisconsin</td>
<td>Fond du Lac County</td>
<td>Offers job access loans</td>
<td>Loans cover costs of uniforms, tools, car, and other work-related items.</td>
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