TRENDS AFFECTING PUBLIC TRANSIT'S EFFECTIVENESS
A Review and Proposed Actions

A study prepared for the American Public Transportation Association

by

Brendon Hemily, Ph.D.

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Disclaimer

This study attempts to distill and synthesize a broad range of trends affecting public transit in the metropolitan community setting, and proposes various actions to address future challenges. The study was underwritten by the American Public Transportation Association, but all views expressed are those of the author.

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About the Author

Dr. Brendon Hemily (brendon.hemily@sympatico.ca) is an independent consultant with over 20 years of experience working with the public transportation industry to understand the complex challenges facing transit systems, to identify best practices, and to articulate practical actions and research needs to help address these challenges. He has focused in particular on encouraging *innovation in transit management and planning*, through the implementation of innovative management and service concepts, as well as the application of advanced technology to improve the effectiveness and efficiency of transit systems.

Prior to 2000, Dr. Hemily worked for 15 years at the Canadian Urban Transit Association (CUTA), serving as CUTA's Manager of Research and Technical Services, where he was responsible for the Canadian national statistical programs and all technical and research activities provided by CUTA to the Canadian transit industry, including the national cooperative Strategic Transit Research Program (STRP). Prior to that, Dr. Hemily was Program Director at the Institute for Urban Transportation at Indiana University, working with Dr. George Smerk, where he conducted research on the use of strategic planning in the transit industry and managed IUT's training activities. Dr. Hemily has made over 80 professional presentations at APTA, TRB, CUTA, and UITP meetings, and has prepared 20 reports and published papers. Dr. Hemily has received a Ph.D. in Transportation and a MS.C.E. from the Massachusetts Institute of Technology, and a B.A. in Economics from Columbia College.

Foreword

For many of us, transit represents the lifeblood of cities, fulfilling an essential and multi-functional role to ensure the livability and sustainability of urban communities. However, transit is facing numerous complex challenges in the medium to longer term, stemming from myriad demographic and socio-economic trends, changes in land-use and mobility patterns, societal changes and concerns, emerging professional practices, etc. There are many experts that focus on exploring and explaining trends and their implications from a general urban planning or transportation perspective, but few look at them from the specific point of view of the transit manager, staff, or board member.

A very innovative General Manager I interviewed early in my career said: "the only time he could devote to '*strategic planning*' of the transit system was when he was taking his shower." This paper is an attempt to take a strategic view of a wide range of trends, distill the challenges they create for transit systems and the industry as a whole, and identify some questions and potential actions for consideration. The Appendices include a summary of concepts and listing of a wide range of accessible resources on various specific topics for those who want more information.

Although the paper covers terrain that will be familiar to some, the result will hopefully clarify the challenges, and encourage renewed thinking on the development and pursuit of a new vision of public transportation in the community setting. At the very least, I hope it will stimulate new thoughts and directions for those transit managers who only have the time to do their strategic planning in the shower.

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ABSTRACT

This paper reviews a wide range of information, including demographic and socio-economic trends, changes in land use and mobility patterns, societal changes and concerns, emerging professional practices in urban planning, etc. The objectives of the study are to distill from these medium-to-longer trends, the challenges they create for transit system effectiveness and for the industry as a whole, and to identify some questions, opportunities, and potential actions for consideration in the formulation of future strategic directions for transit in the community. The study also provides in the Appendices, a discussion of concepts, and a listing of many accessible resources on various specific topics.

EXECUTIVE SUMMARY

This study has conducted a comprehensive review of a wide range of demographic, social, transportation, and land-use trends through a diverse body of literature and web resources in these fields, as well as consulted many documents in areas related to new planning concepts, sustainable communities, and sustainable transportation. A number of trends have emerged from this comprehensive review that will affect transit system effectiveness (i.e. what role transit serves in the community and its ability to serve that role) in the future.

First, it is clear that U.S. cities are "On the Move":

- Transit has made some impressive achievements in the last few years, though somewhat moderated by the current economic slowdown.
- Many cities are enjoying a renaissance, as a result of public and private investments, as well as enhanced attractiveness as a place of residence and employment.
- There have been over the last decade, a significant number of new approaches being discussed by planning and land development practitioners and officials, all focusing on the concept of "sustainable community" and "smart growth", and implementation of these concepts is gaining ground.
- Various initiatives are strengthening the link between transit and the community. These include: joint development, Transit-Oriented Development (TOD) and location-efficient initiatives, Transportation for Livable Communities, and the Transportation and Community and System Preservation (TCSP) Program.

At the same time, the analysis of long-term trends identifies a number of significant challenges; these are expressed as four trends, and four areas of concern. Significant trends identified from the review that will affect transit's effectiveness in the medium-to-longer term, include:

- Growing sprawl, in terms of both population and employment, and also related to the growth in edge cities and big box store retail,

- Growing auto fleet, use, and distances traveled,
- Growing congestion but little sign of any related policy paradigm shift, and
- Changing travel patterns, which are decreasing traditional work trips and increasing trip chaining.

Four areas of societal concern have been identified through the review of these trends as being particularly pertinent in terms of affecting transit's future role in the community and its effectiveness. They include:

- Environmental, energy, economic, and safety implications of increasing auto dependence,
- Health issues resulting from poor air quality and patterns of the built environment, respiratory and obesity-related ailments in particular,
- Mobility requirements of an aging population, and
- Mobility-related social integration issues for the physically disadvantaged, economically disadvantaged, and increasing immigrant population.

Based on the assessment of these trends, there is need for concerted action along a number of dimensions as transit formulates its future strategic directions.

First, any strategy should be guided by a new vision of transit's role within the community. One possible starting point for building such a vision was expressed as follows:

> ***A transportation system that meets the needs for mobility and accessibility while balancing the current and long-term goals of economic growth, environmental quality, and social equity.***

A number of **actions are recommended** by the study. These include:

- **Enhance The Capacity Of Transit To Meet The Congestion Challenge**, through new transit infrastructure and increased priority to transit,

- **Develop A New Customer-Oriented Approach To Service Provision**, built on:
  - a better understanding of current and new markets through ***market segmentation***;
  - a ***Family of Services*** strategy, designed to meet the needs of market segments; and
  - a ***Mobility Management*** approach and coordination of all public transportation.

- **Enhance The Transit-Community Link**, through various efforts:
  - at the federal level, through increased support for the concept of smart growth, the highlighting of transit's potential role, support for MPO involvement, etc.
  - at the local level, through increased leadership by the transit system to create a vision of ***urban transportation in a sustainable community***, and to support or lead initiatives that support transit or sustainable modes, and
  - through practical initiatives that enhance transit's role in the community.

The research also provides an initial set of questions that transit systems could use to initiate strategic reflection on the following issues in their own communities:

Knowledge of Transit Markets?

- What market research information (including demographic and market segmentation information) exists about current customers of the transit system?
- What information exists about the likely future evolution of transit customer markets in the community?
- Has existing travel market information been co-related to the use of the various transit (and other public transportation) services in the community?

Impact of Aging Population; Knowledge and Options?

- What are the characteristics of current seniors market (size, geographic distribution, expectations, etc.)?
- How is the seniors travel market likely to evolve?
- What will be the implications over time in terms of expectations, service design, etc.
- Given the importance of this market, has any effort, specific to the seniors' travel market, been conducted to assess needs or to develop a service plan (such as those in Denver, Orange County, Portland, available from the APTA Information Center Briefing)?
- Have local organizations that assist seniors (social agencies, non-profit organizations, special purpose media) been identified, and contacted, in order to assist with needs assessment and dissemination?

Immigrant Market; Knowledge and Options?

- Does any information exist about the local immigrant travel market, in terms of residential concentrations, travel patterns, and mode choice?
- Has any market research or planning effort, specific to the immigrant travel market, been conducted to assess implications for service design, customer information, etc.?
- Have local organizations that assist immigrants (social agencies, non-profit organizations, special purpose media) been identified, and contacted, in order to assist with needs assessment and dissemination?

Other Market Segments that Merit Special Attention?

- Are there any other specific market segments in the community that warrant special attention (e.g. reverse commute access to jobs, physically disadvantaged, university students, long distance commuters, tourist visitors, etc.)?
- Have there been any recent assessments of these segments (e.g. market size, evolution, current services, expectations, etc.)?
- Who should be consulted and what should be the assessment process?

Development of a Vision?

- What is the status of relations with the MPO and other local planning organizations?
- Are smart growth, sustainable community and sustainable transportation guiding principles for these organizations?
- Does there exist a shared "vision" of public transportation in the community, consistent with sustainable community principles?
- Has it been clearly articulated?
- Have the public, community organizations, and other stakeholders participated in the development of the vision?
- How will this vision be translated into strategic goals and directions for the transit system?
- How will effectiveness in attaining these strategic goals and fulfilling the vision be measured?

Transit's Involvement in Regional/Urban Planning, and Land-Use Decisions and Support for Transit-Supportive Development?

- Is transit a partner with local agencies/departments responsible for planning and land-use development concerning major land-use and development decisions?

- Does transit have the opportunity to review site plans from a transit perspective?
- Has transit developed a set of "transit-supportive" land development and site design guidelines?
- Have these been adequately communicated to politicians, planning officials, and developers?
- What are the opportunities for TOD or Transit-Supportive Development in the region?
- Are there any specific efforts that the transit system could pursue to encourage more TOD?

The five Appendices provide some practical guidance in terms of concepts and identify many resources for transit systems that would like to pursue these topics.

It is hoped that this research will help to stimulate action within the transit industry, so that it can build on the considerable achievements to date, address the identified challenges, and fulfill its potential role in ensuring a more sustainable community for tomorrow.

TRENDS AFFECTING PUBLIC TRANSIT
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1. TRANSIT AND COMMUNITIES ON THE MOVE

Transit systems and the cities they serve in the U.S. are on the move! One senses a remarkable turn-around since the mid-1990's in the transit industry that parallels the health, vitality, and pride found increasingly in U.S. cities. This renewal of both transit and cities results from a number of factors.

1.1. Achievements of Transit

1.1.1. Impressive Recent Ridership Gains

Transit has posted some significant gains in ridership in recent times. Transit ridership in the U.S. was over 9.6 billion in 2001, the highest level in 40 years. Ridership grew 24% between 1995 and 2002, and had gained two billion passengers since 1970 [APTA, 2004; Pucher, 2002].

Substantial ridership increases have occurred in heavy-rail-based cities such as New York City and Washington D.C., but growth in ridership in many cities can also be directly attributable to major new investments made in transit as a result of TEA-21 legislation. New light rail, commuter rail or bus rapid transit services have achieved remarkable success in communities across the country, often posting ridership levels above projected ridership.

1.1.2. Mobility Option for All

Transit provides a mobility option for all, and the availability of that alternative mobility option finds strong public support. In their book, *Policy and Planning as Public Choice: Mass Transit in the United States* [Lewis and Williams, 1999], David Lewis and Fred Williams, highlight the widespread political and public support that the transit industry enjoys, which far exceeds the percent of the population that directly uses and benefits from transit. "Affordable transportation is valued in every urbanized area in the United States. Private vehicle operation is the norm. But every community contains children, elderly people, and others who cannot safely drive and many who cannot afford cars. Local budgets extend transit services for these needs. Additionally, in a significant number of severely congested urban commuting corridors, rapid transit measurably improves the work trip for passengers and motorists alike" [Lewis and Williams, 1999, p. 253]. They estimate the actual monetary value of these benefits as two to three times the budgetary outlays for transit service.

Transit also serves many more people in the community than the daily ridership totals suggest, resulting from occasional usage of the system. "On average, the ratio of people using transit in the community during a month compared to the number of people using transit on one day is 3.04. The ratio of people served in the community to the daily person appears to increase as the size of the system increases" [McCollom, 1999, p. 8].

1.1.3. Access to Jobs

In addition, transit has played a significant role in the national effort to assist people to move off of welfare. The ability to access jobs is often a substantial barrier to those seeking employment, especially as a growing percentage of employment becomes located in increasingly remote suburbs. The Federal Job Access and Reverse Commute (JARC) Program has served to highlight the potential role that public transportation can serve in assisting persons making the transition from welfare to work. By providing late night service to night shift jobs, or reverse commute service to retail centers or industrial parks, transit can make the difference for persons without automobiles to obtain and keep employment.

In cities like Baltimore and Hartford, the JARC Program has served not only to supply needed transit services, it has also resulted in greater coordination between transit providers and human service agencies, which in turn allows a more in-depth and timely understanding of the specific needs.

1.2. Renaissance of Cities

Parallel to the renewed strength of transit is the renaissance found in cities across the Nation.

1.2.1. Public and private investment

Cities are increasingly recognized as a critical element of the Nation's economy. Over the last two decades, one sees the considerable re-investment in the nation's core cities that has taken place, with new cultural, sports, civic, and transportation facilities and amenities. Examples are numerous:

- Baltimore's Inner Harbor
- Pittsburgh's Three Rivers area
- Cleveland's Lakefront
- San Diego's Old Town

This public investment has often been followed by significant private investment, resulting in the revitalizing of the downtown cores.

Much of this public re-investment has been accompanied by, or sometimes initiated by, investment in transit facilities such as LRT or transit malls, Dallas being a fine example. In many cases, this reinvestment in cities has resulted in the renewal of older Rust Belt cities (e.g. Pittsburgh, Cleveland), where employment declines in traditional manufacturing have been stemmed and increasingly replaced by new specialized manufacturing, high-tech, and service employment.

1.2.2. Increased attractiveness as choice of residence and activity

The above efforts have increased the attractiveness of cities, not only as places to invest and do business, but also as places to live. After decades of out-migration, the last decade has shown the first signs of inward migration and growth of the city cores and inner suburbs.

Visible signs of the increased attractiveness of cities, include:

- "Empty Nester" baby-boom parents are seeing their children move onto college and pursue their own lives. This drastically reduces the need for the residential space that made the suburbs attractive to parents of young children, and is enabling these "empty nesters" to move back into cities, in an effort to be closer to cultural facilities, amenities, and services that they desire.
- One also observes, prompted by the renewed health of cities and the increased sense of personal security, the revitalization of older neighborhoods by young Generation X professionals, who do not have, or plan to have, children. They are attracted to residing in cities because of the restaurants, night life, cultural and sport facilities, etc.
- In fact, household composition is changing, with the greatest growth occurring in households of childless couples, non-family households, and single person households. Generation X, and aging boomers choosing different lifestyles, is creating a greater demand for "urban" living, and urban housing (e.g. townhomes, condominiums, and senior living facilities) [Logan, 2002].
- Some experts predict that as a result of technology advances, and with the competitive labor market that will be created by the reduced pool of skilled workers following the retirement of the baby boom generation, workers will be increasingly able to choose their location of residence and employment. Competition for jobs will be increasingly based on quality of life factors, and cities that have developed attractive amenities will have a stronger hand in this competitive labor market. [Pisarski, 2002a; Pisarski, 2000b; Logan, 2002].
- The strong levels of immigration into the U.S over the last decade have often proved a boon to U.S. cities. The 8-14 million immigrants that have arrived in the U.S. are increasingly diverse (not only arriving from Central America, but also from diverse locations like Korea and Ethiopia). In the 1995-2000 period, these immigrants settled in large numbers in five immigrant magnets (New York, Los Angeles, San Francisco, Chicago, Washington D.C.), before in some cases moving on to growing metropolises in the Southeast and the non-California West (e.g. Phoenix, Atlanta, and Las Vegas). "Within metropolitan areas, immigrants have invigorated city and neighborhood population in core urban counties" [Frey, 2003, p. 15]. In addition, many cities in the Midwest and Rustbelt believe immigrants can help to rekindle economic and residential life and are marketing their cities nationally and internationally in order to attract immigrants.

As a result of these factors, one observes the stabilizing in some city core populations and density. These trends are likely to continue.

1.3. New Approaches to "Community"

Along with the above renaissance of cities, one observes a growing discussion of concepts and remarkable convergence of efforts, emerging from a variety of perspectives that look to develop and implement new approaches to **the concept of "community"**. These movements or approaches include:

- New Urbanism
- Traditional Neighborhood Development

- New Community Design
- Smart Growth
- Sustainable Communities
- Healthy Communities

Appendix C provides a more detailed discussion of some of these concepts, and identifies related web resources.

Among these, the concept of *Smart Growth* has perhaps achieved the most widespread visibility, in no small measure due to leaders such as former Governor Parris Glendening of Maryland. In a recent report, prepared by the Smart Growth Network, *Getting to Smart Growth: 100 Policies for Implementation* [Smart Growth Network and ICMA, 2002], Smart Growth is defined in the following way

> "Smart Growth is development that serves the economy, community, and the environment. It provides a framework for communities to make informed decisions about how and where they grow. Smart growth makes it possible for communities to grow in ways that support economic development and jobs; create strong neighborhoods with a range of housing, commercial, and transportation options; and achieve healthy communities that provide families with a clean environment."

"Smart Growth" is increasingly being offered as an alternative to sprawl-type development, in particular as an increasing body of research measures the many impacts and costs of sprawl [Burchell et al., 1998; Litman, 2000; Burchell et al., 2002; Ewing et al., 2002; Muro and Puentes, 2004]. The concept of Smart Growth is increasingly being endorsed by national organizations, such as the National Governors Association or the American Planning Association, and individual initiatives are increasing at the local and state levels, such as the extensive "Envision Utah" effort. Recent studies outline policies and programs to encourage smart growth [Smart Growth Network and ICMA, 2002 and 2003], provide extensive catalogues of smart growth projects [Benfield et al., 2001], develop new visions of "the regional city" based on these principles [Calthorpe and Fulton, 2001], or explore more specifically the transportation / land use linkage to smart growth [Cervero, 2000]. The result of these approaches and efforts has been a remarkable convergence of thinking, increasingly apparent among officials responsible for planning and managing land development, that focuses on the concept of 'community", and how to ensure the sustainability of the community. The outcome is that conventional sprawl-inducing patterns of development are less and less acceptable in states and communities across the Nation.

This growing movement and interest in "sustainable communities" is particularly significant for the transit industry. As discussed in Appendix C, transit is a key component in all of these approaches. This provides a unique opportunity to highlight the important role that is played by public transportation in developing these sustainable communities.

1.4. Linking Transit and Community

In addition, our understanding of the relationship between transit and community has been expanding and strengthening over the years. The following sections outline some of the concepts that have linked transit and community.

1.4.1. Joint development

The path breakers in linking transit and development occurred with the construction of the first post-WWII subways, Toronto, Montreal, and BART, and were studied in such studies as *Land Use Impacts of Rapid Transit* [Knight and Trygg, 1977]. Zoning in these communities, was recast to encourage office or apartment building development adjacent to the new subway stations. More aggressive policies involved the leasing of air-rights over the subway right-of-way, or the development of land adjacent to stations as Transit Joint Development. Transit Joint Development provides a *quid pro.* The developer capitalizes the accessibility advantages into higher rents or greater occupancy. For the transit system, negotiations of Joint Development not only ensure the concentration of activity, which in turn creates major ridership generators for transit service, but also creates either a sharing of capital costs or possibly even a long-term revenue stream for the transit system [Cervero et al., 1991].

Joint Development has become increasingly common since those early precursors, and is today systematically built into heavy rail developments, and occasionally into new Light Rail systems. Recent examples include:

- In the Washington region, WMATA has approved more than 40 projects since establishing its Joint Development Program
- The Hollywood & Highland development, located over the Los Angeles MTA's Hollywood/Highland station involves a $615 million retail and entertainment complex.
- BellSouth's relocation and consolidation of 9,800 employees into three new energy-efficient business centers on top or near MARTA stations in Atlanta [Abbott, 2002].

1.4.2. Transit-Oriented Development and location-efficient initiatives

Joint Development involves the negotiation of a commercial relationship between the transit system and a developer. Unfortunately, this can only occur where the size of the commercial investment can justify such an arrangement, and these are typically limited to heavy rail stations, multi-modal terminals such as downtown rail stations, or Light Rail Stations at exceptional geographic locations.

However, it has been increasingly recognized that transit can play a significant role in shaping development, and conversely, that certain forms of development are more supportive of transit, and a better choice for the land surrounding higher capacity transit stations (LRT in particular). Transit-Supportive Development is development that creates uses consistent with the markets served by transit, while Transit-Oriented Development (TOD) focuses on development in which the transit system is directly involved, and the development builds well integrated pedestrian access to the transit system. The concept of TOD was introduced by New Urbanism leaders such as Peter Calthorpe in his 1993 book *The Next American Metropolis* [Calthorpe, 1993], and by various researchers [Moore and Johnson 1994; Holtzclaw, 1994; Parsons Princkerhoff Quade &

Douglas, 1996]. Robert Cervero in particular, has been examining these forms of development for many years through studies and books: *Transit-Supportive Development in the United States: Experience and Prospects* [Cervero, 1993], *Transit Villages in the 21st Century* [Bernick and Cervero, 1997], and a current Transit Cooperative Research Program (TCRP) Project H-27 on *Transit-Oriented Development: State of the Practice, and Future Benefits* [Cervero et al., 2004 and 2002].

Cervero has surveyed the many definitions of TOD that exist and concludes that "most TOD definitions share several common elements: mixed-use development, development that is close to and well-served by transit, and development that is conducive to transit riding" [Cervero et al., 2002, p. 6]. Other aspects in some TOD definitions include: compactness, pedestrian- and cycle-friendly environs, public and civic spaces near stations, and stations as community hubs. TOD may encompass the development of mixed income housing units on a site adjacent to a transit station, or even the redevelopment of former transit parking lots, as is being done at BART.

The concept of TOD is increasingly becoming accepted within the mainstream of planners and developers, and illustrates an evolution that firmly grounds transit in the community it serves. TOD is also slowly gaining acceptance within the development community, as seen by the growing number of actual developments, and is illustrated by the recent publication by the Urban Land Institute of a report entitled *Ten Principles for Successful Development Around Transit* [Dunphy et al., 2003], and by the increased attention being given by the National Association of Realtors [NAR, 2004; Still, 2002]. There remain however many challenges to the expanded implementation of TOD. Several efforts are underway to examine these challenges so that TOD can be encouraged and that future initiatives maximize the potential benefit for both the community and the transit system. Examples include: the recent Brookings Institution Discussion Paper entitled, *Transit Oriented Development: Moving from Rhetoric to Reality* [Belzer and Autler, 2002], research by Dick Nelson and John Niles [Nelson and Niles, 1999 and 2000; Niles and Nelson, 1999] by Hank Dittmar and Gloria Ohland [Dittmar and Ohland, 2003; and Reconnecting America, 2004], and Robert Cervero et al's's comprehensive TCRP report, entitled *Transit-Oriented Development in the United States: Experiences, Challenges, and Prospects* [Cervero et al., 2004]. .

Beyond Transit-Oriented Development, a number of new initiatives are also building on the economic efficiency provided by persons residing near quality transit. These include:

- Fannie Mae, the nation's largest source of financing for home mortgages, launched in 1999 the Location-Efficient Mortgage Program (or Smart Commute Initiative). This program takes into consideration in its household budget calculation, the reduced transportation costs resulting from close access to transit, termed location-efficiency. This may increase home-buying power by $10,000 or more. The Smart Commute Initiative is available in Chicago, Los Angeles, Seattle, San Francisco, Minneapolis, Pittsburgh, Salt Lake City, Philadelphia, Burlington, Louisville, El Paso, and Delaware. A particularly ambitious Smart Commute Initiative was launched in 2003 in Washington D.C., and uses both rail or bus accessibility as a basis for the mortgage calculation, and also provides discounts for transit passes and for the use of Flexcar car-sharing vehicles. Since then, Nashville, Charlotte, and Columbus have also become part of the Smart Commute Initiative.

- The Metropolitan Transportation Commission in the San Francisco Bay Area has implemented the Housing Incentive Program, which provides grants to foster compact housing with easy access to transit.

1.4.3. Transportation for Livable Communities Initiatives

The concept of 'Livable Communities" emerged in the mid 1990's. Initially launched through a Federal Transit Administration Initiative [FTA, 1997], made possible as a result of ISTEA. The objectives of the Livable Communities concept are to improve mobility and the quality of services available to residents at the **neighborhood level** by:

- strengthening the link between transit planning and community planning, including land-use policies and urban design supporting the use of transit and ultimately providing physical assets that better meet community needs
- encouraging mixed-use neighborhoods that complement residential areas with commercial, recreational, educational, health and other social services
- providing transit services and facilities which provide safety, security and accessibility for all passengers, including disabled persons and elderly members of the community
- ensuring sound environmental practices including careful parking and traffic management techniques to reduce auto trips, conserve space, encourage green areas, avoid gridlock and improve air quality
- stimulating increased participation by community organizations and residents, minority and low-income residents, small and minority businesses, persons with disabilities and the elderly in the planning and design process
- increasing access to employment, education facilities and other community destinations through high quality, community-oriented, technologically innovative transit services and facilities
- leveraging resources available through other Federal, State and local programs.

Examples of Livable Community Projects include the following:

- The Whittier Street Neighborhood Health Center opened the MBTA's Health Station at Roxbury Crossing in the Boston area, involving locating a health center at a public transit terminal.
- The Reisterstown Metro Station project in Baltimore incorporates both a child-care center and a police substation at a transit station.
- Louisville NIA Travel and Jobs Center is the central element of an economic development "campus" of buildings which include job training programs, child care facilities, etc.

Appendix D identifies some resources on transit and livable communities. The concept of Livable Communities has subsequently been pursued as well at the local level. The Metropolitan Transportation Commission (MTC) in the San Francisco Bay Area used the flexibility of TEA-21 funding to create in 1997 an innovative "Transportation for Livable Communities" program. The program provides grants for neighborhood planning or for capital improvement. The program is aimed at implementing low-cost projects that can improve livability, safety, access for the disabled, and local economic development, including: main street revitalizations, neighborhood bus shelters, pedestrian or bicycle links, etc. The program has been extremely

popular and tripled in size since its inception. Similar TLC programs are now being considered in Los Angeles and Sacramento.

Another local example concerns the Program entitled *Building Livable Communities through Transportation*, conducted by New Jersey Transit and Project for Public Spaces Inc, starting in 2000. This involved workshops and training to assist communities to identify how train stations can serve as catalysts for community development, to develop planning and designs centered on train stations, and to develop partnerships to implement a community's vision. Other reports on the connection between transit and livable communities include a TCRP report that explored *The Role of Transit in Creating Livable Metropolitan Communities* [Project for Public Spaces, 1997], and a report on transportation and community partnership [Project for Public Spaces, 1999].

1.4.4. Transportation and Community and System Preservation (TCSP) Pilot Program

Another manifestation of this increased focus on the role transportation can play in community development is the Transportation and Community and System Preservation (TCSP) Pilot Program. The TCSP Program is a FHWA program jointly developed with the Federal Transit Administration, the Federal Rail Administration, the Office of the Secretary, and the Research and Special Programs Administration within the U.S. Department of Transportation, and the U.S. Environmental Protection Agency. This program is a comprehensive initiative of research and grants to investigate the relationships between transportation and community, and system preservation.

Among the projects funded, a number have been designed to specifically link public transportation and community. Examples include:

- Tempe: Conduct a transportation subarea study and create a transit overlay district model to support sustainable development.
- San Francisco: Integrate land use and housing alternatives to support the development of the Mission Street transit corridor.
- San Joaquin Valley (2001): Develop model zoning ordinances and design standards to create efficient land use and livable communities emphasizing pedestrian and transit-oriented design.
- Athens to Atlanta: Develop a model planning process that will address sustainable development and livability in rapidly growing communities.
- Lexington: Develop a handbook, CD-ROM, and workshops for planners, developers, decision-makers and citizens on land use and transportation strategies.
- Saginaw: (Retrofitting Anytown, USA) Redesign a suburban shopping mall to be more pedestrian- and transit-friendly.
- Lansing: Develop a shared regional vision of future land use and development patterns in the Lansing area through visual preference surveys, modeling, and public outreach.
- Philadelphia: Develop metropolitan area-wide strategies to promote transportation efficiency including transit-oriented development, location efficient mortgages, and station area plans.
- Seattle: Promote transportation efficiency and transit-oriented development around existing and proposed transit stations in the region.

Although the TCSP has been suspended pending reauthorization of ISTEA, the web site provides documents that further reinforce the transportation and community relationship.

2. DESPITE ACHIEVEMENTS, LONG-TERM TRENDS POSE CHALLENGES

Despite the remarkable turn-around of US transit and cities, observed in recent years, an assessment of long-term demographic, socioeconomic, land-use, and transportation trends helps to identify some very significant challenges to urbanized areas and to transit system providers.

There is voluminous information available from such sources as: the U.S. Decennial Census Journey to Work survey, the related Census Transportation Planning Package (CTTP 2000), the National Household Travel Survey (NHTS) [formerly the Nationwide Personal Transportation Survey (NPTS)], the new annual American Community Survey, the Bureau of Transportation Statistics, etc. Appendix A lists some important web resources providing information on travel patterns and demographic and social trends.

There are also many experts that have devoted significant effort over the years deciphering and distilling the information from these surveys. In particular, one should note Alan Pisarski, the author of the comprehensive in-depth analysis of *Commuting in America* [Pisarski, 1996; Pisarksi, 2002a], based on each of the 1980, 1990, and forthcoming 2000 Census surveys, and John Pucher, who has written four articles over the years analyzing the socioeconomics of urban travel based on various NHTS and NPTS surveys [Pucher et al., 1998; Pucher and Renne, 2003]. Sandra Rosenbloom [Rosenbloom, 1998; Rosenbloom, 2003] and Stevin Polzin [Polzin et al., 1998; Polzin, 2001; Polzin et al., 2003] have also produced much research on travel and demographic trends and their impacts on transit and on specific markets such as seniors or women. There has been however, relatively little visible effort to draw out some of the implications of these trends in ways that help transit systems define what should be the medium to longer term *strategic directions for transit in the community*; two exceptions are earlier studies based on 1990 data [Crowley and Watson, 1991; Rosenbloom, 1998].

The following section is an attempt to distill from the above, and from many other sources of information, a small number of trends and issues that are believed to be particularly significant for transit systems and their future, from a strategic point of view.

These include the following trends:

- Growing Sprawl
- Growing Auto Use
- Growing Congestion in/into Urban Cores
- Changing Travel Patterns

These trends raise some significant areas of societal concern:

- Environmental, Energy, Economic, and Safety Implications of Increasing Auto Dependence
- Health Issues Related to Auto Use and Patterns of Built Environment
- Mobility of Aging Population
- Social Integration

Although many of these challenges are well known, it is worth re-iterating them. The review of trends has also revealed a few issues that are less well known but merit special attention.

In addition, it should be noted, that although there is a growing societal concern with respect to *homeland security* , its implications for metropolitan travel and land use patterns, for community planning and sustainability, and for transit's role in sustainable communities, remain unknown.

2.1. Trend: Growing Sprawl

According to the latest *National Resources Inventory* of the US Department of Agriculture, the pace of development has increased dramatically in the U.S. between 1992 and 1997, with 2.2 million acres of land being converted annually from agricultural and other non-developed uses into developed land, and this rate of development was 150% higher than the annual rate of conversion in the previous 10 years. This land development is characterized by growing sprawl, with the percentage of land developed far exceeding the percentage growth in population. This continual consumption of "greenfields" [Benfield, Raimi, and Chen 1999] has lead to a wide range of concerns, including: loss of natural watershed lands; loss of forests, community greenspace and critical environmental areas (e.g. wetlands); loss of wildlife habitat; and of particular concern, the loss of prime agricultural land; for example, from 1992 to 1997, more than 3.2 million acres of prime farmland were converted to developed land, prompting great concern from groups such as the American Farmland Trust, that monitor this issue through their "farming on the Edge" initiative. The unabated growth in sprawl development has raised numerous environmental, economic, and social concerns. However, of the many impacts of growing sprawl development, the following three are particularly significant for transit systems.

2.1.1. Suburbs are capturing most population growth and job growth

Between 1990 and 2000, national population increased 13%. Central city population increased by 9% (mostly due to immigration), but suburban population increased by 22%, and now represents 62% of metropolitan population. The suburbs are capturing 75% of job growth and now represent 57% of total metropolitan employment.

In addition, job sprawl is increasing with only 22% of jobs located within three miles of the city center [Glaeser et al., 2001].

The Seattle situation, as recently reported [Sims, 2002], illustrates the continued growth of suburban sprawl, and this despite the revitalizing of the older urban areas in King County. From 1970-1990, the population in the Seattle metropolitan area grew by 38% while the development of land increased by 87%. This represents a doubling of land needed for each person over the previous period. At the same time, there has been a 30% drop in residential densities since 1970. The result was that vehicle miles traveled increased three times faster than population and employment growth between 1980-1990. In the last decade, this rate of growth in VMT is slowing, and is more parallel to the rates of growth in population and employment.

The implication of this trend is significant to transit systems since the journey to work by commuters is one of the core markets served by transit. The growth of both population and job concentration in the suburbs will lead to an increase in the demand for suburb-to-suburb travel by commuters, a market that is difficult for transit to serve.

2.1.2. Edge Cities

The concept of the **Edge City** was extensively documented by Joel Garreau in his book entitled *Edge City; Life on the Frontier* [Garreau, 1991]. This concept describes the concentrations of employment and retail that are occurring in outer suburbs across the U.S., but far from the city center. Garreau defines an Edge City as follows [Garreau, 1991, pp. 6-7]:

- Has five million square feet or more of leasable office space-the workplace of the Information Age (the equivalent of downtown Memphis),
- Has 600,000 square feet of leasable retail space,
- Has more jobs than bedrooms,
- Is perceived by the population as one place, and
- Was nothing like "city" as recently as thirty years ago.

The formation of Edge Cities has been dramatic, and locations like Tysons Corner in Virginia, or The Galleria in Houston, are now permanent significant features in most U.S. urbanized areas. A recent study of 13 metropolitan areas found that 20% of office space was located, on average, in "Edge Cities", but this percentage was much more significant in cities such as Washington, Denver, and reached 40% in Detroit and Dallas. The study also found that on average, 44% of office space was located in The CBD or secondary downtowns, but 36% was located in "Edgeless cities" involving small clusters of office space [Lang, 2000, pp. 5-6]. The relative percentages vary significantly between different metropolitan areas.

Edge City land-use forms, although a threat to the long-term health of city core economic areas, do provide a relative opportunity to transit systems. They do represent a concentration of office and retail that creates a generator for transit ridership, more so than dispersed office parks in "Edgeless Cities" or strip shopping malls. However, to take advantage of this opportunity, it is critical that efforts be incorporated in the land-use and site planning to rationally organize pedestrian movement, accessibility for persons with reduced mobility, and transit locations and movement. This is more likely to occur if transit is incorporated into the review process for these major developments.

2.1.3. Box Stores vs. Older Malls

Big Box retail, with the significant economies of scale that it offers retailers and consumers, is rapidly replacing traditional shopping malls and their anchor department stores as the focus of growth in the retail sector. "For more than 30 years, the mall industry has depended on department stores. They have been the most valued partners in developing new centers and are the tenants with the biggest stores that pay the most rent and traditionally, have drawn the most traffic. But the department store business continues to struggle, having lost half its share of the retail industry to discounters and specialty stores over the past two decades. In the first five months of 2002, while discount store sales nationwide shot up 20.1%, department stores recorded a 2.6% decline" [Johnson, 2002, p.1]. This is encouraging consolidation among department store corporations. "Given the consolidation forecast, more mall anchors can expect to go dark, which puts the onus on mall owners to create flexible alternatives. "We have too much obsolete retail space in this country", says Geoffrey Booth, Director of retail development at the Urban Land Institute" [Johnson, 2002, p. 4].

Traditional shopping malls offer a concentration of activity that becomes a generator of transit ridership. Although it has taken many years, sometimes decades, most transit systems have managed to develop cooperative relationships with mall operators and owners, allowing them in many cases to implement off-street terminals adjacent to the shopping mall, or even in some cases, comprehensive joint development projects. Many transit systems have in fact designed their entire network around these off-street terminals located at shopping malls, which provide the basis for a hub and spoke network. Expansion in Big Box retail gradually undermines the viability of these shopping malls, and one is already observing the closure of older shopping malls in older suburbs.

This trend creates two significant challenges for transit systems. First, the weakening of traditional malls will tend to reduce transit ridership to these locations, and puts in question the typical strategy of placing major hubs at these sites. Second, Big Box stores are very difficult environments for transit to serve, primarily because of the nature of their site design with huge expanses of parking separating them from the arterials. How can transit systems respond to the growth of Big Box stores as desired destinations of potential transit clients and the resulting stress on traditional malls? Innovative redevelopment of traditional malls into new formats are starting to appear, involving outdoor markets, attractive pedestrian restaurant facilities, artist and cultural communities, and even housing, such as the successful "Crossings Project" in Mountain View, California, that also is integrated with commuter rail [Cervero, 2000, p.11]. As for big boxes, efforts to encourage a more pedestrian and transit-oriented site design may offer some hope, such as in the case of Ikea stores in Pittsburgh and Toronto, where most parking is located behind the store allowing relatively good pedestrian access from the arterial.

2.2. Trend: Growing Auto Use

2.2.1. Growth in auto fleet and use: more cars than licensed drivers

In 2000, there is an average of 1.69 vehicles per household, and 55.4% of households now have 2 or more vehicles. The number of vehicles now exceeds licensed drivers. Some experts believe that at some point there will be a saturation of car ownership rates, but this will still mean a continuous increase of the auto fleet, though at perhaps lower rates of growth, more in line with the growth in the population [Pisarski, 2000a]. The number of vehicles will likely rise by another 48-62 million (24-28%) by 2020.

Between 1977 and 2001, using NPTS/NHTS data as a basis, population grew 30%, but household vehicle trips increased 116% and household VMT increased 151%. Household VMT increased by 35% between 1990 and 2001 alone [Polzin et al., 2003]. The reasons for this growth in automobile use are multiple, but patterns of land use are a significant contributing factor. Some experts believe that the rate of growth in VMT will be more moderate in the future [Polzin et al., 2003].

The proportion of households without access to a vehicle has been in continuous decline, dropping from 21.53% in 1960 to 10.29% in 2000. Only one half of vehicle-less households have workers (who commute).

2.2.2. Auto market share of travel continues to increase

The forces that impel personal vehicle use for commuting continue, and include: growing access to automobiles, continued dispersion of jobs and population to the suburbs and beyond, continued pressures of time on multi-worker households, and continued low levels of vehicle operating and ownership costs.

The mode choice of single occupant vehicle for the journey to work continues to increase, representing 64.4% in 1980, 73.2% in 1990, and 75.7% in 2000. Single occupant commuters grew 15% over the last decade, greater than the increase in total workers.

2.2.3. Growth of commuting distance, and in particular in long distance commuting

Average commuting distance rose from 8.5 miles in 1990 to 10.6 miles in 1995. This is caused in particular by the expansion of commuter capture areas. An increasingly significant segment of commuting is represented by persons commuting longer distances, either between two different metropolitan areas, and in particular between their respective suburban areas, or from non-metropolitan areas into metropolitan areas. To illustrate this, nine million commuters in the U.S. are now commuting over 60 minutes, while commuters in the state of West Virginia experienced the highest increase in commuting travel time (+4.5 minutes) in the country between 1990 and 2000.

2.3. Trend: Growing Congestion but little sign of policy paradigm shift

The Texas Transportation Institute has been monitoring the status of urban mobility in 75 urban areas across the Nation for the last 20 years. The latest annual *Urban Mobility Report* [Schrank and Lomax, 2004] highlights the continuous growth of congestion and its cost to society:

- The average annual delay per peak period (rush hour traveler) in the 85 urban areas studies climbed from 16 hours in 1982 to 46 hours in 2002
- The number of hours of the day when congestion might be encountered has grown from 4.5 hours in 1982 to 7.1 hours in 2002.
- 58% of the major road system is congested compared to 34% in 1982
- The 3.5 billion hours of traveler delay in the 85 areas monitored required an excess 5.7 billion gallons of fuel.
- The economic cost of this congestion for the 85 areas in 2002 is $63.2 billion, compared to $61.0 billion in 2001.

The Census Journey to Work indicates that commuting travel time increased on average 3.1 minutes over the last decade, but only 2.1 minutes are considered a real increase (with the remaining minute due to definitional changes) [McGuckin and Srinivasan, 2003, p.6]. This is more than double the increase in the 1980-1990 decade. 40.5% of commutes are over 30 minutes one-way, up from 36.4% in 1990.

The impact of congestion varies. The ever-expanding limits of urbanized areas, and the growth in both employment and residences in the suburbs have allowed many commuters to reduce their personal exposure to the impacts from congestion. This creates a dichotomy between those

commuters living and working in the outer suburbs, who can avoid or reduce the impacts of congestion, and those who cannot avoid it, and see the amount and impacts of the congestion they experience continue to grow.

Growing congestion, as an outcome of increased auto ownership and use is certainly a public concern, but its impact is not uniform within and across regions, and these impacts have not reached levels that would lead to public acceptance of major policy paradigm shifts (e.g. congestion pricing, massive increases in fuel taxes, severe auto-constraining regulations, new regional institutions, etc.), as advocated by various economists, environmentalists and/or sustainable transportation professionals. As a result, the debate over the impacts of congestion and how to address it, is likely to continue in the current mode for some time to come, and balanced modest increases in both road and transit capacity may be the acceptable policy response. This will unfortunately do little for those commuters who cannot avoid the worsening effects of their congestion.

2.4. Trend: Changing Travel Patterns

2.4.1. Decrease in traditional work trips as a proportion of total travel

According to the 2001 NHTS, work travel constitutes just under 15% of all person trips and is decreasing. Furthermore, the proportion of work travel in the peak hours is declining, and work travel is spreading into other time periods. This is a significant challenge for transit since it is historically designed to serve the peak commuting market.

A number of other factors are also causing profound changes to travel patterns that affect transit's customer base and their travel behavior, including:

- Over 70% of civilian employees are in the services sector
- Service sector job growth is dispersed, not concentrated
- Service businesses tend to be smaller in size
- Schedules vary over the short-term
- Employment sites are increasingly dispersed
- Increase in work at home and part-time

2.4.2. Trip Chaining: Work+Shopping+Daycare+School

Over 60% of all women have paid employment, including two-thirds of women with children under six, a percentage that has risen dramatically since the early 1960's. Since 70% of commuting households now have two or more workers, this suggests that living near work is no longer a simple option to achieve. This has created greater pressure on time, increasing what is referred to as "chained" tripmaking; linking the work trip to daycare, to food shopping, errands, etc. in an effort to reduce total travel time on multiple trip purposes has become a central feature. 60% of employed women (and 46% of men) make one or more stops on a typical drive home from work

2.5. Concern: Environmental, Energy, Economic, Safety Implications of Increasing Auto Dependence

One of the conclusions from the above assessment of transportation and land-use trends is that the auto dependence of U.S communities will continue to increase overall. Many studies have explored the many environmental, energy, economic (including land consumption), safety implications and costs caused by increasing sprawl patterns of development and auto use [Benfield, Raimi, and Chen 1999; Burchell et al., 1998; Burchell et al., 2002; Ewing et al., 2002; Gillham, 2002; Hagler Bailly Services and Criterion Planners/Engineers, 1999; Litman, 2000]. EPA has also recently published a report focusing on some of the environmental aspects of the land use/transportation relationship, entitled *Our Built and Natural Environments; A Technical Review of the Interactions between Land Use, Transportation, and Environmental Quality* [U.S. EPA, 2001].

One of the most comprehensive assessments of the broad implications of auto dependence on the sustainability of cities comes from the research by Peter Newman, Jeff Kenworthy, and Felix Laube. Following years of painstaking data gathering of comparable data from cities around the world, they have conducted broad world-wide cross-sectional assessments of environmental, energy, economic, and safety implications of auto dependence. These have appeared in a number of documents and articles including: *Sustainability and Cities; Overcoming Auto Dependence* [Newman and Kenworthy, 1999], and *A Global Review of Energy Use in Urban Transport Systems and Its Implications for Urban Transport and Land-Use Policy* [Kenworthy and Laube, 1999b]. The actual comparative data has been published in the massive document, *An International Sourcebook of Automobile Dependence in Cities, 1960-1990* [Kenworthy and Laube, 1999a].

This body of research is a basic reference for persons concerned about the sustainability of our communities and the role of the urban transportation system. The following Tables, derived from the Kenworthy and Laube database illustrate through international comparisons, some of the most significant impacts of auto dependence. Over and over, along many dimensions, one observes how excessive auto dependence, as represented by the U.S. averages, systematically leads to more negative, or unsustainable, results, when compared to less auto dependent cities in Australia, Canada, and especially Europe.

Table 1 Comparative Travel Statistics (1990)

	Annual Travel in Passenger Cars (passenger km per capita)	Annual Travel in Transit (passenger km per capita)
U.S. Average	16,045	474
Australian Average	10,797	882
Canadian Average	9,290	998
European Average	6,602	1,895

[Kenworthy and Laube, 1999a, pp. 529, 537]

Table 2 Comparison of Metropolitan Transportation Modes (1990)

	% of Total Pass. Km on Transit	% of Transit Pass. Km on Urban Rail	% Work Trips on Transit	%Work Trips by Walking and Cycling	Transit Provision (vehicle km of service per capita)	Road Provision (meters of roadway per capita)	CBD Car Parking Provision (spaces per 1,000 jobs)
U.S. Average	3.1	32.0	9.0	4.6	28.4	6.8	468
Australian Average	7.7	41.2	14.5	5.1	60.0	8.3	489
Canadian Average	10.2	25.9	19,7	6.2	58.0	4.7	408
European Average	22.6	77.3	38.8	18.4	92.5	2.4	230

[Kenworthy and Laube, 1999a, pp. 529, 537, 542]

Table 3 Measures of Auto Dependence (1990)

	Road Expenditure (US$ per capita)	% of City Wealth Spent on Work Travel (% of GRP)	Transit Operating Cost Recovery (R/C ratio)	Traffic Deaths (Deaths per 100,000 population)	Carbon Dioxide Emissions for All Travel (kg per capita)
U.S. Average	264	6.9	35	14.6	4,536
Australian Average	142	6.3	40	12.0	2,789
European Average	135	5.4	54	8.8	1,888

[Kenworthy and Laube, 1999a, pp. 604, 608, 622, 623]

These individual concerns about the various impacts of auto dependence are linked to the more global concern for *sustainable development* (Appendix D provides some background concerning the concept of sustainability and sustainable transportation.). Sustainable transportation plays an important role in the pursuit of sustainable development, in particular because of transportation's impact on greenhouse gases and climate change. As stated in the previously mentioned EPA report,

> "the environmental consequences of vehicle travel and dependency include degradation of air quality, greenhouse gas emissions and increased threat of global climate change…Transportation is a significant source of greenhouse emissions. The accumulation of greenhouse gases in the atmosphere is widely associated with changes in global climate that could raise sea level and increase the frequency and severity of extreme weather events worldwide. Although motor vehicle emissions of most air pollutants have declined since 1970 due to improved technologies and cleaner fuels, increasing VMT growth threatens to reverse this trend. Greenhouse gas emissions from motor vehicles have been increasing rapidly, fueled by increased vehicle travel [U.S. EPA, 2001, p. ii].

The concern for *sustainable urban transportation* is manifesting itself in several ways (See Appendix D for related web sites and resources). Internationally, UITP has recently published a report *3 Stops to Sustainable Mobility* [UITP, 2003] and launched the "Charter on Sustainable Development" initiative, which both APTA and CUTA support. In North America, researchers are increasingly highlighting the linkages between the environmental, economic, and social dimensions of urban transportation policy decisions and current trends [Deakin, 2001; Litman and Laube, 2002]. The Transportation Research Board has recently published TCRP Report 93 entitled, *Travel Matters: Mitigating Climate Change with Sustainable Surface Transportation* [Feigon et al., 2003], that presents information on climate change and examines how greenhouse gasses from transportation may be reduced, and has also developed a related web site to assess transportation greenhouse gas emissions under various conditions and strategies and provide information of particular interest to the transit industry. U.S. DOT has also recently created the "Center for Climate Change and Environmental Forecasting (CCCEF)" as DOT's focal point of technical expertise on transportation and climate change. Of particular interest to the urban transportation community, CCCEF has recently published a study to explore experience in the U.S. of using state and local transportation planning to reduce greenhouse gases [Lyons, Peterson, and Noerager 2003]. Finally, 143 communities in the United States have joined the "Cities for Climate Protection" campaign of the International Council for Local Environmental Initiatives (ICLEI), that is a performance-oriented program for local governments to conducting baseline inventories of greenhouse gas emissions and to develop a strategic agenda to reduce global warming and air pollution emissions. Although the pursuit of sustainable transportation covers many areas, public transit is always part of the mix of solutions, and transit agencies should be engaged in all local sustainable transportation initiatives.

2.6. Concern: Health

The above environmental concerns have been extensively discussed, but there has recently emerged a growing interest in the health-related implications of auto dependence. The growing focus on health relates not only to the issue of air pollutants, but also the contribution of the built environment on health.

2.6.1. Respiratory problems

Air pollution continues to exacerbate lung problems and in particular asthma. High smog levels are responsible for more than 6 million asthma attacks, and 159,000 visits to emergency rooms and 53,000 hospitalizations for asthma-related treatment. Children with asthma are of particular concern, given their heightened sensitivity to air pollution. As reported in a recent Centers for Disease Control and Prevention (CDC) study, "asthma rates among children more than doubled from 1980 to 1995, from 2.3 million to 5.5 million" [Jackson and Kochititzky, 2001, p. 7]. It is estimated that 25% of all children in America live in areas that regularly exceed the EPA's limits for ozone.

The impact of reduced auto use and smog on improved health was dramatically illustrated in research conducted by the CDC during the 1996 Olympics in Atlanta, and reported in the Journal of the American Medical Association. As a result of improved transit service involving an additional 1,000-leased buses on the road, and various other efforts, the number of cars in the morning rush hour was reduced by 22.5%. This in turn helped to reduce peak daily ozone concentrations by 27.9%, and a 41.6% reduction of asthma emergency medical events was observed [Friedman et al., 2001].

2.6.2. Obesity caused by lifestyle leading to increasing cardio-vascular problems

There is a growing exploration of the relationship between land use, auto dependence and health, related to a more sedentary lifestyle, a lack of exercise, and increased rates of obesity. This research includes studies sponsored by the CDC and the Robert Wood Johnson Foundation [Jackson and Kochititzky, 2001, Ewing et al., 2003; McCann and Ewing, 2003], and recent simultaneously published special issues of the American Journal of Public Health and the American Journal of Health Promotion that examined the impact of the built environment on health. As reported in a CDC study, the percentage of U.S. adults who were overweight grew from 47% in 1976, to 61% in 1999. However, the impact was even more dramatic for children and adolescents, where the rates have doubled [Jackson and Kochititzky, 2001, p. 9].

Physical environment and mode of travel are significant factors in this respect. The lack of pedestrian amenities is often cited as a reason for lack of exercise, and a report by the Surgeon General highlights the fact that changes in lifestyle and communities have played a key role in the decline of physical activity.

Various efforts are being mounted to encourage a more "active" approach to lifestyle, because of the numerous positive benefits that this creates. Such efforts also advocate enhancements to pedestrian, cycling, and transit modes; all transit customers are also pedestrians. In addition,

recent studies have been highlighting transit's potential contribution to better health [Noxon, 2001; Shapiro et al., 2002].

2.7. Concern: Mobility of Aging Population

2.7.1. Increasing Senior Population

The elderly are the fastest growing component of U.S. population; there has been a 23% rise in the number of persons between 75 and 85 over the last decade. The issue of an increasing senior population will only accelerate over the coming years with the aging of the baby-boom generation. In 2000, 12.4% of the U.S. population is over 65. This percentage will rise to 13.2% by 2010, and 20% by 2030. The oldest elderly segment (85 and over) is projected to reach approximately 6.5 million by the year 2020, compared with 4 million in 1998. A study in the Tri-County area of Portland estimates that the combined population of elderly and persons with disabilities currently represents 17% of the total population, and will rise to 20% by 2010 [Tri-Met, 2001, p. 8].

The aging of the baby boom generation represents a critical market that will continue to grow over the next 30 years. Other industries (e.g. recreation, leisure, AARP, etc.) have recognized this and are adapting to the changes required to serve this market segment. A recent Brookings Institution study, *The Mobility Needs of Older Americans: Implications for Transportation Reauthorization* [Rosenbloom, 2003] sets the context and examines various policy solutions. Another recent TCRP study entitled *Improving Public Transit Options for Older Persons* [Burkhardt et al., 2002] provides a comprehensive review from a transit perspective, and offers a Handbook of options. However, the travel requirements of older persons need to be assessed within the context of each community, and addressed through the development of specific strategies.

2.7.2. Ratio of working population to non- working population will continue to fall dramatically

The baby boomers are headed toward retirement, and this will drastically alter the ratio of workers to non-workers. "In 1960 there were five workers for each social security recipient, in 2025 there will be two workers for every social security recipient" [McGuckin and Srinivasan, 2003, p.5]. As more and more people live longer, there will be more and more relatives in their fifties and sixties who will be facing the concern of caring for the oldest old. This will increase the premium on time.

2.7.3. Personal crisis caused by loss of license

Contrary to previous generations, the current older population grew up in a physical landscape and personal lifestyle dominated by the use of the automobile. 95% of those persons who will reach age 65 in 2010 have driver licenses. It is clear that as a result of better health and improvements in heath science, a greater percentage of elderly will be able to continue to drive.

At the same time, the report *Mobility and Independence: Changes and Challenges for Older Drivers* [Burkhardt et al., 1998] states that older drivers who face the prospect of reducing or terminating their driving will suffer a variety of undesirable consequences, including: reduced mobility, loss of personal independence, social isolation, and a reduction in their access to

essential services. The loss of license will precipitate a personal crisis, unknown to previous generations.

2.7.4. "Aging in place"

Contrary to the popular image of elderly persons retiring to states like Florida, most elderly "age in place"; only six percent relocate in a given year, and only one percent move to a different state. As a result, the challenge created by the aging of the population is a national phenomenon. By 2025, there will be 27 states with 20% of their population over 65 or more; this is higher than the percentage of the population represented by seniors in Florida today.

According to a report, entitled *Beyond Social Security: The Local Aspects of an Aging America* [Frey, 1999], this phenomenon of aging in place will also tend to increase the disparities between communities. Areas that have declined overall will tend to keep the less advantaged segments of the elderly-older, less well off, dependent populations, and will need to provide for greater community services, such as subsidized transportation, while their tax bases may decline. This will be a significant challenge for central cities. However, suburbs will also face a challenge because they will be home to the largest concentration of elderly. In the year 2000 census, three quarters of the elderly persons in metropolitan areas live in suburban areas, while 21% live in central cities. The fastest elderly population growth between 1980 and 1997 is in car-friendly places like Denver, Las Vegas, Phoenix, Sacramento, Salt Lake City, etc. The aging in place will create significant challenges from a transportation point of view for both city cores and suburbs. This increases the importance of rethinking planning and site design: development that mixes land uses, enhances pedestrian facilities, promotes infill and redevelopment, increases density, etc. could increase the mobility and access of the elderly and reduce the need to travel by car [Rosenbloom, 2003, p. 12].

2.7.5. Dramatic increase needed in mobility services to be provided

According to the Bureau of Transportation Statistics (Omnibus Survey, May 2002), 11% of all persons age 65 and older, drivers and non-drivers alike, reported using public transportation the previous month. However, among non-drivers 75 years of age and older, 14% identify public transportation as their primary mode, and nearly 20% say they use public transportation on a monthly basis, according to AARP's *Understanding Senior Transportation Survey* [Straight et al., 2002]. This suggests that public transportation services can play an important role in enhancing mobility for these senior non-drivers, and offer part of the solution for addressing the challenge of the aging of the population. However, transit faces challenges in fulfilling this role; for example, survey respondents cited various factors that limit seniors' ability to use public transportation including: unavailability of destinations, fear of crime, difficulty boarding transit vehicles, etc.

A few transit systems have conducted planning efforts specifically aimed at assessing the needs of the seniors in their communities in an effort to develop senior transportation plans. Three such planning efforts or plans, for Denver, Orange County, CA, and Portland, OR, are referenced in the APTA Information Center Briefing on Transit Services for Seniors. They illustrate the range of transit functions that will need to be enhanced in order to address the mobility needs of seniors.

Examples include:

- Improved published and telephone customer information, and dissemination of information
- Customer travel training
- Improved operator training
- Improved market research and customer feedback
- Physical design of stops and stations (including barriers, amenities, lighting, etc.)
- Enhanced land-use planning and site design criteria to facilitate accessibility
- Encouraging land uses, such as mixed-use TOD, that bring together housing for the elderly, retail, health, transportation and social services facilities.
- Scaling up and redesign of eligibility assessment
- Greater communication and coordination with an array of public, private, and volunteer based service providers
- Development of brokerage service
- Development of new services (e.g. community bus/service routes using small buses, circulators, route deviation or feeder services, subscription services, etc.)
- Use of /coordination with taxicab services, etc.

The previously mentioned TCRP study [Burkhardt et al., 2002] also provides a good catalogue of options to consider in local assessments. Finally, a recent AARP report, entitled *Liveable Communities: An Evaluation Guide* [Pollak, 1999], provides a practical tool for assessing a community and the services it provides, including transit, from the perspective of older persons.

2.8. Concern: Social Integration

2.8.1. Physically Disadvantaged

There are 54 million persons with disabilities in the U.S. According to a population-based survey conducted in 2000 by the Harris Poll and funded by the National Organization on Disability, approximately 30 percent of Americans with disabilities have a problem with inadequate transportation, compared to approximately 10 percent of the general population. People with disabilities are unemployed at close to seventy percent. Despite the implementation of the Americans with Disabilities Act, and the many enhancements it has brought, the issue of the accessibility and mobility issues of the physically disadvantaged, and their implications for social integration remain a major societal concern, and challenge for the transit industry.

2.8.2. Economically Disadvantaged

A TRB Conference on *Transportation Issues in Large U.S. Cities* [TRB, 1998] focused much attention on the social and economic implications of current patterns of land use and transportation, and their implications on economic opportunity, quality of life, and institutional governance. A key aspect concerns the implications of the lack of auto ownership in an auto-dependent built environment. Although only 7% of white non-Hispanic households are without vehicles, 30% of black households do not own vehicles, and 15% for Hispanic households. The lack of auto ownership is not surprisingly much more pronounced for black households in central cities rising to 37% (and much higher in some cities-61% in New York, 47% in Philadelphia, etc.). This creates considerable equity issues in an auto-dependent built environment. “As

economies and opportunity decentralize and the working poor remain disproportionately centralized, a "spatial mismatch" arises between jobs and people in metropolitan areas" [Blumenberg and Waller, 2003, p. 4]. This was the justification for the JARC program, and remains a significant societal challenge.

2.8.3. Immigrants

The scale of foreign immigration has become prodigious, and surprising. Estimates have reported that between 8 and 14 million immigrants arrived into the U.S. during the 1990's, representing 40% of the sources of population growth in the nineties, and an even greater share of the labor force age group. Immigrants that had arrived between 1990 and 2000 represented 4.7% of the total U.S. population in 2000 [U.S. Bureau of Census, 2000], and immigration is perhaps the dominant factor in national population growth. The strength of the immigration phenomenon impacts the commuting scene in many ways, in particular injecting one third of all new commuters into the system. It increases the number of households without vehicles, and has also often provided the influx to re-urbanize declining inner suburbs

New immigrants are a critical emerging market for transit. They tend to locate, at least initially, in transit-accessible neighborhoods and also offer the advantage of being relatively likely to use transit than other market segments, even as their income increases [Rosenbloom, 1998].

Unfortunately, the transit industry has by and large, paid little attention to the specific requirements of recent immigrants (with the exception being the attention paid to Hispanic transit riders in Southwestern cities), or treated them as captive riders; this is a mistake since immigrant workers are equally likely to carpool as to take transit. Their travel requirements need to be assessed and addressed.

3. THE STATUS-QUO IS NOT ACCEPTABLE: ACTION IS NEEDED

3.1. A Growing Burden on Future Generations, Economically, Environmentally, and Socially

The current context of transportation and community, and the above assessment of foreseeable trends, is creating a growing environmental, economic, and social burden on future generations. Some have argued that there is either no need to address the above issues, or that there is little that can be done.

The status-quo is however, not acceptable for the following reasons:

- The trends discussed are continuous and long-term in nature.
- The negative aspects of these trends will continue to grow, increasing the burden on future generations.
- The positive counter-trends that have been identified are fragile and require nurturing.
- Potential solutions will require concerted action and in most cases long time frames to implement.

The transit industry is uniquely positioned to take a leadership role in pursuing a more visionary approach to transportation in the community, in order to address the concerns raised by transportation and land-use trends in U.S. communities.

3.2. A New Vision for Metropolitan Transportation, based on Sustainability is Required

Many organizations have focused on the concept of *community*, and have articulated the principles that should guide policy makers in developing and designing a more "sustainable community". Appendix C provides some insight into the type of principles emerging from the planning/design or smart growth movements. What is most significant is that these concepts appear to be increasingly accepted within the mainstream of community planning and policymaking. One critical aspect is that one observes state and local governments creating a "vision" of the future based on smart growth strategies. "Smart growth flourishes where a firm and well articulated image of the future is in place" [Cervero, 2000, p.3]

There has been, unfortunately, less effort to articulate such a vision within the transportation community. There has not been the same depth of reflection focusing specifically on defining ***transportation and its role in a more sustainable community***. The development of a vision for "sustainable urban transportation", as discussed in Appendix D, has primarily been pursued by academic researchers [Newman and Kenworthy, 1999; Vuchic, 1999], as well as by some advocacy groups. APTA's report entitled *Mobility for the 21st Century* [APTA, 1996] was an initial step in this direction, and some insightful discussion of sustainable development and the need for a "Vision of Mobility for the 21st Century". However, local follow-up to this effort was limited. The recent UITP "Sustainable Mobility" initiative [UITP, 2003], supported by APTA and CUTA, is also a step in the right direction.

However, with a few exceptions, there is little evidence within the U.S. urban transportation community in general, including the transit industry, of the adoption of a "sustainable transportation" approach, including the articulation of a local vision for urban transportation.

There is therefore a need to develop a **New Vision for Urban Transportation in a sustainable community**, and this vision should be based on the principles underlying sustainability, and discussed and endorsed by the public and local community leaders.. In the course of this research, the most concise Vision Statement identified, encapsulating these basic principles, was defined by The National Science and Technology Council (NSTC) initiative on Transportation and Sustainable Communities (see web site reference in Appendix D). It expresses this vision as follows:

> ***A transportation system that meets the needs for mobility and accessibility while balancing the current and long-term goals of economic growth, environmental quality, and social equity*.**

This is a valuable starting point, but such a Vision needs to be articulated into a comprehensive set of principles, that can be used in the field, similar to what is happening in the field of urban planning (see Appendix C).

The research did identify one potentially valuable example of such an urban-transportation-specific vision. This vision, based on many of the sustainable community principles, was defined by various national organizations in Canada in 1992, and is described in Appendix E. Entitled, *A New Vision for Urban Transportation* [Transportation Association of Canada, 1993, <http://www.tac-atc.ca/english/pdf/urban.pdf>], it remains the most comprehensive **urban transportation-specific vision** document the research has identified, and is based on a list of practical principles, similar to, and consistent with, those emerging from the new planning and smart growth movements.

It is recommended that a similar New Vision for Urban Transportation be developed for the United States. Such a Vision should be based on current knowledge and could help synthesize the myriad information concerning best practices for sustainable transportation that are emerging. The development of a New Vision at the national level could then serve as a template for local communities to develop their own versions of a local vision on urban transportation.

4. ACTION NEEDED: ENHANCE THE CAPACITY OF TRANSIT TO MEET THE CONGESTION CHALLENGE

4.1. Policy Goals Concerning the Role of Transit in a Balanced Transportation System

Transit has an important role to play in addressing the challenges identified in Chapter 2, but to do so requires reinforcing the achievement attained by the transit industry. Transit must continue to play an important role in a balanced multi-modal system. APTA's *TEA 21 Reauthorization Recommendations* states that the national transportation policy must::

- Provide **safe, secure and reliable mobility options** as an integrated part of a balanced transportation system.
- Recognize public transportation as a way to provide all Americans, from all walks of life, **access to social and economic opportunity** to enrich their lives and their communities.
- Invest in the development of transportation system capacity needed to **enable economic growth**, and **reduce traffic congestion** and its adverse effects on families and economic productivity.
- Recognize the central **role of public transportation in achieving other critical national policy goals**, including national security, cleaner air, conserving our energy resources and reducing our dependency on foreign oil, and enhancing educational opportunity.
- Build on the success of the Transportation Equity Act for the 21st Century (TEA 21), and the Intermodal Surface Transportation Efficiency Act (ISTEA) and provide for **significant increases in investments for highways and public transportation**. [APTA, 2002a, p.1]

4.2. Recommendations to Enhance Transit's Role in Reducing Congestion

Beyond the above general goals, transit should be given the tools to assist in the challenge of growing congestion. Transit needs to develop the infrastructure that will increase its **attractiveness**, so that it can become a viable alternative in congested corridors.

Related recommendations include:

- Segregating transit services (commuter rail, Light Rail, Bus Rapid Transit) along major corridors serving suburb to city core corridors, where the effects of increasing congestion are likely to be greatest,
- Expansion of core capacity where transit has reached the limits of its capabilities, and
- Transit Signal and Physical Priority for bus systems along congested corridors.

5. ACTION NEEDED: A NEW APPROACH TO SERVICE PROVISION

The assessment of demographic, socioeconomic, and land-use trends illustrate a broad range of challenges facing the transit industry. Although a solid foundation of safe and efficient transit operations is absolutely necessary, it is no longer sufficient if transit is to meet the challenges created by changing demographics and travel behavior; to be effective, transit must play an active role in the development of sustainable communities. A narrow policy and management focus on the operations-driven goal of providing a good service, will not enable the transit system to address the long-term challenges that have been identified.

5.1. Transit Systems Need to Understand Current and New Market Needs

The assessment of demographic and social trends in Chapter 2 clearly highlights the fact that transit's potential customer markets are disaggregated, and should be viewed as such. Transit needs to adopt marketing management approaches that recognize that there are different types of customers (i.e. different market segments) with different expectations. Transit needs to invest in a better understanding of its markets through **market segmentation**, and how they are likely to evolve. An understanding of demographic trends, and the future evolution of customer segments in one's markets, should be the starting point. The TCRP studies entitled, *Transit Markets of the Future* [Rosenbloom, 1998] and A *Handbook on Using Market Segmentation to Increase Transit Ridership* [Elmore-Yalch, 1998] are useful resources concerning market segmentation, and Appendix B lists studies that provide profiles of transit ridership.

There are four important market segments that emerge in particular from the discussion of the challenges presented in Chapter 2. These are:

5.1.1. Commuters

Peak-hour commuters constitute the most basic market segment for all transit systems. Given its importance, and the challenges described in Chapter 2, it is a segment that transit systems should examine closely. Transit can achieve substantial market penetration where it is given an advantage, through separated right-of-way or significant transit priority, as has occurred with the Los Angeles Metro Rapid. However, commuter markets in corridors, where transit is itself victim of congestion, are likely to be volatile, given trends such as increasing auto ownership, expanding decentralization of residences and employment, increasing personal wealth, etc.

5.1.2. Immigrants (in particular in older inner suburbs)

The immigrant market is one of the surprising findings of the study. The importance of immigration, occurring in many communities and in all regions, and its significance for the commuting market, are under-estimated and little discussed. Yet, it remains one of the most promising market segments for transit, if its needs can be properly met: immigrants naturally tend to start as transit users, and will tend to continue to use transit even as personal income rises. The transit industry however, should not view this segment as "captive", and needs to focus considerable more attention on this promising market in order to better understand their needs (e.g. customer information, service, etc.).

5.1.3. Serving the mobility needs of an aging population

The aging of the population is a key finding from an analysis of demographic trends, and the transit industry needs to focus more effort on understanding current needs of seniors, the likely evolution of the size and needs of this market segment, and prepare for this inevitable development. This is a critical market development issue for the transit industry.

5.1.4. Access for customers with special needs (persons with disabilities and economically disadvantaged)

The market segment of persons with disabilities has been receiving more attention from the transit industry, in large part as a result of the ADA legislation and regulatory requirements, but significant challenges remain. Another market segment with specific transportation access needs are the economically disadvantaged seeking *access to jobs*. Transit needs to develop a better understanding of these markets, related customer needs, and specific cost-effective options, especially since serving such market segments have serious implications in terms of social equity and societal integration, as well as a growing financial implication for transit systems. The Easter Seals Project Action web sites offers many resources related to mobility options for persons with disabilities, and the APTA report *Access-to-Work Best Practices* [APTA, 1999], and the TCRP report entitled *Using Public Transportation to Reduce the Economic, Social, and Human Costs of Personal Immobility* [Crain & Associates et al., 1999] are useful resources on the topic of options for the economically disadvantaged.

5.2. Family of Services

A transit agency's market can be divided into different groups of customers based on demographic, socioeconomic, geographic, trip purpose, etc., referred to as market segmentation. Potential customers in each market segment seek certain attributes in making their choice of mode, and different transit services can be designed with different attributes in order to increase transit's attractiveness to specific customer market segments. This embodies a *customer-orientation or market-driven approach*, and naturally leads to viewing transit as a **Family of Services**, each fulfilling the expectations of specific market segments.

Transit will face significant challenges in the future, based on the assessment of travel and demographic trends in Chapter 2, in particular related to expansion of suburban sprawl development, and the growth in the use of autos. There is no longer a "mass market" for "mass transit". It will be increasingly important for transit systems to not only understand individual market segments as discussed above, but to design services that closely match the needs and expectations of these markets, through a Family of Services. This provides transit systems with the flexibility to address the different needs of, for example, commuters vs. the eldest seniors. It also provides the potential tools for addressing the considerable challenge of providing public transportation in the difficult suburb-to-suburb market. Although more common in Europe [Laconte, 2002], some North American transit systems have also adopted this approach very successfully (e.g. Denver, Kansas City, etc.), but it is recommended that the *Family of Services* strategy become widespread throughout the industry. The TCRP reports entitled, *Guidelines for Enhancing Suburban Mobility Using Public Transportation* [Urbitran et al., 1999] and *The Use*

of Small Buses in Transit Service: A Synthesis of Transit Practice [Hemily and King, 2002] are useful resources on this topic.

5.3. Mobility Management and Public Transportation Coordination

The adoption of a more market-oriented philosophy and of the Family of Services concept, can be further extended by recommending a "mobility management" strategic approach. As illustrated in the vision statement in Section 3.2, transit systems need to move beyond an operations-driven strategic approach, to one focusing on **mobility** and **accessibility**. A variety of mobility options should be available in a sustainable community that provides alternatives to driving alone in an automobile. For any given market segment trip purpose, one mobility option may be preferred to another. Transit systems should increasingly position themselves as the locus for delivery in some cases, or coordination in others, of these various and diverse mobility options. In some respects, this is a natural extension to the "Family of Services" philosophy.

Coordination between multiple public and private operators, will be increasingly critical to meet the needs of the elderly and disabled. The concept of coordination between different conventional transit services, and other private urban and intercity providers, will also be increasingly important as public transportation solutions are deployed in previously unknown markets, such as long distance commuting from quasi-rural non-metropolitan areas into metropolitan suburbs and city cores. Recent experience with the explosion of new services in the Greater Atlanta Area has illustrated the need for coordination of fares and services. Creating "seamless transportation" will be critical to attracting a population with easy access to automobiles.

Finally, in some circumstances, it may be worth considering extending the "mobility management" approach even further: beyond mere coordination, the transit system may wish to act as an actual broker on behalf of the various public and private service providers in the region. Useful resources include: *Paratransit in America* [Cervero, 1997], the TCRP report, *Strategies to Assist Local Transportation Agencies in Becoming Mobility Managers* [Murray et al., 1997], and the various TCRP *New Paradigm* reports [Cambridge Systematics et al., 1999 and 2000].

Focusing on a full spectrum of mobility and accessibility options, through a mobility management approach, is inherent to the pursuit of the economic, environmental, and social dimensions of a sustainable community.

6. ACTION NEEDED: ENHANCE THE TRANSIT-COMMUNITY LINK

Chapter 5 focused primarily on how transit might address through new transportation strategies the evolution in its existing or potential markets. However, the assessment of demographic, social, and land-use trends in this research clearly shows that there are also significant challenges facing metropolitan communities, where transit is well positioned to play an important contribution. Transit can serve an important facilitating role as *enabler in a sustainable community*, but this will require the transit industry to expand its horizon. To fulfill this vision, will require action, both at the federal and local levels, in areas that have not been traditional areas of focus and endeavor for the transit industry. The following sections make various recommendations at both the federal and local levels.

6.1. Actions at Federal Level to Enhance the Transportation-Community Link

6.1.1. Promote concepts of smart growth and sustainability in transportation

The U.S. Environmental Protection Agency and the Department of Energy have strong outreach programs promoting smart growth or sustainable communities concepts, as can be seen at their web sites. Promotion, or even discussion, of these concepts is far less evident at the Department of Housing and Urban Development or at the Department of Transportation, although the recent creation of DOT's Center for Climate Change and Environmental Forecasting is a step in the right direction.

It is particularly important to actively promote a better understanding of the role of transportation, and of transit in particular, within the Smart Growth perspective

6.1.2. Information sharing and dissemination: preparation of an inventory of successful initiatives

There is growing interest in the concepts of Smart Growth and New Community Design, and Federal agencies have responded by initiating comprehensive web sites, or partnerships and networks for dissemination. Sustainable Transportation initiatives and best practices receive far less attention, and are difficult to find. Information sharing and dissemination should be expanded.

One specific dissemination effort that the Federal government could initiate would be the development and compilation of a comprehensive **Best Practices Inventory of Successful Sustainable Urban Transportation Initiatives**. One of the difficulties for transit systems and urban planners in the field is the lack of knowledge concerning practical examples, and the lessons learned from them. In researching the various topics covered in this research, one comes across numerous references to initiatives related to individual smart growth efforts, Transit-Oriented Development (TOD) projects, etc., but these references typically provide minimal information. It would be valuable to practitioners to have a comprehensive resource that provides comparable and practical information on the scale of the project, organizations involved, budget, sources of funding, outcomes, and contacts, etc.

6.1.3. Conduct research on mobility implications of important new markets

Demographic trends clearly highlight the growing importance of the aging population and immigrants on the evolution of future travel trends. There is however limited existing research that is available and accessible to transit managers to understand travel behavior, future mobility needs, and impacts on transportation services and resources of markets such as these.

6.1.4. Encourage Metropolitan Planning Organizations (MPO) to incorporate smart growth and sustainability concepts in regional transportation planning

The Metropolitan Planning Capacity Building (MPCB) Program should be expanded to develop the necessary analytic tools for evaluating smart growth and sustainability implications of the regional transportation system, and to provide broader training to MPO, transit, and local planning staff concerning these concepts and the use of these tools. MPO's should be encouraged to incorporate these concepts in the regional transportation planning process.

6.1.5. Review existing regulations to increase the flexible use of federal funds to support smart growth or sustainable transportation initiatives

Funding criteria should be amended to encourage, rather than constrain the ability to implement TOD at transit facilities, including day care, small retail, affordable housing, etc.

6.1.6. Increase financial support for smart growth initiatives

Funding programs that encourage more smart growth initiatives, such as the Transportation and Community and System Preservation (TCSP) Program, should be reinstated and expanded if possible. Investments in smart growth projects are extremely cost-effective.

6.2. Transit Systems Need to Provide Leadership in Developing Sustainable Communities

Transportation and land use are inextricably linked: land uses determine the performance of the transportation system, and transportation infrastructure and service can shape land use.

This fact is particularly important for transit systems as they address the challenges identified in Chapter 2. Transit can play an important contribution in the development of more sustainable patterns of community development and mobility. Although the linkage between land use and transit is often acknowledged, transit systems need to focus more effort on this relationship; transit needs to focus not only on the transportation side of the equation, but also on the factors, such as land use, that shape the demand for transit. The most successful transit systems in the nation do. The research has shown that, given the challenges caused by increasing auto dependence, it is all the more important for transit systems to provide more leadership at the local level in developing sustainable communities.

This can be pursued in various ways:

6.2.1. Create a Vision of transit in a sustainable community

As mentioned before, the starting point should be the development and articulation of a new vision of urban transportation, and more specifically of transit's role in a sustainable community. In a previous section, the research has identified some starting points for articulating such a vision (see Appendix E), but it is important for such a vision to be firmly grounded in the reality of the local context. The vision should be one that the public, stakeholders, and public officials have defined themselves.

Various methods exist for developing such a vision. The transit system should review its Mission Statement in light of this approach. The development of strategic plans can also provide a valuable opportunity for engaging a dialogue about the agency's mission and developing such a vision statement. Many transit agency strategic plans are merely long-term capital investment plans, but one notes a positive trend within the industry to develop true strategic plans, focusing on mission, goals, objectives, services, resource allocation, future development, and deployment strategies. This provides a unique opportunity to reposition the transit system within the community, and to engage the public, stakeholders, and officials in this reflection.

This dialogue, whether conducted as a step in the development of strategic plans, or through major investment studies, can be greatly enhanced through the use of powerful new visual tools, such as the Visual Preference Survey method developed by Professor Anton Nelssen of Rutgers University, and others. These computerized simulation tools allow participants to visually compare the outcomes of conventional suburban-type development and community/neo-traditional-based development. These tools allow a more engaged citizen participation by showing that alternatives do exist for community design, even within suburbs, and can therefore serve as a powerful mechanism to overcome current inertia or processes that favor conventional (i.e. transit-incompatible) suburban development.

6.2.2. Support smart growth and sustainable development initiatives

The transit systems should also support any smart growth or sustainable development initiatives in the region, since their underlying principles are inherently supportive of transit. However, supporters of smart growth, must struggle against the considerable inertia created by existing practice and regulations. Obstacles include:

- The vast majority of existing zoning laws are based on single land use, block mixed land use, and encourage sprawl through various mechanisms; excessive minimum parking requirements are among the most significant causes of sprawl.
- New sprawl development requires costly public infrastructure (e.g. roads, water and sewers, schools, etc.), but most of these costs are absorbed by the public through the broad tax base, thereby creating no financial reward for reusing existing infrastructure.
- Building codes favor new construction over rehabilitation or reuse of older buildings.
- In addition, re-development of brownfields or existing buildings can often entail heavy costs (land treatment, historic preservation regulations, etc.) that are more onerous than those borne by greenfields development. The playing field is not level.

These types of obstacles therefore create substantial inertia in favor of current patterns of development, and represent a huge challenge. Despite this inertia, the growing emergence of smart growth thinking among individual communities and planners is very encouraging. Transit systems should actively support all local smart growth initiatives, and become actively involved in them as much as possible, where it makes sense. This will also help to build supportive partnerships between transit and local planning and land- use development agencies.

Similarly, the transit agency should support and participate in any local or regional sustainable community initiatives, such as the ICLEI Cities for Climate Protection campaign to reduce greenhouse gases. Proactive efforts on the part of the transit agency will ensure that transit's potential contribution to the effort to address the climate change challenge is fully recognized.

A related effort is to develop an active partnership with the local Metropolitan Planning Organization (MPO). With the exception of some regions, U.S. urbanized areas lack the institutions to address land-use and sustainability issues on a regional basis; most land- use planning and development responsibilities are municipally controlled, and therefore decentralized. However, many of the challenges identified in Chapter 2 require regional solutions. MPO's can play an important role, but often limit their activity to formal administrative functions. ISTEA and TEA-21 legislation, with their integrated intermodal perspectives, and the Metropolitan Capacity Building Program, may be slowly changing this situation. The transit agency and the MPO, operate on a regional basis, and therefore building a strong partnership between transit and MPO, in cooperation with State DOT's, can help to encourage a broader perspective on the assessment of issues and potential solutions.

6.2.3. Transit leadership should promote transit-oriented and transit-supportive development

First, transit should play an active role to promote and nurture development initiatives that are explicitly linked to, and mutually supportive of, transit, i.e. transit-oriented development (TOD). Chapter 1 discussed the growing number of TOD initiatives, but these developments rarely occur spontaneously, without the active promotion and nurturing by the transit system. This requires an active dialogue with local officials, and especially developers to identify potential application locations, and a well-organized and continuous effort by the transit agency's planning group to ensure fruition and effective implementation. It may also be desirable to develop a partnership to implement the concept of "location-efficient mortgages" in the community, since this can be a powerful enhancement to TOD initiatives.

More generally, the transit system should encourage more transit-supportive or transit-friendly development. Transit-supportive development can be promoted in different ways:

- First, the transit system needs to articulate what constitutes "transit-supportive development". A growing number of transit systems (including Seattle Metro, San Diego MTDB, Portland Tri-Met, Denver RTD, Baltimore MTA, etc.) have developed **transit-supportive land-use guidelines / design manuals**. These cover a broad range of topics, from area planning concepts, down to specific site design issues (e.g. location and design of auto parking, pedestrian access, bus amenities, bus turning radii, etc.). These are valuable because they help to deepen the understanding of the concepts among internal

transit staff, and help to articulate requirements for external staff, planning and land-use permit offices, private developers, public officials, etc., concerning what is required to ensure effective transit service to new developments.

- Given the importance and weight of land developers in the overall shaping of community land use, it may also be desirable to produce a "**Transit-Supportive Development" brochure**, specifically aimed and distributed to local private developers. This scaled down version of the above design manual would concisely outline desirable transit-friendly features.
- The transit system should **encourage a review of local land development and site design regulations**, to ensure that they are based on principles of sustainability, and are transit-supportive. Resources, such as the recent APA document *Growing Smart Legislative Guidebook: Model Statutes for Planning and the Management of Change* [APA, 2002] (see Appendix C), offer a resource in this effort.
- Transit systems should **initiate an active dialogue with organizations involved in transit-supportive housing projects**. Establishing a dialogue concerning proposed developments with social housing agencies, or organizations involved in developing residences or communities for older persons, whether private or public, would be particularly valuable, and might help encourage more transit-accessible locations, and more pedestrian and transit-oriented site designs.
- Finally, the transit systems should, to the extent possible, try to **become involved in the formal review process of significant new land development projects**. Some agencies have built a partnership with local site approval agencies that keeps the transit system informed of proposed significant developments, and incorporates a formal review by transit staff into the site and building review, comment, and approval process. The above-mentioned manuals serve as the basis for the transit agency's review of proposed developments. It is clear that such a transit-supportive partnership only happens in rare cases, but transit systems should strive to establish such partnerships wherever possible; ensuring input into local planning and development processes is critical to the long-term health of transit.

6.2.4. Support all sustainable modes (e.g. pedestrian, cycling, car sharing)

Finally, in becoming local leaders for sustainable transportation, transit systems need to ensure support for all sustainable modes of transportation, including pedestrian amenities, cycling, and car sharing. All transit customers are pedestrians as well, and pedestrian access and amenities play a significant role in determining the attractiveness of transit as an option.

There is also an increasing awareness of how transit and cycling can be mutually supportive: a growing number of transit systems are installing bus racks on their buses, allowing bicycles on rail vehicles at the off-peak, and installing bicycle amenities at transfer points.

Finally, car-pooling and especially car sharing are potentially complementary to transit, within a mobility management perspective for those trips or times that transit cannot serve well. In an auto-dependent built environment such as North America, effective coordination of transit and car sharing may provide an attractive alternative, and thereby encourage some households to dispense with their second or third vehicle. Integration of transit and car sharing, sometimes even involving fare integration, has been successful in many European cities (e.g. Zurich), and

initial coordination efforts between transit systems and car-sharing organizations is now starting to appear in U.S. cities (e.g. Washington D.C. WMATA, and Los Angeles LACMTA).

6.3. Practical Initiatives to Pursue at the Local Level

In a recent publication entitled *10 Ways to Enhance Your Community: Unleash the Power of Public Transportation* [APTA, 2002b], APTA has suggested the following ways to strengthen transit's role in the community:

1. Make public transportation a planning priority (in land-use and development decisions)
2. Make public transportation the center of your community (geographic position of transit terminals)
3. Make public transportation look fantastic (focus on amenities and image of transit facilities)
4. Make public transportation easy street for pedestrians (enhance pedestrian access and facilities)
5. Make public transportation the hottest ticket in town (engage transit as partner in local sports and community events)
6. Make public transportation everybody's business (engage local business in supporting transit through employer-provided benefits)
7. Make public transportation a next-door neighbor (encourage programs that build on efficiency of transit location)
8. Make public transportation a canvas for new ideas (engage creativity through public participation)
9. Make public transportation a community partner (encourage transit-oriented livable community initiatives)
10. Make public transportation a wise investment (leverage investment partnerships)

This document provides some practical initiatives and brief examples of initiatives that a transit system might pursue to enhance their community, and that are consistent with the principles discussed in this research. This document serves to spark interest and stimulate ideas.

However, there are many other types of initiatives that might be pursued. In this respect, the previously recommended national inventory of sustainable urban transportation initiatives would be of considerable value, because it would provide guidance to those practitioners whose interest had been peeked.

7. QUESTIONS FOR TRANSIT SYSTEMS TO ASK

Finally, as transit systems start to reflect on the issues covered in this research, it may be useful to reflect on the following questions in each specific context, possibly in the course of workshops used to develop a local vision for the transit agency.

7.1. Knowledge of Transit Markets?

- What market research information (including demographic and market segmentation information) exists about current customers of the transit system?
- What information exists about the likely future evolution of transit customer markets in the community?
- Has existing travel market information been co-related to the use of the various transit (and other public transportation) services in the community?

7.2. Impact of Aging Population; Knowledge and Options?

- What are the characteristics of current seniors market (size, geographic distribution, expectations, etc.)?
- How is the seniors travel market likely to evolve?
- What will be the implications over time in terms of expectations, service design, etc.
- Given the importance of this market, has any effort, specific to the seniors' travel market, been conducted to assess needs or to develop a service plan (such as those in Denver, Orange County, Portland, available from the APTA Information Center Briefing)?
- Have local organizations that assist seniors (social agencies, non-profit organizations, special purpose media) been identified, and contacted, in order to assist with needs assessment and dissemination?

7.3. Immigrant Market; Knowledge and Options?

- Does any information exist about the local immigrant travel market, in terms of residential concentrations, travel patterns, and mode choice?
- Has any market research or planning effort, specific to the immigrant travel market, been conducted to assess implications for service design, customer information, etc.?
- Have local organizations that assist immigrants (social agencies, non-profit organizations, special purpose media) been identified, and contacted, in order to assist with needs assessment and dissemination?

7.4. Other Market Segments that Merit Special Attention?

- Are there any other specific market segments in the community that warrant special attention (e.g. reverse commute access to jobs, physically disadvantaged, university students, long distance commuters, tourist visitors, etc.)?
- Have there been any recent assessments of these segments (e.g. market size, evolution, current services, expectations, etc.)?
- Who should be consulted and what should be the assessment process?

7.5. Development of a Vision?

- What is the status of relations with the MPO and other local planning organizations?
- Are smart growth, sustainable community and sustainable transportation guiding principles for these organizations?
- Does there exist a shared "vision" of public transportation in the community, consistent with sustainable community principles?
- Has is it been clearly articulated?
- Have the public, community organizations, and other stakeholders participated in the development of the vision?
- How will this vision be translated into strategic goals and directions for the transit system?
- How will effectiveness in attaining these strategic goals and fulfilling the vision be measured?

7.6. Transit's Involvement in Regional/Urban Planning, and Land-Use Decisions and Support for Transit-Supportive Development?

- Is transit a partner with local agencies/departments responsible for planning and land-use development concerning major land-use and development decisions?
- Does transit have the opportunity to review site plans from a transit perspective?
- Has transit developed a set of "transit-supportive" land development and site design guidelines?
- Have these been adequately communicated to politicians, planning officials, and developers?
- What are the opportunities for TOD or Transit-Supportive Development in the region?
- Are there any specific efforts that the transit system could pursue to encourage more TOD?

8. CONCLUSIONS

This study has conducted a comprehensive review of a wide range of demographic, social, transportation, and land-use trends through a diverse body of literature and web resources in these fields, as well as consulted many documents in areas related to new planning concepts, sustainable communities, and sustainable transportation. A number of trends have emerged from this comprehensive review that will affect transit system effectiveness (i.e. what role transit serves in the community and its ability to serve that role) in the future.

First, it is clear that U.S. cities are "On the Move":

- Transit has made some impressive achievements in the last few years, though somewhat moderated by the current economic slowdown.
- Many cities are enjoying a renaissance, as a result of public and private investments, as well as enhanced attractiveness as a place of residence and employment.
- There have been over the last decade, a significant number of new approaches being discussed by planning and land development practitioners and officials, all focusing on the concept of "sustainable community" and "smart growth", and implementation of these concepts is gaining ground.
- Various initiatives are strengthening the link between transit and the community. These include: joint development, Transit-Oriented Development (TOD) and location-efficient initiatives, Transportation for Livable Communities, and the Transportation and Community and System Preservation (TCSP) Program.

At the same time, the analysis of long-term trends identifies a number of significant challenges; these are expressed as four trends, and four areas of concern. Significant trends identified from the review that will affect transit's effectiveness in the medium-to-longer term, include:

- Growing sprawl, in terms of both population and employment, and also related to the growth in edge cities and big box store retail,
- Growing auto fleet, use, and distances traveled,
- Growing congestion but little sign of any related policy paradigm shift, and
- Changing travel patterns, which are decreasing traditional work trips and increasing trip chaining.

Four areas of societal concern have been identified through the review of these trends as being particularly pertinent in terms of affecting transit's future role in the community and its effectiveness. They include:

- Environmental, energy, economic, and safety implications of increasing auto dependence,
- Health issues resulting from poor air quality and patterns of the built environment, respiratory and obesity-related ailments in particular,
- Mobility requirements of an aging population, and
- Mobility-related social integration issues for the physically disadvantaged, economically disadvantaged, and increasing immigrant population.

Based on the assessment of these trends, there is need for concerted action along a number of dimensions as transit formulates its future strategic directions.

First, any strategy should be guided by a new vision of transit's role within a sustainable community. One possible starting point for building such a vision was expressed as follows:

> ***A transportation system that meets the needs for mobility and accessibility while balancing the current and long-term goals of economic growth, environmental quality, and social equity.***

A number of **actions are recommended** by the study. These include:

- **Enhance The Capacity Of Transit To Meet The Congestion Challenge**, through new transit infrastructure and increased priority to transit,

- **Develop A New Customer-Oriented Approach To Service Provision**, built on:
  - a better understanding of current and new markets through ***market segmentation***;
  - a ***Family of Services*** strategy, designed to meet the needs of market segments; and
  - a ***Mobility Management*** approach and coordination of all public transportation.

- **Enhance The Transit-Community Link**, through various efforts:
  - at the federal level, through increased support for the concept of smart growth, the highlighting of transit's potential role, support for MPO involvement, etc.
  - at the local level, through increased leadership by the transit system to create a vision of ***urban transportation in a sustainable community***, and to support or lead initiatives that support transit or sustainable modes, and
  - through practical initiatives that enhance transit's role in the community.

The research also provides an initial set of questions that transit systems could use to initiate strategic reflection on the following issues in their own communities:

- Knowledge of Transit Markets?
- Impact of Aging Population; Knowledge and Options?
- Immigrant Market; Knowledge and Options?
- Other Market Segments that Merit Special Attention?
- Development of a Vision?
- Transit's Involvement in Regional/Urban Planning, and Land-Use Decisions, and Support for Transit-Supportive Development?

The five Appendices provide some practical guidance in terms of concepts and identify many resources for transit systems that would like to pursue these topics.

It is hoped that this research will help to stimulate action within the transit industry, so that it can build on the considerable achievements to date, address the identified challenges, and fulfill its potential role in ensuring a more sustainable community for tomorrow.

APPENDICES

A. RESOURCES ON URBAN TRAVEL PATTERNS AND THE IMPLICATIONS OF DEMOGRAPHIC AND SOCIAL TRENDS

B. RESOURCES ON MARKET SEGMENTATION AND PROFILING TRANSIT RIDERSHIP

C. RESOURCES ON SMART GROWTH, NEW URBANISM, TRADITIONAL NEIGHBORHOOD DEVELOPMENT (TND), NEW COMMUNITY DESIGN (NCD)

D. RESOURCES ON TRANSIT AND LIVABLE COMMUNITIES, AND ON SUSTAINABLE TRANSPORTATION

E. A NEW VISION FOR URBAN TRANSPORTATION

BIBLIOGRAPHY

APPENDIX A. RESOURCES ON URBAN TRAVEL PATTERNS AND THE IMPLICATIONS OF DEMOGRAPHIC AND SOCIAL TRENDS

I. WEB SITES ON TRAVEL PATTERNS AND TRENDS

Journey to Work (Decennial Census) Homepage
http://www.census.gov/population/www/socdemo/journey.html
Formal survey conducted as part of the decennial census "long form" focusing on journey-to-work travel.

Census Transportation Planning Package (CTPP 2000)
http://www.fhwa.dot.gov/ctpp/dataprod.htm
CTPP 2000 is a set of special tabulations from the decennial census designed for transportation planners. Various reports are available from this site including a comprehensive review sponsored by FHWA on *Journey to Work Trends in the United States and its Major Metropolitan Areas – 1960 – 2000* [McGuckin and Sriniasan, 2003]

American Community Survey
http://www.census.gov/acs/www/index.html
As of 2000, an annual American Community Survey will replace the long form of the decennial census, providing an annual snapshot of America, and includes demographic, social, and economic information, including a question on "how workers usually got to work the previous week".

National Household Travel Survey (formerly the Nationwide Personal Transportation Survey) Homepage
http://www.fhwa.dot.gov/policy/ohpi/nhts/index.htm
The nation's inventory of personal travel (intercity and urban), based on a national survey conducted every 5-6 years, and reporting trip purpose, means of transportation, trip length, day of week and month of the year, number of people on trip, and a host of other trip-making characteristics.

Census Data for Transportation Planning
http://www.TRBcensus.com/
Web site sponsored by the TRB Subcommittee on Census Data for Transportation Planning, A1D08(1). Provides up-to-date information and web links for the CTPP, ACS, and other data sources pertinent to transportation planning

Status of the Nation's Highways, Bridges, and Transit: 2002 Conditions and Performance Report
http://www.fhwa.dot.gov/policy/2002cpr/index.htm
Comprehensive annual report to congress on the status of the nation's highways, bridges, and transit [U.S. DOT, 2003]. Chapter 14 discusses "The Importance of Transit".

- **Texas Transportation Institute (TTI) – Urban Mobility Report**
  http://mobility.tamu.edu/
  Site provides description of TTI's congestion monitoring program and annual urban mobility report.

- **Bureau of Transportation Statistics**
  http://www.bts.gov/
  Comprehensive collection of statistical reports on all modes of transportation.

- **APTA - Transit Statistics**
  http://www.apta.com/research/stats/Web Portal with transit statistical data synthesized by APTA, as well as links to the National Transit Database (NTD)

II. WEB SITES ON SPECIFIC URBAN POLICY ISSUES AND ON THE IMPLICATIONS OF THE AGING POPULATION

- **The Brookings Institution Center on Urban and Metropolitan Policy**
  http://www.brookings.org/es/urban/urban.htm
  Major research center on urban and regional policy issues. Studies are well researched, but concise and readable, and cover a wide range of relevant topics about trends and policy issues.

- **APTA Transit Resource Guides - #3 Transit Services for Seniors**
  http://www.apta.com/research/info/briefings/
  Downloadable set of documents addressing mobility issues for an aging population.

- **National Science and Technology Council – Accessibility for Aging and Transportation Disadvantaged Populations Partnership**
  http://scitech.dot.gov/partners/accage/index.html
  Web site provides a discussion of issues, publications, and links to various organizations involved in research concerning mobility for an aging population.

- **AARP Research Center Web Site**
  http://www.aarp.org/research/
  Web site contains many studies on the needs of the aging population, including several focusing specifically on transportation-related issues.

APPENDIX B. RESOURCES ON MARKET SEGMENTATION AND PROFILING TRANSIT RIDERSHIP

I. WEB SITES

- **2001 NHTS – Articles – Socioeconomics of Urban Travel**
  http://nhts.ornl.gov/2001/articles/index.shtml
  Of particular interest is the 2003 assessment by John Pucher and John Renne of the 'Socioeconomics of Urban Travel: Evidence from the 2001 NHTS'. This provides interesting information on the profile of transit ridership. (The study by Steven Polzin, et al., on the future moderation in VMT, entitled *The Case for Moderate Growth in Vehicle Miles of Travel*, can also be found at this web site.)

- **2001 NHTS - Early Findings on Public Transportation Travel Trends**
  http://nhts.ornl.gov/2001/presentations/polzin/index.shtml
  Presentation by Steven E. Polzin, PhD., and Xuehao Chu, PhD. of the Center for Urban Transportation Research at the University of South Florida, providing interesting information on the profile of transit ridership, based on the 2001 NHTS.

II. RESOURCES TO DEFINE THE PROFILE OF TRANSIT RIDERSHIP

Section 5.1 made reference to two TCRP studies related to market segmentation. ***A Handbook on Using Market Segmentation to Increase Transit Ridership*** [Elmore-Yalch, 1998] provides some practical guidance on the concept of market segmentation itself.

The second, ***Transit Markets of the Future; the Challenge of Change*** [Rosenbloom, 1998] is a comprehensive assessment of transit's markets and the societal trends that are affecting its markets based primarily on the 1990 Census, the 1990 NPTS, and the American Housing Survey. One interesting concept put forward in the study is the assessment of the propensity of different demographic and socioeconomic groups to use transit for their journey to work, as compared to the national average. It identifies 14 groups that are more likely (than average) to use transit for their journey to work. The following list, derived from data presented in the report [Rosenbloom, 1998, p. 8], ranks these groups in decreasing propensity to use transit.

- Workers without household cars (5.76 times more likely than the average worker)
- Black workers (2.72)
- Workers with mobility or work limitations (2.41 and 1.25)
- Immigrant workers (2.08, ranging from 3.01 to 1.48 depending on number of years since immigrating)
- Asian workers (1.74)
- Hispanic workers (1.73)
- Workers with less than a high school education (1.69 to 2.59)
- Workers with some high school but no degree (1.25)
- Women workers (1.18)

- Workers aged 17 to 29 (1.14)
- Workers age 60 and over (1.07; 1.10 for over 65)
- Workers with graduate school education (1.06)
- Workers with a college degree (1.05)
- Workers with household income below $20,000 (1.04-1.23 depending on income level)

Other studies have also broadly profiled transit ridership.

APTA published in 1992 the report ***Americans in Transit; A Profile of Public Transit Passenger***s [APTA, 1992]. This report (available for free from APTA), assembled from ridership reports from transit systems, provides a good basis for profiling ridership on transit systems. It is still used for several of the descriptive tables in the annual APTA *Public Transportation Fact Book.* Some key findings from this 1992 profile include the following:

- The majority of riders are female (hovering around 60% in areas with 1 Million or less population)
- 55% of transit riders are minorities (31% black and 18% Hispanic), though this proportion decreases considerably in areas under 200,000
- 10% of riders are under age 18, and 7% of riders are over age 65, though the proportions are much higher in areas under 200,000 (15-18% for the under 18, and 15-18% for the over 65)
- 28% of riders have incomes below $15,000 (compared to 16% of the general population). This number increases to 38% if one excludes New York City.
- Work trips constitute 54% of all trips, though this decreases significantly with area population, dropping to only 20% in areas under 50,000.

As stated in the report, minorities and low-income workers constitute a large proportion of public transit passengers, and public transit is part of our nation's social security net. However, as the report also states, the above characteristics vary considerably with size of area population.

John Pucher and John Renne [Pucher and Renne, 2003] have analyzed the 2001 NHTS data in their article '***Socioeconomics of Urban Travel: Evidence from the 2001 NHTS'***, and Steven Polzin [Polzin and Chu, 2003] has prepared a presentation on ***Early Findings on Public Transportation Travel Trends***. Both documents are available from the web (see above) and provide valuable insights into the profile of transit ridership.

Finally, David Crowley in a study prepared for (and available from) the Canadian Urban Transit Association, entitled ***Profiling Transit Ridership*** [Crowley, 2000], studies alternative ways of describing transit customers (and potential customers) used in transit system "attitude surveys" and other studies, in order to develop a useful approach to stratification for use in transit planning and market research.

APPENDIX C. RESOURCES ON SMART GROWTH, NEW URBANISM, TRADITIONAL NEIGHBORHOOD DEVELOPMENT (TND), NEW COMMUNITY DESIGN (NCD)

I. WEB SITES ON NEW URBANISM

Local Government Commission – Center for Livable Communities
http://www.lgc.org/center/index.html
Non-profit association with a variety of resources, including the description of the Ahwahnee Principles (see below), and tools for public involvement.

Congress for the New Urbanism
http://www.cnu.org/index.cfm
Focal point for the "New urbanism" movement.

"New Community Design to the Rescue" (2001), Report on National Governor's Association (NGA) Center for Best Practices web site
http://www.nga.org/center/divisions/1,1188,C_ISSUE_BRIEF^D_2344,00.html
This report explains how states and communities can encourage New Community Design -- mixed-use, mixed-income, walkable development that is distinctly different from sprawl -- by eliminating institutional barriers in the marketplace.

II. WEB SITES ON SMART GROWTH

U.S. Environmental Protection Agency – Encouraging Smart Growth
http://www.epa.gov/livability/
Web site with many resources and links related to Smart Growth. There are many valuable primers, studies and articles on the "Publications" page, including links to download:

- the report *Getting to Smart Growth: 100 Polices for Implementation [*Smart Growth Network / ICMA, *2002*],
- the study entitled *The Transportation and Environmental Impacts of Infill versus Greenfield Development: A Comparative Case Study Analysis* [Hagler Bailly Services and Criterion Planners/Engineers, 1999] that highlights the transportation benefits of infill development, and
- the insightful EPA report *Our Built and Natural Environments: A Technical Review of the Interactions between Land Use, Transportation, and Environmental Quality* [U.S. EPA, 2001].

A link also provides information on EPA's national "Award for Smart Growth Achievement".

- **U.S. Department of Energy - Smart Communities Network: Creating Energy Smart Communities**
  http://www.sustainable.doe.gov/
  Web site with many resources relating to various aspects of the issue of smart (i.e. sustainable) communities.

- **State of Maryland's Smart Growth Program Office**
  http://www.smartgrowth.state.md.us/
  One of the original Smart Growth programs in the nation. Program priorities have been somewhat modified since the change in Administration after the last election.

- **Envision Utah**
  http://www.envisionutah.org
  Comprehensive multiple partner effort to encourage and support a "Quality Growth Strategy". Contains a Toolbox of "Urban Planning Tools for Quality Growth" to assist communities as they plan for the future.

- **Growing Smart Legislative Guidebook: Model Statutes for Planning and the Management of Change (2002), American Planning Association (APA)**
  http://www.planning.org/growingsmart/
  http://www.planning.org/guidebook/Guidebook.htm
  The culmination of APA's seven-year Growing Smart project, this very comprehensive and inexpensive two-volume document provides new practical tools to help combat urban sprawl, promote transit-oriented design, promote affordable housing, and encourage redevelopment, to encourage a new generation of model planning and zoning legislation.

- **Smart Growth Online**
  http://www.smartgrowth.org/Default.asp?res=1024
  A web-based catalogue of Smart Growth resources, available through the Smart Growth Network, and funded through a cooperative agreement between the US EPA and the Sustainable Communities Network. Designed to advance public understanding of smart growth and how growth can improve community livability. The useful "*Getting to Smart Growth*" reports, Volumes I and II [Smart Growth Network and ICMA, 2002 and 2003], can be downloaded from this site.

- **TRB 2002 Workshop: "Transportation System to Support Smart Growth: Issues, Practice, and Implementation"**
  http://www4.trb.org/trb/calendar.nsf/web/SmartGrowth
  Web site contains downloadable presentations from this workshop that explored experience and issues related to transportation's potential role in supporting smart growth.

- **Urban Land Institute (ULI) Smartgrowth.net Web Site**
  http://smartgrowth.net/Home/sg_Home_fst.html
  Web site provides many tools and resources on Smart Growth.

- **Funders' Network for Smart Growth and Livable Communities**
  http://www.fundersnetwork.org
  Focal point for foundations, nonprofit organizations and other partners working to solve the environmental, social, and economic problems created by suburban sprawl and urban disinvestments.

- **Smart Growth America**
  http://www.smartgrowthamerica.com/
  Coalition of nearly 100 advocacy organizations that have a stake in how metropolitan expansion affects our environment, quality of life and economic sustainability. Web site contains reports and up-to-date information on various issues related to smart growth.

- **Sprawl Guide**
  http://www.plannersweb.com/sprawl/sprawlguide.html
  Site contains many documents and resources related to the impacts of sprawl and strategies and initiatives to deal with sprawl

- **Victoria Transport Policy Institute**
  www.vtpi.org
  Independent research organization dedicated to developing innovative and practical solutions to transportation problems. The web site contains a wide range of thoughtful studies on a variety of issues related to transportation costs, benefits, efficiency and equity, TDM, sustainable transportation and smart growth, including a well-researched study on "Evaluating Criticism of Smart Growth".

III. GUIDELINES FOR NEW URBANISM DEVELOPMENT (THE AHWAHNEE PRINCIPLES)

[Available at the Local Government Commission web site:
http://www.lgc.org/ahwahnee/principles.html]

One of the original statements of a new urban design philosophy and approach to planning were, *The Guidelines for New Urbanism Development-The Ahwahnee Principles* [Local Government Commission, 1991]. These were authored by a number of architects, urban designers, reporters, (e.g. Peter Calthorpe, Andres Duany, Elizabeth Plater-Zyberk, Peter Katz, etc.), and introduced at a conference of the Local Government Commission, held at the Ahwahnee Hotel in Yosemite National Park in 1991. They are as follows:

Preamble

Existing patterns of urban and suburban development seriously impair our quality of life. The symptoms are: more congestion, and air pollution, resulting from our increased dependence on automobiles; the loss of precious open space; the need for costly improvements to roads and public services; the inequitable distribution of economic resources; and the loss of a sense of community. By drawing on the best from the past and the present, we can plan communities that will more successfully serve the needs of those who live and work within them. Such planning should adhere to certain fundamental principles

Community Principles.

1. All planning should be in the form of complete and integrated communities containing housing, shops, workplaces, schools, parks, and civic facilities essential to the daily life of the residents.
2. Community size should be designed so that housing, jobs, daily needs, and other activities are within walking distance of one another.
3. As many activities as possible should be located within easy walking distance of transit stops.
4. A community should contain a diversity of housing types to enable citizens from a wide range of economic levels and age groups to live within it boundaries.
5. Business within the community should provide a range of job types for the community's residents.
6. The location and character of the community should be consistent with a larger transit network.
7. The community should have a center focus that combines commercial, civic, cultural, and recreational uses.
8. The community should contain an ample supply of specialized open space in the form of squares, greens, and parks whose frequent use is encouraged through placement and design.
9. Public spaces should be designed to encourage the attention and presence of people at all hours of the day and night.
10. Each community or cluster of communities should have a well-defined edge, such as agricultural greenbelts or wildlife corridors, permanently protected from development.
11. Streets, pedestrian paths and bike paths should contribute to a system of fully connected and interesting routes to all destinations. Their design should encourage pedestrian and bicycle use by being small and spatially defined by buildings, trees, and lighting and by discouraging high-speed traffic.
12. Wherever possible, the natural terrain, drainage and vegetation of the community should be preserved with superior examples contained within parks or greenbelts.
13. The community design should help conserve resources and minimize waste.
14. Communities should provide for the efficient use of water through the use of natural drainage, drought-tolerant landscaping, and recycling.
15. The street orientation, the placement of buildings, and the use of shading should contribute to the energy efficiency of the community.

Regional Principles

1. The regional land- use planning structure should be integrated with a larger transportation network built around transit rather than freeways.
2. Regions should be bounded by and provide a continuous system of greenbelt/wildlife corridors to be determined by natural conditions.
3. Regional institutions and services (government, stadiums, museums, etc.), should be located in the urban core.
4. Materials and methods of construction should be specific to the region, exhibiting continuity of history and culture and compatibility with the climate to encourage the development of local character and community identity.

Implementation Principles

1. The general plan should be updated to incorporate the above principles.
2. Rather than allowing piecemeal development, local governments should take charge of the planning process. General plans should designate where new growth, infill, or redevelopment will be allowed to occur.
3. Prior to any development, a specific plan should be prepared based on the planning principles. With the adoption of specific plans, complying projects could proceed with minimal delay.
4. Plans should be developed through an open process and participants in the process should be provided visual models of all planning proposals.

IV. NEW URBANISM / TRADITIONAL NEIGHBORHOOD DEVELOPMENT (TND)

One of the original, and most interesting, attempts to rethink community planning stemmed from the architecture/urban design community, and is called **New Urbanism** or **Traditional Neighborhood Design** (TND). The primary focus of TND is to create traditional-style neighborhoods, in terms of both form and function. The Ahwahnee Principles form its basis, and support a pattern of development that is conducive to increasing walking and transit use, and to reducing dependence on the automobile. Subsequent to the 1991 meeting, a Congress for the New Urbanism was formed to pursue and promote an approach to planning based on these principles.

A parallel concept of New Community Design (NCD), has been adopted by the National Governors' Association, and presented in the report entitled *New Community Design to the Rescue; Fulfilling Another American Dream* [Hirschorn and Souza, 2001], prepared by the (NGA) Center for Best Practices (see web site above).

These approaches to community design have been widely discussed within the architectural, urban design, and planning communities. These concepts are often contrasted with the dominant land use form of *sprawl*. For example, a recent book by Andres Duany, Elizabeth Plater-Zyberk, and Jeff Speck, entitled *Suburban Nation; The Rise of Sprawl and the Decline of the American Dream* [Duany et al., 2000], is a very readable and excellent reference, providing an in-depth assessment of the current planning and development practices that promote sprawl, and a critique of the problems created by sprawl. This book provides an alternative vision of community development, based on the TND principles that can be applied equally to suburban or city re-urbanization (e.g. infill or brownfields development), as well as a practical program for action.

The stated principles of the Congress for the New Urbanism, as embedded in their formal Charter, completed in 1996 are articulated in this book in the following manner. "In order to promote community, the built environment must be diverse in use and population, scaled for the pedestrian, and capable of supporting mass transit as well as the automobile. It must have a well-defined public realm supported by buildings reflecting the architecture and ecology of the region" [Duany et al., 2000, p. 258]. These principles appear to be gaining support in the community. They are also consistent with the perspectives that are emerging under the Livable Communities, or Smart Growth initiatives.

Transit plays a prominent and integral role in the TND vision and approach, as presented by Calthorpe, Duany, and others involved in the Congress for the New Urbanism. The more extensively such an approach to planning would be applied and deployed through development projects, the more it would serve to counteract the many challenges facing transit.

V. SMART GROWTH

The concept of Smart Growth focuses on the broader issue of managing growth, both in urbanized and rural areas, but incorporates many of the principles discussed above.

Many definitions exist:

> "The Urban Land Institute defines Smart Growth as development that is environmentally sensitive, economically viable, community-oriented, and sustainable." [ULI <smartgrowth.net> web site]

And the U.S. EPA states that "Smart growth development practices support national environmental goals by preserving open spaces and parkland and protecting critical habitat; improving transportation choices, including walking, bicycling, and transit, which reduces emissions from automobiles; promoting brownfield redevelopment; and reducing impervious surfaces, which improves water quality." [EPA Smart Growth Awards web site]

In 1996, numerous national organizations came together to form the *Smart Growth Network*, a network of private sector, public sector and non-governmental partner organizations seeking to encourage smart growth in neighborhoods, communities, and regions across the United States. Through support of the U.S. Environmental Protection Agency and the International City/County Management Association, the Smart Growth Network has published a recent report, entitled *Getting to Smart Growth: 100 Policies for Implementation* [Smart Growth Network and ICMA, 2002] that defines Smart Growth in the following way:

> "Smart Growth is development that serves the economy, community, and the environment. It provides a framework for communities to make informed decisions about how and where they grow. Smart growth makes it possible for communities to grow in ways that support economic development and jobs; create strong neighborhoods with a range of housing, commercial, and transportation options; and achieve healthy communities that provide families with a clean environment." [Smart Growth Network and ICMA, 2002, p. i]

This report has developed 100 policies to assist communities that recognize the value and importance of smart growth, and help policymakers put ten smart growth principles into practice. The ten principles are:

- Mix Land Uses
- Take Advantage of Compact Building Design
- Create a Range of Housing Opportunities and Choices
- Create Walkable Communities
- Foster Distinctive, Attractive Communities with a Strong Sense of Place
- Preserve Open Space, Farmland, Natural Beauty, and Critical Environmental Areas
- Strengthen and Direct Development Towards Existing Communities
- Provide a Variety of Transportation Options
- Make Development Decisions Predictable, Fair, and Cost-Effective
- Encourage Community and Stakeholder Collaboration in Development Decisions.

One can note that many of these smart growth principles are consistent with the Ahwahnee Principles discussed above.

Interest in the concept of Smart Growth has continued to grow in recent years, in particular under the early leadership of former Governor Parris Glendening of Maryland. Many organizations have adopted Smart Growth principles, including:

- National Governors' Association
- National Associations of Counties
- National Association of Realtors
- National Trust for Historic Preservation
- American Farmland Trust, etc.

There have also been an increasing number of initiatives to support Smart Growth, including:

- *U.S. EPA's National Awards for Smart Growth Achievement*
  The U.S. Environmental Protection Agency launched in 2002 the creation of a national "Awards for Smart Growth Achievement" program as a way to recognize and support communities that promote and achieve smart growth, while at the same time bringing about direct and indirect environmental benefits.

- *Utah's "Envision Utah" Program*
  In 1997, "Envision Utah" was formed to help guide the development of a broadly and publicly supported Quality Growth Strategy - a vision to protect Utah's environment, economic strength, and quality of life. As defined on their web site (see above), "Envision Utah is a partnership of citizens, business leaders and policy-makers, working together to create a strategy that will preserve critical lands, promote water conservation and clean air, improve our region-wide transportation system, and provide housing options for all residents" [Envision Utah web site].

- Recent smart growth initiatives are also being reported in many individual states such as Michigan, New Jersey, Illinois, Maine, Delaware, New Mexico, Tennessee, Pennsylvania, etc., and this in spite of the many administration changes that took place in the last elections [Peirce, 2003].

- The *Funders' Network for Smart Growth and Livable Communities*
  The Funders' Network (see web site above) is an active resource and focal point for foundations, nonprofit organizations and other partners working to solve the environmental, social, and economic problems created by suburban sprawl and urban disinvestments.

- *An increasing number of conferences focusing on Smart Growth or related topics*
  Related conferences include: the annual "Congress for the New Urbanism", the annual "New Partners for Smart Growth" Conference, the annual "Rail-Volution" conference, a special workshop organized by TRB in 2002 entitled "Transportation System to Support Smart Growth: Issues, Practice, and Implementation" (see web site above), etc.

In addition to the above, the American Planning Association (APA) released in 2002 a major document that will make a significant contribution to the practical deployment of the Smart Growth approach to planning, design, and the management of development. Entitled ***Growing***

Smart Legislative Guidebook: Model Statutes for Planning and the Management of Change [APA, 2002], this comprehensive and inexpensive two-volume 1,450-page document represents the culmination of APA's seven-year "Growing Smart" project (see web reference above). These guidebooks provide a comprehensive look at the entire planning and land development processes, in all of its detail, and provides an array of legislative statutes that can be used by jurisdictions to help combat urban sprawl, promote transit-oriented design, promote affordable housing, and encourage redevelopment. The intent is to encourage a new generation of model planning and zoning legislation for the U.S.

There are now numerous organizations, including EPA, the Department of Energy, as well as various networks, that are focus and providing resources on "Smart Growth" or "Sustainable Communities", several of which are referenced above.

Perhaps the most significant observation from the above discussion is to note the convergence of thinking that is increasingly apparent among officials responsible for planning and managing land development. Conventional sprawl-inducing patterns of development are less and less acceptable in states and communities across the Nation, and transit is an important component of all of these new approaches to planning and growth management.

It is also clear however that the challenge of trying to change current well-established patterns of land development is huge. Obstacles include:

- The vast majority of existing zoning laws are based on single land use, and encourage sprawl through various mechanisms, among which minimum parking requirements are significant.
- New sprawl development requires costly public infrastructure (e.g. roads, water and sewers, schools, etc.), but most of these costs are absorbed by the public through the broad property tax base, providing no financial incentive for reusing existing infrastructure.
- Building codes favor new construction over rehabilitation or reuse of older buildings.
- In addition, re-development of brownfields or existing buildings can often entail heavy costs (land treatment, historic preservation regulations, etc.) that are more onerous than those borne by greenfields development. The playing field is not even.

These types of obstacles therefore create substantial inertia in favor of current patterns of development, and represent a huge challenge. In addition, smart growth approaches to planning are not without their critics, and the tone of discussion becomes all the more strident and ideological as the interest in smart growth concepts expands. Persons interested in the debate surrounding smart growth should refer to a recent study by Todd Litman, entitled, ***Evaluating Criticism of Smart Growth*** [Litman, 2003], and available from the VTPI web site (see above), that provides a thorough review and assessment of the criticisms and issues raised by the critics of smart growth.

Nonetheless, the emerging convergence of thinking within the planning and growth management communities is very encouraging. The various concepts discussed share many common characteristics and represent only slight variations on similar perspectives. It should be noted that the multiplicity of terminology does induce some level of confusion among non-experts.

APPENDIX D. RESOURCES ON TRANSIT AND LIVABLE COMMUNITIES, AND ON SUSTAINABLE TRANSPORTATION

I. WEB SITES ON TRANSIT AND LIVABLE COMMUNITIES

💻 **Federal Transit Administration – Livable Communities Initiative**
http://www.fta.dot.gov/library/planning/livbro.html
Describes Livable communities program and examples of projects that link enhancements to transit services and facilities and the quality of life in communities.

💻 **Transportation and Community and System Preservation (TCSP) Pilot Program**
http://www.fhwa.dot.gov//////tcsp/
Provides overview of DOT's TCSP Program, application criteria, and list of awarded projects.

💻 **American Public Transportation Association (APTA) – 10 Ways to Enhance Your Community: Unleash the Power of Public Transportation;**
http://www.apta.com/research/info/online/documents/10ways.pdf
Brochure that explores how communities can be strengthened through the linkage with enhanced public transportation.

💻 **Local Government Commission – Center for Livable Communities**
http://www.lgc.org/center/index.html
Web site provides many resources to assist local officials and encourage livable communities, including Policymaker Guides on Transit-Oriented Development and Infill Development, as well as case studies on revitalizing inner neighborhoods and older suburbs.

💻 **Project for Public Spaces**
http://www.pps.org/
Non-profit resource on creating livable communities, with considerable focus on role of site design and transportation.

💻 **Center for Transit-Oriented Development -Reconnecting America**
http://www.reconnectingamerica.org/html/TOD/index.htm
Web site provides many resources to encourage Transit-Oriented Development nationally through the development of a variety of tools and standards.

II. WEB SITES ON SUSTAINABLE TRANSPORTATION

Travel Matters: Mitigating Climate Change with Sustainable Surface Transportation
http://www.travelmatters.org/
The Travel Matters web site is a project of the Center for Neighborhood Technology, developed under the auspices of TRB TCRP Project H-21 [Feigon et al., 2003]. The web site offers a trio of resources—interactive emissions calculators, on-line emissions maps, and a wealth of educational content—to emphasize the close relationship between more efficient transit systems and lower greenhouse gas emissions.

Smart Communities Network / Sustainable Transportation
http://www.sustainable.doe.gov/transprt/trintro.shtml
Site sponsored by U.S. Department of Energy. Provides a comprehensive source of references (under Key Principles) on various issues related to Sustainable Transportation, including Integrated Land-Use Planning, Transit-Oriented Designs, Sprawl, Transportation Choices, etc.

U.S. DOT Center for Climate Change and Environmental Forecasting (CCCEF)
http://climate.volpe.dot.gov/
DOT's focal point of technical expertise on transportation and climate change, including the 2003 study on *Greenhouse Gas Reduction Through State and Local Transportation Planning* [Lyons, Peterson, and Noerager 2003].

National Science and Technology Council – Sustainable Transportation Partnership
http://scitech.dot.gov/partners/sustran/
Discussion and links to various organizations involved in research concerning sustainable transportation

UITP-International Association of Public Transport – Sustainable Mobility Initiative
http://www.uitp.com/project/susdev_intro.cfm
Web site describes the UITP initiative launched in 2003 to promote "Sustainable Mobility". The recent 40-page brochure entitled "Ticket to the Future; Three Stops to Sustainable Mobility" can be downloaded from the site, as can the "UITP Charter on Sustainable Development".

Centre for Sustainable Transportation (CST)
http://www.cstctd.org/CSThomepage.htm
Canadian multi-modal resource on sustainable transportation.

The Surface Transportation Policy Project
http://www.transact.org/
Organization whose goal is to ensure that transportation policy and investments help conserve energy, protect environmental and aesthetic quality, strengthen the economy, promote social equity, and make communities more livable. Web site contains reports on various issues related to transportation investment policy and impacts. Several studies have focused on the costs of sprawl and congestion [STPP, 1999a, 1999b, 2000] and the positive contribution of sustainable transportation for communities [STPP, 2001]

III. THE CONCEPT OF SUSTAINABILITY

Another transit-supportive concept that has emerged from a totally different origin is that of "Sustainability". Despite the different origins of the concepts discussed in this report, there is a considerable degree of consistency among these various perspectives from transit's point of view. One senses a convergence of consensus on a number of key principles, and all are supportive of transit.

The World Commission on Environment and Development (informally known as the Bruntland Commission), introduced the concept of *sustainability* in their report *Our Common Future*, stating that "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [World Commission on Environment and Development, 1989, p. 43].

The concept of sustainability incorporates two key requirements: 1) the protection of the needs of future generations, and 2) an integrated perspective on the three dimensions of all human activity (economic development, environmental protection, and social justice).

The concept of sustainability was enshrined by the 1992 "Earth Summit" UN Conference on Environment and Development held in Rio de Janeiro. Among the important documents agreed upon at this conference were a statement on sustainability called the Rio Declaration, and a 700 page action plan for sustainability called Agenda 21. There was considerable world-wide focus on the concept of sustainability following the Rio Conference, which in turn has lead to new thinking and perspectives on many issues. The critical urban transportation dimensions of sustainability were therefore immediately recognized, in particular because of the externalities created by increasing auto dependence in the world, and because auto use is one of the most important sources of greenhouse gases, the generator of climate change.

Many institutions and experts [Newman and Kenworthy, 1999] have recognized the importance of cities in the global economy, and the critical role cities will need to play in the pursuit of sustainable development. As a result of this recognition, more than 2,000 local governments have implemented Local Agenda 21 Sustainability Plans since the 1992 Rio Conference.

The most creative thinking identified in the review relates to some of the efforts to explore dimensions of sustainability at the metropolitan level, and is consistent with thinking that places

the city economy at the heart of national economic development. Some of this effort has been inspired by Jane Jacobs and her focus on City Economies as the prime engine for economic development [Jacobs, 1969]. Many of the efforts use bio-systems models to represent the complex interactions between the three dimensions (e.g. economic, environmental, and social).

Monitoring of trends is critical for professionals concerned about sustainability. This is true not only with respect to the complex issues surrounding the measurement and forecasting of climate change, but also with respect to the myriad factors that affect sustainable development, both globally and locally, through the ecosystem interactions of economic, environmental, and social dimensions. The recent focus on metropolitan sustainability has lead to new ways of comparing the achievements of different metropolitan areas and countries with respect to the three dimensions of sustainability (economic, environmental, and social), through the use of indicators.

IV. DEFINING SUSTAINABLE TRANSPORTATION

The Centre for Sustainable Transportation (CST) in Canada, defines sustainable transportation as follows:

"A sustainable transportation system is one that:

- allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations.
- is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy.
- limits emissions and waste within the planet's ability to absorb them, minimizes consumption of non-renewable resources, reuses and recycles its components, and minimizes the use of land and the production of noise." [CST web site – see above]

The National Science and Technology Council (NSTC) initiative on Transportation and Sustainable Communities (see web site above) expresses the concept of a sustainable transportation system concisely as follows:

> ***A transportation system that meets the needs for mobility and accessibility while balancing the current and long-term goals of economic growth, environmental quality, and social equity.***

Both definitions make reference to the two concepts at the heart of the sustainability concept, namely: 1) the protection of the needs of future generations, and 2) the integrated perspective on the three dimensions of all human activity (economic, environmental, and social).

APPENDIX E. A NEW VISION FOR URBAN TRANSPORTATION

A New Vision for Urban Transportation: a Briefing Document
http://www.tac-atc.ca/english/pdf/urban.pdf
The six page briefing document can be downloaded from this web site.

It is worth highlighting a very early and pertinent initiative to develop "***A New Vision for Urban Transportation***". Many of the principles discussed in this report had been already identified in the early 1990's. At the time, there was a growing concern with the trends affecting urban transportation among Canadian professionals and decisonmakers along multiple dimensions. As a result, several organizations came together to organize a two and a half day vision development process focusing on urban transportation, including: The Transportation Association of Canada (that lead the effort), the Federation of Canadian Municipalities, the Canadian Institute of Planners, the Canadian Urban Transit Association, etc. [The author of the present study participated in this workshop.] A number of principles emerged from the process (See below). Proceedings helped to articulate these principles, which were subsequently widely disseminated in the form of a briefing document, entitled *A New Vision for Urban Transportation* [Transportation Association of Canada, 1993, Reprinted 1998].

The process helped achieve a consensus among different key interests, subsequently joined by others (e.g. the Canadian Institute of Transportation Engineers). It created a platform for discussion, and promoted the concept among municipal and provincial decsionmakers. [It should be noted that the process later suffered, as did most of the public sector, from the retrenchment and confusion caused by the massive restructuring of the federal and provincial public sector that took place in the mid 1990's]. Nonetheless, it was an important initiative and a precursor to much of the discussion that is taking place today.

The significance of this initiative is that this document still *represents one of the few efforts that focuses specifically on developing a* ***Vision for the urban transportation system*** *that is consistent with principles of smart growth and sustainability.*

The basic principles of this vision are listed below:

1. *Urban Structure and Land Use*: Plan for increased densities and more mixed land use.
2. *Walking*: Promote walking as the preferred mode for person trips.
3. *Cycling*: Increase opportunities for cycling as an optional mode of travel.
4. *Transit*: Provide higher quality transit service to increase its attractiveness relative to the private auto.
5. *Automobile*: Create an environment in which automobiles can play a more balanced role.
6. *Parking*: Plan parking supply and price to be in balance with walking, cycling, transit and auto priorities.
7. *Goods Movement*: Improve the efficiency of the urban goods distribution system.
8. *Inter-Modal Integration:* Promote inter-modal and inter-line connections.
9. *New Technology:* promote new technologies, which improve urban mobility and help protect the environment.

10. *System Optimization:* Optimize the use of existing transportation systems to move people and goods.
11. *Special User Needs:* Design and operate transportation systems which can be used by the physically challenged.
12. *Environment:* Ensure that urban transportation decisions protect and enhance the environment.
13. *Funding/Financing:* Create better ways to pay for future urban transportation systems.

Each principle is articulated more fully in the complete document that can be downloaded from the TAC web site.

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