

THE COSTS OF

Sprawl

IN PENNSYLVANIA

Final Report

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CLARION ASSOCIATES

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INTRODUCTION

Americans are good at making choices – and pride themselves on their ability to make them well. Our thriving market economy provides us with a staggering variety of goods and services to choose from (within the limits of our pocketbooks). But we rise to the challenge and make those decisions every day. In fact, most Americans have developed the skills to wade through the daily ocean of information and come to a relatively quick decision as to “what I want to buy”. The question then becomes “what does it cost”?

In many cases, the answer is easy – it's the price written on the price tag. But in other cases it is not so easy. Many a teenager has belatedly discovered that the true cost of a car is not just the price paid to the dealer -- it includes the myriad other bills that must be paid to keep the car running and legal. Many a first time home buyer has discovered to his or her chagrin that the monthly mortgage note is only one of many checks that must be written if he or she wants to keep up the house over time. And many a retiree on a long-anticipated world trip has discovered that the price of an everything-included tour never includes everything. Fortunately, we can all learn from our mistakes as consumers, and many sellers are now required to disclose those hidden costs that will come as the most unpleasant surprises to buyers. With more information, we make better decisions, and the economy adjusts to provide more of the things we want when we know the true costs involved.

Unfortunately, it is much harder to identify the true costs of our public policy and investment decisions than it is for a car or a house. Ever since World War II, Pennsylvania (and most other states) have been making, encouraging, accommodating, or tolerating public investment decisions and land use policies that have led to “sprawl” development patterns. Those Pennsylvanians who have the enough money to choose where to live have not only made their personal decisions within this public policy framework -- they have either passively or actively supported it. The sheer volume of sprawl-promoting home purchase decisions, business location decisions, and auto purchase decisions that have been made since 1945 suggests that sprawl meets some important needs for some of the people who make those decisions.

As relatively wise consumers, however, many Pennsylvanians have long suspected that they have not been made aware of the full costs of sprawl. They also know that some low- and moderate-income residents of the state have far fewer choices, and may be bearing the costs of being “left behind”. Almost since post-war sprawl began, analysts have been warning that it carries hidden costs that are not being priced in the marketplace. As citizens of the state have been asked to bear the costs of ever-more-expensive roads and transit systems, and have discovered that they had to move ever farther from the central cities to maintain the open space and inexpensive public services they enjoyed a decade earlier, those warnings begin to ring true. It has become increasingly clear that decisions about where to buy a house or locate a business are being made without a true understanding of the full costs involved. As the rate of sprawl has increased during the 1980s and 1990s, Pennsylvanians' concerns about sprawl have also increased. They want to know what the hidden costs are, how big they are, and when and how they may be required to pay those costs. They know that investment decisions do change when true costs are known, and that the economy will adjust to provide what people want to buy when they know what it really costs.

This study is an attempt to answer the following Basic Questions:

**“What Are the Costs of Sprawl in Pennsylvania,
How Big Are They,
And Who Pays for Them?”**

As we approach these questions, it is important to keep in mind that sprawl and economic growth are not the same – sprawl does not imply that growth is occurring, and growth does not require sprawl in order to happen. Some of America's healthiest communities have learned that their local economies can grow without sprawl (or with much less sprawl than they have seen in the past) through better use and reuse of land. Economic growth is almost always a positive thing for the communities in which it occurs, and is often necessary to remain competitive in the American economy, but sprawl is not the price of admission.

Just as importantly, many communities are experiencing sprawl without growth. They are not accommodating net new jobs and residents -- just re-arranging existing populations and jobs into different land use patterns. Without intending to, some of these communities are simply moving economic activities from areas where there is infrastructure to support it to areas where new infrastructure must be built, and undermining the survival of the economic generators in older areas of the city. The result is that the public is often asked to bear both the costs of constructing new infrastructure and then additional costs to "undo" the damage done through underuse of existing investment in older areas.

Defining Sprawl

One of the persistent problems in many efforts to document the costs of sprawl is that it is difficult to define just what sprawl is. While academics can and do debate this issue at length, it is important not to over-emphasize any specific definition. The phenomenon of low density, dispersed development is simply too well documented to debate, and we suspect that most Pennsylvanians "know it when they see it." In this report, we use the definition of "sprawl" used in The Costs of Sprawl-Revisited: Transit Cooperative Research Report 39 (1998) – which is the latest nationwide evaluation of the Costs of Sprawl by many of the leading researchers in this field. The Costs of Sprawl-Revisited defines sprawl as a regional pattern of real estate development that is characterized by all of the following characteristics:

- Low Relative Density;
- Unlimited and Non-Contiguous (Leapfrog) Outward Expansion;
- Spatial Segregation of Different Land Uses;
- Consumption of Exurban Agricultural Lands and Environmentally Sensitive Lands; and
- Travel Dominance by Motor Vehicle.

In addition, The Costs of Sprawl-Revisited acknowledges that some researchers would add two additional defining characteristics of sprawl, namely:

- Small Developers Operating Independently of Each Other; and
- Lack of Integrated Land Use Planning (due to a Fragmented System of Local Governments with Varying Fiscal Capacities).

Although this qualitative definition may seem lacking in specificity, there are two good reasons to use it. First, it represents the closest thing to consensus that leading researchers have been able to achieve; and second, using this definition makes it easier to compare findings from Pennsylvania to those in other studies throughout the country. All of the communities analyzed in this report are experiencing sprawl under this definition.

Defining the Costs of Sprawl

In the 25 years since serious study of the costs of sprawl began, researchers have had a hard time defining what costs should be measured – and distinguishing between individual costs, social costs, and costs that are born by both the individual and society. Although most studies to date show a basic understanding that societal costs are in the end born by some group of individuals (i.e., there is no free lunch) – few studies actually quantify how societal costs are in fact repaid by the public. The reason is that the pattern in which the costs of sprawl fall on the public is extremely complex – and it varies by location, income level, and the types and levels of taxes paid by each member of the public. Simply put – there is no "typical household"

that could be meaningfully defined across Pennsylvania. Partly for that reason, researchers have stopped trying to put a single, generic price tag on sprawl. If we were to define a hypothetical household and then conclude that “sprawl costs a typical Pennsylvania family \$5,000 per year” (for example), the number of cases in which that price tag would be inaccurate would far outnumber the cases where it would be accurate. It would also ignore the fact that some households have the money and freedom to relocate and avoid some costs – while others do not.

Instead of trying to create a “one price fits all” definition of sprawl, this report again follows the lead of The Costs of Sprawl–Revisited, which uses the following definition.

“[T]he ‘costs’ of sprawl are the resources expended relative to a type, density, and location of development. These ‘costs’ involve physical, monetary, temporal, and social/ psychological resources. They involve costs to the individual, to the community, and to society.”

Using this definition, this study documents as many costs as we could find that were capable of being quantified with available data. Instead of a single price tag for sprawl, we found many different price tags for sprawl. Sometimes the costs are cumulative (i.e., a household may bear the sum of several different costs identified in the report), and sometimes they are not. By not assuming that the costs are all born by a typical household, we hope that the results of this study more accurately represent the pattern in which the costs of sprawl actually appear. However, once you have defined a given situation (i.e. a proposal to build a new, low-density subdivision, or a decision to build a new transit line), the costs of sprawl in that situation will include all the costs documented in this report that apply to that situation.

Methodology

Our goal was to document the hidden costs of sprawl in Pennsylvania, to test our findings against similar work in other states, and to draw on general studies applicable to Pennsylvania when no state-specific information was available. To do so, we gathered information from four types of sources:

- **Case Studies.** We visited 21 different Pennsylvania communities in two case study efforts to ask how sprawl patterns of development were affecting each community, and to gather information on revenue and spending patterns over time. The larger case study identified two **Large Communities**, two **Medium Sized Communities**, and two **Small Communities** in six different regions of the state, and then focused on the Core City and a representative Inner Suburb and Outer Suburb in each one. The Project Steering Committee (listed in the Acknowledgments to this report) selected each of the six case study areas, as well as the individual local governments chosen to be representative of the inner and outer suburbs surrounding the central city. The primary goal was to make the results of this study as reliable as possible by choosing case study jurisdictions that (1) cover all sizes of communities, (2) in all areas of the state, (3) where clear examples of inner and outer suburbs can be identified, and (4) where most or all of the relevant information was available. In each case:
 - the **Core City** represents the historical center city (or town) of the area;
 - the **Inner Suburb** is a jurisdiction representative of the first ring of post-WWII expansion outward from the Core City (many of which are now growing more slowly if at all); and
 - the **Outer Suburb** is a fringe area, further away from the Core City, which is still feeling the effects of active land development and growth.

Each case study jurisdiction was sent a lengthy survey questionnaire, and then visited and interviewed to review the questionnaire and to ask follow-up questions about costs that may not have been covered in the questionnaire. Because of the wide variety of jurisdictions studied, it is very likely that the results of this study are representative of the impacts felt in other areas of the state that are experiencing outward expansion. The larger case study set is listed below.

Category	Small Communities	
	Meadville Area	Williamsport Area
Core City	Meadville (Crawford Co.)	Williamsport (Lycoming Co.)
Inner Suburb	W. Meade (Crawford Co.)	S. Williamsport (Lycoming Co.)
Outer Suburb	Vernon (Crawford Co.)	Loyalsock (Lycoming Co.)
Category	Medium Size Communities	
	Lehigh Valley	York Area
Core City	Allentown (Lehigh Co.)	York (York Co.)
Inner Suburb	S. Whitehall (Lehigh Co.)	Spring Garden (York Co.)
Outer Suburb	N. Whitehall (Lehigh Co.)	Springettsbury (York Co.)
Category	Large Communities	
	Philadelphia Area	Pittsburgh Area
Core City	Philadelphia (Philadelphia Co.)	Pittsburgh (Allegheny Co.)
Inner Suburb	Bensalem (Bucks Co.)	Monroeville (Allegheny Co.)
Outer Suburb	Buckingham (Bucks Co.)	Hempfield (Westmoreland Co.)

The second, smaller case study compared an Inner Suburb, an Outer Suburb, and a Mature Suburb located between them. We wanted to identify whether there is a class of suburbs that is experiencing neither the high costs of maintaining older infrastructure near the Core City nor the high costs of building new infrastructure for new development on the edge of the metropolitan area. These jurisdictions were selected by the consultant as a representative sample of different classes of suburbs in the Philadelphia area. The case study set is shown below.

Category	Philadelphia Area Jurisdiction
Inner Suburb	Upper Darby Township (Delaware Co.)
Mature Suburb	Tredyffrin Township (Chester Co.)
Outer Suburb	Uwchlan Township (Chester Co.)

- **Local Government Financial Statistics.** To supplement the case study process, we reviewed information published by the Commonwealth of Pennsylvania on local government spending for years 1980, 1990, and 1995. We used this data to identify levels and trends in local spending on infrastructure construction and maintenance, and to frame questions for local officials about whether that information accurately reflected spending patterns.
- **U.S. Census Data.** To supplement the case study process, we gathered U.S. census data for each of the case study jurisdictions. We used this data to identify apparent trends in growth, and to frame questions for local officials about what trends were in fact occurring and what their impacts were.
- **Review and Screening of Other Studies.** In order to confirm the findings from the case studies, and to address those costs of sprawl that could not be addressed through the case studies, we reviewed over 150 studies from all over the country that have attempted to document the costs of sprawl. Whenever we drew on the findings of a national study, we screened its findings to eliminate those that were not applicable to Pennsylvania. A list and summary of all those studies we reviewed is attached as an Appendix to this report.

In reviewing the findings in this report, it is important to keep the following in mind:

1. Unless otherwise specifically noted, all dollar figures are in "current dollars" (i.e. the dollar costs measured in the year for which the data was gathered). They have not been corrected for inflation.

2. Most of the research on expenditures in the case study communities presents only municipal expenditures – it does not cover additional expenditures that may be made by special taxing or service districts providing similar or supplementary services – such as water or sewer services. This may understate the total financial burden on taxpayers – particularly in the Outer Suburbs.
3. Wherever road maintenance costs are documented per mile of road, it includes only local spending on roads that local governments maintain. It does not include state or federal government spending on roads that they maintain.
4. Wherever tax base per household has been documented, it includes the value of real property for tax assessment purposes divided by the number of households in the jurisdiction.
5. Where tax levels have been documented, they include only taxes imposed by the local jurisdiction (and not additional taxes imposed by school districts or by taxing districts operating within the city or town).
6. Wherever data on median home price is presented, that data is based on the actual sales price of single family detached homes (including manufactured homes that the local government treats as single family homes – but generally not including mobile homes).
7. Many of the available studies on the loss of farmlands and sensitive environmental lands use different definitions of what is included in those categories – so the numerical results of different studies on the same topic may not be directly comparable.

Findings

The answers to the Basic Questions are that:

**"Sprawl Creates Four Important Types of Costs
Those Costs are Substantial, and
Most Pennsylvanians Pay Them
in One Way or Another"**

We found that sprawl development patterns create several hidden costs that are born by most of the people where the sprawl occurs – and in some cases by all the people of Pennsylvania. Some of the costs are paid through taxes and charges that are higher than they would be if sprawl did not occur. In other cases, they are "paid" through losses in the quality of life in the region where the sprawl occurs. The four major categories of costs are:

- Increased Public and Private Construction and Operating Costs (for Infrastructure and Housing)
- Increased Transportation and Travel Costs
- Increased Land and Natural Habitat Loss
- Increased Social Costs and Decreased Quality of Life

Our specific findings in each of these categories are summarized below, and are discussed in more detail in the chapters that follow.

I. INCREASED CONSTRUCTION AND OPERATING COSTS

Sprawl results in:

- Higher costs to build infrastructure and schools;
- Higher costs to operate infrastructure and schools once they have been built;
- Higher combined construction and operating costs (so-called 'life-cycle costs'); and
- Higher land costs for housing.

1. Three major research investigations have concluded that construction costs for roads, utilities, and schools can be up to 25% lower under planned growth scenarios that avoid sprawl development. More specifically, those studies showed that the infrastructure construction savings for "planned growth" rather than "sprawl" scenarios varies by the type of infrastructure involved. For local roads, the savings are approximately 25%, and for sewer and water utilities it is about 20%. In contrast, savings in school construction costs are approximately 5%, and there is no significant savings in the construction costs for police, fire, and rescue stations.

2. If the percentage savings listed above are applied to Pennsylvania, the results would be a dramatic reduction in costs born by the citizens of the state at the local level. If the 25% savings in road construction costs were applied to just the \$ 210 million that the state's local governments spent on road construction in 1995, the savings would be approximately \$ 52 million per year. If a blended savings rate of 10% were applied to the \$1.2 billion that Pennsylvania's local governments spent on all capital construction in 1995, the result would be a savings of \$120 million per year.

Each year, Pennsylvania's local governments may be spending up to \$120 million more than they would have to spend if more compact forms of development were used.

3. In the Philadelphia area between 1989 and 1998, sprawl led to the need to construct 21 new schools in the Outer Suburbs (to accommodate enrollment growth of 14%), while the number of schools in the Core City and Inner Suburbs declined by 1 (and still accommodated enrollment growth of 9%). Class size accounted for some of the difference between the Core City and other jurisdictions, but none of the difference between Inner and Outer Suburbs.
4. The highest rates of increase in road maintenance costs are found in Philadelphia and Pittsburgh, but in other areas of the state the Inner or Outer Suburbs are sometimes seeing per mile road maintenance costs rising faster than their Core Cities.
5. A 1990 study of the fiscal impacts of residential development found that, on average, housing on lots of one acre or more resulted in an average public revenue deficit of \$490 per year, while housing on lots of one-quarter acre or less generated a deficit of \$114 per year.

6. Where residential land uses are allowed to dominate the mix of land uses in rural Pennsylvania townships, the fiscal costs of new development generally outweigh their fiscal benefits. A 1997 study found that the ratio of expenses to revenues created by new residential growth ranged from 2:1 in Stewardson Township in Potter County to 1.03:1 in Carroll Township in Perry County.

Sprawl may increase local government losses from municipal services and schools by between \$100 and \$1000 per taxpaying household per year.

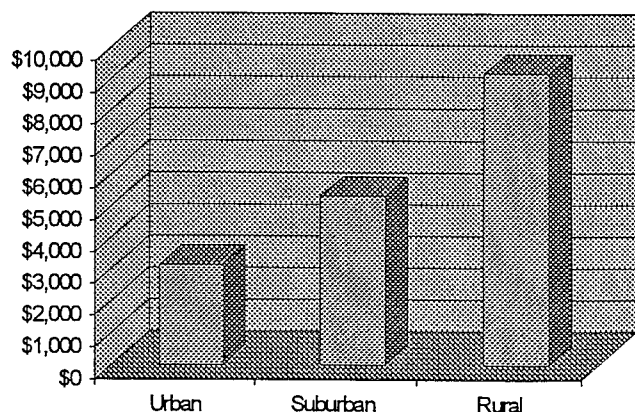
7. A 1993 study of Ephrata Township in Lancaster County found that sprawl could increase the combined governmental deficit for municipal services and schools by between \$100 and \$1,000 per year per household (depending on the pattern of sprawl), when compared to more compact development patterns.
8. In the case study areas, the highest per household expenditures for municipal capital and operating costs are found in the Large Communities, and the lowest are found in the Small communities. Within each case study area, the highest per household expenditures are found in the Core Cities, and the lowest are found in the Outer Suburbs.
9. In the case study areas, government spending on a per household basis is generally increasing faster in the Inner Suburbs than in the Core Cities. In the Small Communities, per household expenditures in the Inner and Outer Suburbs increased up to three times faster than they increased in the Core City. In the Medium Sized and Large Communities, per household expenditures increased faster -- sometimes dramatically faster -- in the Inner Suburbs than they did in the Core Cities.
10. National studies have found that at a statewide level of analysis, planned growth can result in lower consumption of land per new home, which can reduce private housing costs 2% -- 8% below what they would be under a sprawl scenario. Those findings assume, however that the housing supply and demand are roughly in balance, and that total amount of housing available is not being restricted. On the other hand, one California study found that if housing supply is restricted below housing demand, private housing costs may increase up to 9%. As a result, controls on the amount of housing that is built could offset the cost savings that could be achieved through controls on the location of housing and lot size.

II. Increased Transportation and Travel Costs

Sprawl results in:

- Increased vehicle miles traveled (VMT);
- Lower use of transit, bikes, and walking;
- Higher costs from automobile accidents; and
- Less cost-efficient and effective public transit.

Annual Per Household Transportation Costs in Pittsburgh (1990)



1. In 1984, VMT per capita for rural counties was 50% higher than for urban counties, but by 1995 the gap between urban and rural VMT had narrowed to 43% because the longer travel distances in sprawl development has led some Outer Suburban counties to display more rural travel patterns.
2. In the Pittsburgh area, between 1970 and 1990, vehicle miles traveled per person increased by over 90%, average trip length increased from about 7 miles to 10 miles per trip, and VMT per household increased by over 60%.
3. Based on data from the Pittsburgh area, daily VMT per capita in the suburbs is about 50% higher than in urban areas, while VMT per capita in rural areas is about 150% percent higher than in the

urban locations. Because of differences in VMT, the average suburban household spent about \$1,500 more per year on automobile-related costs, and the average rural household spent about \$4,600 more per year, when compared to a similar household in a urban location.

4. Studies from throughout the country have concluded that when development is more compact and contains a mix of land uses, transit and walking modes of transport increase relative to automobile usage.
5. The increased number of vehicle crashes due to sprawl related increases in VMT cost Pennsylvania residents over \$8 million in 1996.
6. The low density, spread-out characteristics of sprawl makes the use of transit as an alternative transportation mode less cost-efficient and effective. In the Philadelphia area, fully 40% of the Southeastern Pennsylvania Transportation Authority's annual operating deficit is attributable to only 13.6% of the total number of transit trips –those longer trips that connect the city with increasingly sprawling suburban areas. If the Outer Suburbs were developed at residential densities similar to the Inner Suburbs, the total operating subsidy would drop by about 20%.
7. A study in the Lehigh Valley area found that, between 1980 and 1990, the number of workers using carpools decreased faster than it did around the state as a whole, and the number of workers using public transit decreased almost three times as fast as it did around the state as a whole.
8. Sprawl pulls public-sector spending on transportation infrastructure outwards to areas where more road miles are necessary to serve fewer people. Between 1986 and 1995 the City of Philadelphia received the lowest level of state funding for highway construction and maintenance in the Philadelphia area (far lower than its share of highway usage). Even after disproportionately high spending for mass transit is taken into account, Philadelphia received 50% fewer transportation dollars per capita than suburban areas with similar trip use and origin patterns.
9. Sprawl creates an increased need for reverse commuting (commuting outward from Core Cities to Suburbs in order to find jobs). In the Delaware Valley, reverse commuting on public transit is subsidized at the rate of \$3.47 per trip, while intra-Philadelphia commuting is subsidized at the rate of only 81 cents per trip. The net increase in reverse commuting between 1970 and 1990 increased public transit subsidy costs by about \$ 6 million per year.
10. Indirect social costs (including air/water pollution, waste, barrier effects, noise, and costs of parking and accidents not paid by the transportation user) constitute about 16% of the cost per passenger mile for single-occupant vehicles (SOV), less than 7% of the total costs for transit use, and a negligible share of the costs for walking and bicycling.

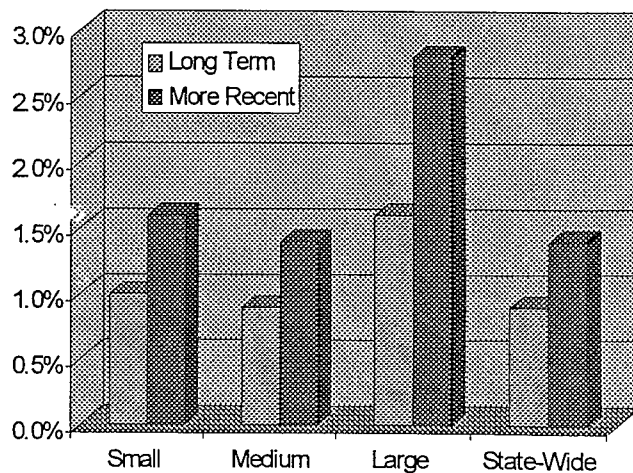
III. INCREASED LAND AND NATURAL HABITAT LOSS

Sprawl results in:

- Higher Consumption of Land Per Household
 - Loss of Agricultural Lands and Sensitive Environmental Lands
 - Increased Costs to Maintain Agricultural Lands and Open Spaces
1. Pennsylvania lost over 1 million acres of cropland, forest, and open space between 1992 and 1997, or more than 35 acres of land for each new resident of the state during that period. As a result, Pennsylvania ranked number two in the nation (after Texas) in the change in total acres of land developed.

2. In 1965, the average amount of land consumed per household in Montgomery County was .80 acres, but by 1990, the rate had increased to an average of 1.14 acres per household. Interestingly, at the same time, average household size decreased by 21%, from 3.48 persons per household to 2.75 persons per household.
3. In Montgomery County between 1965 and 1990, 62,185 acres of land was developed for new residential development. If land development per household had continued at the 1965 level, the amount of land consumed by new residential growth would have been 45% lower, and over 44 square miles of land in central and western Montgomery County would have been left undeveloped.
4. In Chester County, every 100 acres of single-family residential development is supported by an additional 38 acres of roads and 18 acres of utilities. Because of these needs for land to support the roads and utilities that support new homes, every 1 acre of single-family residential development, results in the loss of an average of 1.56 acres of agriculture, wooded, and vacant land.
5. While there has been widespread loss of agricultural land throughout Pennsylvania over the last 25 years, the loss has been most extreme around urban metropolitan areas such as Philadelphia, Pittsburgh, Harrisburg, and Reading.
6. The rate of agricultural land loss has quickened during the past 10-15 years, compared to historical rates of loss since 1969. If Pennsylvania continues to lose farmland at its historic 23-year rate of 0.9% per year, there would be no farmland left in the state in less than 100 years (other than land protected by existing programs). However, if the rate of loss continues at the faster rate of 1.4% experienced during 1982-1992, there would be no farmland left in the State in approximately 70 years (again, except for land protected by existing programs). On the bright side, farmland preservation programs have protected over 160,000 acres of Pennsylvania farmland to date, and that total will rise over time and will offset some of the losses from sprawl development.
7. In the Delaware Valley, the rate of agricultural land loss between 1982 and 1992 was 70% faster than the average loss from 1969 to 1992. If farmland continues to be consumed at the average rate of 2.8% seen between 1982 and 1992, all farmland in the region would be converted (other than land protected by existing programs) within 28 years.
8. Montgomery and Bucks Counties lost nearly a third of their farmland base during the ten-year period from 1982 to 1992 – a rate of consumption that could only be sustained for 20 years before all of the farmland would be converted (other than land protected by existing programs).
9. Pennsylvania loses between 1 and 6 acres of farmland for each new household created. The figure is around 1 acre per household in larger communities, and rises to 5 or 6 acres per household in smaller communities.
10. In addition to the loss of farmland, Pennsylvania has been losing sensitive environmental lands at a significant rate. The state lost an average of 1,200 acres of wetlands per year from 1956 to 1979, and wetlands now only constitute 2% of the state.
11. National studies confirm that sprawl is linked to the loss of more sensitive environmental lands --such as

Rate of Loss of Farmland By Size of Community



wetlands, flood plains, critical habitat, aquifer recharge areas, stream corridors, and steep slopes -- than would occur under planned, compact development patterns. More compact forms of growth could save between 17% and 27% of the environmentally sensitive lands currently being consumed.

12. In Chester County, citizens have incurred costs of about \$91 million -- or about \$89 per household per year -- to purchase farmlands and open space to protect them from development.

During the last decade, the Lehigh Valley has spent \$18 million to acquire open space, but its local governments have still seen open space per capita decline between 27% and 57%.

13. In the Lehigh Valley, open space acquisition programs have managed to acquire about one acre for every three acres lost through development, and different areas of the Valley have seen open space per capita decline between 27% and 57%.

14. A 50 year old tree provides an economic benefit of over \$250 per year by providing environmental protection services that would otherwise have to be provided by the development that removes the tree. If the value of these benefits were capitalized at a (conservative) rate of 5%, the market would value each tree at over \$55,000.

IV. Increased Social Costs and Decreased Quality of Life

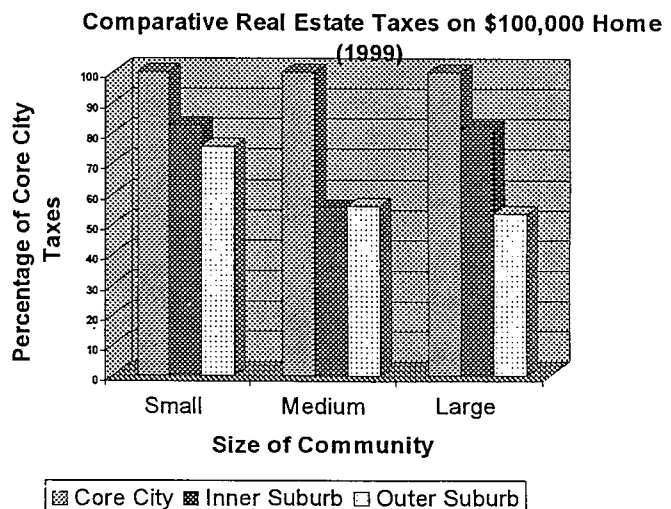
Finally, sprawl creates several harder-to-measure costs, including:

- Increased Stress;
- Increased Air and Water Pollution;
- Increased Pressures on Historic Properties;
- Increased Concentration of Poorer Citizens in Core Cities;
- Increased Jobs-Housing Mismatch;
- Unattainable Suburban Housing;
- Higher Tax Burdens for Core City Residents;
- Over-Concentration of Tax-Exempt Properties in Core Cities;
- Over-Concentration of Regional Financial Obligations in the Core Cities; and
- Increased Fiscal Distress for Core Cities

1. One study found that sprawl results in longer commutes, more freeway travel, and more use of freeway interchanges, which have all been correlated with statistically significant effects on job satisfaction, work absences due to illness, and overall incidence of colds or flu.
2. Sprawl has contributed to an increase of approximately 12% (compounded) per decade in the number of auto trips taken per day, and auto emissions increase disproportionately with the number of trips taken. About 64% of all carbon monoxide emissions for a 5-mile trip occur while starting a cold engine, and the increase in the number of auto trips taken per day has significantly offset the effects of improvements in automobile emissions controls.
3. A study in the Chesapeake Bay area found that moving from a sprawl pattern to a more concentrated pattern of development could decrease sedimentation by 2.3 million pounds, nitrous oxides by 1.5 million pounds, and water consumption by 38.1 billion gallons by the year 2020.

4. Conversion of historic open spaces to residential development creates fiscal losses for the local governments where the land is located. A 1992 study of Straban Township in Adams County found that the costs of services provided per dollar of tax revenue was only \$0.12 for open land versus \$1.10 for land developed for residential uses.
5. Sprawl is partly responsible for disinvestment and demolition of historic structures in older downtowns, which undermines the growing and lucrative heritage tourism industry. Heritage tourism accounts for 25% of tourism spending in the state, and each lost heritage tourism visit costs the state approximately \$335.
6. Sprawl appears to put historic preservation efforts at more risk than compact development patterns. Preservation Pennsylvania recently identified that 34% of its listed "at-risk" sites were threatened by sprawl-related development activity.
7. Sprawl and its relatively more expensive housing on larger lots have led to an increasing concentration of poor households and female headed households in Core Cities and Inner Suburbs. In each of the six case study areas, Inner Suburb and Outer Suburb median incomes are between 25% and 150% higher than those in the Core City.
8. The disproportionate levels of poor in Core Cities creates high costs to those cities and to the state. Between 1985 and 1995, the provision of poverty-related services cost the City of Philadelphia over \$134 million per year (not including the cost of crime prevention and the added costs of educating the urban poor and diverse urban population in the city schools). One study found that "if only half of the \$134 million obligation were reimbursed and used to reduce the wage tax, the estimated results would be an 8% reduction in tax rates, an increase in employment of over 5,700, a reduction in unemployment of 10% and a resultant increase in wage tax revenue of over \$140 million."
9. Sprawl and its relatively more expensive large lot housing reduce the affordability of suburban housing to Core City residents. There were only two cases (out of twelve) where residents of a case study Core City could afford to buy a median-priced home in an Inner or Outer Suburb. In 1990, the Delaware Valley Regional Planning Commission found that a household earning the regional median income could not afford to purchase the median-priced housing unit in 81% of the region's municipalities.
10. Sprawl development generally results in residents of Core Cities having significantly higher real estate tax bills than residents of their Inner and Outer Suburbs. Case study comparisons of real estate taxes on equivalent \$100,000 homes showed that (with only a few exceptions) real estate taxes are highest in the Core Cities, significantly lower in the Inner Suburbs, and even lower in the Outer Suburbs.
11. Sprawl development patterns have resulted in rapidly rising real estate tax levies in the Core Cities and Inner Suburbs (which need to spread the costs of repairs to older infrastructure

Sprawl results in concentrations of poverty in the Core Cities. The provision of poverty-related services costs the City of Philadelphia over \$130 million per year.



over fewer residents) and in the Outer Suburbs (which need to build expensive new infrastructure to accommodate growth). Only those "in between" Mature Suburbs, whose infrastructure is appropriately sized for their population, have been able to avoid these rapid increases.

12. Sprawl has led to an over-concentration of tax-exempt properties in Core Cities. If the value of tax exempt properties in each Core City were proportionate to its share of the regional population, the real estate tax burden on taxable real property in the Core City could be reduced between 15% and 25%.
13. The fragmented system of local governments associated with sprawl development patterns results in Core Cities providing several expensive services that are consumed by the region as a whole, which the citizens of the Core City have to pay for. In Philadelphia, the total cost of un-reimbursed regional services is over \$460 million per year. If the city were able to be reimbursed for those expenses the city's wage tax could be reduced by almost 40%.
14. Sprawl development patterns have resulted in total and per capita real estate tax bases increasing much faster in Inner Suburbs than they are in the Core Cities, and faster in Outer Suburbs than they are in Inner Suburbs. At the same time, the Core Cities and Inner Suburbs rely on real estate taxes to fund a much larger portion of their budgets (sometimes twice as much) as Outer Suburbs.
15. Sprawl helps create a mismatch between infrastructure capacity, population, service needs and income levels within different cities. As a result of this mismatch, Core Cities are sometimes unable to adequately maintain their existing infrastructure. In 1993-1994, the City of Philadelphia was able to fund less than 60% of its infrastructure capital needs.

If each of these costs were assigned to the activity that creates it (such as the creation of low density residential subdivisions or the incorporation of new suburban governments), two important things would happen. First, Pennsylvanians would begin to experience the true costs of their home and business location and travel decisions, and would probably adjust those decisions in ways that would reduce the pace and scope of sprawl. Second, the resulting decisions would be more economically efficient, in that more of the current externalities of individual decisions would be internalized. More efficient decisions would reduce economic waste, and would make Pennsylvania's economy more competitive.

Limitations of the Study

Like all economic research, this study has its limitations. Most importantly, this effort did not involve the creation of a Pennsylvania-specific econometric model of defined "compact growth" and "sprawl" scenarios. While we believe that many parts of the econometric modeling performed in nearby New Jersey and Maryland are applicable to Pennsylvania, there is no doubt that Pennsylvania-specific models would have given some new insights. In addition, wherever this report cites other studies on a particular topic, it becomes subject to the differing definitions used in those studies. Unfortunately, many past research efforts use different definitions for terms like "urban", "suburban", "rural", "farmland", "roads", and "municipal services." They also study impacts over different periods of time, so that there is no standardized time frame for comparing the results of different studies. There are some cases where information is only available for one or a few Pennsylvania communities. Rather than ignore those facts, we have presented them, and allowed the reader to draw his or her own conclusions about whether the results are generally applicable to a particular size of community, or to a particular region of the state, or to the entire state. Finally, the study does not include a detailed breakdown of who actually pays for water and sewer extensions throughout the state, because of the difficulty of obtaining reliable data and tracking those funds through state funding programs and local budgets.

On the other hand, the methodology used in this effort has some distinct strengths that tend to offset some of its limitations. First, the use of 21 different case study jurisdictions around the Commonwealth ensures that most of the findings are specific to Pennsylvania. In addition, where a trend is seen in a multitude of

Small, Medium, and Large communities scattered across the state, it is very likely that the trend applies to most of the local governments experiencing sprawl patterns of development. Second, by using the same definitions used in major national studies on these topics, we have made it more likely that the findings of those studies can be compared with findings in Pennsylvania. Finally, by casting a broad net to cover a wide variety of impacts, studied in a variety of ways, we have made the study more "robust". Criticism of any particular finding does not implicate all the findings. The fact that so many different studies confirm each others' findings that sprawl creates significant costs that are not reflected in the market prices for land or building or cars tends to make the conclusion more reliable. At some points it may be helpful to ask "how many different studies would have to be wrong – and by how much would they have to be wrong – for a reasonable person to conclude that sprawl does not create this cost." By analogy, a critic might find fault with any given test of the effectiveness of seat belts, but many studies would have to be very wrong before the same critic could reasonably conclude that the use of seat belts does not save lives.

Further Research Needed

The object of this report was to quantify the dollar values of measurable costs of sprawl -- and not the dollar value of the benefits of sprawl. There is no denying, however, that sprawl development reflects benefits that are valued by many Pennsylvanians. In fact, the benefits of larger personal spaces and individual automobile travel appear to be valued in every society where the economy makes them available. Among other benefits, it appears that sprawl reflects some consumer preferences (for those who can afford it, and with the information they have available) and may promote a pattern of smaller and potentially more responsive local governments.

This report does not deny those benefits, but it does attempt to outline more clearly the price tag that is attached to them. Recently, The Costs of Sprawl -- Revisited (cited earlier) made preliminary attempts to quantify some of those benefits on the basis of available national research. We would encourage future Pennsylvania-specific research into the dollar value of the benefits of sprawl and who receives those benefits. This report has found that many of the costs of sprawl fall on those who have the least ability to avoid them -- and it would be equally important for any study of the benefits of sprawl to identify how many of those benefits flow to those who have the fewest choices in where and how to live. When such research is available, it will allow a more "apples-to-apples" comparison of both the economic effects and the socio-economic impacts of today's sprawl-oriented development patterns.

In addition, although this report covered infrastructure costs, it did not isolate the costs of water and sewer extensions. Since the extension of water and sewer lines often enables sprawl development to occur, and since the costs of those extensions is often large, we would encourage more detailed research on this discrete area of infrastructure spending. Any such study should also address whether there is a match between those who pay the costs of such extensions and those who reap the benefits.

Finally, there continues to be a dearth of reliable research on the dollar cost of environmental losses and social impacts caused by the increasing segregation and separation of the population that accompanies sprawl. Not only has there been a lack of research on the dollar cost of environmental assets lost, but there has been almost no research on the costs incurred by state and local governments, non-profit organizations, and private industry in trying to offset the impacts of those losses. For instance, the Centers for Disease Control has recently linked the increase in obesity in the U.S. to more sedentary lifestyles fostered by auto-dependent development, but there has been little research to quantify the dollar cost of those impacts or to isolate the portion of those costs caused by sprawl development patterns. There has also been little research to document the dollar costs of increasing jobs/housing imbalances in terms of lost productivity and increased training and travel costs. We would encourage additional research on each of the topics identified in part V of this report (Increased Social Costs and Decreased Quality of Live), including analyses of who bears each type of cost and who captures the benefit.

I. INCREASED CONSTRUCTION AND OPERATING COSTS

There is strong evidence -- both from Pennsylvania and elsewhere in the nation -- that sprawl results in higher costs to build and operate housing and the infrastructure that goes along with it. Large-scale modeling studies and local case studies confirm that the construction and operating costs of both private and public facilities rise as growth becomes more dispersed and less coordinated. More specifically, there is "hard" data that sprawl results in:

- Higher costs to build infrastructure and schools;
- Higher costs to operate infrastructure and schools once they have been built;
- Higher combined construction and operating costs (so-called 'life-cycle costs'); and
- Higher land costs for housing.

A. Construction Costs

Finding: *Planned, compact growth patterns produce significant construction cost savings for roads and utilities, and more modest cost savings for schools, when compared to sprawl patterns of growth.*

Three major research investigations have concluded that construction costs for roads, utilities, and schools can be up to 25% lower under planned growth scenarios that avoid sprawl development. (Frank - Literature Synthesis 1989; Duncan - Florida Community Case Studies 1989; and Burchell -- studies of New Jersey, Michigan, Lexington, Delaware Estuary, and South Carolina 1992-1997). These findings are summarized in Table 1-1.

Table 1-1 Relative Construction Costs for Public Infrastructure Under Sprawl versus Planned/Compact Development					
Infrastructure Cost Category	Sprawl Development Cost Index	Planned Development Cost Index (% Relative to Sprawl)			Planned Development Blended Cost Index (% Relative to Sprawl)
		Duncan	Burchell	Frank	
Roads (Local)	100%	40%	74-88%	73%	75%
Utilities (Sewer/Water)	100%	60%	86-93%	66%	80%
Schools	100%	93%	97%	99%	95%
Other (Police, Fire, and Rescue Stations)	100%	102%	n/a	100%	100%

Sources: *Economic and Fiscal Costs (and Benefits) of Sprawl*, Robert W. Burchell, 29 *Urban Lawyer* 2, p. 159 (Spring 1997); Robert W. Burchell studies (1992-1997), and Clarion Associates

Information on school construction and school closings in the five-county Philadelphia metropolitan area between 1989 and 1998 suggest that the impacts of sprawl on school construction costs may actually be higher than suggested in Table 1-1.

If the dollar savings suggested in Table 1-1 were applied to Pennsylvania, the results would be a dramatic reduction in costs born by the citizens of the state at the local level. For example, if a potential 25% savings in road construction costs were applied to just the \$ 210 million that the state's local governments spent on road construction in 1995 – the savings would be approximately \$ 52 million per year. Savings in state and federal highway construction would increase that number dramatically. As another example, if a blended savings rate of 10% (lower than the documented savings rates for roads and utilities, but higher than the documented savings rates for schools and "other" facilities) were applied to the \$1.2 billion that Pennsylvania's local governments spent on all capital construction in 1995, the result would be a savings of \$120 million per year to the taxpayers of the state. More Pennsylvania-specific information on infrastructure costs is included in Subsection C below (Construction and Operating Costs Together).

Finding: *Sprawl tends to create demands to construct new schools. While Inner and Outer Suburbs in the Philadelphia area experienced increases in total student enrollment between 1984 and 1994, only the Outer Suburbs had to incur capital costs to provide a net increase in the number of new schools to meet demand.*

Table 1-2 shows that across the Philadelphia metropolitan area, there were a total of 20 school closings and a total of 40 new schools constructed from 1989 to 1998. A closer look reveals the number of schools in the Core City and Inner Suburban areas remained almost unchanged. At the same time, the Outer Suburban counties constructed 32 new schools, while closing only 11 schools, for a net increase of 21 schools. The table also shows that, at the end of that period, the Core City and Inner Suburbs had an average class size (measured at the 3rd grade) of between 23 and 30 students, while the Outer Suburbs had an average class size of between 22 and 25 students.

Table 1-2 School Openings and Closings in Southeastern Pennsylvania, 1989-1998				
Location/County	School Closings	School Openings	Net Change	Average 3 rd Grade Class Size (1998)
Core City & Inner Suburbs				
Philadelphia	5	5	0	30.0
Delaware	4	3	-1	23.5
Sub-Total	9	8	-1	
Outer Suburbs				
Montgomery	3	12	+9	22.5
Chester	4	8	+4	23.9
Bucks	4	12	+8	25.0
Sub-Total	11	32	+21	
TOTAL PHILADELPHIA AREA:	20	40	+20	

Source: *The Future of First Generation Suburbs in the Delaware Valley Region*, Delaware Valley Regional Planning Commission (draft dated July 31, 1998) and Clarion Associates

Table 1-2 shows that Philadelphia and Delaware County were able to accommodate a joint enrollment increase of about 9% in one fewer school than they had at the start of the decade. In contrast, the outer-suburban counties had a joint enrollment increase of about 14%, but needed to build 21 new schools to accommodate the growth. Some of the difference can be explained by class size, since the Outer Suburbs did have smaller class sizes than Philadelphia at the end of the decade. Note, however, that Delaware County was able to maintain a class size almost identical to the Outer Suburbs while closing one school. Another explanation for the dramatic difference in school construction may be that there was more unused capacity in the Philadelphia and Delaware County schools at the beginning of the 10 year period. A third

likely explanation is that the geographic dispersion of Outer Suburb schools limits their ability to accommodate new suburban students as efficiently as schools closer to the heart of the metropolitan area.

A similar finding was presented in Yuhfill's 1994 analysis of enrollment and new school construction trends in Montgomery County, Pennsylvania -- a county that contains both older Inner Suburbs and fast-growing Outer Suburbs. Yuhfill reports that since the mid-1960s, the Abington School District closed 8 of its 18 schools as recent student enrollment numbers plummeted to nearly one-half the 12,600 peak enrollment in 1968. The school district reported that some of its school buildings were still operating at as low as 27% of capacity. In stark comparison, the North Penn School District, encompassing the booming outer suburbs of Montgomery County, has constructed three new elementary schools between 1989 and 1994, at a total cost of \$27 million.

B. Operating Costs

Although the existing infrastructure of Core Cities is often underused -- it is not a free good. For example, although it may cost less to build an infill development that ties into existing water and sewer mains (compared to a sprawl development requiring the construction of new mains), there may still be increased operating costs due to higher use rates for the existing infrastructure. Existing roads that carry more traffic will need to be repaired and resurfaced more often, and the same is often true for water and sewer facilities. In general, though, it appears that operating costs are also lower under non-sprawl patterns of development.

Finding: *The highest per mile road maintenance costs in Pennsylvania are still being experienced by the large center cities of Philadelphia and Pittsburgh. In larger communities, the road maintenance costs of Inner Suburbs are generally higher than outlying jurisdictions. In smaller communities, the Outer Suburbs often have road maintenance costs higher than Inner Suburbs.*

Because road maintenance costs are a large part of many municipal budgets, per mile road maintenance costs are of particular concern to many elected officials and taxpayers. The case study of six areas of Pennsylvania produced a wealth of information on local public expenditures for road maintenance. Table 1-3 summarizes local budgets figures for road maintenance costs divided by total miles of local roadway in the jurisdiction.

Table 1-3 Road Maintenance Cost per Mile of Roadway (1995)					
Small Communities					
Meadville Area		Williamsport Area		Comparison to Core	
Meadville	\$17,997	Williamsport	\$17,063	Core	100%
W. Meade	\$5,876	S. Williamsport	\$15,973	Inner Suburb	33-94%
Vernon	\$7,620	Loyalsock	\$20,662	Outer Suburb	42-121%
Medium Sized Communities					
Lehigh Valley		York Area		Comparison to Core	
Allentown	\$15,568	York	\$9,211	Core	100%
S. Whitehall	\$16,246	Spring Garden	\$12,763	Inner Suburb	104-139%
N. Whitehall	\$4,511	Springettsbury	\$7,073	Outer Suburb	29-77%

Table 1-3 Road Maintenance Cost per Mile of Roadway (1995)					
Large Communities					
Philadelphia Area		Pittsburgh Area		Comparison to Core	
Philadelphia	\$151,758	Pittsburgh	\$72,812	Core	100%
Bensalem	\$15,853	Monroeville	\$20,512	Inner Suburb	10-28%
Buckingham	\$10,136	Hempfield	\$9,312	Outer Suburb	7-13%

Source: 1980, 1990 and 1995 Local Government Financial Statistics; Commonwealth of Pennsylvania; Pennsylvania Department of Transportation; and Clarion Associates

Many of the differences between communities shown in Table 1-3 are due to the inherent differences between the older, intense highway systems in the Large Communities and the less developed (and sometimes even unpaved) systems in the Inner and Outer Suburbs. Other differences are explained by the fact that Outer Suburbs are often able to require new businesses to cover the costs of road improvements that would otherwise appear in their road budgets. Nevertheless, the table reveals some interesting patterns.

- The highest per mile road maintenance costs (by far) are experienced in the Core Cities of the Large Communities (Philadelphia and Pittsburgh), and the per mile maintenance costs of their Inner and Outer Suburbs are only a small fraction of the Core City costs.
- In the Medium Sized Communities, the highest road maintenance costs are being experienced by the Inner Suburbs (both the Core City and Outer Suburbs are lower).
- In the Small Communities, the lowest road maintenance costs are being experienced by the Inner Suburbs (both the Core City and Outer Suburb expenses are higher)

Finding: *In Pennsylvania, the highest rates of increase in road maintenance costs are generally still being felt in the older Core Cities of Philadelphia and Pittsburgh, but in other areas of the state Inner or Outer Suburbs are sometimes seeing municipal budget road maintenance costs rise faster than their Core Cities.*

Just as interesting as the patterns in road maintenance costs are the patterns in how those expenditures are rising over time. Table 1-4 summarizes the increase in local budget figures for road maintenance costs between 1980 and 1995 divided by total miles of local roadway in the jurisdiction in the same years.

Table 1-4 Increase in Road Maintenance Cost per Mile of Roadway (1980-1995)					
Small Communities					
Meadville Area		Williamsport Area		Comparison to Core	
Meadville	71.6%	Williamsport	35.1%	Core	100%
W. Meade	-1.9%	S. Williamsport	41.0%	Inner Suburb	0-116%
Vernon	151.0%	Loyalsock	579.7%	Outer Suburb	211-1651%
Medium Sized Communities					
Lehigh Valley		York Area		Comparison to Core	
Allentown	-25.9%	York	-23.8%	Core	N/A
S. Whitehall	79.9%	Spring Garden	199.0%	Inner Suburb	N/A
N. Whitehall	100.4%	Springettsbury	61.0%	Outer Suburb	N/A

Table 1-4 Increase in Road Maintenance Cost per Mile of Roadway (1980-1995)					
Large Communities					
Philadelphia Area		Pittsburgh Area		Comparison to Core	
Philadelphia	225%	Pittsburgh	205%	Core	100%
Bensalem	23.6%	Monroeville	36.8%	Inner Suburb	10-18%
Buckingham	433.8%	Hempfield	89.4%	Outer Suburb	44-193%

Source: 1980, 1990 and 1995 Local Government Financial Statistics; Commonwealth of Pennsylvania; Pennsylvania Department of Transportation; and Clarion Associates

Table 1-4 reveals that:

- The highest rates of growth in road maintenance costs (over 400%) are being experienced in some Outer Suburbs – presumably to address the added traffic impacts that come with growth. (The extremely high rate of increase in Loyalsock is explained by an ambitious road paving program, and the rate should decline when that is completed.)
- The second highest rates of growth in road maintenance costs (around 200%) are experienced in the Large Core Cities of Philadelphia and Pittsburgh, because of the need to maintain very extensive systems that serve their entire regions. However, at least one Inner Suburb (Spring Garden) is approaching these high rates of increase
- In every area except Pittsburgh, one Inner Suburb or one Outer Suburb (or both) experienced road maintenance increases that were higher than their Core City.
- Road maintenance costs are not declining in any Outer Suburb, but they are declining in two Core Cities and one Inner Suburb of Small and Medium Sized Communities.

Finding: *As higher-income households and businesses move to suburban and exurban areas, the educational cost burden increases on the Inner Suburbs and Core Cities. In the Philadelphia metropolitan area, per pupil school district expenditures as a percentage of both local tax base and median income decrease substantially as distance from the urban core increases.*

As a industry and population move to the Outer Suburbs, remaining residents and businesses in the Philadelphia Core City and Inner Suburbs have had to pay a disproportionate share of their earnings and tax base revenues on educational expenses. Tables 1-5 and 1-6 below show that when Philadelphia and its suburban and rural areas are compared in terms of the ratio of per pupil spending to tax base per household, the ratio for Philadelphia's suburbs is only about one-third as high as it is in Philadelphia. While not showing the same level of distress as Philadelphia, the Inner Suburb expenditure burden is almost twice as large as the burden on Outer Suburbs. When the ratio of per-pupil expenditure to median household income is analyzed, Inner Suburbs are shown to bear only three-fourths, and Outer Suburbs and rural areas only about half, of the burden experienced by the Core City of Philadelphia.

Table 1-5 Income, Tax Base, Home Sales, and Per Pupil Expenditures				
Location	1997 Median Household Income	Tax Base per Household	1997 Avg. Home Sale Price	1995 Per Pupil Spending
Philadelphia	\$31,404 (1998)	\$54,951	\$49,900	\$6,827
Inner Suburb	\$60,074	\$143,992	\$155,398	\$9,856
Mature Suburb	\$80,419	\$254,821	\$232,407	\$8,955
Outer Suburb	\$81,201	\$224,542	\$193,755	\$8,233

Sources: Philadelphia Inquirer Guide to Home Prices (March 29, 1998); Pennsylvania Department of Community and Economic Development Local Government Financial Statistics; Delaware Valley Regional Planning Commission; Clarion Associates.

Table 1-6 Per Pupil School Expenditures As a Percent of Average Tax Base and Median Income Per Household				
Location	Percentage of Average Tax Base Per Household	Comparison to Core City	Percentage of Median Income Per Household	Comparison to Core City
Philadelphia	12.42%	100%	21.74%	100%
Inner Suburb	6.84%	55%	16.41%	75%
Mature Suburb	3.51%	28%	11.14%	51%
Outer Suburb	3.67%	30%	10.14%	47%

Sources: Philadelphia Inquirer Guide to Home Prices (March 1998); Pennsylvania Department of Community and Economic Development Local Government Financial Statistics; Delaware Valley Regional Planning Commission; Clarion Associates

Finding: *The Philadelphia Core City and Inner Suburbs incur higher school operating costs due to the need to provide a wide range of services to an increasingly diverse student population. These same districts are experiencing a declining real estate tax base and limited household income growth with which to fund these increasing operating costs.*

The Future of First Generation Suburbs in the Delaware Valley Region presents the experience of the Upper Darby School District as an example of the fiscal woes typical of Inner Suburbs in the Philadelphia metropolitan area. During the 1970s, the school district had to establish an English as a Second Language program to meet the needs of its increasingly diverse minority student population. In the 1980s and 1990s, new and different groups of immigrants moved into the district. Student enrollment increased 27% from 1991 to 1997, as a result of increases in school-aged children, more children per family, and increases in private school tuition that forced many children back into the public system. This increased enrollment and the more varied needs of a diverse student population increased the district's capital and staff needs. During the past four years alone, the Upper Darby School District has spent \$21 million on new facilities.

Finding: *When residential land uses are allowed to dominant the mix of uses in rural Pennsylvania townships, the fiscal "costs" of residential land uses generally outweigh their fiscal "benefits", on average. This is primarily due to the burdens placed on local school districts from unchecked residential growth.*

A study of eleven rural Pennsylvania townships by Kelsey (1997) showed that, on average, township expenditures on community services and schools for residential land uses outweighed the revenues the township receives from such residential land uses in the form of property and other taxes, licenses, and fees. The order of magnitude of this negative fiscal impact ranged from a high of 1:2 (for every \$1 taken in, the

township expended \$2) in Stewardson Township (Potter County) to a more marginal negative impact of 1:1.03 (for every \$1 taken in, the township expended \$1.03) in Carroll Township (Perry County). By contrast, commercial, industrial, and farm/open land uses provided, on average, a net positive fiscal impact by contributing more to township and school district total revenues than they required back in expenditures for services. The results occur largely because of school-related expenses -- while all land uses contribute revenues to the school district, expenditures are directly related only to residential land uses. Kelsey found that school expenditures accounted for an overwhelming 84 percent of all local spending in these 11 townships, while other local government spending accounted for the remaining 16 percent. The results of Kelsey's analysis are summarized in Table 1-7 below.

Table 1-7 Ratio of Township and School District Total Annual Revenues to Total Annual Expenditures by Type of Land					
TOWNSHIP	TYPE OF LAND				
	Residential	Commercial	Industrial	Farm/ Open	Camps/ Forest
South Central PA					
Bethel Twp (Lebanon County)	1:1.08	1:0.07	1:0.27	1:0.06	---
Carroll Twp (Perry County)	1:1.03	1:0.06	---	1:0.02	---
Straban Twp (Adams County)	1:1.10	1:0.17	1:0.05	1:0.06	---
Southeast PA					
Bedminster Twp (Bucks County)	1:1.12	1:0.06	1:0.04	1:0.04	---
Buckingham Twp (Bucks County)	1:1.04	1:0.16	1:0.12	1:0.08	---
Maiden Creek Twp (Berks County)	1:1.28	1:0.14	1:0.07	1:0.06	---
Richmond Twp (Berks County)	1:1.24	1:0.11	1:0.06	1:0.04	---
North Central PA					
Bingham Twp (Potter County)	1:1.56	1:0.26	---	1:0.15	1:0.15
Stewardson Twp (Potter County)	1:2.11	1:0.37	---	1:0.12	1:0.31
Sweden Twp (Potter County)	1:1.38	1:0.07	---	1:0.07	1:0.08
Western PA					
Allegheny Twp (Westmoreland County)	1:1.06	1:0.15	1:0.14	1:0.13	---
Notes: Residential Land: Contains dwelling units (single-family houses, apartments, townhouses, mobile homes, etc.). Includes dwelling units located on farms. Commercial Land: Used for commercial purposes (typically, retailing, office, gas stations, etc.). Industrial Land: Used for industrial purposes (typically, wholesaling and factories). Farms/Open Land: Agricultural property with 10 or more acres. Camps/Forest Land: Forest acreage of 10 acres or more. Any buildings on such land are not for year-round residency.					

Source: Kelsey, Timothy K., "Fiscal Impacts of Different Land Uses: The Pennsylvania Experience," (Penn State College of Agricultural Sciences/Cooperative Extension Circular #410, c. 1997).

Finding: *Public operating costs for utilities and schools can be reduced under a planned growth approach that redirects growth towards communities with excess service capacity and away from more rural areas with less infrastructure.*

Three major studies have found that operating cost savings of between 2% and 40% can be achieved by avoiding sprawl patterns of growth. These findings are summarized in Table 1-8.

Table 1-8 Annual Savings in Municipal and School District Operating Costs		
Study	Place Studied	Annual Cost Savings from Planned Development (vs. Sprawl Development)
Burchell (1992)	New Jersey	2%
Burchell (1997)	Michigan	5 - 6%
American Farmland Trust (1986)	Loudoun County, Virginia	40.5%

Source: Clarion Associates

In addition, a 1990 study of the fiscal impacts of residential development at different densities found that, on average, residential house lots that were one acre or larger resulted in an average annual public revenue deficit of \$490 versus \$114 for house lots that were one-quarter acre or smaller in size. (Propst/Schmid)

C. Construction and Operating Costs Together

Rather than considering construction costs or operating costs by themselves, some studies have focused on the combined construction and operating costs for utilities and schools. In light of the findings summarized above, one would expect that combined costs for sprawl development patterns would also be higher – and they are. Importantly, one of the most detailed studies of combined construction and operating costs took place in Pennsylvania. In reviewing these results, however, it is important to keep in mind that different types of local governments are required to (or choose to) provide different levels of services. The City of Philadelphia, for example, provides several services normally provided by county government, while some smaller local governments do not even need to provide fire protection. Regardless of these differences, however, the results clearly indicate that the costs of local government services tend to rise significantly as sprawl occurs. In addition, please note that this report does not isolate water and sewer construction costs from general infrastructure costs, because of the difficulty of obtaining reliable data and tracking those funds through state funding programs and local budgets. Density based cost differences in this expensive component of infrastructure may be more dramatic than those blended cost differences reported below.

Finding: *One Pennsylvania study found that residential sprawl development patterns could increase the combined governmental deficit from the provision of municipal services and schools by between \$100 and \$1,000 per year per household, when compared to more compact development patterns.*

A 1993 study by Tischler & Associates for Ephrata Township in Lancaster County, Pennsylvania looked at the effect of differing residential land use patterns on the costs of both municipal services and school services. It found that as the number of households increases, the cost of providing essential municipal services (water, sewer, roads, and public safety services) also increases on a per unit basis in the jurisdiction where the growth occurs. The Tischler study also confirms, however, that these cost impacts vary significantly depending on how growth occurs.

Ephrata Township is located in northern Lancaster County and adjacent to Ephrata Borough and Akron Borough. Tischler & Associates studied the potential fiscal impacts of providing Township services under three alternative future residential development patterns.

- An “urban infill” alternative, in which future development would be relatively compact in form and would occur contiguously with existing borough boundaries. Lot sizes would range from 5,000 to 15,000 square feet, and future housing values were assumed to average \$99,000.

- A "sprawling subdivision" alternative, in which future residential units would be scattered throughout the study area in large pockets (subdivisions) of development. Lot size would average 1 acre, and housing values were assumed to average \$117,900.
- A "sporadic development" alternative, in which future development would occur in a sporadic and random pattern across the rural Township landscape, as farms were carved piecemeal into lots ranging in size from ¼ acre to 20 acres. A wide range of housing types would be provided as the farms were randomly subdivided--from mobile homes and duplexes to single family homes on large lots. Under this alternative, housing values were assumed to average \$144,800.

On the other hand, Tischler looked at how alternative residential development patterns would affect the future operating and capital costs of the local school district, and reached the opposite conclusion. The study concluded that projected school district revenue deficits are primarily a function of the projected increase in the absolute number of residential households, rather than a function of general residential land development patterns. Under each alternative development scenario, the growth in the number of residences increases the fiscal needs of the school district more than it increases the revenue generated by the additional housing unit, producing an average net cost of about \$450 per household per year. In fact, because of the density and housing price assumptions made, Tischler found that the number of housing units created under the "urban infill" alternative would result in a higher school operating deficit than under the sprawl development alternative.

Importantly, the Ephrata Township study found that municipal service losses from sprawl development were 13 to 17 times larger than the minor savings in school district costs. These results are summarized in Table 1-9.

<p align="center">Table 1-9 Fiscal Impact Analysis for Municipal Services and School District Over a 20 Year Period Ephrata Township, Lancaster County, Pennsylvania</p>						
Residential Development Pattern	Municipal Services		School Services		Municipal Services and Schools	
	Deficit per Household	Deficit per Household per Year	Deficit per Household	Deficit per Household per Year	Combined Deficit per Household per Year	Added Cost per Household per Year vs. Urban Infill
Urban Infill	\$800	\$40	\$9,827	\$493	\$533	--
Sprawling Subdivision	\$2,933	\$147	\$9,733	\$487	\$634	\$101
Sporadic Development	\$22,667	\$1,133	\$8,267	\$413	\$1,546	\$1,013

Source: Tischler & Associates (1993) and Clarion Associates

Finding: *In Pennsylvania, the per household expenditures of local governments are very closely tied to the size of the community, and the gaps between per household spending in Core Cities and Suburbs are smallest in smaller communities.*

The six case studies also provided valuable information about the combined construction and operating cost impacts of sprawl. In general, because of the age of the Core City infrastructure and the level of services historically provided, the cost of municipal services is dramatically higher in central areas. Expenditures per household are summarized in Table 1-10.

Table 1-10 Expenditures per Household for Municipal Services (Construction and Operating Costs) (1995)					
Small Communities					
Meadville Area		Williamsport Area		Comparison to Core	
Meadville	\$1,462	Williamsport	\$1,206	Core	100%
W. Meade	\$492	S. Williamsport	\$823	Inner Suburb	34-68%
Vernon	\$739	Loyalsock	\$946	Outer Suburb	51-78%
All Crawford Co.	\$769	All Lycoming Co.	\$797	All Areas	53-66%
Medium Sized Communities					
Lehigh Valley		York Area		Comparison to Core	
Allentown	\$1,742	York	\$2,429	Core	100%
S. Whitehall	\$1,902	Spring Garden	\$1,248	Inner Suburb	51-109%
N. Whitehall	\$466	Springettsbury	\$900	Outer Suburb	27-37%
All Lehigh Co.	\$1,270	All York Co.	\$942	All Areas	39-73%
Large Communities					
Philadelphia Area		Pittsburgh Area		Comparison to Core	
Philadelphia	\$7,470	Pittsburgh	\$2,843	Core	100%
Bensalem	\$1,513	Monroeville	\$1,421	Inner Suburb	21-50%
Buckingham	\$1,322	Hempfield	\$396	Outer Suburb	14-18%
All 5 County Region	\$3,633	All Allegheny & Westmoreland Co.	\$1,298	All Areas	46-49%

Source: 1980, 1990 and 1995 Local Government Financial Statistics; Commonwealth of Pennsylvania; and Clarion Associates

While many of the differences in expenditures shown in Tables 1-10 are due to differing community preferences about what services (and what quality of services) they want to support, a few significant patterns emerge.

- The highest per household expenditures are found in the Large Communities, and the lowest are found in the Small communities.
- Within each area, the highest per household expenditures are found in the Core areas, and the lowest are found in the Outer Suburbs.
- In the Small Communities, the lowest per household expenditures are found in the Inner Suburbs (i.e. the Outer Suburbs actually have higher spending levels), while in the Medium Sized and Large Communities the lowest expenditures are found in the Outer Suburbs.
- The gap between Core expenditures and Outer Suburb expenditures is smallest in the Small Communities (where the lowest figure is about 34% of the Core spending figure) and largest in the Large Communities (where outer area spending is sometimes only about 14% of the Core level).
- In the case of the Lehigh Valley, Inner Suburb expenditure levels actually exceed those in the Core City of Allentown.

Finding: *In Pennsylvania, government spending on a per household basis is generally increasing faster in the Inner Suburbs than in the Core Cities. In smaller communities, even Outer Suburbs are seeing per household spending increase faster than the Core City.*

Just as interesting as the patterns in per household expenditures are the patterns in how those expenditures are rising over time. Increases in expenditures per household in the same case study communities between 1980 and 1995 are summarized in Table 1-11.

Table 1-11 Increase in Expenditures per Household (1980-1995)					
Small Communities					
Meadville Area		Williamsport Area		Comparison to Core	
Meadville	87.7%	Williamsport	44.4%	Core	100%
W. Meade	86.2%	S. Williamsport	90.7%	Inner Suburb	98-204%
Vernon	243.7%	Loyalsock	170.1%	Outer Suburb	278-383%
All Crawford Co.	86.0%	All Lycoming Co.	68.9%	All Areas	98-155%
Medium Sized Communities					
Lehigh Valley		York Area		Comparison to Core	
Allentown	113.1%	York	131.2%	Core	100%
S. Whitehall	232.2%	Spring Garden	182.9%	Inner Suburb	139-205%
N. Whitehall	140.8%	Springettsbury	76.7%	Outer Suburb	58-124%
All Lehigh Co.	117.6%	All York Co.	93.5%	All Areas	71-104%
Large Communities					
Philadelphia Area		Pittsburgh Area		Comparison to Core	
Philadelphia	127.8%	Pittsburgh	94.1%	Core	100%
Bensalem	784.9%	Monroeville	107.5%	Inner Suburb	114-618%
Buckingham	-45.5%	Hempfield	93.1%	Outer Suburb	99%
All 5 County Region	98.4%	All Allegheny & Westmoreland Co.	76.4%	All Areas	77-81%

Source: 1980, 1990 and 1995 Local Government Financial Statistics; Commonwealth of Pennsylvania; and Clarion Associates

Table 1-11 reveals that residents in Inner Suburbs should be at least as concerned with increasing governmental expenditures as residents of the Core City, and that even residents of the Outer Suburbs of Small Communities should be wary of the governmental costs that come with low density growth.

- In the Small Communities, per household expenditures in the Inner and Outer suburbs increased up to three times faster than they increased in the Core City.
- In the Medium Sized and Large Communities, per household expenditures increased faster -- sometimes dramatically faster -- in the Inner Suburbs than they did in the Core Cities. This probably reflects the fact that Inner Suburbs are increasingly needing to provide the same types of facilities, services, and relatively expensive maintenance that Core Cities historically have had to provide.

Finding: *Studies throughout the country have found that patterns of sprawl characterized by large-lot, single-family developments far from the Core City, will result in greater public capital and operating costs for local roads and utilities, but only small impacts on the capital and operating costs for local schools.*

At least five other studies of areas outside Pennsylvania confirm that sprawl development patterns produce combined construction and operating costs that are significantly higher than those from more planned, compact growth patterns. These findings are summarized in Table 1-12.

Table 1-12 Overall Capital and Operating Infrastructure Cost Savings From Sprawl vs. Planned/Compact Development			
Study	Place Studied	Infrastructure Cost Savings	
		% Relative to Sprawl	Measurement Unit
Burchell (1992)	New Jersey	9.2%	Statewide Total Savings
Duncan (1989)	Several Cases Studies of Specific Florida Communities	36.7%	Savings per Dwelling Unit
Peiser (1984)	Model Community of 80,000 Residents + 72,000 Workers	5%	Community-Wide Savings
Governor's Commission on Growth in the Chesapeake Bay Region (1991)	Maryland	15%	Statewide Savings (Roads and Utilities Only)
American Farmland Trust (1986)	Loudoun County, Virginia	63%	County-wide Savings Under a "Medium-Density" versus "Rural Sprawl" Scenario (Water and Sewer Service)

Source: Clarion Associates

D. Housing Costs

Finding: *Generally, at a statewide level of analysis, sprawl development will result in greater private development costs for housing than under a planned growth scenario.*

The Burchell studies of New Jersey and Michigan are the only studies to look at overall housing costs in a larger area governed by managed growth (at the state or regional level), where development would be restricted in certain locations (e.g., areas with fragile lands) while encouraged in others (areas with existing or excess infrastructure capacity, such as centers or crossroads). These large-scale studies developed housing cost models to estimate the likely housing price increases in the more restricted outlying areas and the likely housing price decreases in targeted growth areas (due to their inherent higher densities and the proposed housing type mix--e.g., more attached housing). Under the planned development scenarios in Burchell's studies, more housing would be built in core areas than in more rural, outlying areas. The studies concluded that overall private housing costs under the planned growth scenarios would be between 2% and 8% lower than under the sprawl development scenarios. These studies are summarized in Table 1-13.

Table 1-13 Private Housing Costs Savings Compact/Planned Growth vs. Sprawl Development		
Study	Place of Study	Savings (% Relative to Sprawl)
Burchell (1992)	New Jersey	6.1%
Burchell (1997)	Michigan	6.8%
Burchell (1997)	South Carolina	7%
Burchell (1995)	City of Lexington, KY	2.5%
Burchell (1995)	Delaware Estuary Region	8.4%

Source: Clarion Associates

If the households who buy homes under a sprawl scenario are willing to pay these increases (i.e., they feel it is worth it to acquire more private open space and other amenities), then the higher costs of sprawl housing do not represent an inefficiency. Still, communities and regions that are concerned with the affordability of their housing stock should take note of the savings possible through the use of less land per home.

In contrast, studies by Schwartz (1981 and 1989) and Katz and Rosen (1987) have analyzed the housing price effects of growth controls in a specific community. Those studies have found that the imposition of residential growth controls, such as annual building permit caps, does have an adverse impact on housing prices compared to homes located in similar communities without such controls. For example, a 1981 study showed that housing costs in Petaluma, California, were 8% higher than a neighboring city's housing costs. A similar comparison study found that housing costs in growth-controlled Davis, California were 9% higher than in other cities' non-regulated markets. Even if some who buy homes in communities with growth controls are willing to pay higher prices in order to live in a more restricted environment, this may create an inefficiency for the remainder of the market that is not willing to pay that premium.

Read together, these studies suggest that compact forms of growth can result in savings of up to 8% in the cost of housing, provided that the absolute supply of the number of housing units is not constrained (i.e., everyone who is able to buy a house at "sprawl" prices can find one for sale), but that controls that restrict the number of housing units supplied can result in price increases of up to 9%, which could wipe out the savings created by compact growth.

II. Increased Transportation and Travel Costs

Because transportation and travel information is regularly studied for purposes of transportation planning, there is a wealth of "hard" data on the costs of transportation systems -- including empirical research, survey data, case studies, and census data. In addition, several large-scale studies have used simulation modeling to determine travel behavior and the impacts of urban form on transportation and travel. Quantitative studies have shown a strong relationship between sprawl patterns of development and increased transportation and travel costs, including:

- Increased vehicle miles traveled (VMT);
- Lower use of transit, bikes, and walking;
- Higher costs from automobile accidents; and
- Less cost-efficient and effective public transit.

A. Increased Vehicle Miles Traveled

Finding: *Each year Pennsylvanians drive more miles, and that growth in vehicle miles traveled is occurring rapidly in both rural and urbanized areas of the state. While there is a general trend toward increased vehicle miles driven per capita that may not be directly related to sprawl, the increase is compounded by residence and business relocation to far-flung peripheral areas. The costs related to increased vehicle miles traveled (VMT) include lost leisure/work time, increased vehicle operation and maintenance costs, increased air pollution, and increased accident costs (in addition to the increased capital and maintenance costs for roads and highways documented in Section I of this study).*

Data collected by the Pennsylvania Department of Transportation and the Center for Rural Pennsylvania documents differences in Vehicle Miles Traveled (VMT) between urban and rural counties in the state. VMT information for state roads (excluding local roads and interstate highways) is summarized in Table 2-1.

Location	1984	1990	1995	Change 1984-1995	Average Annual Increase
All Pennsylvania	13.20	15.20	16.10	21.97%	1.82%
Rural Counties	17.80	20.60	21.20	19.10%	1.60%
Urban Counties	11.90	13.80	14.80	24.37%	2.00%

Note: In this table, a county is "rural" if more than 50% of its population is defined as rural by the U.S. Census Bureau -- i.e. more than 50% of its population lives outside an urbanized area in a place with a population under 2,500.

Source: PennDOT and Center for Rural Pennsylvania, as reported in *Inside Rural Pennsylvania* (Nov. 1997), prepared by the Center For Rural Pennsylvania

Table 2-1 shows that VMT per capita for Rural Counties was 50% higher than for Urban Counties in 1984. Between 1984 and 1995, however, the rate of VMT increase was higher in Urban Counties than for Rural Counties, and by 1995 the gap between Urban and Rural VMT had narrowed to 43%. The data also reflects the fact that, at the Urban/Rural boundary, travel characteristics reflecting a melding of two lifestyles. As

the Urban boundary moves farther from urban or suburban core areas, suburban travel at the periphery takes on a more rural character. Higher levels of VMT reflect a more rural lifestyle -- with generally greater distances between travel origins and destinations -- although the population is large enough to merit an Urban designation.

Additional data confirms that these trends are occurring within the Pittsburgh region. From 1970 to 1990, the average growth in VMT was 3.3% per year (compounded), well above the statewide average of 1.82% shown in Table 2-1 above. An analysis of data published by the Southwest Pennsylvania Corporation also shows:

- Decreased development density in the region,
- Increased number of trips per day,
- Increased travel time per trip, and
- Increased distance per trip.

Development density in the Pittsburgh region declined from 930 persons per square mile to 910 persons per square mile between 1970 to 1990, indicative of an increasingly sprawling metropolitan area. Not surprisingly, during the same 20-year time period, vehicle miles traveled per person increased by over 90%, average trip length increased from about 7 miles per trip to 10 miles per trip, and VMT per household increased by over 60%. Even if we assume that the costs of cars, parts, gas, repairs, or insurance did not increase from 1970 to 1990 (i.e., we use a 1998 figure of \$.32 per mile as the cost of car ownership), this increase in VMT in the Pittsburgh region cost an average household about \$1,800 per year per car. This information is summarized in Table 2-2.

Table 2-2 Southwest Pennsylvania Travel Data				
Measure	1970	1990	Change	% Change
Population	2,577,000	2,322,000	- 255,000	-9.9%
Households	877,000	934,000	57,000	6.5%
VMT/Day	22,600,000	38,800,000	16,200	71.7%
VMT/Household/Day	25.77	41.54	15.77	61.2%
VMT/Capita	8.77	16.71	7.94	90.5%
Cost/VMT (1998 \$)	\$.32	\$.32	---	
Cost/Household/Day	\$8.25	\$13.29	\$5.04	61.1%
Cost/Household/Year	\$3,011.25	\$4,851.87	\$1,840.62	61.1%

Source: Southwest Pennsylvania Corporation and Clarion Associates

The significant growth in VMT in the Pittsburgh region results from household growth in the area, plus a change in the nature of commuting patterns. In a compact urban community, average miles per trip is substantially lower than in a suburban location, which in turn is lower than in rural counties. As the Pittsburgh metropolitan population is increasingly housed in more rural, exurban areas beyond the boundaries of the traditional suburbs, commuting patterns change to accommodate these new residential locations. The increase in miles traveled reflects both travel back to the urban/suburban locations commuters have left behind (to work and play), and the longer travel distances inherent in more rural locales.

Table 2-3 shows a finer breakdown of transportation-related costs per Pittsburgh-area household based on location within either the urban core, suburban areas, and exurban or rural areas. In the Pittsburgh region, as in the state as a whole, daily VMT per capita in the suburban location was about 50% higher than in the urban location, while VMT per capita in the rural locations was about 150% percent higher than in the urban locations. The increased cost for a household in the "Actual" column represents both increased costs due to additional VMT and increased costs due to larger household sizes in non-Core areas. The column labeled "vs Urban" eliminates household size from the calculation, and shows that the need to travel by car farther

and more frequently in suburban and rural areas has imposed significant additional expenses on residents of those areas. Because of differences in VMT, the average suburban household spent about \$1,500 more per year on automobile-related costs, and the average rural household spent about \$4,600 more per year, when compared to a similar household in an urban location.

Table 2-3 Transportation Costs for the Pittsburgh Region (1990)						
Measure	Urban Center		Suburban		Rural Area	
	Actual	vs Urban	Actual	vs Urban ¹	Actual	vs Urban ¹
Daily VMT per capita	11.78	N/A	17.62	5.84	29.16	17.38
Cost of Vehicle Operation/Mile	\$0.32	N/A	\$0.32	\$0.32	\$0.32	\$0.32
Cost/Day/Person	\$3.77	N/A	\$5.64	\$1.87	\$9.33	\$5.56
Cost/Person/Year	\$1,376	N/A	\$2,058	\$682	\$3,405	\$2,029
Average Household Size	2.30		2.59	2.30	2.70	2.30
Cost/Household/Year	\$3,164		\$5,330	\$1,569	\$9,194	\$4,667
<p>Urban Center: The urban core of the region, in which population densities generally exceed 10,000 persons per square mile and/or a high percentage (>70%) of the land area is developed. Some pockets of slightly dense development are included to form a cohesive area. SPRPC-defined population density includes residents and employees in an area; Census-defined population density includes only residents.</p> <p>Suburb: 1970: Census-defined Urbanized Area, less any areas defined as above. The Census defines a contiguous area around the urban center with a population density no less than 1,000 persons per square mile. 1990: Areas added from the 1980 Census-defined Urbanized Area, plus additional areas developed by 1990 as identified from aerial photographs.</p> <p>Rural Area: Any area not defined as an Urban Center or Suburb.</p>						

Source: Southwest Pennsylvania Corporation and Clarion Associates

Finding: *National studies confirm that sprawl generates more vehicle miles traveled (VMT) than more compact forms of development. Sprawl creates longer distance traveled and increases dependence on the automobile--two of the three primary factors behind the trend of increased VMT nationally (the third is changing demographics).*

At least four other studies from around the country confirm the impacts of sprawl outlined above.

1. Between 1970 and 1994, under the prevailing sprawl patterns of development, the Chesapeake Bay area population grew by 26% while vehicle miles traveled increased by 105%. In the next 10 years, VMT is expected to increase another 39% while the population is expected to increase by only 10%. (Chesapeake Bay Commission 1996)
2. A simulation comparing Portland, Oregon future growth patterns found that a "growing out" pattern (with new development continuing at current types and densities) resulted in an estimated 15% higher average daily VMT than in a "growing up" pattern that kept all growth within the existing urban growth boundary by reducing lot sizes and introducing more multi-family housing. (Portland Metro 1994)
3. Based on a 1994 study of 28 California communities, controlling for levels of transit service and vehicle ownership, a doubling of residential densities is associated with 16% fewer vehicle miles of travel. (Holtclaw 1994)
4. Children have lost approximately 12 hours per week of parental time over the last 30 years due to commuting. (Chesapeake Bay Commission 1997)

B. Lower Use of Transit, Bikes, and Walking

Finding: *Sprawl patterns of development, with more spread-out uses and greater segregation of uses, result in a greater share of trips being taken by automobile and fewer trips being made by transit, bike, or walking.*

The Delaware Valley Regional Planning Commission's report, *"Journey to Work Trends in the Delaware Valley Region 1970-1990,"* concludes that commuters in the greater Philadelphia/Trenton region are following the national trend of intensified use of single occupant vehicles. Driving alone is the mode of choice for over two-thirds of the region's resident workers, representing 1.6 million commuters in 1990. This represents an increase of 33% from the 1980 level. Carpooling or ride-sharing is most prevalent within the City of Philadelphia, where single occupant vehicles represent only 45% of the vehicles on the road versus 70% in the surrounding suburbs. Growth of the region's suburban and exurban populations has increased the regional average for single occupancy vehicles, although not all suburban residents have the same propensity to drive alone. The region's most urbanized suburban county, Delaware County, also has the lowest level of single occupancy vehicles.

On the other end of the spectrum, the 1980-1990 Journey to Work data for the Philadelphia CBD show that the share of center city workers living in Philadelphia who took transit to work (45%) exceeded the share of center city workers living in Philadelphia who drove alone. Because of shorter average trip lengths, Philadelphia also has the greatest share of resident workers walking to work (10.3%). In 1990, almost 106,000 residents of the Delaware Valley Region in Pennsylvania (6% of the total resident workers) walked to work. Over 66,000 of these walkers resided within Philadelphia city limits.

Studies from throughout the country overwhelming support the finding that when development is more compact and contains a mix of land uses, transit and walking modes of transport increase relative to automobile usage. Citing a 1997 report, households in transit-accessible neighborhoods in Chicago spent an average of about \$380 per month on transportation, while their suburban counterparts spent an average of about \$662 per month. (Benfield 1999) An interesting comparison case study of central, inner, and outer neighborhoods in the United States (where those with higher income tend to move to the edge) and in Australia (where those with lower incomes tend to move to the edge), found that automobile usage in both countries grew most rapidly in the outer areas of the cities. Thus, automobile usage was not simply a function of how wealthy people were, but also heavily dependent on the structure of cities and whether transport options are available other than the automobile. "[A]s cities become more dispersed and lower in density towards the edges, the levels of compulsory automobile use rises markedly, regardless of income level." (Kenworthy and Newman 1993).

C. Cost of Automobile Accidents

Finding: *The increased number of vehicle crashes due to sprawl related increases in VMT cost Pennsylvania residents over \$8 million in 1996.*

Data from the Pennsylvania Department of Transportation publication, *Pennsylvania Crash Facts and Statistics 1996*, appears to support a relatively direct relationship between VMT and the number of vehicular crashes. Since vehicle miles traveled have increased dramatically in the state, in large part due to sprawl development patterns, the concomitant increase in vehicle accidents/crashes is at least partially attributable to the increased driving that sprawl requires. PennDOT estimates that economic loss due to traffic accidents (in terms of personal injury and property damage costs only) is \$918 per Pennsylvania resident. Even if only 20% of the VMT increase in rural areas is attributable to sprawl development patterns (and the remainder is due to existing rural residents driving more), sprawl cost Pennsylvania residents more than approximately \$8 million in traffic crash related costs in 1996, not including job-related losses such as lost wages and productivity. This information is summarized in Table 2-4.

Table 2-4 Estimated Cost of Sprawl-Related Automobile Accidents Based on Growth in Vehicle Miles Traveled in Pennsylvania(1992--1996)	
Rate of Increase in VMT per year in Rural Areas	1.6%
Rate of Increase in VMT per year in Urban Areas	2.0%
Difference in Rural and Urban Rates of VMT Growth	.4%
Average Increase in VMT/Year in Rural Areas (1992-1996)	1.46 Billion Miles
Average Increase in VMT /Year in Urban Areas (1992-1996)	1.84 Billion Miles
Difference in Rural and Urban Average Increases in VMT / Year (Sprawl-Related VMT)	.38 Billion Miles
Accidents per Billion VMT	1,473
Accidents Related to Urban/Rural VMT Differences	557
Average Cost per Accident	\$ 77,256
Annual Cost Related to Urban/Rural VMT Differences	\$ 43,031,000
Annual Cost Related to Sprawl (assuming 20% VMT factor)	\$ 8,606,000
Note: This table uses PennDOT's definition of Urban and Rural highways	

Source: 1996 Pennsylvania Crash Facts and Statistics; Pennsylvania Department of Transportation; and Clarion Associates.

D. Less Cost-Efficient and Effective Public Transit

Finding: *Sprawl makes the use of transit as an alternative transportation mode less cost-efficient and effective.*

Both in Pennsylvania and throughout the country, highway usage and transit usage are subsidized. As shown in Table 2-5 below, the Southeastern Pennsylvania Transportation Authority (SEPTA) had an operating deficit of \$343 million in 1996-97, or a \$1.18 operating deficit per trip. Fully 97% of this deficit is covered by state and local funding sources, including a 6% tax on the sale of periodicals, a 3% tax on auto leases, and \$1 tax per tire for every tire purchased. If the costs of annual mass transit subsidies to SEPTA were spread evenly across the population of the state, it would cost each Pennsylvania household about \$114 per year.

Table 2-5 Southeastern Pennsylvania Transportation Authority: 1996-97 Operating Year				
Division	Service Area	Operating Deficit	Total Trips	Deficit/Trip
City Transit	Philadelphia	\$205,077,671	251,703,807	\$0.81
Victory	Chester/Delaware	\$25,443,716	13,561,560	\$1.88
Frontier	Bucks/Montgomery	\$8,407,338	3,053,456	\$2.77
Regional Rail	Bucks/Chester/Delaware/Montgomery/Philadelphia	\$104,093,613	23,012,428	\$4.52
TOTAL		\$343,022,338	291,313,251	\$1.18

Source: Pennsylvania Urban Transit Statistical Report, 1996-97 and Clarion Associates

In situations where the cost of public transit is high relative to other options, or the ability of the system to satisfy personal needs is low, other transportation options are chosen. In the Delaware Valley, the cost is now

prohibitive to connect distant suburban locations with employment concentrations in downtown Philadelphia and elsewhere.

Table 2-5 confirms that the operating deficit per trip increases geometrically as the service area increases beyond the boundaries of the core City of Philadelphia. Stated differently, fully 40% of SEPTA's annual operating deficit is attributable to only 13.6% of the total number of transit trips that arise from longer city-suburban commutes. These are the trips that connect the city with increasingly sprawling suburban areas. If, instead, the total population served by transit to the outer suburbs (the Frontier and Regional Rail Divisions) were accommodated at densities similar to populations served by the inner-suburb transit system (the Victory Division), the total operating subsidy would drop to \$0.95 per trip -- nearly 20% below 1990 levels. If spread over the population of the state, the cost to an average household would drop to \$92. If, as is more likely, additional transit services are added in the future to connect diverse suburban business and suburban residential areas, the operating deficits will probably increase substantially.

The case study of the Lehigh Valley shows the dramatic comparison between changes in commuting behavior in a high growth area, and those in the state as a whole, between 1980 and 1990. These results are summarized in Table 2-6.

Table 2-6 Comparative Commuting Patterns Between Pennsylvania and Lehigh County (1980-1990)						
	Pennsylvania			Lehigh County		
	1980	1990	% Change	1980	1990	% Change
Population	11,863,896	11,881,643	0.15%	272,349	291,130	6.90%
Labor Force	5,370,900	5,797,937	7.95%	135,853	151,621	11.61%
Drive Alone	2,956,080	3,818,385	29.17%	85,878	111,388	29.70%
Carpool	978,735	689,656	-29.54%	24,817	16,615	-33.05%
Public Transit	399,375	343,724	-13.93%	3,986	2,451	-38.51%
Work at Home	99,384	144,551	45.45%	1,979	3,305	67.00%

Source: 1990 Census Transportation Planning Package

Table 2-6 reveals that the population and labor force of the Lehigh Valley grew much faster than that of the state as a whole, and that:

- The number of workers using carpools decreased faster than it did around the state.
- The number of workers using public transit decreased almost three times as it did around the state.
- The number of workers who work at home increased significantly faster than it did around the state.

According to the Lehigh Valley Planning Commission and PennDOT, the growth in passenger car registrations and licensed drivers in the Lehigh Valley since 1990 has been at more than double the rate of population growth. Growth in VMT has been at a rate more than eight times as fast as population growth.

Finding: *Public-sector spending on transportation infrastructure in the Greater Philadelphia region results in a transfer of public dollars towards those people and jobs that locate in suburban locations rather than center city locations.*

As indicated in Table 2-7 below, PennDOT data for highway construction and maintenance expenditures from 1986 to 1995 show that the City of Philadelphia received the lowest level of funding on a per capita basis. When adjusted for actual usage, based on origin of trip, the City of Philadelphia receives even less highway funding per capita. Even after further adjusting for expenditures for mass transit that are

disproportionately spent in the City of Philadelphia, total transportation expenditures are still 50% lower for city residents than for suburban residents. (Rusk, Orfield, and Voith)

Table 2-7 Transportation Expenditures in the Philadelphia Metropolitan Area 1986-1995						
County	1990 Population		Actual Expenditure Distribution		Expenditure Distribution Based on Use and Origin of Trip	
	Number	% of Metro Total Pop	Per Capita	% of Region	Per Capita	% of Region
Philadelphia	1,585,577	42.5%	\$566	29.4%	\$424	23.2%
Delaware	547,651	14.7%	\$1,647	29.5%	\$1,106	20.9%
Montgomery	678,111	18.2%	\$1,019	18.4%	\$1,100	25.7%
Chester	376,396	10.1%	\$827	12.6%	\$1,183	15.3%
Bucks	541,174	14.5%	\$574	10.2%	\$802	14.9%
Suburban Total	2,143,332	57.5%	\$1,006	70.6%	\$1,041	76.8%
Metro Total	3,728,899	100.0%	\$819	100%	\$779	100%

Source: Richard Voith, *Transportation Investments in Philadelphia Metropolitan Area: Who Benefits? Who Pays? And What Are the Consequences?* (March 22, 1998)

The spending patterns highlighted in Table 2-7 result in relatively greater payment for services by central city residents, while suburban residents enjoy the bulk of capital and maintenance investment in the metro area.

Finding: *The spatial mismatch between employment opportunities and available labor force has caused an increase in commutes of greater distance, which in turn increases the costs to the commuting individual (out-of-pocket costs and stress related to commuting) and to the greater community.*

As documented in Table 2-8 below, the increase in the number of "reverse" commuters in the Delaware Valley between 1970 and 1990 has several negative societal impacts, although they are difficult to quantify because of the lack of detailed data. For example, data were unavailable to show the breakdown of reverse commutes by transport mode (i.e., public transit, single-occupancy vehicle, carpools, etc.). In this report, we assume that 15% of all "reverse commutes" to suburban job locations were taken via public transit (the same percentage as reported in the 1990 Census).

Table 2-8 1970-1990 Commuting Patterns--Philadelphia Metro Area				
County	# Employed Persons (During Census Week)		Increase	
	1970	1990	Actual	% Change
Philadelphia To Suburban Commute				
Bucks	15,531	23,866	8,335	53.7%
Chester	3,117	5,303	2,186	70.1%
Delaware	12,009	15,161	3,152	26.2%
Montgomery	37,869	54,113	16,244	42.9%
TOTAL	68,526	98,443	29,917	43.7%

Suburb to Philadelphia Commute				
Bucks	30,896	30,692	-204	-0.7%
Chester	10,733	11,771	1,038	9.7%
Delaware	64,828	59,652	-5,176	-8.0%
Montgomery	55,598	55,956	358	0.6%
TOTAL	162,055	158,071	-3,984	-2.5%
Increase in "Reverse" Commuting			33,901	

Source: Delaware Valley Regional Planning Commission and Clarion Associates

Using DVRPC data, the commute out to the suburbs via public transit is subsidized at an average of \$2.66 per trip (\$3.47 per trip for city to suburb, less \$.81 per trip assuming Philadelphia resident workers used public transit to commute to jobs within the city). Thus, the net increase in reverse commutes just in the Delaware Valley has a total societal cost to Pennsylvania residents of over \$ 6 million per year in public transit subsidies. Associated with the increased length and cost of trip is decreased disposable income (higher cost per commute to the suburbs than commutes intra-city) and increased time away from home. Reverse commuting also affects suburban businesses. Many labor-intensive businesses, such as hotels and restaurants, have trouble meeting their labor needs. In addition, some employers have had to use privately-owned vans to transport their workers from suburban transportation hubs to their jobs.

Finding: *Increased reliance on automobile travel results in higher levels of indirect costs that are born by the state as a whole, when compared to transit*

A study by Apogee Research in 1984 found that 16% to 17% of the cost per passenger mile for single-occupant vehicles (SOV) are indirect social costs (including air/water pollution, waste, barrier effects, noise, and costs of parking and accidents not paid by the transportation user), versus only 1% to 7% of the total costs for transit use and a negligible share of the costs for walking and bicycling are social costs.

III. INCREASED LAND AND NATURAL HABITAT LOSS

Both land use modeling studies and Pennsylvania case studies support a strong relationship between sprawl development patterns and increased loss of agricultural lands (both prime and non-prime) and sensitive environmental lands (such as wetlands, flood plains, critical wildlife habitat, aquifer recharge areas, stream corridors, and steep slopes). While farmland may be taken out of production for a variety of reasons – including changes in the personal finances of the owner, probate issues, or conversion to timberlands – it is clear that sprawl patterns of development exert significant additional pressure to convert farmlands to other uses. This is particularly true in and around metropolitan counties, where nearly 60 percent of the state's farms were located in 1997.

The loss of farmlands should be of concern not just because it represents a loss of productive open space, but because it represents the loss of an economic asset that has fueled one of the United States' major export industries. Although dramatic gains in productivity make it likely that the U.S. will be able to replace those crop yields lost through sprawl development, the total agricultural output of the state and the country will still be significantly lower than it would be if sprawl was not consuming farmland at a significant rate.

A. Land Consumption in General

The U.S. Department of Agriculture's 1997 National Resources Inventory recently reported that Pennsylvania lost over 1 million acres of cropland, forest, and open space in just five years (between 1992 and 1997). As a result, Pennsylvania ranked number two in the nation (after Texas) in the change in total acres of land developed. This amazing rate of land consumption was not caused by increases in the state's population -- it amounts to over 35 acres of land consumed for each new resident of the state during that five year period.

In addition, in a June 1993 report entitled "*Suburban Sprawl in Central and Western Montgomery County*", the Montgomery County Planning Commission found that there has been a rapid increase in the amount of land consumed per household over a 25-year period. In 1965, the average land consumed per household was .80 acres. By 1990, the rate had increased substantially to an average of 1.14 acres per household. Interestingly, at the same time, average household size decreased by 21%, from 3.48 persons per household to 2.75 persons per household. In total, between 1965 and 1990, 62,185 acres of the county were developed for new residential development. If, instead, land development per household had continued at the 1965 level from 1965 to 1990, the amount of land consumed by new residential growth would have been only 34,107 acres (versus 62,185 acres) -- a 45% savings equivalent to over 28,000 acres or 44 square miles of land in central and western Montgomery County alone.

Data from Chester County also supports the linkage between lower density, dispersed development, and increased loss of agricultural and sensitive lands. Like many places in Pennsylvania, Chester County has experienced predominantly single-family detached home development, with more than 22,000 acres developed for single-family homes from 1970 to 1990. For much of this 20-year period, Chester County was an outer-ring bedroom suburb of Philadelphia. It was not until the economic expansion of the 1980s that significant residential development occurred (except in a few close-in communities along the Route 202 corridor). Since 1990, Chester County has grown at even more rapid rates than the 20-year statistics shown in Table 3-1 below.

Table 3-1 shows that, on average, every 100 acres of single-family residential development in Chester County is supported by an additional 38 acres of roads and 18 acres of utilities. Because of the need for land to accommodate the roads and utilities that support new homes, every 1 acre of single-family residential development, results in the loss of 1.56 acres of agriculture, wooded, and vacant land.

<p align="center">Table 3-1 Chester County Land Use 1970-1990 (Area in Square Miles)</p>								
Year	Single Family	Multi- Family	Mfg.	Trans.	Utility	Ag.- Wooded, Vacant	Other	Total
1970	64.78	4.33	3.62	25.87	1.12	625.23	37.06	762.01
1990	99.3	6.49	4.74	39.03	7.53	572.8	29.77	759.66
Change 1970-90								
Square Miles	34.52	2.16	1.12	13.16	6.41	-52.43	-7.29	-2.35
Acres	22,093	1,382	717	8,422	4,102	(33,555)	(4,666)	(1,504)

Source: *Land Use in the Delaware Valley 1970-1990 Analytical Report No. 2* Delaware Valley Regional Planning Commission, July 1994

Chester County's land use pattern also supports the commonly-held notion that development density declines as the distance from the urban core increases. In close-in Delaware County, every additional housing unit consumes an average of 0.22 acres. In comparison, in Chester County, the total land consumption per dwelling unit is 72% higher, or .38 acres per dwelling unit.

B. Loss of Agricultural Lands and Sensitive Environmental Lands

Finding: *While there has been widespread loss of agricultural land throughout the State of Pennsylvania over the last 25 years, the loss has been most extreme around urban metropolitan areas such as Philadelphia, Pittsburgh, Harrisburg, and Reading, which are also the most productive agricultural areas of the state.*

Several Pennsylvania studies support a linkage between sprawl and loss of agricultural lands, compared to losses stemming from more compact or planned growth patterns. Tables 3-2 shows the loss of agricultural land in several areas of Pennsylvania.

Table 3-2 Loss of Agricultural Land in Case Study Communities			
Community	Time Period	Percentage Loss	
		Total	Annual
Statewide Average			
Pennsylvania	1969-1992	-20.9%	-0.9%
Small Communities			
Crawford County (Meadville)	1987-1996	-10.3%	-1%
Lycoming County (Williamsport)	1972-1990	-10.8%	-.6%
Medium Sized Communities			
Lehigh and Northhampton Counties (Lehigh Valley)	1969-1992	-27.8%	-1.2%
York County	1969-1992	-24.2%	-1.1%

Table 3-2 Loss of Agricultural Land in Case Study Communities			
Community	Time Period	Percentage Loss	
		Total	Annual
Large Communities			
Total Delaware Valley (Philadelphia)	1969-1992	-37.7%	-1.6%
Allegheny & Westmoreland Counties (Pittsburgh)	1969-1992	-25.9%	-1.1%

Source: Center for Rural Pennsylvania; Setting the Agricultural Agenda: Issues and Directions for Crawford County Agriculture, Crawford County Planning Commission, 1996; Lycoming County Comprehensive Plan, Amended December 18, 1997; and Clarion Associates

Table 3-2 illustrates the dramatic connection between the rates of agricultural land loss and community size. The bigger the community, the faster the rate at which it is losing surrounding farmland each year. In addition, it shows that the rate of farmland loss around both Medium Sized and Large communities is occurring faster than it is across the state as a whole. Unfortunately, these are also the most productive agricultural areas of the state -- in 1997 almost two-thirds of the market value of Pennsylvania agricultural products came from farms located in the state's largest metropolitan areas. These losses are directly related to the continued movement of the residents of these areas outward from the urban centers over the 23-year period and the increasing opportunities that it creates for alternative uses of farmland.

Finding: *The rate of agricultural land loss has quickened during the past 10-15 years, compared to historical rates of loss dating back to 1969.*

Just as importantly, the rate at which Pennsylvania's communities are losing farmland is accelerating. Table 3-3 below shows how the rate of agricultural land lost statewide accelerated during the decade from 1982 to 1992 in both the Medium Sized and Large Communities included in the case studies.

Table 3-3 Accelerating Rate of Farmland Loss			
Jurisdiction	Avg. Annual Loss 1969-1992	Avg. Annual Loss 1982-1992	1982-92 Rate of Loss vs. 23 Yr. Avg.
Statewide Average			
Pennsylvania	-0.9%	-1.4%	150%
Small Communities			
Crawford County (Meadville)	1.0% (1987-1996)	1.6% (1995-1996)	160%
Lycoming County (Williamsport)	-0.8%	-1.4%	175%
Medium Sized Communities			
Lehigh and Northampton Counties (Lehigh Valley)	-1.2%	-1.7%	140%
York County (York)	-1.1%	-1.7%	160%
Lancaster County (Lancaster)	-0.4%	-0.7%	170%
Large Communities			
Total Delaware Valley (Philadelphia)	-1.6%	-2.8%	170%
Allegheny & Westmoreland Counties (Pittsburgh)	-0.6%	-0.8%	133%

Source: Center for Rural Pennsylvania and Clarion Associates

This information suggests that the accelerating rate of farmland loss is occurring regardless of the size of the community.

If Pennsylvania continues to lose farmland at its historic 23-year rate of 0.9% per year, there would be no farmland left in the state in less than 100 years. However, if the rate of loss continues at the faster rate of 1.4% experienced during 1982-1992, there would be no farmland left in the State in approximately 70 years. The rate of agricultural land loss in the Delaware Valley between 1982 and 1992 was 70% faster than the average loss over the entire 23 year-period from 1969 to 1992. In the Delaware Valley, assuming farmland continues to be consumed at the average rate of 2.8% experienced between 1982 and 1992, farmland in Valley would be converted to other uses at the end of only 28 years. Similarly, Montgomery and Bucks Counties lost nearly a third of their farmland base during the ten-year period from 1982-1992 – a rate of consumption that could only be sustained for 20 years (at the most) before all of the farmland would have been converted. Finally, in *Renewing our Community, The Rusk Report on the Future of Greater York*, David Rusk documented the following trend in York County:

"In 1960, there were 408,200 acres of farmland in York County. Farmland comprised 70% of all county land. By 1992, there were 252,052 acres of farmland, now totaling only 43% of all county land. . . .In short, in just three short decades almost 30 percent of York County's farmland was lost to suburban sprawl, [as much county land as was consumed during the previous 200 years]. . . .The [York County] Planing Commission projects that, if current trends continue, in 25 years the total percentage of farmland in York County may be less than 20%."

By comparison, in Maryland, the Governor's Commission on Growth Management in the Chesapeake Bay Region calculated that the state had lost 147,400 acres of agricultural land between 1971-1988. The Commission also estimated in 1991 that if current trends persisted another 333,000 acres (13%) would be lost by 2020. While very serious, these acreages translate into the loss of farmland at a rate of less than .7% per year – which is significantly lower than the rate at which the Pennsylvania has been losing farmland.

Finding: *Pennsylvania loses up to 6 acres of farmland for each new household created.*

Table 3-4 summarizes the relationship between farmland loss and new household creation in several Pennsylvania communities.

Table 3-4 Farmland Loss Related to Household Growth 1982 to 1992						
Location	Total Acres Lost: 1982- 1992	% Acres Lost: 1982-1992	Pop. Change 1980- 1990	Household Change 1980-1990	% Household Change 1980-1990	Acres Lost per Household
Small Communities						
Crawford County (Meadville)	26,136 (1987-1996)	-10.3 (1987-1996)	-2,700	1,225	4.0%	5.61 (1987-1996)
Lycoming County (Williamsport)	19,210 (1972-1990)	-10.8% (1972-1990)	-373	3,077	6.8%	6.24 (1972-1990)
Medium Sized Communities						
Lehigh and Northampton Counties (Lehigh Valley)	33,113	-16.8%	40,468	22,514	12.4%	1.47
York County (York)	47,827	-15.9%	26,611	16,353	14.6%	2.92

Table 3-4 Farmland Loss Related to Household Growth 1982 to 1992						
Location	Total Acres Lost: 1982- 1992	% Acres Lost: 1982-1992	Pop. Change 1980- 1990	Household Change 1980-1990	% Household Change 1980-1990	Acres Lost per Household
Lancaster County (Lancaster)	28,928	-6.9%	60,476	27,092	21.9%	1.07
Large Communities						
Total Delaware Valley (Philadelphia)	109,503	-26.5%	154,804	128,876	15.0%	0.85
Allegheny & Westmoreland Counties (Pittsburgh)	15,476	-7.7%	-135,529	6,217	.92%	.02

Source: Center for Rural Pennsylvania, U.S. Census of Population and Clarion Associates

Each of the communities listed in Table 3-4 are growing faster than the state in general, and in all but one of the communities the percent of total farmland acres lost has been greater than the state average. The table shows a strong relationship between community size and the rate of farmland loss per new household. The smaller the community, the more farmland it loses per new household formed.

At one end of the spectrum, Allegheny and Westmoreland Counties reported little farmland land lost, few households formed, and a correspondingly low rate of agricultural land loss per household. In the more suburban counties of the Delaware Valley (Bucks, Chester, and Montgomery Counties), the rate of loss is over 1 acre per household. A lower rate in Delaware County, where little developable land exists, pulls the average for the area down to .85 acre of farmland lost per household created during the 1980s. In the Lehigh Valley, nearly 1.5 acres of farmland, on average, were lost for each new household created during the 1980s. More dramatic is the rate of loss in York County, which approaches 3 acres for each new household created. But even this figure is dwarfed by the rates of loss in the two Small Communities, where each new household is accompanied by the loss of between 5 and 6 acres of farmland.

David Rusk reported similar findings in his analysis of the Reading area. From 1980 to 1990, the population of Reading grew by 16% and the number of households increased by about 21%, but the urbanized land area grew by 81%. In 1980, the average new household consumed .35 acres of urbanized land area, but by 1990 that figure had increased by over 50% to .53 acres of land area for each new household. According to Rusk's analysis, for each new household created in the Reading area the urbanized area grew by 1.38 acres.

Finding: *In York County, the amount of farmland lost for each new household created has grown dramatically since 1969, and it is likely that this pattern applies to many other Pennsylvania counties.*

Between 1969 and 1978, York County lost farmland at the rate of .85 acre per new household, but that figure more than doubled to an average of 1.81 acres per household during the next ten years, and then almost doubled again to a figure of 3.20 acres per new household between 1987 and 1992.

As growth is compounded by increases in land consumption, the ratio of farmland as a percentage of all land in York County has shifted. In 1960, 70% of all of the land in the county was farmland. By 1992, developed land exceeded farmland, with the latter representing only 43% of all of the land in the county. According to the York County Growth Management Plan, "if this trend continues it is possible that in 25 years, the total percentage of farmland in York County may be less than 20%." This loss is particularly important in light of the economic importance of agriculture to both York County and the state. According to 1992 statistics, York

County was the state leader in the production of wheat, soybeans, and barley and second in corn for grain. The loss of valuable farmland is not only detrimental to the economy of York, but also to the entire state.

Finding: *Studies from throughout the country have confirmed the connection between sprawl development patterns and the dramatic loss of farmlands.*

The results of national studies in six other states confirm that sprawl patterns of development result in greater losses of agricultural lands than would occur through compact development. These findings are summarized in Table 3-5.

Table 3-5 Loss of Agricultural Land From Sprawl Patterns of Development		
Study	Place of Study	Savings in the Consumption of Agricultural Acreage under Compact Growth Versus Sprawl Development
Burchell (1992)	New Jersey	39%
Burchell (1995)	Lexington, KY	18%
Burchell (1997)	Michigan	17.4%
Burchell (1997)	South Carolina	18%
Burchell (1997)	Delaware Estuary Region	29%
Landis (1995)	San Francisco Bay Area	50% (of Farmland plus steep-sloped areas)

Source: Clarion Associates

In the New Jersey study, agricultural lands were defined to include crop land that is harvested, lands in permanent pasture, and woodlands that could be used for agricultural purposes. Burchell's New Jersey study also found that under sprawl development patterns, loss of farmland would tend to include those ranked as "prime" or "marginal" lands (as opposed to those ranked as "poor" agricultural lands) because these tend to be the flattest, best drained, and easiest to develop.

Finding: *Studies from throughout the country have confirmed the connection between sprawl development patterns and the dramatic loss of sensitive environmental lands.*

In addition to the loss of farmland, Pennsylvania has been losing sensitive environmental lands at a significant rate. The state lost an average of 1,200 acres of wetlands per year from 1956 to 1979, and wetlands now only constitute 2% of the state. (Chesapeake Bay Commission 1996)

The same studies that have documented the linkage between sprawl and the loss of agricultural lands in six other states found strong linkages between sprawl development patterns and the loss of sensitive environmental lands. Those studies tend to confirm that sprawl results in a greater loss of wetlands, flood plains, critical habitat, aquifer recharge areas, stream corridors, and steep slopes than would occur under planned, compact development patterns. The estimated savings in environmentally sensitive lands under non-sprawl scenarios ranged from 17% to 27%. Two of these studies addressed areas in the northeastern U. S. (New Jersey and the Delaware Estuary), and it is likely that Pennsylvania could also experience reductions in the loss of sensitive lands of between 17% and 27% under compact growth scenarios. This information is summarized in Table 3-6 below.

Table 3-6 Loss of Sensitive Lands From Sprawl Patterns of Development		
Study	Place of Study	Savings in the Consumption of Sensitive Land Under Compact Growth (Compared to Sprawl)
Burchell (1992)	New Jersey	17%
Burchell (1995)	Lexington, KY	20%
Burchell (1997)	Michigan	21%
Burchell (1997)	South Carolina	22%
Burchell (1997)	Delaware Estuary Region	27%
Landis (1995)	San Francisco Bay Area	Savings of 10,500 acres of wetlands and 8,000 acres of steep slopes

Source: Clarion Associates

Finding: *A 50 year old tree provides an economic benefit of over \$250 per year by providing environmental protection services that would otherwise have to be provided by the development that removes the tree. If those services are not replaced, then the community has lost environmental quality that it would take at least \$250 to replace.*

Studies by the North American Forestry Association estimate that, on an annual basis, a 50 year old tree provides soil erosion and storm water control benefits valued at \$75, wildlife shelter benefits valued at \$75, air cooling services valued at \$73, and air pollution control benefits valued at \$50. If the value of these benefits were capitalized at a (conservative) rate of 5%, the market would value each tree at over \$55,000.

C. Cost of Maintaining Agricultural Land (Open Space Acquisition Programs)

Finding: *Over the past decade, some Pennsylvania counties have incurred average costs of between \$22 and \$89 per household per year to preserve open space and farmland in the face of sprawl development pressures.*

Pennsylvania's planning and real estate tax laws have generally not been effective means to encourage the retention of farmland in the face of development pressures, or to maintain enough privately-owned open space to meet the needs of the citizens of the state. Due to the loss of farmland and open space to development, both Chester County and Lehigh County (among others) have issued bonds to buy or protect open space and park land, and for farmland retention. At least some of the costs associated with such bond programs can be viewed as costs of sprawl, since there would be less voter desire to purchase open lands if farmlands and other sensitive lands were not disappearing.

The Chester County program was approved by voters in November 1989, and involved a \$50 million bond issue for open space. That money leveraged another \$62 million in state, municipal, and private resources, for a total of commitment of \$112 million. Through 1996, about \$91 million of those funds had been spent (the full \$50 million in county funds plus \$40.8 million in other resources), to preserve over 7,600 acres of farmland, 452 acres of environmentally sensitive lands, and 874 acres of regional park land. The total of all funds spent amounts to about \$621 for each of Chester County's 146,000 households (although much of the money came from the state, and should in fairness be divided over all of the residents of Pennsylvania).

Similarly, between 1989 and 1997, Lehigh County has spent about \$18 million for open space protection, (about \$14 million in state funding and about \$4 million in county, municipal, and private funds). The total of all funds spent amounts to about \$155 for each of Lehigh County's 116,000 households (although much

of the money came from the state, and should in fairness be divided over all of the residents of Pennsylvania).

The spending documented above amounts to between \$22 and \$89 per household per year. Not all of the open space spending in Chester and Lehigh Counties was necessarily caused by the citizens' desire to slow the effects of sprawl, however. Some of it is probably due to a general increase in the public's desire to protect open space -- even in areas where sprawl is not occurring. Assuming that only half of the voter willingness to purchase open space is caused by the disappearance of existing open spaces, and assuming that the Chester and Lehigh County programs are meeting their voters' needs (i.e. that the citizens feel these acquisition programs are adequately offsetting the loss of open spaces caused by sprawl), the experience with those two programs suggest that it might cost each Pennsylvania households between \$ 11 and \$45 per year to replace some of the open space amenities lost through sprawl patterns of development.

Table 3-7 Open Space Expenditures		
	Chester County (1989-1996)	Lehigh County (1989-1999)
Open Space Expenditures	\$ 90,800,000	\$18,000,000
Households	146,160 (1995)	115,951 (1996 est)
Open Space Cost/Household	\$621	\$155
Open Space Cost/Household/Year	\$89	\$22
% Caused by Sprawl	Assume 50%	Assume 50%
Sprawl-Related Open Space Cost/Household/Year	\$45	\$11

Source: "Generations" published by the Chester County Board of Commissioners; and Clarion Associates

Finding: *Local open space acquisition programs do not appear to be offsetting the loss of agricultural lands associated with sprawl. About 3 acres of farmland and open space has been lost for each acre acquired. This has caused the amount of undeveloped open space per capita to fall by at least 25%, and sometimes more.*

A case study of the Lehigh Valley suggests, however, that efforts to acquire open space and park lands is not offsetting the loss of farmlands in the area. Table 3-8 suggests that even though Lehigh County has added over 7,000 acres of park land and open space between 1972 and 1992, the County experienced a net loss of over 17,000 acres of agricultural and vacant lands during that same period.

Table 3-8 Lehigh Valley Change in Net Open Space (1972-1992)			
	Additions of Park Land and Open Space (in Acres)	Net Loss of Agricultural, Vacant, and Open Space Lands (in Acres)	Ratio of Loss to Gain
Allentown	294	(574)	2.95
South Whitehall	377	(1,027)	3.7
North Whitehall	638	(1,346)	3.11
Lehigh County	7,073	(17,596)	3.5

Source: "Twenty Years of Land Use Change in the Lehigh Valley," November 1993.

Table 3-9 show that as a result of the net loss of undeveloped land in the Lehigh Valley and the increasing population of that area, there has been a rapid decrease in undeveloped land per capita. The rapid population growth and development within North Whitehall Township displays the level of open space loss that is occurring along certain road corridors of the Lehigh Valley.

Table 3-9 Lehigh Valley Undeveloped Land Per Capita (1972-1998)				
Municipality	Acres		Loss	
	1972	1997/98	Nominal	Percentage
Allentown	.03	.03	0	0
South Whitehall	.44	.27	.17	39%
North Whitehall	2.11	.90	1.21	57%
Lehigh County	.63	.46	.17	27%

Source: "Twenty Years of Land Use Change in the Lehigh Valley," November 1993; "Lehigh Valley Profile & Trends 1998 Edition", May 1998; Lehigh Valley Planning Commission; and Clarion Associates;

IV. Increased Social Costs and Decreased Quality of Life

In addition to the direct dollar costs associated with construction and operation of infrastructure, inefficient transportation systems, and the loss of farmland and open space, sprawl affects Pennsylvanians' quality of life and imposes social costs that are much harder to measure. These include:

- Increased Stress;
- Increased Air Pollution;
- Increased Water Pollution;
- Increased Pressures on Historic Properties;
- Increased Concentration of Poorer Citizens in Core Cities;
- Increased Jobs-Housing Mismatch;
- Less Attainable Suburban Housing;
- Higher Tax Burdens for Core City Residents;
- Over-Concentration of Tax-Exempt Properties in Core Cities;
- Over-Concentration of Regional Financial Obligations in the Core Cities; and
- Increased Fiscal Distress for Core Cities

A. Increased Stress

Finding: *At least one study suggests that greater stress is associated with a lifestyle that includes commuting, which is in turn associated with sprawl.*

Increased travel impedance, as measured by commuting distance and time, is associated with increased measures of stress. Nationally, between 1983 and 1995, the average commute time increased by 14% and commute lengths rose by 37%. (Benfield 1999) Travel impedance was found to have statistically significant effects on job satisfaction, work absences due to illness, and overall incidence of colds or flu. The study found that stress effects are strongly associated with freeway travel and with road exchanges, both of which increase with the low densities and dispersed development patterns of sprawl. (Novaco 1990)

B. Increased Air Pollution

Finding: *The current rates of VMT growth, and the increase in the number of auto trips that are associated with sprawl, are significant contributors to ozone and other air pollutants*

A study by the Chesapeake Bay Commission in 1997 found that air quality could be significantly improved by a 10% per year reduction in the growth rate of vehicle miles traveled. This could result in a reduction of 19.2 tons /day for ozone and oxides of nitrogen as well as a 287 ton /day decrease in carbon monoxide by the year 2020.

In addition, while average trip length has increased both nationally and in Pennsylvania over the last 20 years, there have only been marginal increases in pollution due to additional trip length. This relatively small increase in pollution is a result of improved automobile emission control systems. The more significant increase in air pollution results from the increase in the number of trips per day. Pittsburgh's experience in terms of vehicle trip trends is similar to the national trend. Nationally, the number of trips per day (as opposed to their length) have increased by approximately 12% (compounded) per decade for each of the last two decades. Pittsburgh regional data shows a 12.2% growth rate from 1980 to 1990. These equivalent levels of growth imply that the national EPA data on pollution and the conclusions presented apply as equally

to Pennsylvania as it does to the nation as a whole. According to the United States Environmental Protection Agency:

"In the first few minutes of all trips, emissions are higher because the emissions control equipment has not yet reached its optimal operating temperature. In fact, for a trip of 5 miles, most emissions occur during the cold start. In newer-model cars, cold start emissions have decreased only slightly, whereas running-engine emissions have fallen dramatically"

The EPA also reports that 64% of all carbon monoxide emissions for a 5-mile trip occur upon the cold start. Thus, the changing nature of commuting patterns primarily attributed to sprawl development patterns have significantly offset the effects of other improvements in automobile emissions controls.

C. Increased Water Pollution

Finding: *Sprawl patterns of development appear to be linked to increased amounts of water pollution in the Chesapeake Bay watershed and other areas.*

Technical studies undertaken for the Governor's Commission on Growth in the Chesapeake Bay Region (1991) looked at the likely water pollution impacts of alternative development patterns on the Chesapeake Bay and its watershed from 1990-2020. The results are shown in Table 4-1.

Table 4-1 Key Impacts of Alternative Development Patterns on the Chesapeake Bay & Watershed (1990-2020)		
Impact	Dispersed/Sprawl Pattern	Concentrated Pattern
Increase in Sedimentation	5.7 million tons	3.4 million tons
Increase in Nitrous Oxides	1.6 million pounds	.08 million pounds
Increase in Water Consumption	108.8 billion gallons	70.7 billion gallons

Burchell, et al., for the Governor's Commission on Growth in the Chesapeake Bay Region (1991)

In addition, the increase in impervious surface can lead to increased stormwater run-off, a key contributor to stream and watershed degradation. A study in Akron, Ohio, cited in Benfield (1999), found that the run-off from new suburban residential development is up to ten times that of pre-development conditions and run-off from new commercial development is as much as eighteen times higher.

D. Increased Pressures on Historic Properties

Finding: *Sprawl patterns of development create pressure to convert historic landscapes to other uses that have higher net costs to local government.*

Dollars and Cents of Battlefield Preservation (Conservation Foundation 1994), presents evidence of the economic benefits from the preservation of historic resources, particularly historic battlefields, versus the development of such resources for residential or nonresidential uses. The study notes that the secondary expenditures of visitors to historic places are significant contributors to the local economy. The National Park Service estimates that a community that provides financial support for a historic site and that enjoys direct visitor spending can expect that visitor spending will contribute about \$2 for every \$1 the community spent on financial support.

The same study concludes that, when compared to residential development (and even some commercial or industrial development), preservation of an historic landscape resource generates more revenue than it

demands in public services. A 1992 study of for Straban Township in Adams County found that the costs of services provided per dollar of tax revenue was only \$0.12 for open land versus \$1.10 for land developed for residential uses. This same study concluded that "farm and open land provide clear economic benefits to all residents of the township by providing more in revenue than they require in local expenditures."

Finding: *In addition to demolition to accommodate new construction, Pennsylvania's historic resources are adversely impacted as the redirection of capital away from Core Cities results in the neglect and abandonment of older buildings and the context that they create.*

Throughout the state, changes in development economics have combined with public policies to make many historic properties economically unfeasible to maintain or adaptively re-use. The inclusion of auto-dependent parking requirements and setbacks in urban zoning requirements (or the use of similar auto-dependent benchmarks in private lending practices), for example, have made it harder to re-use or re-finance older buildings for new uses. In addition, changes included in the federal Tax Reform Act of 1986 reduced the amount of historic tax credits available and the way in which they are treated for accounting purposes, which further hampers efforts to maintain historic resources in Core Cities. The combination of these factors has put many more urban properties at risk due to neglect. Central city fiscal stress in the Pittsburgh and Philadelphia case studies--attributable in some degree to sprawl (see subsections IV. H-K below)--has led to the widespread loss of individual historic resources through neglect.

Finding: *The shifting of investment dollars away from historic Core Cities has increased demolition of older properties, and some of these costs are paid by municipalities as they try to avoid the maintenance costs and liability risks of vacant tax properties.*

Municipalities throughout Pennsylvania spend public and private dollars to demolish older buildings, many of which have been designated historic, and countless others that have yet to be identified as historic -- monies which otherwise could be invested in services and infrastructure improvements. Since 1970, Philadelphia alone has demolished close to 29,000 residential buildings. Pittsburgh is contemplating the imminent demolition of 70 commercial buildings in its downtown due to business and retail moving out of the city. The City of Erie has demolished 423 historic buildings, while the City of New Castle has demolished 174 historic buildings. The same sequence of events is occurring in municipalities of all sizes around the state. Shortages of funds for identification and re-use of historic structures in older urban areas have resulted in properties being demolished faster than these properties can be identified and preservation strategies employed.

Finding: *In addition to demolition and neglect, sprawl threatens the historic character of Pennsylvania's older towns and cities by encouraging "auto-oriented" forms of building and site layouts that are then inappropriately reproduced in older downtowns, and that change the character of the area to the detriment of the remaining buildings.*

Even where historic properties have been protected, the environment in which they are located may be changed so dramatically that their historical significance is greatly diminished or lost entirely. This occurs when roads are widened and setbacks to historic properties are reduced. In other cases, new development in historic areas uses standardized floor plans and elevations that do not respect the site location, scale, massing, signage, facade detailing, or parking location of surrounding structures, and the historic setting of surrounding buildings is compromised. The case studies confirm that sprawl is contributing to the erosion of the authentic context and built fabric of many of Pennsylvania's historic towns and districts. In the Meadville case study, for example, the rhythm of its historic downtown streetscape was irretrievably disrupted by the construction of auto-oriented buildings that do not match the building scale, materials, front building setbacks, signage, and location of on-site parking found on surrounding properties.

Finding: *Demolition of historic structures and the erosion of historic character may result in a decline in historic tourism revenues, which could cost the state up to \$335 per lost tourist visit.*

The economic impact of maintaining "authentic" historic towns and districts is significant to the Pennsylvania tourism industry. "Heritage Tourism" is defined broadly in the *Pennsylvania Heritage Tourism Study* to include a wide variety of historic, cultural, and outdoor activities. In 1997, the heritage tourism industry generated \$5.35 billion in economic benefits, 69,000 jobs, and \$617 million in tax revenues to Pennsylvania. The most popular attractions listed by travelers are, first and foremost, the state's historic towns/districts, then Philadelphia's Liberty Bell, the Gettysburg battlefields, the Amish country, and various attractions and museums throughout the state. Based on a survey of 1,700 United States leisure travelers, the *Study* identified "historic towns/districts" and "battlefields/forts" as the top two attractions for Pennsylvania heritage travelers.

The recognition of historic towns/districts, rather than specific historic sites, by leisure travelers as a key element of tourism generation is significant. Throughout Pennsylvania, historic small towns and the character of the historic business areas are endangered by the patterns of demolition, disinvestment, and loss of historic surroundings. The evolution of these small towns could seriously hamper the base and/or growth of Pennsylvania's heritage tourism industry in the future. Arthur Frommer, originator of the Frommer Travel Guidebook series, has stated that "The link [between historic preservation and increased tourism] . . . occurs only when a community preserves entire districts, not just isolated structures. Tourism does not go to a city that has lost its soul" (Preservation Forum, 1988).

According to the *Pennsylvania Heritage Tourism Study* (D.K. Shifflet, May 1999), heritage tourism accounts for 12% of all leisure visitation (trips) and 25% of all tourism spending in Pennsylvania. It is the fastest growing segment of Pennsylvania's travel market. Heritage tourists spend more days in the state (3.3 days vs. 2 days), and spend significantly more dollars in the state (\$102/day vs. \$73/day per person), than all other categories of leisure visitors to Pennsylvania. Each heritage tourism visit therefore results in an average of \$335 in tourism spending, and the loss of each visit could result in that much less in tourism spending.

Finding: *Preservation Pennsylvania recently identified that 34% of its listed "at-risk" sites were threatened by sprawl-related development activity.*

Preservation Pennsylvania, Inc. publishes an annual report entitled "*Pennsylvania At Risk*," which identifies historical and cultural resources in Pennsylvania at risk of loss due to a variety of economic, social, or other forces. One of the criteria for listing is whether a property is "faced with imminent, recognized endangerment either from overt action, neglect, incompatible use, or loss of context." From 1992 to 1997, Preservation Pennsylvania has identified 76 properties in the state that are at risk, as defined by the criteria cited above. Of these 76 properties, 26—or 34%—are identified as being at risk due to sprawl related development activity. While these properties may not currently be generating revenue from either a use or heritage tourism point of view, they are identified as significant parts of the fabric of the lives of Pennsylvania residents.

E. Increased Concentration of the Poorer Citizens in Core Cities

Finding: *Sprawl and the relatively more expensive housing it tends to foster through larger lot zoning have lead to an increasing concentration of poor households in Core Cities and older Inner Suburbs.*

One side-effect of sprawl is that it has tended to concentrate poorer families in older Core Cities — although that tendency has now spread to include Inner Suburbs too. While sprawl certainly does not create poor populations, the dynamics of sprawl do result in those who can afford less being left behind. Although poverty imposes costs on both the individual and society that are not attributable to sprawl — the

concentration of poverty in income-segregated communities creates additional costs that are related to sprawl.

In his studies titled *Philadelphia Metropolitics* and *Pittsburgh Metropolitics*, Myron Orfield highlights two indicators of municipal and population distress: (1) the percentage of children under the age of five deemed to be living in poverty, and (2) the percentage of female headed households with children under the age of 18. Orfield's studies indicate a geographic pattern that shows that the problems are not limited to the central city, but also occur in the inner-ring suburbs. His findings are confirmed by (1) a comparison of information from three jurisdictions in the greater Philadelphia, and (2) information from the six case study communities distributed across Pennsylvania, which are summarized in Tables 4-2 and 4-3.

Table 4-2 Percentage of Children Under 18 in Poverty (1990)					
Small Communities					
Meadville Area		Williamsport Area		Comparison to Core	
Meadville	33.0%	Williamsport	30.8%	Core	100%
W. Meade	17.1%	S. Williamsport	10.8%	Inner Suburb	35-52%
Vernon	13.7%	Loyalsock	11.5%	Outer Suburb	37-41%
All Crawford Co.	22.8%	All Lycoming Co.	16.5%	All Areas	54-69%
Medium Sized Communities					
Lehigh Valley		York Area		Comparison to Core	
Allentown	22.0%	York	31.2%	Core	100%
S. Whitehall	0.0%	Spring Garden	3.3%	Inner Suburb	0-11%
N. Whitehall	2.4%	Springettsbury	3.7%	Outer Suburb	11-12%
All Lehigh Co.	11.0%	All York Co.	8.6%	All Areas	28-50%
Large Communities					
Philadelphia Area		Pittsburgh Area		Comparison to Core	
Philadelphia	33.3%	Pittsburgh	11.9%	Core	100%
Bensalem	6.7%	Monroeville	3.4%	Inner Suburb	20-31%
Upper Darby Township	10.3%				
Tredyffrin Township	1.7%			Mature Suburb	5%
Buckingham	4.2%	Hempfield	3.7%	Outer Suburb	6-31%
Uwchlan Township	2.1%				
All 5 County Region	11.5%	All Allegheny & Westmoreland Co.	8.7%	All Areas	35-73%

Source: U.S. Census

Table 4-2 shows the dramatic concentration of children living in poverty in the Core Cities, and confirms that:

- The concentration of poverty occurs in Small and Medium Sized Communities as well as Large Communities
- The largest gaps are found in the Middle Sized Communities, where the Inner and Outer Suburbs have less than 15% as many children in poverty as the Core City (although the counties as a whole have poverty rates about 28-50% of the Core City levels).

- In both the Small and Large Communities, Inner and Outer Suburbs have about 30% as much poverty as their Core Cities (although the counties as a whole have poverty rates in the 50-70% range).

Table 4-3					
Percentage of Female Headed Households With Children Under 18					
Small Communities					
Meadville Area		Williamsport Area		Comparison to Core	
Meadville	8.7%	Williamsport	10.1%	Core	100%
W. Meade	7.2%	S. Williamsport	6.5%	Inner Suburb	65-84%
Vernon	2.5%	Loyalsock	7.8%	Outer Suburb	28-77%
All Crawford Co.	5.1%	All Lycoming Co.	6.4%	All Areas	59-63%
Medium Sized Communities					
Lehigh Valley		York Area		Comparison to Core	
Allentown	12.7%	York	17.9%	Core	100%
S. Whitehall	6.1%	Spring Garden	6.5%	Inner Suburb	36-48%
N. Whitehall	6.2%	Springettsbury	6.0%	Outer Suburb	34-49%
All Lehigh Co.	5.4%	All York Co.	5.2%	All Areas	29-43%
Large Communities					
Philadelphia Area		Pittsburgh Area		Comparison to Core	
Philadelphia	9.8%	Pittsburgh	29.6%	Core	100%
Bensalem	5.3%	Monroeville	12.6%	Inner Suburb	43-144%
Upper Darby Township	14.1%			Mature Suburb	109%
Tredyffrin Township	10.7%	Hempfield	3.9%	Outer Suburb	13-80%
Buckingham	3.9%			All Areas	57-66%
Uwchlan Township	7.8%	All Allegheny & Westmoreland Co.	16.9%	All Areas	57-66%
All 5 County Region	6.5%				

Source: U.S. Census

Table 4-3 illustrates the dramatic differences in the distribution of female headed-households throughout Pennsylvania. In particular, it shows that:

- The highest concentrations of female headed households are in the Core Cities -- regardless of whether they are a Small, Medium Sized, or Large Communities
- The most dramatic differences are in the Large Communities, where the Cores have about twice as many female headed households as their Inner Suburbs, and seven times as many as their Outer Suburbs.
- In contrast, the smallest gaps are found in the Smaller Communities where some Inner and Outer Suburbs have concentrations of female headed households only 25% lower than their Core Cities.

These findings are supported by the pattern of median incomes in each of the case study areas, which is summarized in Table 4-4. In each of the six case study areas, Inner and Outer Suburb median incomes are between 25% and 150% higher than those in the Core City.

Table 4-4 Median Incomes (1998-1999)					
Small Communities					
Meadville Area		Williamsport Area		Comparison to Core	
Meadville	\$23,392	Williamsport	\$25,025	Core	100%
W. Meade	\$32,573	S. Williamsport	\$31,758	Inner Suburb	127-139%
Vernon	\$32,854	Loyalsock	\$38,458	Outer Suburb	140-154%
Medium Sized Communities					
Lehigh Valley		York Area		Comparison to Core	
Allentown	\$33,271	York	\$26,120	Core	100%
S. Whitehall	\$56,301	Spring Garden	\$44,360	Inner Suburb	169%
N. Whitehall	\$67,847	Springettsbury	\$44,953	Outer Suburb	172-204%
Large Communities					
Philadelphia Area		Pittsburgh Area		Comparison to Core	
Philadelphia	\$30,272	Pittsburgh	\$27,243	Core	100%
Bensalem	\$48,370	Monroeville	\$47,825	Inner Suburb	127-160%
Upper Darby Township	\$38,398				
Tredyffrin Township	\$85,189			Mature Suburb	281%
Buckingham	\$80,317	Hempfield	\$38,918	Outer Suburb	143-267%
Uwchlan Township	\$80,836				

Source: Know The Neighborhood, Lysias, Inc. and Clarion Associates

The disproportionate levels of poor located in urban areas creates very high costs to both those center cities and to the state as a whole. According to the study, "The Fiscal burden of Unreimbursed Poverty Expenditures in the City of Philadelphia: 1985-1995" (Summers and Jukubowski) the provision of poverty related services costs the city over \$134 million per year. "In 1990, over 20% of the city (of Philadelphia) population lived below the poverty level, compared with an average poverty level of 4.7% in its suburbs, and an average poverty level of 11.6% in America's 50 largest cities." This cost is approximately "8% of the local taxes paid by a household of four with a median income of \$40,000 that lives in a \$120,000 home." Not included in these figures are the cost of crime prevention and the added costs of educating the poor and more diverse urban population in the city schools. The implications on City revenues and tax structure is profound. According to the Summers study, "if only half of the \$134 million obligation were reimbursed and used to reduce the wage tax, the estimated results would be an 8% reduction in tax rates, an increase in employment of over 5,700, a reduction in unemployment of 10% and a resultant increase in wage tax revenue of over \$140 million."

F. Increased Jobs-Housing Mismatch

Finding: *Sprawl and the relatively more expensive housing it tends to foster reduce affordable housing opportunities, and reduce the ability of the labor pool to relocate closer to outer-ring suburban employment locations, which exacerbates the spatial mismatch between some working populations and jobs.*

Between 1970 and 1990, Pennsylvania lost nearly 500,000 manufacturing jobs. The impact of the loss of those jobs appears to have been compounded, however, by a growing mismatch between the places where the manufacturing jobs exist and the place where many manufacturing workers live. Several Pennsylvania studies have analyzed the factors that fuel the spatial mismatch between jobs in the suburbs and labor availability in the urban areas. The factors identified include inadequate skills or education, race, limited transportation or access to transportation, and affordable housing. David Rusk and Myron Orfield, in particular, have produced comprehensive studies of several metropolitan areas in Pennsylvania that appear to substantiate the link between current sprawl patterns of land use patterns and increased social costs, including spatial mismatch and inner-city fiscal stress. David Rusk's findings are summed up in the title of his report for the City of Reading and Berks County (1997), *"Today's Winners Become Tomorrow's Losers."* Among other things, Rusk's study concludes that:

- Decline Is Not Limited to Central Cities
- With Constant Outward Sprawl, Older Urban Centers Face Steady Economic Decline
- 1st Ring Suburbs are "Yesterdays Winners and Today's Losers"
- 2nd Ring Suburbs are "Today's Winners and Tomorrow's Losers"
- Exurbs & 3rd Ring Suburbs are the "Day After Tomorrow's Winners"

Rusk's studies are important because they describe the existence and effects of sprawl in communities other than Philadelphia and Pittsburgh. He concludes that indicators of social stress, declining quality of life, and stress on the economic structure of smaller cities and towns are evident throughout Pennsylvania.

The Delaware Valley Regional Planning Commission (DVRPC) report, *"The Mismatch Between Jobs and Workers in the Delaware Valley"* documents positive regional employment growth between 1970 and 1990, despite a declining number of jobs locating within the City of Philadelphia. Shifts in the predominant employment industries also directly affected the location of job growth in the region, as well as the occupational skills required of workers. The DVRPC report stated that:

"Manufacturing uses traditionally located [in the urban cores] along major railroad corridors and along rivers, given their need to import resources and move completed products. In contrast, service sector employment is more mobile and have made the suburbs more attractive, given the availability of larger tracts of land, concentration of residential development, and access provided by the highway system."

As a result, while in 1970 manufacturing represented 29% of the region's total employment and services accounted for only 19.4% of total jobs, by 1990 manufacturing accounted for only 15.6% of total employment while service sector jobs accounted for over 30% of the region's total jobs. From 1970 to 1980, the region experienced an overall population loss of 2%--largely attributable to the loss of manufacturing jobs in the older urban areas. Even more dramatic was the significant loss of population in the City of Philadelphia (13.4% decline from 1970-80) and in Inner Suburban Delaware County (8% population loss). In stark comparison, the Outer Suburban communities in Bucks and Chester Counties each realized population gains of over 10% during this same decade.

Between 1970 and 1990, the entire Delaware Valley Region (Pennsylvania plus New Jersey counties) gained over 600,000 jobs, with the greatest increase occurring in Montgomery County. Although Philadelphia's employment losses stabilized during the 1980's, strong employment growth in the suburban counties has resulted in the Core City's declining share of the region's employment. According to the DVRPC, the decentralization of the workplace in the Delaware Valley has affected suburban employers as they encounter difficulty in filling their labor needs. Suburban employers are generally unable to tap Philadelphia's extensive labor supply because of the length of the commute, the expense of the commute, and in many cases the suburban jobs' inaccessibility to public transportation. The lack of affordable suburban housing has further exacerbated this jobs-housing mismatch problem. This information is summarized in Table 4-5.

Table 4-5 Increase (Decrease) in Population and Employment: Philadelphia and its Pennsylvania Suburbs				
County	1970-1980		1980-1990	
	Population	Employment	Population	Employment
Philadelphia	(261,786)	(148,348)	(102,633)	(718)
Delaware	(48,449)	35,531	(7,356)	38,543
Montgomery	19,541	98,457	34,490	108,255
Chester	38,914	39,329	59,736	44,107
Bucks	62,483	68,984	61,963	60,301
Subtotal PA Suburbs	72,489	242,301	148,833	251,206
TOTAL	(189,297)	93,953	46,200	250,488

Source: Delaware Valley Regional Planning Commission

As shown in Table 4-6 below, in Montgomery County there were approximately 1.31 jobs located for each resident worker in 1988. Because transit services from the central city out to suburban job locations (or between suburban residential concentrations and suburban employment centers) are extremely limited, the outward migration of employment opportunities has intensified the mismatch between employment centers and available labor force primarily in the Core City and Inner Suburbs.

Table 4-6 Employment, Resident Labor Force and Jobs to Households Ratio Delaware Valley Region (1988-1990)					
Location	Population	Households	Employment	Jobs/ Household Ratio	Jobs / Resident Workers Ratio
Philadelphia	1,585,577	603,075	864,400	1.47	1.18
Delaware	547,651	201,374	255,517	1.31	.85
Montgomery	678,111	254,995	510,159	2.11	1.31
Chester	376,396	133,257	191,554	1.48	1.00
Bucks	541,174	190,507	265,849	1.39	.88
DVRPC Region					1.09
DVRPC-Defined "Acceptable Level"				1.50	No Standard

Source: Delaware Valley Regional Planning Commission

Studies in other U.S. cities related similar spatial mismatch patterns. In the Boston area, a study of welfare recipients found that no entry-level jobs in the region's high-employment-growth areas could be reached by mass transit within 30 minutes, and only 14 percent could be reached within one hour. (Benfield 1999)

G. Less Attainable Suburban Housing

David Rusk has postulated that the problems associated with the concentration of poorer households in central cities are not limited to those areas, but have expanded to the inner-ring and maturing suburbs. Table 4-7 uses data from the six case study areas, plus an additional three suburban jurisdictions around Philadelphia, and shows that the median income of Core City residents is often insufficient to afford the median-price of an existing home in both the Inner and Outer Suburbs.

Table 4-7				
Shortage of Central City Income Versus Median Price of Homes in Suburban Area (1998-99)				
Location	Median House Price (1998-99)	Estimated Income Required to Purchase Median Priced Home	Core City	
			Median Household Income	Income Excess/(Shortage)
Small Communities				
Meadville	\$58,000	\$20,730	\$23,392	\$2,662
West Mead	\$62,000	\$21,059		\$2,333
Vernon	\$104,000	\$35,095		(\$11,703)
Williamsport	\$67,000	\$24,996	\$25,025	\$29
S. Williamsport	\$75,000	\$26,788		(\$1,763)
Loyalsock	\$95,000	\$32,890		(\$7,865)
Medium Sized Communities				
Allentown	\$75,000	\$27,207	\$33,271	\$6,064
South Whitehall	\$125,000	\$41,828		(\$8,557)
North Whitehall	\$141,000	\$46,137		(\$12,866)
York (CC)	\$62,000	\$23,569	\$26,120	\$2,551
Spring Garden	\$95,000	\$31,370		(\$5,250)
Springettsbury	\$125,000	\$40,641		(\$14,521)
Large Communities				
Pittsburgh	\$70,000	\$27,127	\$27,243	\$116
Monroeville	\$90,000	\$32,456		(\$5,213)
Hempfield	\$94,000	\$29,806		(\$2,563)
Philadelphia	\$53,000	\$19,295	\$30,506	\$11,211
Bensalem	\$117,000	\$41,007		(\$10,501)
Upper Darby Township	\$73,700	\$26,365		\$4,141
Tredyffrin Township	\$219,646	\$68,718		(\$38,212)
Buckingham	\$245,050	\$79,387		(\$48,881)
Uwchlan Township	\$176,500	\$55,800		(\$25,294)
Note: 1. Estimated based on the following assumptions: [a] 10% downpayment; [b] 7% interest rate on a 30-year fixed rate mortgage; [c] real estate taxes based on actual 1999 mill rates for each community; [d] a reasonable assumption for property insurance costs; and [e] 28% of total income devoted to housing costs.				

Source: Know The Neighborhood, Lysias, Inc.; The Philadelphia Inquirer, "Guide to Home Prices" (March 29, 1998); and Clarion Associates.

Table 4-6 shows the dramatic effects of income segregation on housing affordability. There are only two communities in which a median-income Core City resident could afford to buy a median-priced home in an Inner or Outer Suburb. Residents of Meadville would be able to afford a median-priced home in the Inner Suburb of West Mead, and residents of Philadelphia would be able to afford an average house in Upper Darby Township. In every other case, residents of the Core City could not afford to move out of the Core City if they wanted to.

This finding is also confirmed by a 1992 DVRPC report entitled *Bridging the Gap*, which utilized the jobs/households ratio and the median income necessary to purchase median-priced housing units to identify (1) specific urban areas that contain affordable housing stock but lack jobs and (2) suburban employment centers that have jobs but lack a resident labor pool due to a shortage of affordable housing opportunities. The DVRPC found that a household earning the regional median income (\$38,300) could not afford to purchase the median-priced housing unit in 81% of the Delaware Valley region's municipalities. In addition, the DVRPC found that only 10% of the Pennsylvania municipalities in the Delaware Valley contained median-priced housing units that a household earning the regional median income (\$38,300) could afford.

The shortage of affordable housing near employment centers primarily affects entry level and technical workers who cannot afford to buy or rent housing close to work and must therefore commute long distances. Since the cost of land is the highest single component of housing cost, the low-density development pattern of sprawl, plus the costs of new infrastructure, plus compliance with suburban building code requirements, create formidable barriers to the construction of affordable housing.

Finding: *National studies support the fact that sprawl leads to higher priced land/housing packages, which tends to keep lower income families concentrated in center cities.*

Several national studies support a linkage between sprawl and suburban exclusivity through research on what happens when affordable housing is made available in formerly exclusive suburbs, typically through government-mandated housing programs like New Jersey's *Mt. Laurel* "fair share" requirements. The studies document that households that would otherwise be shut out of suburban housing markets because of price do prosper and assimilate if given the opportunity to "break in." Those who occupy affordable housing in more suburban locations (generally through deliberate inclusionary programs) take on the employment characteristics, ambition levels, and success rates of the population of those jurisdictions. These studies tend to support the claim that suburban exclusionary zoning is responsible for poverty concentrations in core-area neighborhoods. (Wish & Eisdorfer 1996; Davis 1993; Fischer 1991)

In a 1996 New Jersey study, Wish and Eisdorfer reported that close to 15,000 affordable housing units have been built and occupied as a result of legislation emanating from the series of *Mt. Laurel* cases in that state. Occupants of these housing units are employed, doing well at local schools, and integrated without incident in neighborhoods. The Gautreaux (Chicago) and Cincinnati program studies show that residents moving from the central city to the suburbs using housing vouchers have higher rates of employment and higher salaries and their children have better school attendance and grades than families who chose not to move. However, self-selection issues (the successful and ambitious tend to choose to participate in the first place) cloud these findings to some degree.

H. Higher Tax Burdens for Core City Residents

Finding: *Sprawl development generally results in residents of Core Cities having significantly higher real estate tax bills than residents of their Inner and Outer Suburbs.*

Table 4-8 compares the real estate tax burdens for local municipal services (not including school districts and special taxing districts) in the six case study communities.

Table 4-8					
Real Estate Taxes as a Percentage of Median Income and Home Price					
Location	Median Home Price	Real Estate Taxes	Median Income	Taxes as a % of	
				Income	Home Price
Small Communities					
Meadville	\$58,000	\$1,426	\$23,392	6.1%	2.5%
West Mead	\$62,000	\$1,216	\$32,573	3.7%	2.0%
Vernon	\$104,000	\$1,976	\$32,854	6.0%	1.9%
Williamsport	\$67,000	\$1,941	\$25,025	7.8%	2.9%
S. Williamsport	\$75,000	\$1,839	\$31,758	5.8%	2.5%
Loyalsock	\$95,000	\$2,038	\$38,458	5.3%	2.1%
Medium Sized Communities					
Allentown	\$75,000	\$1,956	\$33,271	5.9%	2.6%
South Whitehall	\$125,000	\$1,819	\$56,301	3.2%	1.5%
North Whitehall	\$141,000	\$2,274	\$67,847	3.4%	1.6%
York	\$62,000	\$1,919	\$26,120	1.5%	7.3%
Spring Garden	\$95,000	\$1,786	\$44,360	1.9%	4.0%
Springettsbury	\$125,000	\$1,944	\$44,953	1.6%	4.3%
Large Communities					
Pittsburgh	\$70,000	\$2,311	\$27,243	8.5%	3.3%
Monroeville	\$90,000	\$2,294	\$47,825	4.8%	2.5%
Hempfield	\$94,000	\$1,250	\$38,918	3.2%	1.3%
Philadelphia	\$53,000	\$1,402	\$30,272	4.6%	2.6%
Bensalem	\$117,000	2650	\$48,370	5.5%	2.3%
Buckingham	\$245,050	3730	\$80,317	4.6%	1.5%

Source: Know The Neighborhood, Lysias, Inc.; Philadelphia Inquirer; County Boards of Assessment; and Clarion Associates

Table 4-8 reveals several that in most cases the residents of the Core City pay a significantly higher percentage of their median income towards real estate taxes than the residents of their Inner or Outer Suburbs. The two exceptions are Spring Garden and Bensalem, in which real estate taxes require more of their residents' median income than York and Philadelphia, respectively.

Another measure of the distribution of real property tax burdens is shown by comparing the base real estate taxes for municipal services (not including school districts and special taxing districts) that would be levied on a house valued at \$100,000 in each community. This comparison is shown in Table 4-9.

Table 4-9 Real Estate Taxes Based on Equivalent \$100,000 Homes (1999)					
Small Communities					
Meadville Area		Williamsport Area		Comparison to Core	
Meadville	\$2,459	Williamsport	\$2,897	Core	100%
W. Meade	\$1,962	S. Williamsport	\$2,452	Inner Suburb	80-85%
Vernon	\$1,900	Loyalsock	\$2,145	Outer Suburb	74-77%
Medium Sized Communities					
Lehigh Valley		York Area		Comparison to Core	
Allentown	\$2,608	York	\$3,095	Core	100%
S. Whitehall	\$1,455	Spring Garden	\$1,697	Inner Suburb	55-56%
N. Whitehall	\$1,613	Springettsbury	\$1,555	Outer Suburb	50-62%
Large Communities					
Philadelphia Area		Pittsburgh Area		Comparison to Core	
Philadelphia	\$2,644	Pittsburgh	\$3,302	Core	100%
Bensalem	\$2,265	Monroeville	\$2,549	Inner Suburb	77-86%
Upper Darby Township	\$2,548			Mature Suburb	51%
Tredyffrin Township	\$1,347				
Buckingham	\$1,522	Hempfield	\$1,749	Outer Suburb	53-54%
Uwchlan Township	\$1,439				

Source: County Assessment Offices and Clarion Associates

Table 4-9 demonstrates that in almost every case, real estate taxes on an equivalent house are highest in the Core Cities, significantly lower in the Inner Suburbs, and even lower in the Outer Suburbs. The two exceptions are that the Inner Suburb had the lowest tax level in the Lehigh Valley, and that Tredyffrin Township (a Mature Suburb of Philadelphia) had lower taxes than those suburbs closer in and further out from that large Core City.

Finding: *Sprawl development patterns have resulted in rapidly rising real estate tax levies in the Core Cities and Inner Suburbs (which need to spread the costs of repairs to older infrastructure over fewer residents) and in the Outer Suburbs (which need to build expensive new infrastructure to accommodate growth). Only the "in between" suburbs, whose infrastructure is appropriately sized for their population, have been able to avoid these rapid increases.*

The costs of municipal and school operations has grown faster in the Inner Suburbs than in Mature or Outer Suburbs. Table 4-10 below shows that, in order to make up for the relatively lower levels of real estate tax base per capita, inner-ring suburbs have had to increase their mill rates dramatically, placing a relatively heavier tax burden on its residents. Table 5-10 shows that mill rate have increased significantly more in both the Inner and Outer Suburbs compared to the more Mature Suburb; indeed, the school district mill rate in both the Inner and Outer Suburbs were nearly double the mill rate level in the Mature Suburb in 1995.

Table 4-10 1980 to 1995 Increase in Real Estate Tax Millage Rates				
Location	Percentage Increase		Increased Mill Rate Level vs. Mature Suburb (Tredyffrin Township)	
	School District	Municipal	School District	Municipal
Upper Darby Township (Inner)	187.3%	158.6%	217.8%	185.1%
Tredyffrin Township (Mature)	86.0%	85.7%	100.0%	100.0%
Uwchlan Township (Outer)	150.0%	163.8%	190.5%	175.0%

Source: Chester and Delaware County Assessment Offices and Clarion Associates

I. Over-Concentration of Tax-Exempt Properties in Core Cities

Finding: *Core Cities contain a disproportionate number of the tax-exempt real properties that provide services to the residents of their entire regions. If the value of tax exempt properties in each Core City were proportionate to its share of the regional population, the real estate tax burden on taxable real property in the Core City could be reduced between 15% and 25%.*

Because of their history as the older cities of each region, many Core Cities contain more than their fair share of government, social service, educational, and other non-profit institutions that are exempt from real estate taxes. The levels of tax-exempt properties in the six case study communities are summarized in Table 4-11.

Table 4-11 Percent of Real Estate Value that is Tax Exempt (1998)				
Small Communities				Comparison to Core City
Meadville	33.1%	Williamsport	26.6%	100%
W. Meade	9.2%	S. Williamsport	13.7%	28-52%
Vernon	8.1%	Loyalsock	11.1%	24-42%
All Crawford Co.	8.6%	All Lycoming Co.	11.8%	26-44%
Medium Sized Communities				Comparison to Core City
Allentown	20.3%	York	25.9%	100%
S. Whitehall	10.1%	Spring Garden	12.0%	46-49%
N. Whitehall	9.2%	Springettsbury	9.0%	35-45%
All Lehigh Co.	10.0%	All York Co.	10.4%	40-49%
Large Communities				Comparison to Core City
Philadelphia	26.5%	Pittsburgh	34.0%	100%
Bensalem	13.8%	Monroeville	12.0%	35-52%
Buckingham	5.1%	Hempfield	11.1%	19-35%
Suburban	5.5%	Suburban	11.5%	21-34%

Source: County Assessors Offices and Clarion Associates

Table 4-11 shows that the disproportionate location of tax-exempt properties affects not only Core Cities, but also Inner Suburbs. The three examples below show the dramatic financial effect of this over-concentration of tax-exempt properties.

- **Small Community.** Over \$286 million of market value in Williamsport is real estate tax-exempt. Assuming that the suburban community tax exempt properties provided a more local service and this percentage was used as a base, then the level of tax exempt properties in Williamsport that were regional in nature would be about \$127 million. The loss in real estate tax revenues from excess tax-exempt properties is calculated at over \$918,000 per year, or 1.55 mills of tax. Just the reflection of local versus regional tax-exempt properties would reduce the city mill rate to 6.43. The total reduction in real estate taxes in Williamsport could be as high as 16.7%.
- **Medium Sized Community.** Over \$309 million of market value in York is real estate tax-exempt. Assuming that the suburban community tax exempt properties provided a more local service and this percentage was used as a base, then the level of tax exempt properties in York that were regional in nature would be about \$124 million. This loss in real estate tax revenues is calculated at over \$1.8 million, or 2.04 mills of tax. Just the reflection of local versus regional tax-exempt properties would reduce the city mill rate to 8.05. The total reduction in real estate taxes in Williamsport could be as high as 17.3%.
- **Large Community.** Properties with \$1.1 billion of assessed value in Pittsburgh are real estate tax-exempt. Assuming that the suburban community tax exempt properties provided a more local service and this percentage was used as a base, then the level of tax exempt properties in Pittsburgh that were regional in nature would be about \$ 372 million. This loss in real estate tax revenues to the City of Pittsburgh is calculated at \$44 million per year, or 20.56 mills of tax. Just the reflection of local versus regional tax-exempt properties would reduce the city mill rate by 25.4%.

J. Over-Concentration of Regional Financial Obligations in the Core Cities

Finding: *The fragmented system of local governments associated with sprawl development patterns results in Core Cities providing numerous expensive services that are consumed by the region as a whole, but which the citizens of the Core City have to pay for.*

Philadelphia, in particular, continues to provide a variety of services to its region for which it receives no reimbursement. Expenditures for new prison facilities, criminal justice facilities, and court buildings to accommodate the state court system cost the city over \$107 million per year. In addition, agencies providing state or state-mandated services occupy several city buildings without paying rent. Philadelphia also provides annual operating subsidies to many of the cultural institutions that serve the region as a whole. These include subsidies to the Art Museum, Atwater Kent Museum, Community College of Philadelphia, Convention Center, and the Free Library. The total outlay for those facilities alone is in excess of \$81 million per year. The full cost of un-reimbursed regional services is summarized in Table 4-12. If the City of Philadelphia were able to be reimbursed for the expenses listed in Table 4-12, the city's wage tax could be reduced by almost 40%.

Table 4-12 City of Philadelphia Un-Reimbursed Regional Services	
Category	Cost (\$ millions)
Disproportionate Share of Tax Exempt Real Estate	98
First Judicial District	107
Welfare System	134
Cultural Institutions	81
Economic Stimulus	40
Total	460

Source: Philadelphia, A New Urban Direction, Office of the City Controller, and The Fiscal burden of Unreimbursed Poverty Expenditures in the City of Philadelphia: 1985-1995, Summers and Jukubowski

K. Increased Fiscal Distress for Core Cities

Finding: *Sprawl development patterns have resulted in real estate tax bases that are increasing much faster in Inner and Outer Suburbs than they are in the Core Cities.*

Along with population growth there has been strong growth in the real estate tax base of the Outer Suburbs. This information is summarized in Table 4-13 and the tables that follow.

Table 4-13 Increase in Market Value of Real Estate						
Location	1980-90	1990-95	Location	1980-90	1990-95	Comparison to Core (1995)
Small Communities						
Meadville	120.0%	23.5%	Williamsport	152.6%	13.9%	100%
West Meade	126.0%	26.6%	South Williamsport	161.1%	15.3%	110-113%
Vernon	94.4%	32.5%	Loyalsock	187.4%	24.7%	138-178%
All Crawford Co.	112.3%	28.2%	All Lycoming Co.	172.9%	16.8%	120-121%
Medium Sized Communities						
Allentown	-0.6%*		York	225.9%	10.9%	100%
South Whitehall	7.8%*		Spring Garden	200.5%	20.2%	185%
North Whitehall	47.0%*		Springettsbury	237.3%	27.7%	254%
All Lehigh Co.	10.7%*		All York Co.	225.4%	37.3%	342%
Large Communities						
Philadelphia	160.9%	2.7%	Pittsburgh	165.0%	0.8%	100%
Bensalem	336.2%	-5.7%	Monroeville	132.7%	19.4%	2425%
Buckingham	360.9%	29.8%	Hempfield	133.1%	30.0%	1104-3750%
All 5 County Region	297.8%	4.1%	All Allegheny & Westmoreland Co.	135.1%	18.8%	152-1100%

*NOTE: Lehigh Valley values are changes in assessed values from 1991 through 1998

Source: 1980, 1990, and 1995 Local Governmental Financial Statistics; Commonwealth of Pennsylvania; and Clarion Associates.

Table 4-13 reveals that:

- In every case except one, the real estate tax base of the Inner Suburb increased faster than that of the Core City.
- In every case, real estate tax base in the Outer Suburb increased faster than that of the Inner Suburb and the Core City.
- In Small Communities, the Outer Suburb tax base increased at about 150% the Core City rate.
- In Medium Sized Communities the Outer Suburb tax base grew more than twice as fast as the Core
- In Large Communities, tax base growth in the Outer Suburbs outpaced the Core City by a wide margin.
- In all cases, the tax base increases of the 1980s were much larger than those of the 1990s, but the differences were most dramatic in the Large Cities, where tax base growth was all but stagnant between 1990 and 1995.

Finding: *Sprawl development patterns have resulted in Core Cities having the lowest levels of per capita real estate tax base (in spite of population losses), and in Core Cities generally having the slowest rates of growth in per capita tax base.*

Table 4-14 summarizes information about the growth (or decline) of tax base per capita in the case study communities. 1995 tax base per capita is based on 1995 valuation levels and 1996 population estimates.

Table 4-14 Growth in Real Estate Tax Base Per Capita (1990-1995)								
Location	1990	1995	Avg. Annual Growth	Location	1990	1995	Avg. Annual Growth	Comparison to Core (1995)
Small Communities								
Meadville	\$18,239	\$22,860	4.87%	Williamsport	\$21,038	\$25,056	3.82%	100%
W. Meade	\$20,654	\$24,289	3.52%	S. Williamsport	\$22,445	\$26,528	3.64%	72-95%
Vernon	\$27,298	\$35,991	6.37%	Loyalsock	\$36,428	\$44,382	4.37%	114-131%
All Crawford Co.	\$18,603	\$23,039	4.77%	All Lycoming Co.	\$25,472	\$29,664	3.29%	86-98%
Medium-Sized Communities								
Allentown	\$15,544	\$16,151	3.90%	York	\$19,229	\$22,055	2.94%	100%
S. Whitehall	\$31,864	\$33,859	6.26%	Spring Garden	\$51,007	\$60,527	3.74%	161-274%
N. Whitehall	\$22,025	\$25,779	17.04%	Springettsbury	\$52,016	\$62,786	4.20%	285-436%
All Lehigh Co.	\$22,410	\$24,130	7.68%	All York Co.	\$31,451	\$39,811	5.32%	181-197%
Large Communities								
Philadelphia	\$19,570	\$21,555	2%	Pittsburgh	\$25,803	\$27,448	1.3%	100%
Bensalem	\$53,276	\$49,479	-1.4%	Monroeville	\$42,996	\$52,376	4.4%	191-230%
Buckingham	\$84,146	\$78,194	-1.4%	Hempfield	\$25,298	\$31,911	5.2%	116-363%
All 5 County Region	\$40,358	\$42,015	.8%	All Allegheny & Westmoreland Co.	\$25,534	\$30,947	4.2%	113-195%

Source: 1990 and 1995 Local Government Financial Statistics, Commonwealth of Pennsylvania, Pennsylvania State Data Center and Clarion Associates.

The information in Table 4-14 shows that:

- In 1995, in every community of every size, the retail tax base increase per capita of the Inner Suburbs and Outer Suburbs exceeded that of the Core City. In the Smaller Communities, the big jump in tax base occurs between the Inner and Outer Suburbs; in the Medium Sized Communities it occurs between the Core and the Inner Suburbs. In Philadelphia, big jumps in per capita tax base occur between the Core and the Inner Suburbs, and then again between the Inner and Outer Suburbs. In Pittsburgh, the tax base is actually higher in the Inner Suburbs than in the Outer Suburbs.
- In the Medium Sized and Large Communities, the per capita real estate tax base of Inner Suburbs, Outer Suburbs, and each county as a whole have risen significantly faster than the per capita tax base of the Core City. In most cases, the growth rate for suburban communities is no more than twice as fast as that of the Core City.
- In the Smaller Communities, the per capita real estate tax base of both the Inner Suburbs and the county as a whole have risen slower than that of the Core City.
- In communities of all sizes, the highest rates of per capita real estate tax base growth have been in the Outer Suburbs. In the Small Communities, the gap between Outer Suburban and Core City per capita tax base growth rates is about 30%, but in the Medium Sized and Larger Communities the Outer Suburban rate of growth is sometimes three or four times the rate for the Core City.

Finding: *Sprawl development patterns and dramatic declines in state and federal grants have resulted in Core Cities having to replace traditional real estate revenues with significant amounts of "Other" revenues.*

Over the past 15 years, Core Cities have had to change the sources of revenue they use to support their operations. Those changes are summarized in Table 4-15 below.

Table 4-15 Center City Revenues By Source							
Small Communities							
Source	City of Meadville			City of Williamsport			Average Change
	1980	1990	1995	1980	1990	1995	
RE Taxes	22.80%	27.84%	28.59%	24.69%	28.85%	26.96%	4.1 %
Act 511 Taxes*	15.65%	13.96%	13.51%	16.22%	19.18%	18.49%	.1 %
State and Fed Grants	12.61%	6.51%	8.81%	38.01%	23.59%	21.67%	-10.1%
State Highway Aid	2.34%	2.26%	2.19%	2.45%	3.30%	2.91%	-.31%
Other	46.60%	48.98%	46.90%	18.63%	25.08%	29.97%	5.8 %
Medium Sized Communities							
Source	City of Allentown			City of York			Average Change
	1980	1990	1995	1980	1990	1995	
RE Taxes	28.74%	27.66%	25.42%	28.76%	22.46%	18.59%	-6.7 %
Act 511 Taxes*	18.93%	17.24%	13.68%	15.00%	12.35%	11.01%	-4.6 %
State and Fed Grants	16.79%	7.20%	4.04%	14.84%	10.85%	13.17%	-7.2 %
State Highway Aid	1.82%	1.60%	2.09%	2.22%	1.58%	1.37%	-.3 %
Other	33.71%	46.30%	54.76%	39.18%	52.76%	55.86%	18.9 %

Table 4-15 Center City Revenues By Source							
Large Communities							
Source	City of Philadelphia			City of Pittsburgh			Average Change
	1980	1990	1995	1980	1990	1995	
RE Taxes	9.7%	10.1%	6.8%	28.0%	30.2%	30.5%	-.4 %
Act 511 Taxes*	30.5%	42.4%	26.3%	22.6%	27.7%	31.3%	2.3 %
State and Fed Grants	27.8%	14.3%	16.2%	33.9%	8.4%	10.0%	-17.8 %
State Highway Aid	0.5%	0.7%	0.1%	1.2%	1.1%	1.2%	-.2 %
Other	31.4%	32.6%	50.6%	14.3%	32.6%	27.0%	16.0 %
*Note: Act 511 Taxes include per capita, earned income, real estate transfer, mercantile and business privilege taxes, amusement, and occupational privilege taxes							

Source: 1980, 1990, and 1995 Local Governmental Financial Statistics; Commonwealth of Pennsylvania; and Clarion Associates.

Table 4-15 demonstrates that::

- Among Core Cities, only the Core Cities of Small Communities have been able to increase their reliance on real estate taxes – and that increase has been small. The Medium Sized Core Cities have had to decrease their reliance on real estate taxes significantly, and the Large Core Cities have seen the share of their revenues from real estate taxes remain relatively stable.
- As traditional sources of revenue have declined – particularly state and federal grants – Core Cities of all sizes have had to dramatically increase their reliance on “Other” sources of income.

Table 4-16 compares how the Core Cities, Inner Suburbs, and Outer Suburbs in the six case study areas are meeting their revenue needs in different ways.

Table 4-16 Revenues by Source (1995)					
Location	RE Taxes	Act 511 Taxes*	State and Fed Grants	State Highway Aid	Others
Small Communities					
Meadville	28.59%	13.51%	8.81%	2.19%	46.9%
West Meade	22.42%	35.42%	16.32%	9.17%	16.66%
Vernon	13.36%	33.91%	12.34%	7.20%	33.20%
Williamsport	26.96%	18.49%	21.67%	2.91%	29.97%
South Williamsport	30.40%	19.24%	21.63%	3.95%	24.78%
Loyalsock	14.89%	26.39%	16.23%	0%	42.5%
Medium Sized Communities					
Allentown	25.42%	13.68%	4.04%	2.09%	54.76%
South Whitehall	23.02%	27.77%	.37%	2.30%	46.53%
North Whitehall	8.10%	54.84%	1.67%	10.71%	24.69%
York	18.59%	11.01%	13.17%	1.37%	55.86%
Spring Garden	20.63%	25.48%	4.44%	0%	49.45%
Springettsbury	7.57%	28.51%	1.35%	2.61%	59.96%

Table 4-16 Revenues by Source (1995)					
Location	RE Taxes	Act 511 Taxes*	State and Fed Grants	State Highway Aid	Others
Large Communities					
Philadelphia	6.8%	26.3%	16.2%	.1%	50.6%
Bensalem	37.1%	9.7%	4.5%	2.3%	46.4%
Buckingham	10.9%	36.9%	4.1%	3.4%	44.7%
Pittsburgh	30.5%	31.3%	10.0%	1.2%	27.0%
Monroeville	18.7%	50.6%	1.5%	1.9%	27.3%
Hempfield	18.4%	49.5%	1.6%	9.4%	2.1%
*Note: Act 511 Taxes include per capita, earned income, real estate transfer, mercantile and business privilege taxes, amusement, and occupational privilege taxes					

Source: 1995 Local Governmental Financial Statistics; Commonwealth of Pennsylvania; and Clarion Associates

Table 4-16 shows that in Small, Medium Sized and Large Communities, the Outer Suburbs are by far the least dependent on real estate revenues to meet their budget needs. In some cases, the Outer Suburbs rely on real estate taxes to generate less than half the budget shares found in Core Cities and Inner Suburbs. In addition, the table illustrates that both Core Cities and Inner Suburbs are relatively dependent on real property tax revenues. In three of the six case study areas, the Inner Suburbs actually fill more of their budget needs with real estate taxes than do their Core Cities.

Finally, Table 4-17 summarizes how the shares of local budgets funded by different sources of local revenues have been changing over time.

Table 4-17 Increase in Revenues by Source (1990-1995)						
Location	RE Taxes	Act 511 Taxes	State and Fed Grants	State Highway Aid	Others	Total
Small Communities						
Meadville	20.2%	13.3%	58.4%	13.2%	12.1%	17.0%
West Meade	45.6%	15.7%	12693%	17.7%	34.4%	50.8%
Vernon	464.7%	38.1%	948.1%	13.5%	52.9%	78.1%
Williamsport	24.8%	28.7%	22.6%	17.8%	59.5%	33.5%
South Williamsport	47.2%	23.1%	289.2%	17.6%	-30.1%	24.9%
Loyalsock	64.0%	19.6%	1257.4%	-100%	248.4%	105.9%
Medium Sized Communities						
Allentown	8.6%	-6.2%	-33.7%	54.4%	39.7%	18.1%
South Whitehall	8.8%	21.6%	35.0%	27.8%	51.4%	30.2%
North Whitehall	204.5%	50.4%	1779.0%	34.1%	47.6%	56.4%
York	10.0%	18.4%	61.3%	14.7%	40.7%	32.9%
Spring Garden	94.1%	8.7%	11726.6%	-100	21.3%	29.3%
Springettsbury	148.0%	27.0%	70.6%	29.9%	54.4%	49.0%

Table 4-17 Increase in Revenues by Source (1990-1995)						
Location	RE Taxes	Act 511 Taxes	State and Fed Grants	State Highway Aid	Others	Total
Large Communities						
Philadelphia	8.7%	-0.3	82.1%	-87.2%	150.0%	60.8%
Bensalem	47.7%	31.0%	62.6%	30.3%	294.3%	104.9%
Buckingham	10.9%	36.9%	4.1%	3.4%	44.7%	100.0%
Pittsburgh	1.8%	13.7%	20.0%	9.2%	-16.6%	0.7%
Monroeville	46.1%	49.0%	339.2%	16.9%	80.8%	56.7%
Hempfield	9.9%	29.5%	160.2%	19.1%	11.2%	21.3%

Source: 1990 and 1995 Local Governmental Financial Statistics; Commonwealth of Pennsylvania; and Clarion Associates

Table 4-17 shows that:

- In all six case study communities, the increase in revenues from real estate taxes was smallest in the Core Cities.
- In the Small and Medium Sized Communities, real estate tax revenues in the Outer Suburbs are increasing at a large multiple of the growth rate in the Core City (somewhere between 3 and 20 times faster).
- In the Small and Medium Sized Communities, total revenues are growing much faster in the Outer Suburbs than they are in either the Core Cities or the Inner Suburbs.
- In the Large Communities, both real estate revenues and total revenues have increased much faster in the Inner Suburbs than they did in either the Core City or the Outer Suburb. In Philadelphia, the small increases in real estate tax revenues and the very large increase in "Other" revenues (especially the wage tax, business taxes, and user fees) is a deliberate attempt to maintain the residential tax base of the city.

Finding: *Sprawl appears to be correlated with abandonment of Core City real property assets.*

While there is some agreement that sprawl is a major cause of Core City fiscal stress, many of the forces that contribute to fiscal deterioration need the characteristics of sprawl to operate. Fragmented suburban governments competing for the "best" land uses (e.g., high-income residential and nonresidential properties) do create stress for those local city governments that cannot compete because of already strained resources. (Downs 1994) At least one study of residential abandonment in cities nationwide found that the most statistically significant causal relationship to Core City abandonment was the amount of housing built outside the Core City but inside its metropolitan area. (Sternlieb and Burchell 1977)

Finding: *Core City income growth results in higher suburban income growth, and house value appreciation. Policies that weaken income growth in Core Cities tend to weaken income growth and house value appreciation in the suburbs.*

Richard Voith, of the Philadelphia Federal Reserve Bank's Research Department, has conducted extensive research on the relationship between urban and suburban growth, and the impact of private and public sector actions on relative rates of growth in Philadelphia and its suburbs. Mr. Voith's work entitled *Do Suburbs Need Cities*, published in the Journal of Regional Science, August 1998, concludes that a healthy, growing central city fosters healthier, faster-growing suburbs. The study expands upon previous work by Mr. Voith that found that employment declines in the City of Philadelphia adversely affected suburban house values

(controlling for changes in suburban employment). He concludes that city income growth positively affects suburban growth in income, house value, and (to a lesser extent) population. Mr. Voith's estimates "imply that the slow rate of income growth in our large central cities has a significant negative impact on the aggregate wealth of metropolitan areas." In addition, the "simple raw correlations suggest that the correlation between city growth rates and suburban growth rates have been increasing over the last three decades." The relationships in Voith's report were primarily measured in large cities and their suburbs. The report clarified that income trends in small cities have little measurable impact on their suburbs.

Finding: *Due to the mismatch between infrastructure capacity, population, service needs, and income levels within the city, Core Cities are sometimes unable to adequately maintain their existing infrastructure.*

Because of the trends in per household expenditures and tax base increases above, and because of the significant costs of un-reimbursed regional services, Philadelphia has been able to fund less than two-thirds of its estimated capital infrastructure maintenance needs. This information is summarized in Table 4-18.

Table 4-18 City of Philadelphia Annual Capital Expenditure Requirements and Actual Expenditures (1993-1994)			
Category	Annual Investment (\$millions)		Percent of Required level
	Required	Expended	
Cultural and Recreation	44.7	19.8	44.3%
Economic Development	76.4	47	61.5%
Health and Welfare	2.3	1.6	69.6%
Judicial and Law Enforcement	28.9	44.5	154.0%*
General Management	13.2	20.1	152.3%*
Services to Property	229.1	112.6	49.1%
Mass Transit	332.8	223.7	67.2%
Streets and Highways	167.9	60.9	36.3%
Total	895.3	530.2	59.2%
*Note: Due to budgetary cycles, allocations in a specific category may exceed annual pro rata needs in any given year, while many capital needs remain unmet.			

Source: Investment in the City's Infrastructure: Levels for FY '93-94, Philadelphia City Planning Commission

APPENDIX

Synopsis of Costs of Sprawl Literature Reviewed

NAME OF REPORT	SUMMARY												
I. PUBLIC AND PRIVATE CAPITAL AND OPERATING COSTS													
1. Higher Infrastructure Costs													
<i>The Future of First Generation Suburbs in the Delaware Valley</i> (July 31, 1998 (Draft) Delaware Valley Regional Planning Commission (DVRPC))	PA Dept of Education shows that roughly 2/3 of 21 public school closings occurred in districts in and around Philadelphia between 1989 and 1998. The majority of openings occurred in central or upper Bucks County, central and western Montgomery County, and Chester County.												
<i>Fiscal Impact Analysis of Residential Development Alternatives Lancaster County, PA</i> (May 7, 1998 Tischler & Associates)	<p>Study looked at public sector revenues and costs associated with facilities and services needed to accommodate three different patterns of new residential development, each with a build out of 750 units within a study area of 4,200 acres. The study then determined the net fiscal impact of providing public facilities and services to each scenario. Build out time was defined as a twenty year period within Ephrata Township.. Scenario one consists of compact development within the urban growth boundary and a density of 4 units/acre. Scenario 2 was tested as a sprawling subdivision, developed as farms come on the market, with an average density of one unit/acre. Scenario 3 replicated sporadic and random development throughout the study area, representing farmers incrementally selling off portions of their property, and constructing a range of housing types with an overall average density of 5 units /acre. The study concluded the following:</p> <ul style="list-style-type: none"> The net fiscal impact of all three scenarios is positive upon the Ephrata Area School District during the early years of development. However costs quickly exceed revenues with deficits resulting in all scenarios. Scenario 1 and 2 are similar throughout the analysis, (deficits of \$7.4 million and \$7.3 million respectively) but scenario 3 has slightly higher revenues and lower costs, (deficit of \$6.2 million). Fiscal deficits for Ephrata township, due to capital costs of water and sewer systems needed to serve the low density development of scenario 3, generated the highest deficit of \$17 million. Though scenario 2 generated higher revenues than scenario 1, costs to provide improvements for highways, water and sanitary sewer resulted in a deficit of \$2.2 million. Scenario 1 had a deficit of \$.6 million, as highway improvements were low and few capital projects were needed to accommodate new homes. Results and analysis of costs/revenues are detailed in the report. 												
<i>Level of Service, Cost and Revenue Assumptions Lancaster County PA</i> (February 1993 Tischler & Associates)	Fiscal Impact Analysis of Residential Development Alternatives Lancaster County, PA. Details value of housing, revenue and costs of services for agricultural land, public land, Ephrata Township, and public water and sewer. Expenditures for the Township and construction costs for scenarios 1 and 2 are analyzed. Level of service, revenue and cost assumptions for Volunteer Fire and Ambulance are also outlined.												
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<i>Land Use In The Delaware Valley 1970-1990 Analytical Report #2</i> (July 1994 DVRPC)	Land classification by use, derived from interpretation of aerial photographs. Example of conclusions – Land for “utility” uses show an increase of 14 sq. miles representing an increase of 88% from 1970. This increase is due in part to land consumed by high voltage electric lines in the region. An increase of 6.4 miles was interpreted in Chester County, alone.												
<i>The Costs of Sprawl; RERC (1974)</i>	<p>Estimated capital costs of providing recreation, school, public facility, road/street, and utility services for a community of 10,000 units under six different development patterns or prototypes:</p> <table border="1"> <thead> <tr> <th colspan="2">Capital Costs Per Unit</th></tr> </thead> <tbody> <tr> <td>Sprawl Mix:</td><td>\$13,556</td></tr> <tr> <td>Low-density planned:</td><td>\$14,582</td></tr> <tr> <td>Low-density sprawl:</td><td>\$16,482</td></tr> <tr> <td>High-density planned:</td><td>\$10,995</td></tr> <tr> <td>Planned mix:</td><td>\$12,487</td></tr> </tbody> </table>	Capital Costs Per Unit		Sprawl Mix:	\$13,556	Low-density planned:	\$14,582	Low-density sprawl:	\$16,482	High-density planned:	\$10,995	Planned mix:	\$12,487
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<i>The Search for Efficient Urban Growth Patterns</i> , James Duncan et al. (Florida Department of Community Affairs, July 1989)	<p>Sprawl versus compact development resulted, on average, in additional infrastructure costs (roads, schools, utilities, and others) of \$5,540 per dwelling unit (1990 dollars), or 37% greater costs overall per unit.</p> <p>Broken down by type of infrastructure, compact development costs as a percent of sprawl development costs per unit = 39.7% (roads); 92.5% (schools); 60.4% (water/sewer utilities)</p>												

NAME OF REPORT	SUMMARY															
<i>Impact Assessment of the New Jersey Interim State Development & Redevelopment Plan</i> , Robert W. Burchell et al. (February 1992)	<p>"Trend" (sprawl) development versus "planned" (compact) development patterns resulted in total additional local/state infrastructure costs of \$1,433,000 (statewide impact), or 9.2% greater costs overall.</p> <p>Comparison of infrastructure costs savings for constructing roads, schools, and utilities under planned/compact development versus sprawl patterns:</p> <table><tr><td></td><td><u>Sprawl</u></td><td><u>Planned Dev.</u></td></tr><tr><td>Roads (Local):</td><td>100%</td><td>74.2%</td></tr><tr><td>Schools:</td><td>100%</td><td>96.7%</td></tr><tr><td>Utilities (Water/Sewer):</td><td>100%</td><td>92.4%</td></tr></table>		<u>Sprawl</u>	<u>Planned Dev.</u>	Roads (Local):	100%	74.2%	Schools:	100%	96.7%	Utilities (Water/Sewer):	100%	92.4%			
	<u>Sprawl</u>	<u>Planned Dev.</u>														
Roads (Local):	100%	74.2%														
Schools:	100%	96.7%														
Utilities (Water/Sewer):	100%	92.4%														
<i>The Costs of Alternative Development Patterns: A Review of the Literature</i> , James E. Frank (ULI 1989)	<p>Comparison of infrastructure costs savings for constructing roads, schools, and utilities under planned/compact development versus sprawl patterns:</p> <table><tr><td></td><td><u>Sprawl</u></td><td><u>Planned Dev.</u></td></tr><tr><td>Roads (Local):</td><td>100%</td><td>73%</td></tr><tr><td>Schools:</td><td>100%</td><td>99%</td></tr><tr><td>Utilities (Water/Sewer):</td><td>100%</td><td>66%</td></tr></table>		<u>Sprawl</u>	<u>Planned Dev.</u>	Roads (Local):	100%	73%	Schools:	100%	99%	Utilities (Water/Sewer):	100%	66%			
	<u>Sprawl</u>	<u>Planned Dev.</u>														
Roads (Local):	100%	73%														
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<i>Fiscal Impacts of Alternative Land Development Patterns in Michigan: The Costs of Current Development Versus Compact Growth</i> , Robert W. Burchell, et al. (1997)	<p>Comparison of infrastructure costs savings for constructing roads, schools, and utilities under planned/compact development versus sprawl patterns:</p> <table><tr><td></td><td><u>Sprawl</u></td><td><u>Planned Dev.</u></td></tr><tr><td>Roads (Local):</td><td>100%</td><td>87.6%</td></tr><tr><td>Schools:</td><td>100%</td><td>n/a</td></tr><tr><td>Utilities (Water/Sewer):</td><td>100%</td><td>86.3%</td></tr><tr><td>Housing Costs</td><td>100%</td><td>93.2%</td></tr></table>		<u>Sprawl</u>	<u>Planned Dev.</u>	Roads (Local):	100%	87.6%	Schools:	100%	n/a	Utilities (Water/Sewer):	100%	86.3%	Housing Costs	100%	93.2%
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<i>South Carolina Infrastructure Study: Projections of Statewide Infrastructure Costs 1995-2015</i> , Robert W. Burchell, et al. (1997)	<p>Comparison of infrastructure costs savings for constructing roads, schools, and utilities under planned/compact development versus sprawl patterns:</p> <table><tr><td></td><td><u>Sprawl</u></td><td><u>Planned Dev.</u></td></tr><tr><td>Roads (Local):</td><td>100%</td><td>88%</td></tr><tr><td>Schools:</td><td>100%</td><td>n/a</td></tr><tr><td>Utilities (Water/Sewer):</td><td>100%</td><td>87%</td></tr><tr><td>Housing Costs</td><td>100%</td><td>93%</td></tr></table>		<u>Sprawl</u>	<u>Planned Dev.</u>	Roads (Local):	100%	88%	Schools:	100%	n/a	Utilities (Water/Sewer):	100%	87%	Housing Costs	100%	93%
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<i>The Economic Impacts of Trend Versus Vision Growth in the Lexington Metropolitan Area</i> , Robert W. Burchell, et al. (1995)	<p>Comparison of infrastructure costs savings for constructing roads, schools, and utilities under planned/compact development versus sprawl patterns:</p> <table><tr><td></td><td><u>Sprawl</u></td><td><u>Planned Dev.</u></td></tr><tr><td>Roads (Local):</td><td>100%</td><td>85.2%</td></tr><tr><td>Schools:</td><td>100%</td><td>n/a</td></tr><tr><td>Utilities (Water/Sewer):</td><td>100%</td><td>93.3%</td></tr><tr><td>Housing Costs</td><td>100%</td><td>97.5%</td></tr></table>		<u>Sprawl</u>	<u>Planned Dev.</u>	Roads (Local):	100%	85.2%	Schools:	100%	n/a	Utilities (Water/Sewer):	100%	93.3%	Housing Costs	100%	97.5%
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<i>Does it Pay to Plan Suburban Growth?</i> in <i>Journal of the American Planning Association</i> 50, Richard B. Peiser (1984)	<p>"Planned" development versus "unplanned" development resulted in total infrastructure savings of 5% (\$39.8 million versus \$41.9 million for a community of 80,000 residents and 72,000 workers).</p> <p>Broken down by type of infrastructure, planned development costs as a percent of unplanned development costs = 125% (roads); 91.5% (sewer); 78% (water); and 93.7% (drainage).</p>															
<i>Cost of Sprawl</i> , Maine State Planning Office (1997)	<p>Cost to build new roads in Maine during 1980s increased by \$200 per household. Cost to build these roads cost taxpayers \$17 million. Maine built roads at a rate of 100 miles/yr from 1987 to 1994. [p. 8 - 9]</p> <p>Maine's spending on roads, education, and police during 1980s increased by \$637 million (\$1,300/household). In Augusta, pop. declined but real expenditures increased by 35% partly due to the need to construct and improve roads for commuters. [p.10]</p>															

NAME OF REPORT	SUMMARY
<p><i>Priorities for Action: A Paper by the Chesapeake Bay Commission</i> (October 10, 1996)</p>	<p>The use of compact, higher density development has been shown to produce a 4% to 8% savings in capital costs of infrastructure at the regional and state levels. [p. 4]</p> <p>The cost to build a single parking lot can be \$10,000 to \$15,000 over the course of 20 yrs [p. 4]</p> <p>James Frank, author of Costs of "Alternative Development Patterns", found that capital costs of streets, sewers, water, storm drainage, and schools could be reduced by \$17,000/unit by choosing a central location and using a mix of housing, instead of leapfrogging. [p. 5]</p> <p>More cost savings by targeting projected growth to previously developed or adjacent growth areas:</p> <p>roads: \$31.5 to \$740 million Schools: \$15.1 to \$200 mill. water and sewer: \$17.4 to \$440 mill. [p. 5]</p> <p>According to the 2020 Panel, high-density development, as opposed to sprawl, could save \$10.8 billion in road construction costs by 2020. [p.5]</p> <p>Dwellings built at a density of 5 units per acre cost \$5,000 to \$20,000 more to build than those at a density of 15 to 25 units per acre. [p.6]</p> <p>In Remlik Hall, VA, in a clustered development, the developer saved \$525,000. 53% of the savings was from not having to build as many roads. [p. 6-7]</p> <p>New Jersey expects to save \$1.38 billion in infrastructure costs by planning for higher density infill redevelopment. \$740 mill. of that \$1.38 billion is from savings on road construction. [p. 7]</p> <p>According to a Maryland study, residents will pay \$10 billion by 2020 to construct schools, roads & sewers to serve sprawl development. [p.8]</p>
<p><i>Growing Greener: A Conservation and Responsible Land Use Investment Initiative for the 21 Century</i>, (June 1998)</p>	<p>In Burchell's 1992 study quantifying costs of sprawl, he projects that New Jersey could save \$1.4 billion in infrastructure funding for roads, utilities and schools over a 20 yr. period, by improving existing infrastructure and directing growth. [p. 3]</p> <p>Burchell's study of South Carolina indicates that the state could save \$16.7 billion of its projected \$56.7 billion 20 yr. infrastructure budget by using planned development as opposed to sprawl. [p. 3]</p> <p>The cost of maintaining public facilities has resulted in their demise. A backlog of \$175 million in infrastructure improvements has been identified in Pennsylvania. Approx. \$100 mill. is needed in Pennsylvania state parks for sewer and water facilities, roads bridges, dams campgrounds, comfort stations and buildings. The Pennsylvania Fish and Boat Commission needs over \$65 million to upgrade hatcheries, dam safety repairs and access area rehabilitation, and priority fish passage projects. [p. 7]</p>

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<i>Managing Community Growth: Policies, Techniques, and Impacts</i> , Eric Damian Kelly (date unknown)	<p>A 1984 study of planned versus unplanned dev. on a 7,500 ac. site in Houston, found that planned dev. yielded savings of approx.1.6% in construction of utilities. [p. 166]</p> <p>1989 James Frank study:</p> <table><tr><td></td><td><u>Streets</u></td><td><u>Utilities</u></td></tr><tr><td>SF 1u/ac:</td><td>\$12,308</td><td>\$19,789</td></tr><tr><td>SF 3u/ac:</td><td>\$7,083</td><td>\$11,388</td></tr><tr><td>SF 5u/ac:</td><td>\$7,526</td><td>\$8,843</td></tr><tr><td>Townhouses 10u/ac:</td><td>\$6,785</td><td>\$6,019</td></tr><tr><td>Mixed 12u/ac (SF/TH/MF):</td><td>\$6,229</td><td>\$6,865</td></tr><tr><td>MF 15u/ac:</td><td>\$5,297</td><td>\$3,384</td></tr><tr><td>MF 30u/ac:</td><td>\$3,773</td><td>\$3,096</td></tr></table> <p>The Governor's Commission On Growth in the Chesapeake Bay Region (Maryland Study Commission 1991) estimated statewide (Maryland) infrastructure costs for roads and utilities at \$9,191/SF unit as opposed to \$4,104 under a compact form of development. When all development (residential + nonresidential) costs for all services was included in the study, the planned development scenario resulted in a 15% savings in capital costs versus trend development.</p>		<u>Streets</u>	<u>Utilities</u>	SF 1u/ac:	\$12,308	\$19,789	SF 3u/ac:	\$7,083	\$11,388	SF 5u/ac:	\$7,526	\$8,843	Townhouses 10u/ac:	\$6,785	\$6,019	Mixed 12u/ac (SF/TH/MF):	\$6,229	\$6,865	MF 15u/ac:	\$5,297	\$3,384	MF 30u/ac:	\$3,773	\$3,096
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<i>The Fiscal and Economic Impacts of Local Conservation and Community Development Measures</i> , Luther Propst and Mary Schmid (1993)	<p>Construction costs of capital improvements such as schools or sewer facilities may represent only a fifth or sixth of the entities actual operating costs. Providing services to new residents, operating schools, and providing school transportation accounts for the majority of these costs. [p. 7]</p> <p>A Maryland Office of Planning study of clustering showed that by increasing the number of units per lot from 1 every 5 acres, a city could save \$3,500 per added unit. As a result, a previously zoned lot for 1 unit/ac. to 3 units/ac. would save the city \$7,000, not to mention that the city would save 10 acres of open space. [p. 22]</p>																								
<i>Density Related Public Costs in Loudoun County, Virginia</i> , American Farmland Trust (1986)	<p>The County spends the largest percentage of its revenues on school construction, operation, and transportation, at 62% (\$38,403,000). This amount represents 71% of total county revenues. [p. 11]</p> <p>Average annual public costs of water and sewer service (rural estimates include installation fees):</p> <table><tr><td>medium density:</td><td>\$260,000/yr</td><td></td></tr><tr><td>high density:</td><td>\$240,000/yr</td><td></td></tr><tr><td>rural sprawl:</td><td>\$14,178,000 (instl.)</td><td>\$709,000/yr</td></tr><tr><td>rural cluster:</td><td>\$7,089,000 (instl.)</td><td>\$355,000/yr</td></tr></table> <p>[p. 27-29]</p>	medium density:	\$260,000/yr		high density:	\$240,000/yr		rural sprawl:	\$14,178,000 (instl.)	\$709,000/yr	rural cluster:	\$7,089,000 (instl.)	\$355,000/yr												
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2. Higher Public Operating Costs																									
<i>Fiscal Impacts of Different Land Uses: The Pennsylvania Experience</i> (1997 Timothy K. Kelsey (Penn State College of Agricultural Sciences/Cooperative Extension Circular #410))	<p>Study of 11 rural Pennsylvania townships to determine fiscal impacts, on average, of servicing residential, commercial, industrial, farm/open space, and camps/forest land uses. By looking at their annual budgets, Kelsey compared total township and school district revenues to total expenditures by land type. Found that, on average, in all 11 townships, residential land created negative fiscal impact (spent more than took in), while all the other non-residential land uses created, on average, positive fiscal impact. Results primarily influenced by school district budgets: 84 percent of all 11 townships' total local expenditures were accounted for by the school districts. Even in Straban Township (Adams County) where much of agricultural land was enrolled in state farmland protection programs (such as Act 319—"Clean and Green"), which reduces the amount of real estate taxes paid on productive farmland, farmland still contributes more than it requires (ratio of 1:0.06).</p>																								
<i>Impact Assessment of the New Jersey Interim State Development & Redevelopment Plan</i> , Robert W. Burchell et al. (February 1992)	<p>Combined municipal and school district operational costs could be reduced by 2% <u>annually</u> (each year after year) under planned (compact) growth, as opposed to trend (sprawl) growth.</p>																								
<i>Fiscal Impacts of Alternative Land Development Patterns in Michigan: The Costs of Current Development Versus Compact Growth</i> , Robert W. Burchell, et al. (1997)	<p>Combined municipal and school district operational costs could be reduced by 5-6% <u>annually</u> (each year after year) under planned (compact) growth, as opposed to trend (sprawl) growth.</p>																								

NAME OF REPORT	SUMMARY
<i>Cost of Sprawl</i> , Maine State Planning Office (1997)	One study estimates the cost of constructing schools and busing to accommodate sprawl at \$30 to \$40 million/yr. [p. 11]
<i>Priorities for Action: A Paper by the Chesapeake Bay Commission</i> (October 10, 1996)	A Wisconsin study showed local residents paid an additional \$30 in taxes to cover police, fire, schools, and other services for each \$1 mill. in new construction. Every new single-family detached home cost taxpayers \$10,607 to service. [p. 8]
<i>Cost of Services Study, Broadwater and Gallatin County, Montana</i> , Mark Haggerty (1997)	In Gallatin County (1994), 93% of the County's expenditures went for residential services. 77% of Broadwater County's expenditures went for residential services. Residential development demands \$1.45 (Gallatin) to \$3.25 (Broadwater) in direct services for every dollar each county generates, compared with the \$.25 (Gallatin) and \$.31 (Broadwater) that ag land requires in services. Clearly, residential development doesn't pay its own way, while ag land provides a surplus of revenues to the local govt. Similar studies in Idaho and Utah support this conclusion. [p. 12-15]
<i>Fiscal Impact of Different Land Uses on County Government and School Districts in Gallatin County, Montana</i> , Mark Haggerty (1996)	In this study of the cost of development, the results showed that education was the most expensive service that the County govt provided to its residents. [p. 18]
<i>The Fiscal and Economic Impacts of Local Conservation and Community Development Measures</i> , Luther Propst and Mary Schmid (1993)	Construction costs of capital improvements such as schools or sewer facilities may represent only a fifth or sixth of the entities actual operating costs. Providing services to new residents, operating schools, and providing school transportation accounts for the majority of these costs. [p. 7]
<i>Density Related Public Costs in Loudoun County, Virginia</i> , American Farmland Trust (1986)	For the fiscal operating yr. 1982-83, the school spent \$130.91/pupil for school bus transportation and bus replacement. The researches estimated that this figure would jump to \$141.90 for 1984. In rural sprawl areas, the total cost to transport children to school would be \$186,740, compared to a high density area where the cost would be \$33,350. [p. 24-25] Avg. annual public costs of water and sewer service (rural estimates include installation fees): medium density: \$260,000/yr high density: \$240,000/yr rural sprawl: \$14,178,000 (instl.) \$709,000/yr rural cluster: \$7,089,000 (instl.) \$355,000/yr [p. 27-29] Loudoun County calculated the average cost per household to provide police protection at \$50.46. The estimated increase in population of 3,260 households in 1984 would result in a cost to the county of \$165,000. Estimated additional cost of providing fire protection to the estimated 3,260 new households in 1984: \$57,300/yr. (\$17.57*3,260). Estimated additional cost of providing health and welfare services to 3,260 new households in 1984: \$295,000 (\$90.33*3,260) [p. 29-31] Average annual expenditures on operating costs in Loudoun County: rural sprawl: \$4,959,000 rural cluster: \$4,516,700 medium density: \$3,528,800 high density: \$3,462,700 [p. 32] Net Loss per dwelling/person in Loudoun County for new 1000 unit communities: <div style="display: flex; justify-content: space-around;"> <div> <u>dwelling</u> <u>person</u> rural sprawl: \$2,232 \$685 medium density: \$670 \$206 </div> <div> <u>dwelling</u> <u>person</u> rural cluster: \$1,847 \$567 high density: \$705 \$216 </div> </div> [p. 38]

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<i>Managing Community Growth: Policies, Techniques, and Impacts</i> , Eric Damian Kelly (date unknown)	James Frank study, 1989-- Operating costs per unit under alternative development patterns: Distance from employment, sewage/water plant, receiving body of water: <table><tr><td></td><td><u>Leapfrog</u></td><td><u>5 mi.</u></td><td><u>10 mi.</u></td></tr><tr><td>SF 1u/ac.</td><td></td><td>\$7,300</td><td>\$14,600</td></tr><tr><td>SF 3u/ac.</td><td>\$3,297</td><td>\$7,300</td><td>\$14,600</td></tr><tr><td>SF 5u/ac.</td><td></td><td>\$7,300</td><td>\$14,600</td></tr><tr><td>Townhouses 10 u/ac:</td><td>\$5,019</td><td>\$6,875</td><td>\$13,750</td></tr><tr><td>Mixed 12u/ac:</td><td>\$3,870</td><td>\$6,875</td><td>\$9,400</td></tr><tr><td>MF 15u/ac:</td><td>\$5,019</td><td>\$5,840</td><td>\$13,750</td></tr><tr><td>MF 30u/ac.:</td><td>\$5,019</td><td>\$5,840</td><td>\$11,680</td></tr></table> <p>[p. 169]</p>		<u>Leapfrog</u>	<u>5 mi.</u>	<u>10 mi.</u>	SF 1u/ac.		\$7,300	\$14,600	SF 3u/ac.	\$3,297	\$7,300	\$14,600	SF 5u/ac.		\$7,300	\$14,600	Townhouses 10 u/ac:	\$5,019	\$6,875	\$13,750	Mixed 12u/ac:	\$3,870	\$6,875	\$9,400	MF 15u/ac:	\$5,019	\$5,840	\$13,750	MF 30u/ac.:	\$5,019	\$5,840	\$11,680
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<i>Impact Assessment of the New Jersey Interim State Development & Redevelopment Plan</i> , Robert W. Burchell et al. (February 1992)	If new development is contained around existing development and is also increased somewhat in terms of density and FAR, even with significant decreases in density to preserve lands at the periphery, overall residential and nonresidential development costs will be approximately 10% less per unit or per 1,000 square feet. Median housing prices/costs per unit in planned versus trend (sprawl) development estimated to be 6% lower (a savings of approximately \$10,500 in 1990 dollars).																																
<i>Fiscal Impacts of Alternative Land Development Patterns in Michigan: The Costs of Current Development Versus Compact Growth</i> , Robert W. Burchell, et al. (1997)	Somewhat lower savings emerged out of Burchell's Michigan study, 5-6%, than found in the 1992 New Jersey study. Housing costs estimated to be 6.8% lower for compact growth versus current or trend development.																																
<i>Fostering Rural Cooperation and Improving Quality of Life</i> , Dr. James Dunn and Dr. Frank Pogue (July 1997)	Development of houses on 1/3 [acre] lots located 10 miles from town cost required \$48,000/unit, compared to \$24,000 and \$18,000/unit in more compact and mixed development scenarios. <p>[p. 2]</p>																																
<i>Density Related Public Costs in Loudoun County, Virginia</i> , American Farmland Trust (1986)	Annual real property taxes in Loudoun County for 1,000 new units: Rural Sprawl: \$892,000 Rural Cluster: \$892,000 Medium Density: \$846,250 High Density: \$782,200 <p>[p. 35]</p>																																
<i>Managing Community Growth: Policies, Techniques, and Impacts</i> , (Eric Damian Kelly)	In Colorado where developers paid for most public improvements but few private improvements, tax bills for some special districts jumped from \$500 to \$10,000/yr. As a result, many of these special districts went bankrupt. <p>[p.177]</p>																																
4. More Adverse Public Fiscal Impacts																																	
<i>The Future of First generation Suburbs in the Delaware Valley</i> (July 31, 1998 (Draft) DVRPC)	School district of Upper Darby has experienced a 27% increase in enrollment between 1991 and 1997. Its need to serve larger and more diverse population has increased pressure on facilities and program funding. In the past 4 years, upper Darby High School has spent \$21 million on capital needs. As school enrollment rises, the township has lost an estimated 2.2% of its population and home prices have fallen in the eastern part between 15-18% in the past 5 years. Accessed property values fell 5.2% from 1990-1997. Tax rates within the school district have risen 55% during 1990-1997 as a response to this trend.																																
<i>Inside Rural Pennsylvania, A Statistical Profile</i> (November 1997 The Center for Rural Pennsylvania)	Between 1980-1990 the number of housing units in rural Pa increased nearly 10%. The most common form of housing stock is the single family home. In the state's rural and small towns nearly 40% of its housing stock is less than 25 years old forcing rural townships to install infrastructure systems to support new housing.																																
<i>Impact Assessment of the New Jersey Interim State Development & Redevelopment Plan</i> , Robert W. Burchell et al. (February 1992)	Planned development, encouraging more compact growth in or near existing development, would result in an annual \$112 million (2%) fiscal advantage to municipalities within the state. This advantage reflects the ability to draw on usable excess operating capacity in already developed areas as well as efficiencies of service deliveries. Public school districts will realize annual savings of \$286 million (2%) under the planned development alternative, again reflecting the use of excess capacity and other service and fiscal efficiencies gained.																																
<i>Cost of Sprawl</i> , Maine State Planning Office (1997)	In Maine, from 1980 to 1993, crime fell by 17%, but the number of officers increased by 10% to provide coverage to outer suburbs, a 40% increase in cost equal to \$60 per household. [p. 9]																																

NAME OF REPORT	SUMMARY
<i>Priorities for Action: A Paper by the Chesapeake Bay Commission</i> (October 10, 1996)	In Loudoun County, VA, the average family paid only \$1,280 in taxes, while receiving \$5,800 in services, thereby covering only 1/4 of the costs. [p. 3]
<i>The Fiscal and Economic Impacts of Local Conservation and Community Development Measures</i> , Luther Propst and Mary Schmid (1993)	A 1990 study of the fiscal impacts of various residential development densities showed that house lots larger than one acre caused an average revenue deficit of \$490, while the deficit for 1/4 acre lots was just \$114. [p. 8] A study of Boulder, CO found that it costs the city \$75/yr to maintain an acre of open space, whereas it costs the city \$4,000/yr to provide services (not including school and transportation) to an acre of residential development. [p. 19]
5. Higher Aggregate Land Costs	
<i>Inside Rural Pennsylvania, A Statistical Profile</i> (November 1997 The Center for Rural Pennsylvania)	There was an 11% increase in the market value of taxable properties in the state's rural areas compared to a less than 5% increase in urban areas during the same time period. However, even though per capita market values of rural areas increased at a faster rate between 1992-96 than urban municipalities, rural market values are still significantly lower than urban per capita market rates.
<i>Improving Land Use Futures: Applying the California Urban Futures Model</i> , John D. Landis (1995)	In the San Francisco bay area, alternatives to sprawl tested under the author's model consumed 10-25% less overall land than did sprawl.
<i>Impact Assessment of the New Jersey Interim State Development & Redevelopment Plan</i> , Robert W. Burchell et al. (February 1992); <i>The Economic Impacts of Trend Versus Vision Growth in the Lexington Metropolitan Area</i> , Robert W. Burchell, et al. (1995); <i>Fiscal Impacts of Alternative Land Development Patterns in Michigan: The Costs of Current Development Versus Compact Growth</i> , Robert W. Burchell, et al. (1997)	Alternatives to sprawl consumed 20-40% less overall land than trend (sprawl) development patterns. Also, since typically design densities are higher in compact development patterns, housing costs decreased because the land cost component per housing unit decreased as permitted densities increased.
II. TRANSPORTATION AND TRAVEL COSTS	
1. More Vehicle Miles Traveled	
<i>Regional Profile</i> (November 1991 Southwest Pennsylvania Corporation)	1990 vehicle miles traveled on an average weekday increased 72% from 1970. The average annual VMT was over 800,000 miles (3% total increase). The average trip length has increased from 7 miles in 1970 to 10 miles in 1990.
<i>PA Highway Data</i> (The Center for Rural Pennsylvania)	This document lists the DVMT traveled, the total number of miles of highway, the number of license drivers and the total number of registered in states vehicles for the years 1984, 1990 and 1995 in all Pennsylvania counties.
<i>Data on Rural Traffic Jams</i> (The Center for Rural Pennsylvania)	In 1995 the DVMT for PennDOT owned roads showed that the average rural driver drove nearly 30 miles per day. This represents a 7% increase in DVMT from 1990. In urban areas the average driver drove 22 miles a day, an increase of 8% for DVMT.
<i>Highway Traffic Trends in Del. Val Region 1960-1990-1995</i> (February 1997 DVRPC)	The report presents findings of the 1995 traffic counting survey and assesses highway travel trends by comparing 1995 traffic volumes with that collected in 1960 and 1990. Traffic counts are depicted throughout the region along 6 screenlines, two cordons and counts of two turnpikes. Highway traffic volume and hourly variation were analyzed. There were significant shifts in traffic from the 1990 traffic counts due to the opening of the Mid County Expressway (I-476) in 1992, the opening of the Vine Street Expressway (1991) and the construction of I-95 ramps in Center City.
<i>Commuting Patterns of Resident Workers in the Delaware Valley Region Bulletin No. 10</i> (April 1994 DVRPC)	In each county the share of residents working in the same county declined between 1980-1990. The share of each county's residents (excluding Mercer County) working in Philadelphia was lower in 1990 than 1980. Employment grew in the 4 PA. Suburban counties by 26% reaching 1,011,000 workers by 1990. Almost 82% of these workers came from PA. suburban jurisdictions and 10% came from Philadelphia. Reverse commuting to suburban destinations has become increasingly important to Philadelphia residents, with Montgomery County attracting the largest share, and Bucks and Delaware Counties also attracting Philadelphia workers.
<i>1995-1996 Statistical Summary and Annual Report</i> (Pennsylvania Dept. Of Agriculture)	In 1985 the per capita daily vehicle miles traveled was 13. In 1995 the per capita DVMT was 16.

NAME OF REPORT	SUMMARY
<i>Moving Beyond Gridlock: Traffic and Development</i> , (ULI 1997), R. T. Dunphy, D.L. Brett, S. Rosenbloom and A. Bald	Three factors have contributed about equally to the unequivocal increase in vehicle miles traveled since 1980: changing demographics, growing dependence on the automobile, and longer distance traveled. Sprawl, which creates longer distance traveled and increases dependence on the automobile, is thus a major source of increased VMT. As densities increase, per capita vehicle miles of travel decline.
<i>Using Residential Patterns and Transit to Decrease Automobile Dependence and Costs</i> (1994 NRDC), J. Holtzclaw	Based on a 1994 study of 28 California communities, controlling for levels of transit service and vehicle ownership, a 100% (doubling) of residential densities is associated with 16% fewer vehicle miles of travel.
"Subcentering and Commuting: Evidence from the San Francisco Bay Area, 1980-1990" from a paper presented at the 1996 TRED Conference on Transportation and Land Use (Lincoln Institute), Robert Cervero and Kang-Li Wu	A study of dispersed subcenters in the San Francisco Bay area links segregation of land uses and leapfrog development patterns to increased travel. Between 1980 and 1990, workers at these subcenters experienced a 23% increase in average commuting VMT; 80% of this increase was attributed to longer distances between home and work.
<i>Region 2040: Recommended Alternative Decision Kit</i> , (1994 Portland, OR), Metro	A simulation comparing Portland, Oregon future growth patterns found that a "growing out" pattern (with new development continuing at current types and densities) resulted in an estimated 15% higher average daily VMT than in a "growing up" pattern that kept all growth within the existing urban growth boundary by reducing lot sizes and introducing more MF housing.
<i>Cost of Sprawl</i> , Maine State Planning Office (1997)	In Maine during 1980s, population increased by 10%, while miles driven increased by 57%, or 40 million miles/yr. [p. 8]
<i>Priorities for Action: A Paper by the Chesapeake Bay Commission</i> (October 10, 1996)	Between 1970 and 1994, the Chesapeake Bay area pop. grew by 26% while auto miles traveled increased by 105%. In the next 10 yrs, miles traveled is expected to increase another 39% while the pop. is expected to increase only 10%. [p. 8]
2. Longer Travel Times	
<i>Regional Profile</i> (November 1991 SPRPC)	The average trip by residents of the Urban Center and Small Towns takes 10-11 minutes and about 1/4 of total resident travel from the Urban Centers and Small Towns is on freeways and expressways. Only 10% trips of residents from Industrial Valley Towns travel on freeways and expressways and the average trip length is 15 minutes. 40% of trips from residents of the suburbs are traveled on freeways and expressways as are the trips of rural residents, however their average trip lengths are 15 minutes and 19 minutes respectively. Accessibility has changed due to highway improvements or increased congestion. Travel time from Cranberry to the Golden triangle declined from 49 minutes in 1980 to 36 minutes in 1990, due to the completion of I-279. Congestion has caused travel times to increase in other areas such as an 18 minute increase from Monroeville to the Greater Pittsburgh International Airport.
<i>Journey to Work Trends in the Del. Val. Region 1970-90</i> (June 1993 DVRPC)	The average commuting time in the region required by residents to their job was 24.6 minutes in 1990.. The average travel time for commuting required by residents of the PA suburbs was 23.7 minutes. Montgomery County had the lowest travel time of 22.5 minutes. City residents required an average of 27.4 minutes to reach their workplace. 26.31% of trips by PA suburbs took under 15 minutes, while 17.6 % of the trips by city residents did so. 46% of trips by city residents took longer than 30 minutes, whereas only 35% of PA suburban residents traveled that length of time. Heavier use of public transportation by city residents probably accounts for some of the extra travel time. There was not a dramatic difference in travel time experienced from 1980 to 1990. The average regional travel time in 1980 was only 1.3 minutes less than 1990. All of the decline however occurred in the most urbanized counties of Philadelphia, (-2.7), Delaware,(-1.1), and Camden,(-0.7). All the other counties experienced increased travel times with Chester County experiencing the largest increase of 1.6 minutes.
<i>The Future of First generation Suburbs in the Delaware Valley</i> (July 31, 1998 (Draft) DVRPC)	1990 travel time show that first generation suburbs have the shortest mean travel times of 22.8 minutes. One theory explaining this is that first generation suburbs have natural locational advantages such as superior road access and proximity to the region's cores.
<i>Changes in Regional Travel Characteristics and Travel Time Budgets in the San Francisco Bay Area 1960-1990</i> from paper presented at the Transportation Research Board 73 rd Annual Meeting, (January 1994), C. L. Purvis	Travel time budgets remained fairly constant in the Bay Area between 1960 and 1990. Even as the number of trips per person declined, the travel times remained constant because of the longer duration of trips. Purvis says these results are comparable to those in other metropolitan areas and consistent with travel time budget studies of the 1970s and 1980s.
<i>"Measuring Transportation Performance" in Transportation Quarterly</i> 49 (1995), Reid Ewing	Florida study found that residents of areas with high levels of access to a mix of uses, including jobs, schools, shopping, and other services spent up to 40 minutes less per day in vehicular travel than residents in less accessible neighborhoods. Time was saved by linking trips into tours and by making shorter trips.

NAME OF REPORT	SUMMARY
<i>Moving Beyond Gridlock: Traffic and Development</i> , (ULI 1997), R. T. Dunphy, D.L. Brett, S. Rosenbloom and A. Bald	According to surveys, people are willing to accept longer travel times to work and shopping in order to have the quality of housing they desire.
<i>Priorities for Action: A Paper by the Chesapeake Bay Commission</i> (October 10, 1996)	In the Washington D.C. area, the average speed of the beltway was 47 MPH in 1981, but by 1988 had slowed to 23 MPH. [p. 8] In the Chesapeake Bay area, sprawl development will generate 10.9 million hours of driving time from 1990 to 2020. Whereas concentrated development would only produce 5.6 mill hours of driving, and medium density only 6.3 million hours. [p. 8]
<i>Beyond Sprawl: New patterns of Growth to Fit the New California</i> , author and date unknown	A survey by Contra Costa Times showed that the commute times for residents of 10 cities in Alameda and Contra Costa counties had increased an average of 13% between 1980 and 1990. [p. 6]
3. More Automobile Trips	
<i>Journey to Work Trends in the Del. Val. Region 1970-90</i> (June 1993 DVRPC)	Driving alone is the mode of choice for over two thirds of the region's resident workers, representing 1.6 million commuters in 1990. This represents an increase of 33% in number of resident workers who drove alone in 1980. Outside of Philadelphia whose resident workers share of single occupant automobiles is 45% every other county in the region has a share over 70%. Among the suburban counties in PA, Delaware County which is also the most urbanized county has the lowest share of workers driving alone.
<i>Means of Transportation & Travel Time of Resident Workers in Del. Val. Bulletin 11</i> (April 1994 DVRPC)	The most striking changes between 1980-1990 was the increase of 33% of residents using single occupant vehicles. This increased the modal share for the region by 9 points to 70%. The modal share for Philadelphia workers in single occupant vehicles was significantly lower at 45%. Growth of automobile ownership has outpaced growth in population and employment. The perceived cost of driving is seen by many as less than the cost of taking public transportation. The continuing shift of jobs from the city to the suburban location with free parking has encouraged many workers to more easily drive to work than take transit or carpool.
<i>Regional Profile</i> (November 1991 SPRPC)	Despite population declines travel has increased. The number of trips per person has increased by 20% from 1980-1990. The outer five counties saw an increase of 400,000 trips from 1978 to 1990.
<i>1995-1996 Statistical Summary and Annual Report</i> (Pennsylvania Dept. of Agriculture)	1985 had an average 67 vehicles per mile of highway, statewide. 1995 there were 76 vehicles per mile of highway. The number of in-state registered vehicles increased 16% from 1985 (7.7 million vehicles) to 1995 (9 million vehicles). During the same period, the number of licensed drivers increased 11.5%.
<i>Automobile Dependence: The Irresistible Force</i> (1993), J. Kenworthy and P. Newman	From a study of rates of growth in central, inner, and outer neighborhoods in the United States (where those with higher income tend to move to the edge) and in Australia (where those with lower incomes tend to move to the edge), found that automobile usage in both countries grew most rapidly in the outer areas of the cities. Automobile usage was not simply a function of how wealthy people were, but also heavily dependent on the structure of the city and whether transport options are available other than the automobile. "[A]s cities become more dispersed and lower in density towards the edges, the levels of compulsory automobile use rises markedly, regardless of income level."
<i>Vehicle Occupancy for Del. Val Region</i> (April 1998 DVRPC)	The 5 PA counties had an average AVO rate of 1.21 persons per vehicle. The 5 county average occupancy rates per vehicle type are as follows: Auto Pick up and Van 1.17 AVO Truck 1.05 AVO Bus 8.51 AVO The occupancy rates varied inversely with function class i.e. the higher the class the lower the rate. In the 5 PA counties no consistent difference was observed between rural and urban highways. Buses, however, did carry a higher passenger load in urban areas (8.71 AVO) than in rural areas (7.31 AVO). The lowest rate for autos occur during the morning rush hours, with the highest rates climbing in early afternoon. Buses carry heavier loads in late morning than during peak hours. This may be attributed to heavy transit dependency in Philadelphia, senior citizen patronage and reduced midday service. Vehicle availability increased 22% from 1980 to 1990. Chester County had the largest rate of increase in vehicle availability (up 28%) and showed the biggest drop (22%) for vehicle occupancy. Conversely, Philadelphia had the smallest increase in vehicle availability (11%) and the smallest decline in vehicle occupancy. Comparison of study results show that AVO rates are decreasing which is supported by growth in vehicle ownership, decreasing family size, and rising incomes of the region.
4. Higher Household Transportation Spending	

NAME OF REPORT	SUMMARY
<i>The Future of First Generation Suburbs in the Delaware Valley</i> (July 31, 1998 (Draft) DVRPC)	Car ownership rates are lowest in the core cities and highest in the outer portions of the region. The incidence of owning 2 or more vehicles rise with distance from the urban core.
<i>Cost of Sprawl</i> , Maine State Planning Office (1997)	The typical household budget of a Northeast family for transportation =17%, higher than budgets for medical, food, clothing & taxes. [p. 7]
<i>Priorities for Action: A Paper by the Chesapeake Bay Commission</i> (October 10, 1996)	16% to 20% of household expenditures in the US go to auto-related expenses. [p. 9] \$4,000 per household could be saved annually if the number and distance of trips were reduced allowing families to own fewer cars. [p. 9]
<i>Beyond Sprawl: New patterns of Growth to Fit the New California</i> , author and date unknown	The average Californian spends \$1 of every \$5 on buying and maintaining their cars. [p. 6]
5. Less Efficient and Effective Transit	
<i>Journey to Work Trends in the Del. Val. Region 1970-90</i> (June 1993 DVRPC)	Overall commutation from suburban counties to Center City declined by 6% between 1980 and 1990, falling from about 90,000 commuters in 1980 to 84,000 in 1990. In Pennsylvania, only Chester County put a majority of their CBD workers on public transportation, (52%). The reasons Chester County also was the only PA suburban county to show an increase in transit ridership can be attributed to the fact that: Chester County experienced the fastest growth of resident workers during the 1980's, up 35%; Septa expanded rail service to western Chester County during the latter half of the decade and employment in Center City Philadelphia has increased. However it should be realized that although Chester County saw an increase of commuters to the CBD, it is the furthest county from the CBD and who sent the fewest workers.
<i>1980-1990 Journey to Work Trends in the Philadelphia CBD</i> (February 1995 DVRPC)	The 1980-1990 Journey to Work Trend in the Philadelphia CBD shows that the share of Center City workers living in Philadelphia who took transit to work (45%) exceeded the share of Center City workers living in Philadelphia who drove alone. Invariably, because of the practicality of shorter trip lengths Philadelphia also has the greatest share of workers walking to work, (10.3%). In 1990 almost 106,000 residents of the Delaware Valley Region in Pa walked or 6% of the total resident workers, walked to work. Over 66,000 of these walkers resided in Philadelphia.
<i>Means of Transportation & Travel Time of Resident Workers in Del. Val. Bulletin 11</i> (April 1994 DVRPC)	Use of public transportation in the region has declined by 4% from 1980 to 273,000 commuters in 1990. This represents 11% of the modal share, down from 14% in 1980. Ridership in PA. on bus or trolley (light rail) lines had increased 6% while ridership on subway/elevated lines (SEPTA's Market Frankford, Broad Street, and Norristown lines) had fallen 6.8% and ridership on the Regional Rail lines fell a dramatic 27.6%.
<i>Regional Profile</i> (November 1991 SPRPC)	The Pittsburgh region saw a number of transit improvements between 1970 and 1980 including the Southhills LRT, Downtown Subway, South Busway and East Busway. Work trips by transit increased by 23,000 trips or 19% between 1978 and 1990 in Allegheny County. Transit trips were increasingly focused in the Golden Triangle and eastern Pittsburgh, accounting for 65% of all transit trips in 1978 and 78% in 1990. Overall transit trips declined 78% from 11,00 to 3,000 among residents of the outer five counties from 1978 to 1990.
<i>"Transit, Urban Form, and the Built Environment: A Summary of Knowledge" in Transit and Urban Form</i> , Vol. I., (1996 Transit Cooperative Research Program), Parsons Brinckerhoff Quade and Douglas	As residential densities in a rail corridor increased from 1 to 4 persons per acre throughout the length of the line, the cost per vehicle mile would decline by about 5% and the effectiveness (passenger-miles per line mile) would increase by about 26%. Adding 50,000 jobs to the CBD (at the end of the rail line) and increasing employment densities would lower costs per vehicle mile by about 9% and increase effectiveness by 44%.
<i>The Relationship Between Land Use and Travel Behavior in the Puget Sound Region</i> , (1994, Washington State DOT), L. D. Frank and Gary Pivo	Using data from Puget Sound region, authors identified thresholds at which transit use substantially increases: at 50-70 employees and 9 to 13 persons per gross acres for work trips and 75 employees and 18 persons per gross acre for shopping trips.
6. Higher Social Costs of Travel	
<i>The Costs of Transportation: Final Report</i> (1994 Conservation Law Foundation), Apogee Research	16 to 17% of the cost per passenger mile for single-occupant vehicles (SOV) are social costs (including air/water pollution, waste, barrier effects, noise, and costs of parking and accidents not paid by the transportation user), versus only 1-7% of the total costs for transit use and a negligible share of the costs for walking and bicycling are social costs. (Other numerous studies have shown that the dominant mode of travel under sprawl conditions is the SOV).

NAME OF REPORT	SUMMARY						
<i>Priorities for Action: A Paper by the Chesapeake Bay Commission</i> (October 10, 1996)	<p>Traffic delays cost money. Research indicates that in the San Francisco area, an estimated \$2 bill./yr is lost while sitting i. traffic. [p. 9]</p> <p>Commuting not only creates stress, but lowers work productivity as well. [p. 10]</p> <p>Children have lost approximately 12 hours per week of parental time over the last 30 years due to commuting. [p. 10]</p> <p>Air quality could be significantly improved by a 10%/yr reduction in the growth rate of vehicle miles traveled. This could result in a reduction of 19.2 tons /day for ozone and oxides of nitrogen as well as a 287 ton /day decrease in carbon monoxide by 2020. [p. 16]</p> <p>The 5 cities in the nation with the worst air quality and the # of unhealthful air days:</p> <table><tr><td>Salt Lake City-- 8.8</td><td>Phoenix-- 9.6</td><td>Las Vegas-- 10.2</td></tr><tr><td>New York-- 9.6</td><td>Los Angeles-- 150.8</td><td></td></tr></table> <p>[p. 16]</p> <p>Between 1990 - 2020, low-density development is expected to contribute an additional .16 million pounds in oxides of nitrogen, while a concentrated pattern will cause only a .08 million pound increase. [p. 16]</p>	Salt Lake City-- 8.8	Phoenix-- 9.6	Las Vegas-- 10.2	New York-- 9.6	Los Angeles-- 150.8	
Salt Lake City-- 8.8	Phoenix-- 9.6	Las Vegas-- 10.2					
New York-- 9.6	Los Angeles-- 150.8						
III. LAND/NATURAL HABITAT PRESERVATION							
1. Loss of Agricultural Land							
<i>Generations</i> (Chester Co. Open Space & Recreation)	Between 1989-1996, 7,600 acres of farmland was saved through Open Space Agricultural Easement Program. Agriculture is the number one industry in Chester County and is the second most productive agricultural county in Pennsylvania. Under the County's Open Space Municipal Grant Program the County provides matching grants to municipalities to encourage open space retention, through acquisition, preservation and protection. The report details 10,424 acres saved at total cost of 90.8 million.						
<i>The Future of First Generation Suburbs in the Delaware Valley</i> (July 31, 1998 DVRPC)	Direction 2020 Plan utilized a model; to calculate land consumption forecasts that 274,000 acres would be developed by 2020, the majority of which is now farms and woodland. This development forecast represents 11% of total area of the region or 17% of the remaining undeveloped land in the region.						
<i>Land Use In The Delaware Valley 1970-1990 Analytical Report #2</i> (July 1994 DVRPC)	The 9 county region lost 215 square miles of agricultural land since 1970. In 1990 agricultural land accounted for 26% of the region's area. In Pennsylvania, the largest losses were in Montgomery County (-63.7 sq. miles) and Chester County, (-55 sq. miles).						
<i>Inside Rural Pennsylvania, A Statistical Profile</i> (November 1997 The Center for Rural Pennsylvania)	Since 1970 the state lost nearly one third of its farms and ¼ of its farmland. The total acreage of Pennsylvania farms in 1982 was 8,293,649 acres. This farmland declined in 1992 to 7,189,541 acres. Between 1988-95, nearly 13% of farms with sales under \$10,000 disappeared. The average size of a small farm in 1995 was 79 acres. According to the Census of Agriculture, the largest loss of small farms was in eastern and south central PA. Between 1985-95 the number of large farms increased 2% and their acreage increased 1%. Average size of a large farm is 337 acres. This study entails a statewide statistical profile analyzing all rural municipalities and all urban municipalities.						
<i>Zoning for Farming, A Guidebook for PA. Municipalities on How to Protect Valuable Agricultural Lands</i> (September 1995 The Center for Rural Pennsylvania)	<p>Lists municipalities with Agricultural Protection Zoning Ordinances (APZ) and documents area of the APZ, area of the municipality and percentage of the municipality in the APZ. Fulton in Lancaster County and Codorus in York County have the highest percentage of their municipalities protected by an APZ, both at 93.5%.</p> <p>Lists farmland under Pennsylvania agricultural conservation easement in relation to all farmland within a participating county for May 1994. Lancaster and York Counties lead the state in number of acres of farms under conservation easements. 29 of Pennsylvania's 67 counties participated with a total of 441 farms encompassing 54,988 acres under easement. This represents 1.2 % of all farmland within the participating counties, (4,545,277 total acres of farmland) and .7% of all farmland within the state. (7,866,289 acres).</p>						
<i>Rural Percentage Rates by County</i> , (1990 Census, Center for Rural Pennsylvania)	According to the 1990 census, Pennsylvania has the nation's largest rural population with 3,693,348 rural residents. 31.1% of the state's residents live in rural areas. The Center for Rural Pennsylvania classifies a municipality as rural if more than 50% of its population is defined by the Census as non-urban. 42 of 67 counties in the State are classified as rural. This document list the rural percentage rate of each county in the state.						

NAME OF REPORT	SUMMARY
<i>Pennsylvania County, Population, 1900-2020</i> (Center for Rural Pennsylvania)	This document contains the Census population per decade from 1900 to 1990 and the population projections for each decade from 2000 to 2020.
<i>Farmland and Farms by County, 1969-1992</i> (Center for Rural Pennsylvania)	This document breaks down the number of farms and the number of acres in farmland for each county in the State.
<i>1995-1996 Statistical Summary and Annual Report</i> (Pennsylvania Dept. Of Agriculture)	PA Dept of Agriculture estimates that between 1970-1995 the state lost more than 2.5 millions acres of farmland and over 24,000 farms. Between 1990-95 the state lost 400,000 acres of farmland, an average of 180 acres a day. Adjusted for inflation, between 1970-95, the value per acre of farmland and building increased 60% while nationally, the increase has been less than 8%.
<i>Government Policy and Land Use Change Along State Highways: A case Study of Highway Access Permits and Municipal Planning</i> (August 1996 The Center for Rural Pennsylvania)	This report concludes that numerous access points to a state highway, particularly in a rural area, encourages suburban sprawl. The State regulations in an attempt to be equitable in the allotment of access have created a suburban landscape which encourages parallel to roadway development. This study documents two scenarios of highway access in Somerset and Franklin Counties to evaluate the state regulation of highway access.
<i>1997 National Resources Inventory</i> (U.S. Dept. of Agriculture)	Between 1992 and 1997, Pennsylvania lost over 1 million acres of cropland, forests, and open lands, or over 35 acres per new resident added to the state. Only Texas ranked higher in terms of change in total acres of land developed.
<i>Adoption and Stability of Agricultural Zoning in Lancaster County, PA Research Report No. 15</i> (October 6, 1992 R. Coughlin Dept. of City and Regional Planning, University of Pennsylvania)	Antidotal experiences found that experience of development often prompted support of true agricultural zoning. 35 out of 40 townships with significant areas of agriculture have adopted agricultural zoning. Between 1980-91 Lancaster county lost in 35 municipalities, 3624 acres agricultural zoned land to the rezoning of other districts representing only 1.4% of the land originally zoned agricultural. Nearly 2/3 of the rezoned acreage was shifted to residential zones. 20% was rezoned to industry and utility. Rezoning to industry was particularly large in the Northern Region where development pressures are higher and residential rezoning occurred in the Southern Region where development pressures are lowest. Net gains of agriculture zones land was more concentrated in a few townships whereas net losses appeared in 25 townships. The Pa Agricultural Conservation Easement Program purchased easements on 6,674 acres in Sept. 1991. The Lancaster Farmland Trust acquired easements on a total of 15,000 acres in the County. Previous to 1991, the County had gained easements on 5,665 acres. While easements provide much more secure protection than that provided by agricultural zoning, easement account for only 3.8% of the county's land in agricultural use. Agricultural zoning covers 272,00 acres or 71.6% of land in agriculture use the county.
<i>Lancaster County Growth Tracking Report</i> (March 1998 Lancaster Co. Planning Commission)	Between 1994-1996, 1478.7 acres identified as agriculture land was developed, 2067.2 acres identified as conservation/preservation land was developed. 60% of county's land development occurred outside UGBs. 42% of minimum acreage needed to accommodate 20 years of the county's growth was developed. 9% of the 20 year projected population increase was accommodated.

NAME OF REPORT	SUMMARY
<i>Clean and Green - Staff Analysis of PA Farmland and Forest Lands Assessment Act of 1974 (April 1997 Joint State Government Commission)</i>	<p>The characteristics that make land suitable for agricultural production, large level open parcels with good drainage, also make it desirable for construction. The dispersion of population growth away from cities to more rural areas is a factor in the conversion of open land. Development scattered through agricultural areas tends to spawn more development. Factors that affect whether a farm will be sold for development include:</p> <ul style="list-style-type: none"> • Change from local to non-local ownership and from farm owners to tenant farmers. • Low Profitability due to low prices received for output, low yield, high labor costs, high taxes. • Urban Sprawl causes an "impermanence syndrome" as rising land prices can trigger a rise on property tax reassessments. Public service expenditures increase and taxes rise to meet public demand. Farmers suffer damage or theft of property and or livestock and interference from increased traffic with farm equipment. Farmers start to sell a few tracts and forgo farm improvements and investments. Production decreases, farm income drops. Agricultural support industries close down. • Life Cycle Events such as retirement or death. <p>Pa. As do 35 other states, do not require that all tax savings on deferred taxation plans be paid upon conversion. Consequently, rollback taxes plus interest generally are more than offset by the gain realized through land sale. This deferred taxation subsidizes holding costs, thereby subsidizing speculative behavior. Since 1974 the rate of decline in farms, farmland, cropland, and harvested land has slowed dramatically in the United States and in Pennsylvania. Statistic in this report show that Pennsylvania's rate of decline in number of farms, and acreage of farmland, cropland and harvested land exceeds the rate of decline in the United States during the 1959-1992 time period. This occurred despite that while the national population boomed a 47% increase over the 1960-1995 time period, Pennsylvania's population grew only 7%. Furthermore since most of Pennsylvania's growth occurred prior to 1970, the State population increases since 1970 have been less than 0.5 percent per decade. National growth for this time period has been almost 11.8%. Yet Pennsylvania's rate of decline of farm related acreage was double in farmland, eight times larger in cropland, and four times larger in harvested land. The Northern Piedmont area which includes southeastern Pennsylvania was identified by the American Farmland Trust. As the second most threatened area of the country where prime or unique farmland was most threatened by urban growth, The study analyzes farmland forest land and open space throughout the state in order to evaluate The PA Farmland and Forest Land Assessment Act of 1974. It alludes that preferential property tax and assessment laws have not stopped the conversion of farmland in counties where development pressures exist.</p>
<i>Impact Assessment of the New Jersey Interim State Development & Redevelopment Plan, Robert W. Burchell et al. (February 1992)</i>	<p>Note: Agricultural lands include cropland that is harvested, lands in permanent pasture, and woodlands that could be used for agricultural purposes.</p> <p>Savings in the consumption of agricultural acreage under compact growth versus trend (sprawl) development = 39% (a savings of 42,000 acres). Sprawl would destroy 108,000 acres of agricultural land between 1990-2010, whereas planned development would consume 66,000 acres.</p> <p>(30,000 acres by the year 2010). Also found that under sprawl development patterns, loss of farmland would tend to be comprised of prime or marginal lands (in a ranking from best to worst of "prime," "marginal," and "poor") because these tend to be the best/easiest to develop (flatter, better drainage, etc.)</p>
<i>The Economic Impacts of Trend Versus Vision Growth in the Lexington Metropolitan Area, Robert W. Burchell, et al. (1995)</i>	Savings in the consumption of agricultural acreage under compact growth versus trend (sprawl) development totaled 18% in Lexington.
<i>Fiscal Impacts of Alternative Land Development Patterns in Michigan: The Costs of Current Development Versus Compact Growth, Robert W. Burchell, et al. (1997)</i>	Savings in the consumption of agricultural acreage under compact growth versus trend (sprawl) development 17.4% in Michigan.
<i>South Carolina Infrastructure Study: Projections of Statewide Infrastructure Costs 1995-2015, Robert W. Burchell, et al. (1997)</i>	Savings in the consumption of agricultural acreage under compact growth versus trend (sprawl) development 18% in South Carolina.

NAME OF REPORT	SUMMARY
<i>Impact Assessment of DELOP CCMP versus STATUS QUO on the Twelve Municipalities in the DELEP Region; Robert W. Burchell, et al. (1995)</i>	Savings in the consumption of agricultural acreage under compact growth versus trend (sprawl) development = 29% (2,350 acres) in the Delaware Estuary region.
<i>Improving Land Use Futures: Applying the California Urban Futures Model, John D. Landis (1995)</i>	Under a scenario of "compact growth", future savings in agricultural acreage in the San Francisco Bay area versus status quo development patterns totaled nearly 50% of farmland and step-sloped areas.
<i>Priorities for Action: A Paper by the Chesapeake Bay Commission (October 10, 1996)</i>	<p>In Maryland where agricultural production accounts for 14% of the state's gross product, 147,400 acres of agricultural land were lost between 1971-1988. If the current trends persist, the state will lose another 333,000 acres (13%) by 2020. [p. 12]</p> <p>The Coastal Plain of Delaware and Maryland is the 9th most threatened agricultural region in the nation. [p. 12]</p> <p>Urban growth in the Wilmington-Newark and Washington- Baltimore regions is endangering 60% of the areas' best farmland. [p. 12]</p> <p>On the national level, 4.3 million acres of prime farmland were destroyed between 1982 and 1992. 79% of the nation's fruits, 69% of its vegetables, and 52% of the dairy products are produced on seriously threatened land. [p. 12]</p> <p>Sprawl will consume 108,000 acres of high-quality farmland by 2010 in New Jersey. Planned development could save 30,000 acres during the same period. [p.12]</p> <p>Planned development consumes 40% less agricultural land than low-density sprawl. [p. 13]</p>
<i>Beyond Sprawl: New patterns of Growth to Fit the New California, author and date unknown</i>	Between 1982 and 1987, the Central Valley of California lost almost ½ million acres of productive farmland. [p. 7]
<i>Redefining Progress: Recommendations from the 21st Century Environment Commission, (June 1998)</i>	According to 1992 National Resource Inventory data, from 1982 to 1992, Pennsylvania experienced a 300,000 acre decrease in cropland and 264,000 acre decrease in pasture land, and a 436,000 increase in developed land. [p. 28]
2. Reduced Farmland Productivity	
<i>Priorities for Action: A Paper by the Chesapeake Bay Commission (October 10, 1996)</i>	In California's Central Valley, sprawl will reduce direct agricultural commodity sales by \$1.13 billion per year, more than directed growth. Related sales of suppliers, processors, and other agricultural support businesses would decline by \$1.7 billion per year more than directed growth. The cumulative loss of direct and indirect agricultural sales for sprawl will be \$72 billion more than concentrated growth by 2040. [p. 13]
<i>Beyond Sprawl: New patterns of Growth to Fit the New California, author and date unknown</i>	Sprawl induced ozone pollution can reduce crop yields by as much as 30%. Currently, pollution-induced costs to agricultural land exceed \$200 million per year [p. 7]
3. Reduced Farmland Viability (Water Constraints)	
<i>Beyond Sprawl: New patterns of Growth to Fit the New California, author and date unknown</i>	40 of California's 350 groundwater basins are seriously overdrafted and water planners predict that by 2020 the state will face a water supply deficit of between 2 to 8 mill. acre feet. [p. 8]
<i>Impact Assessment of the New Jersey Interim State Development & Redevelopment Plan, Robert W. Burchell et al. (February 1992)</i>	This study considered how water demand influenced water consumption under trend versus compact development scenarios, but found only small differences in water demand by development scenario (about a 2 million gallon per day difference). Did not relate this finding to the amount of water supply for agricultural and residential settlements in given locations compared to the total supply available.
4. Loss of Fragile Environmental Lands	
<i>Economic Values & Impacts of Sport Fishing, Hunting & Trapping Activities in PA (undated technical draft report, The Center for Rural Pennsylvania)</i>	No info relating to sprawl issues

NAME OF REPORT	SUMMARY
<i>Impact Assessment of the New Jersey Interim State Development & Redevelopment Plan</i> , Robert W. Burchell et al. (February 1992)	Note: Fragile environmental lands include wetlands, floodplain, and steep slopes. Savings in the consumption of fragile environmental lands under compact growth versus trend (sprawl) development totaled 17% in New Jersey.
<i>The Economic Impacts of Trend Versus Vision Growth in the Lexington Metropolitan Area</i> , Robert W. Burchell, et al. (1995)	Savings in the consumption of fragile environmental lands under compact growth versus trend (sprawl) development totaled 20% in Lexington.
<i>Fiscal Impacts of Alternative Land Development Patterns in Michigan: The Costs of Current Development Versus Compact Growth</i> , Robert W. Burchell, et al. (1997)	Savings in the consumption of fragile environmental lands under compact growth versus trend (sprawl) development totaled 21% in Michigan.
<i>South Carolina Infrastructure Study: Projections of Statewide Infrastructure Costs 1995-2015</i> , Robert W. Burchell, et al. (1997)	Savings in the consumption of fragile environmental lands under compact growth versus trend (sprawl) development totaled 22% in South Carolina.
<i>Impact Assessment of DELOP CCMP versus STATUS QUO on the Twelve Municipalities in the DELEP Region</i> ; (1995 Robert W. Burchell, et al.)	Savings in the consumption of fragile environmental lands under compact growth versus trend (sprawl) development totaled 27% in the Delaware Estuary region.
<i>Improving Land Use Futures: Applying the California Urban Futures Model</i> , (1995 John D. Landis)	Under a scenario of "compact growth" versus "business as usual," future savings in steep slopes acreage in the San Francisco Bay area totaled 10,500 acres of wetlands and 8,000 acres of steep sloped lands.
<i>Cost of Sprawl</i> , Maine State Planning Office (1997)	Sprawl development seriously fragments wildlife habitats of bobcats, hawks, owls, and birds. This has diminished nesting sites for endangered birds. In 1985, 85% of Maine's wetlands were visible from a road or within 2,000 feet of a road, and thus of limited habitat value. Of Maine's 2,700 lakes, 200 have been harmed by development, and 300 are at risk. [p.11-12]
<i>Priorities for Action: A Paper by the Chesapeake Bay Commission</i> (October 10, 1996)	Pennsylvania lost an average of 1,200 acres of wetlands per year from 1956 to 1979. Wetlands now only constitute 2% of the state. [p. 14] The loss of wetlands in the mid-1950s to the late 1970s was 24,000 acres in Maryland, 63,000 acres for Virginia, and 28,000 acres for Pennsylvania. [p. 15] In Delaware, 1,075 acres of frail lands could be saved by avoiding sprawl (a 27% reduction). [p. 15] Literature review reveals planned growth requires only 17% of the level of development on frail lands compared to sprawl development. [p. 15] North America Forestry Association estimates that over the course of 50 years, the monetary value of a 50 year old tree is \$57,151 because it prevents soil erosion, shelters wildlife, and cools and cleans the air. [p. 15] * In the last 2 decades, over 80 species have become endangered or threatened primarily from the loss of wetlands. [p. 15]
<i>Beyond Sprawl: New patterns of Growth to Fit the New California</i> , author and date unknown	95% of California's wetlands have been destroyed over the last 200 years. [p. 7]
5. Reduced Regional Open Space	
<i>Land Use in The Delaware Valley 1970-1990 Analytical Report #2</i> (July 1994 DVRPC)	Statistics used to determine the need for additional lands to support the growth in residential development and the loss of undeveloped land in the region.
<i>Economic and Fiscal Costs (and Benefits) of Sprawl in 29 Urban</i> Lawyer 159, R. Burchell (1997)	As of 1990, there were 2 million acres available for development in New Jersey. Allowing sprawl development would consume 292,079 acres, whereas planned development would consume only 117,607 acres, 60% less overall land drawdown than sprawl. [p. 175]

NAME OF REPORT	SUMMARY
IV. INCREASED SOCIAL COSTS AND DECREASED QUALITY OF LIFE	
1. Aesthetically Displeasing	
<i>The Fiscal and Economic Impacts of Local Conservation and Community Development Measures</i> , (1993 Luther Propst and Mary Schmid)	Passive open space has a higher monetary value effect on the real estate market than active recreational open space. A 1973 study found that properties directly adjacent to an active park containing heavily-used recreational facilities sold for less than those properties a block away, while those properties facing passive parks sold for as much as 7% to 23% more than properties a block away. [p. 6]
2. Weakened Sense of Community	
<i>The Future of First Generation Suburbs in the Delaware Valley</i> (July 31, 1998 (Draft) DVRPC)	By 1990 3 of 4 municipalities that include parts of Levittown lagged behind the region's suburbs in indicators of community stability: population change, median income, and growth in home sale prices.
3. Greater Stress	
<i>Objective and Subjective Dimensions of Travel Impedance as Determinants of Commuting Stress</i> (Ulrich)	No Pennsylvania specific data
<i>Wellness By Design, Psychologically Supportive Patient Surroundings</i> (Ulrich)	No Pennsylvania specific data
<i>Stress Recovery During Exposure to Natural And Urban Environments</i> (Ulrich)	No Pennsylvania specific data
<i>Visual Landscapes and Psychological Well Being</i> (Ulrich)	No Pennsylvania specific data
<i>The Role of Trees in Human Well Being and Health</i> (Ulrich)	No Pennsylvania specific data
<i>"Objective and Subjective Dimensions of Travel Impedance as Determinants of Commuting Stress" in American Journal of Community Psychology</i> 18 (1990 Raymond W. Novaco, et al.)	Increased travel impedance, as measured by commuting distance and time, is associated with increased measures of stress. Travel impedance was found to have statistically significant effects on job satisfaction, work absences due to illness, and overall incidence of colds or flus. The literature, however, does not rigorously address the link between commuting stress and the density of development or urban form. The closest is a finding from this same study that stress effects are strongly associated with freeway travel and with road exchanges.
4. More Pollution	
<i>Priorities for Action: A Paper by the Chesapeake Bay Commission</i> (October 10, 1996)	Increased water pollution in the water supply from development between 1990 - 2020: 1. Sedimentation: Sprawl-- 5.7 mill. tons Medium density-- 4.1 mill. tons Concentrated dev.-- 3.4 mill. tons 2. Nitrous oxides: Sprawl- 1.6 mill. pounds Medium density -- .10 mill. pounds Concentrated dev.-- .08 mill. lbs 3. Increased water consumption from growth: Sprawl-- 108.8 bill. gallons Medium density -- 84.6 bill. gallons Concentrated dev.-- 70.7 bill. gal. [p. 17]
<i>Redefining Progress: Recommendations from the 21st Century Environment Commission</i> , (June 1998)	As of April 1, 1998, Pennsylvania had 12,831 miles of its 83,261 miles of stream assessed for water quality. Of the 12,831 miles assessed, 4,314 miles are impaired. Of the impaired miles, 1,297 are impacted by agricultural activities, and 2,244 are impacted by acid mine drainage [p. 39]
<i>Impact Assessment of the New Jersey Interim State Development & Redevelopment Plan</i> , Robert W. Burchell et al. (February 1992)	Found that air pollution would be very similarly reduced in the future under either sprawl or compact development scenarios. Most of the reduction would be due to more stringent emission controls that would affect the entire motor vehicle fleet of New Jersey. Development pattern, at least in this instance, did not significantly influence air pollution levels.

NAME OF REPORT	SUMMARY
<i>Cost of Sprawl</i> , Maine State Planning Office (1997)	Car use has doubled since 1970, resulting ozone problems have been caused by emissions. [p. 1]
<i>Beyond Sprawl: New patterns of Growth to Fit the New California</i> , author and date unknown	California has the worst air quality in the nation, and air pollution experts estimate that 1/3 of all air pollution emissions are traceable to car and truck emissions exacerbated by longer commutes and higher auto use. Air pollution in the four-county Los Angeles area costs \$7.4 billion/yr or \$600/resident. [p. 8]
5. Lessened Historic Preservation	
<i>Pennsylvania Heritage Tourism Study</i> (May 1999 D.K. Shifflet & Associates, Ltd.) [Prepared for the Penna. Dept. of Conservation & Natural Resources]	Market analysis of Pennsylvania's growing heritage tourism industry based on survey of 1,700 U.S. leisure travelers. Top four most popular "heritage tourism" attractions were historic towns/districts, Philadelphia's Liberty Bell, Gettysburg, and Amish Country. Fastest growing segment of leisure tourism industry in state; heritage tourists stay a day longer and spend 40% more money than other types of leisure travelers to state. Heritage tourists are highly satisfied with Penna heritage tourism experience, and scored second to Wash D.C. in terms of satisfaction. Penna heritage tourism product best described as "educational" and "scenic" by survey respondents. Total indirect and direct economic benefit to state in 1997 from heritage tourism = \$3.9 billion [includes \$1 billion in earning (wages + salaries), over 55,000 jobs, and \$497.1 million from associated taxes].
<i>The Economic Benefits of Preserving Philadelphia's Past</i> <i>Preservation Alliance for Greater Philadelphia</i> (Rypkema and Wiehagen, Preservation Alliance for Greater Philadelphia)	Historic Preservation increases tax base, employment and housing stock. Underutilized infrastructure is put back into service. \$24 million redevelopment of the National Publishing Company created over 200 construction jobs and ultimately helped boost the city's tax base. Historic neighborhoods are losing population at a much slower rate than the rest of Philadelphia, (5% compared to the citywide 12-14%). Historic neighborhoods house only 6.3% of the city's population but over 285 are homes to those with a graduate and/or professional degree, 24% of college graduates in Philadelphia live in an Historic Home. 21% of people that moved into Philadelphia from other parts of the country moved into an Historic Home. 15% of people that moved into Philadelphia from the suburbs in the last 5 years moved into an Historic Home. Philadelphia's Historic Religious Landmarks also provide a variety of human services and programs that are crucial to survival of the urban core.
<i>Pennsylvania's Endangered Heritage</i> (undated, Preservation Pennsylvania)	Lists properties from 1992 -1997 included in Pennsylvania At Risk and which have had either a positive preservation outcome, have been lost, or remain at risk. 26 of these properties that are currently at risk are threatened by development associated with sprawl.
<i>Dollars and Cents of Battlefield Preservation</i> , Frances H. Kennedy and Douglas R. Porter (1994 Conservation Foundation)	Secondary expenditures of visitors to historic places is significant. The National Park Service uses an average multiplier of 2.0—meaning a community that supports a historic site and that enjoys direct visitor spending can expect that up to about two times the amount of direct expenditures will flow into their local economy. [pp. 8-9] Compared to residential development, and even commercial or industrial development to some degree, preservation of a historic open space resource such as a battlefield is a fiscal winner—i.e., generates more revenue than it demands public services in return. A 1992 study of for Straban Township in Adams County, Pennsylvania, found that the costs of services provided per dollar of tax revenue was only \$0.12 for open land versus \$1.10 for land developed for residential uses. This same study concluded that "farm and open land provide clear economic benefits to all residents of the township by providing more in revenue than they require in local expenditures." [p.12]
6. Fosters Suburban Exclusion	
<i>Philadelphia Metropolitcs: A Regional Agenda for Community and Stability</i> (March 1997, Myron Orfield)	Comprehensive study with many conclusions on the changes that are occurring in the study area. Maps social changes and the impact of those changes on the populace in the study area. Many statistics that relate to sprawl.
<i>Today's Winners, Tomorrow's Losers: Social and Economic Costs of Urban Sprawl in Reading, Berks County</i> (September 19, 1997 (Presentation) David Rusk)	The major conclusion of this Rusk presentation is that the changes that are occurring in urban areas, are not limited to the central city. The thesis is that negative changes are presently occurring in the first generation suburbs and will inevitably occur in the outer suburban rings. One important conclusion of the study is that it highlights how these social and economic challenges must be met by communities of all sizes in PA..
<i>Renewing Our Community – Report on York: The Rusk Report on the Future of Greater York</i> (November 20, 1997 David Rusk)	Comprehensive study with many conclusions on the changes that are occurring in the study area. Many statistics that relate to sprawl.

NAME OF REPORT	SUMMARY
<i>Mon Valley Expressway/Southern Beltway</i> (August 19, 1998 (Draft) Surface Transportation Policy Project)	Examines the desirability of proceeding with two major new highway projects proposed for the Pittsburgh region, the Mon Fayette Expressway and the Southern Bypass. The total cost of this project is \$3.2 billion with \$900 million of committed funds and a shortfall of 2.3 billion. This does not factor in costs of maintenance, opportunity costs, environmental and community costs. TEA-21 will finance only 25 million for this project so that the remainder must have major local support. If this amount was raised locally it would require a contribution of \$2,502 per household or \$990 per person within the 6 county Pittsburgh metropolitan area. An alternative source of funding through a regional gas tax would require a 35 cent per gallon surcharge for the region for the next ten years. Report lists 44 alternative projects that TEA-21 funds could finance throughout the Pittsburgh region for a total cost of \$864 million. Concludes that these projects will not attract economic growth from other areas to Pittsburgh or the Mon Valley. Beltways draw resources out of the city and enable sprawl. Roads do not equal economic development. Beltway system has been a powerful force for moving people and jobs out of the central city with the result as more traffic and congestion. Central cities with suburban beltways have experienced lower gains in retail sales and employment than those with beltways within their jurisdiction or with no beltway. Also widens the gap for those that depend on public transportation. Roads don't relieve congestion. A study of 30 urban counties in California by Hansen and Huang found that at a metropolitan level, every 1% increase in new lane miles of highway generates 0.9% increase in traffic within four years.
<i>Pittsburgh Metropolitcs: A Regional Agenda for Community and Stability</i> (January 21, 1997 (Preliminary Draft Report) Myron Orfield)	<p>Comprehensive study with many conclusions on the changes that are occurring in the study area. Maps social changes and the impact of those changes on the populace in the study area. Many statistics that relate to sprawl, including:</p> <p>In 1990, 37% of Pittsburgh's preschool children fell below the federal poverty line. In the low tax-base/low social health communities, the rate was 35.3%. In the high tax-base communities, the poverty rate was 7.4%. [p. 14]</p> <p>The most striking decrease in the percentage of children in poverty took place in white-collar places like Sewickley (16.2 % to 0%), Fallowfield (12.7% to 3.5%), Edgewood (12.2% to 3.1%), and Pleasant Hills (8.8% to 0%). [p. 15]</p> <p>Pittsburgh has the highest rate of female-headed households in the metropolitan area, with 39%. Low tax- base/low social health communities had 28.3%, while high tax-base communities had only 11.3%. [p. 15]</p> <p>The City of Pittsburgh's median household income in 1989 was only \$20,747, compared to high tax-base suburbs where median income was \$38,240. [p. 15]</p>
<p><i>"The Gautreaux Assisted Housing Program" in Housing Markets and Residential Mobility</i>, Mary Davis, (1993 Urban Institute Press).</p> <p><i>"Is Housing Mobility an Effective Anti-Poverty Strategy? An Examination of the Cincinnati Experience,"</i> Paul B. Fischer (1991 Stephen H. Wilder Foundation)</p> <p><i>"The Impact of Mount Laurel Initiatives: An Analysis of the Characteristics of Applicants and Occupants,"</i> Naomi Wish and Stephen Eisdorfer (1996 Seton Hall University)</p>	<p>Regarding the degree to which suburban exclusionary zoning is responsible for poverty concentrations in core-city neighborhoods, these studies indicate that those who occupy affordable housing in more suburban locations (opportunities typically made available through deliberate inclusionary programs) take on the employment characteristics, ambition levels, and success rates of the population of those jurisdictions. In other words, "place" appears to matter, wherein the attitudes and expectations of residents are transmitted/communicated to newcomers who wish to improve their current economic and social positions.</p> <p>In New Jersey (Wish & Eisdorfer), close to 15,000 affordable housing units have been built and occupied as a result of legislation emanating from the series of <i>Mt. Laurel</i> cases in that state. Occupants of these housing units are employed, doing well at local schools, and integrated without incident in neighborhoods.</p> <p>The Gautreaux (Chicago) and Cincinnati program studies show that residents moving from the central city to the suburbs using housing vouchers have higher rates of employment and higher salaries and their children have better school attendance and grades than families who chose not to move. Self-selection issues (the successful and ambitious tend to choose to participate in the first place) cloud these findings to some degree.</p>
7. Fosters Spatial Mismatch	
<i>Homeownership A Vanishing Dream?</i> (November 1990 DVRPC)	Large employment centers are often located in areas where a median priced unit is unaffordable to the median income household. King of Prussia and Route 1 Corridor have increasing employment opportunities, yet the median incomes necessary to purchase a median priced house in these areas range from \$70,000 to greater than \$90,000. Housing affordability criteria, including median sales price, median income required, affordability "gap" and affordability "index" are listed for each municipality in 1989.

NAME OF REPORT	SUMMARY
<i>Bridging the Gap Closing the Mismatch between Jobs and Workers in the Delaware Valley</i> (October 1992 DVRPC)	Report utilizes the Jobs/Households Ratio and the median income necessary to purchase a median priced housing unit housing prices to identify specific areas of urban population centers which contain affordable housing stock but lacks jobs and identify suburban employment centers which lack resident labor pool due to a lack of affordable housing opportunities. Lack of affordable housing near employment centers primarily affects entry level and technical workers who cannot afford to buy or rent housing close to work and must commute long distances. Since the cost of land is the highest single component of housing cost, the low density development pattern of sprawl and its exclusionary zoning impedes the construction of affordable housing. A 1990 study by the DVRPC found that a median income households could not afford to purchase the median priced housing unit in 81% of the region's municipalities.
<i>The Mismatch Between Jobs and Workers in the Del Val.</i> (July 1991 DVRPC)	<p>There was regional employment growth between 1970 and 1990 despite a declining number of jobs within the City of Philadelphia, as employment opportunities continue to move to suburban locations.. In 1970, manufacturing represented 29% of the region's total employment, and the service sector employment accounted for 19.4% of total jobs. By 1990 manufacturing accounted for only 15.6% of total employment, while service sector jobs accounted for over 30% of the region's total jobs. During the 1970-1980 time period the region experienced an overall population loss of 2% which was largely attributable to the loss of manufacturing jobs in older urban areas thus resulting in a 13.4% decline of the population in Philadelphia and a 8% decline of the population in Delaware County. However Bucks and Chester Counties each realized population gains of over 10% during this same decade. Manufacturing uses traditionally located along major railroad corridors and along rivers, given their need to import resources and move completed products. Changes in the employment sector has directly affected the locational focus of job growth in the region as well as occupational skills requirement for workers. In contrast, service sector employment is more mobile and have found the suburbs attractive, given the availability of larger tracts of land, concentrations of residential development, and access provided by the highway system. Between 1970 and 1990 the Delaware Valley Region gained over 600,000 jobs, with the greatest increase realized in Montgomery County. Although Philadelphia's employment growth stabilized during the 1980's, strong employment growth in the suburban counties has resulted in a Philadelphia obtaining a declining share of the region's overall employment. The decentralization of the workplace in the Delaware Valley has impacted suburban employers as they find difficulty in filling their labor needs. Suburban employers are unable to tap Philadelphia's extensive labor supply because of the length of the commute, the expense of the commute, and in many cases the jobs' inaccessibility to public transportation. The lack of affordable suburban housing has further exacerbated the mismatch problem.</p> <p>Suburban counties, where employment growth has significantly exceeded population growth, have become net importers of labor, with the number of people entering the county each day exceeding the number of residents leaving the county to work in other locations. In Montgomery County there were approximately 1.31 jobs located within the county for each resident worker in 1988.</p>
<i>"The Spatial Mismatch Hypothesis: Three Decades Later," in Housing Policy Debate 3 (1992), John Kain</i>	While studies in this area are consistent in their finding and agreement that there is a spacial mismatch between newly-created suburban jobs and central-city located low-skilled workers, there is little evidence/research that sprawl plays a major role in the mix of factors that create spatial mismatch.
<i>"City Jobs and Residents on a Collision Course: The Urban Underclass Dilemma," in Economic Development Quarterly 4 (1990), John D. Kasarda</i>	Spatial mismatch is fueled by a host of factors including race, inadequate skills/education, and limited transportation or access to transportation. Often unfilled jobs in the suburbs are lower-order and -paying jobs that are not worth accessing by public transit if the prospective employee must also pay for child care services to retain the job. However, the move from welfare to workfare will likely fuel spatial mismatch into a major issue in many cities/metropolitan area., Bennett Harrison (1974)
<i>"Discrimination in Space: Suburbanization and Black Unemployment in Cities," in Patterns of Racial Discrimination, Vol. 1: Housing</i>	
<i>Priorities for Action: A Paper by the Chesapeake Bay Commission</i> (October 10, 1996)	Between 1980 and 1990, 81% of the Chicago region's new jobs went to suburban locations, leaving behind a growing problem of joblessness and poverty. [p. 4]
8. Fosters Residential Segregation	
<i>The Future of First Generation Suburbs in the Delaware Valley</i> (July 31, 1998 (Draft) DVRPC)	Levittown was neither racially or socioeconomically diverse. Levitt initially refused to sell to Afro Americans. Currently only 100 Afro Americans reside among 17,000 homes. "Levittown offers a very narrow range of house type to a narrow income range. It is a one class community on a great scale, too congested for effective variety and too spread out for social relationships necessary among high school children, old folks, and families who cannot afford outside help. Mechanically it is admirably done, socially the design is backward" Lewis Mumford, Levittown Express (5/20/92)

NAME OF REPORT	SUMMARY
<i>The Economic Benefits of Preserving Philadelphia's Past Preservation Alliance for Greater Philadelphia</i> (November 1998 Rypkema and Wiehagen)	Diversity of race, income and educational levels is greatest in Philadelphia's historic neighborhoods. Philadelphia has a population that is about 53% white, 40% black with the balance Asian or other ethnicities. Citywide barely one block in five had less than either 80% black persons or less than 80% white persons. In the 106 block groups within the historic districts, nearly 50 % met this diversity test and had no extreme concentration of any race.
<i>Homeownership A Vanishing Dream?</i> (November 1990 DVRPC)	Study analysis determined that a median regional income, \$38,300, could not afford to purchase a median priced unit in 285 of the region's 352 municipalities, (81%). Only 10% of Pa's municipalities, 23 municipalities of 239 municipalities, existed in 1989 where the median priced house was affordable to median income families. The least affordable counties in PA were Bucks, Montgomery and Chester counties where the issue is affordability of both rental and owner occupied units. In 1989, Montgomery County's "Housing Cost Study" determined the median income household in the County could afford to purchase housing of no more than \$108,266. The median prices of new and existing single family homes at that time were \$207,398 and \$142,000, respectively. Older boroughs and cities are generally more affordable than suburban municipalities, however the older housing stock may present significant rehab and maintenance costs. In Philadelphia the greatest housing problems are the lack of below market rental housing, housing quality and homelessness.
<i>"The Impact of Mount Laurel Initiatives: An Analysis of the Characteristics of Applicants and Occupants,"</i> Naomi Wish and Stephen Eisdorfer (1996 Seton Hall University)	No statistically valid studies exist to prove the point that suburbs acting under the self-interests fomented by fragmented governments tend to be more exclusionary than suburbs without fragmented governmental control over land use (primarily because few if any of the latter exist in the U.S.). However, in states such as New Jersey where there is state legislation mandating the inclusion of affordable housing in many outlying suburbs, it has been shown that integration of neighborhoods moves quickly and directly.
<i>Pittsburgh Metropolitcs: A Regional Agenda for Community and Stability,</i> Myron Orfield (January 1997)	During the 1980s, Pittsburgh lost 20.3% of its white preschool kids. During that same time, 92 suburbs gained white children. [p. 19] Pittsburgh's median household income in 1989 was only \$20,747, compared to high tax-base suburbs where median income was \$38,240. [p. 15] In 1995, the Pittsburgh school district had 59.2% non-Asian minority students, compared to the more affluent suburbs which had less than 2% non-Asian minorities. [p. 18]
9. Worsens City Fiscal Stress	
<i>New Visions for Metropolitan America,</i> Anthony Downs (1994: Lincoln Institute of Land Policy)	While there is limited agreement that sprawl is a major cause of central-city fiscal stress--other causal factors unrelated to development patterns contribute to this ill--many of the forces that contribute to fiscal deterioration need the defining characteristics of sprawl to operate. Fragmented suburban governments, all competing for the "best" land uses (e.g., high-income residential and nonresidential properties) do create stress for those local governments that cannot compete because of already strained resources.
10. Worsens Inner-City Deterioration	
<i>Residential Abandonment: The Tenement Landlord Revisited,</i> George Sternlieb and Robert W. Burchell (1977)	While there appears to be no scientifically valid way to determine the degree of sprawl development pattern's responsibility for worsening inner-city deterioration, there are studies that indicate a link between the two. From a study of residential abandonment in cities nationwide, it was found that the most statistically significant causal relationship to central city abandonment was the amount of housing built outside the central city yet inside the city's metropolitan area.
<i>Exclusionary Land Use Controls: Conceptual and Empirical Problems in measuring the Invisible Wall,</i> Robert Schafer (1975)	To the degree that significant amounts of housing are built farther out in the metropolitan area and the occupancy costs of this housing are comparable to, or lower than, existing housing, this new housing will be sought in preference to closer-in housing.
MISCELLANEOUS/GENERAL	
<i>The Future of First Generation Suburbs in the Delaware Valley</i> (July 31, 1998 (Draft) DVRPC)	Defines First Generation Suburbs as older industrial boroughs and townships, and boroughs that developed rapidly after World War II. Rapid growth of suburbs occurred (1950-1960) due to general preference for low density living, expanded vehicle availability, major new roads and highways, mortgage lending policies that favored new development over existing housing stock, racially discriminatory mortgage lending practices, and white flight from urban schools. Between 1970-1990 total population in nine counties increased slightly over 1% in 20 years from 5.12 to 5.18 million. However total developed land jumped by 174,000 acres, an increase of 30% of developed land from 1970-1990. This is equivalent of adding one acre of new development every hour for 20 years.

NAME OF REPORT	SUMMARY
<i>Land Use In The Delaware Valley 1970-1990 Analytical Report #2</i> (July 1994 DVRPC)	In the 9 county region Residential land use increased 146 sq. miles, (29%) but population did not change significantly. Single Family Detached housing accounted for 123.79 sq. miles of this increase. Nonresidential land use decreased 125 sq. miles. Of a total of 3814 sq. miles in the region in 1990, 17% is residential, with 14% nonresidential and 67% undeveloped. Specific breakdowns for each county are detailed in the report. Land use of 1990 based on information derived from aerial photographs.
<i>Regional Profile</i> (November 1991 SPRPC)	<p>This report classifies municipalities within the S.P.R.C. as:</p> <ul style="list-style-type: none"> • Urban Center-Core where population exceeds 10,000 persons per square mile or more than 70% of land is developed. • Industrial Valley Town-Municipality that had a dominant manufacturing center in 1970, Lower and Mid-Mon Valleys and Allegheny, Turtle Creek and Ohio River Valley. • Small Town- Population threshold of 5,000 and/or development density nearing 10,000 in town center. Established, diverse and independent economic bases. • Suburbs-For 1970, Census defined Urbanized area, less any areas defined above. For 1990, areas added by the 1980 Census and 1990 aerial photographs. • Rural areas- Any area not defined as above. <p>The region lost about one quarter in population between 1970-1990. The Urban Center and Industrial Valley Towns lost substantial population, 23% loss in population, and the suburbs gained dramatically, 23% gain in population. Although there was substantial employment growth in the suburbs 73% increase, overall employment in the Urban Center also grew as growth in medical services, high tech engineering, and information services compensated for losses in manufacturing and corporate headquarters. Throughout the region the economy became more diverse with manufacturing accounting for 13% of jobs while medical, high tech engineering and other service jobs accounting for 54% of the regional share. Employment shrank in the Industrial Valley Towns by 32%. Commercial centers of some Valley towns that were suffering in 1980, nearly collapsed by 1990 due to population migration to the suburbs and suburban shopping center competition. Although losses in the business district occurred within small towns, those small towns that were able to develop new specialized markets kept a viable business district. Development sprawled in leap frog pattern with expansive parking lots, large lot subdivisions, and sprinkling of office and commercial buildings. An additional 5% of land was developed between 1970 and 1990 in areas that were classified as suburban in 1970. As suburban development encroached on rural areas, development density decreased from 2600 persons per square mile to 1,600 per square mile of developable land. Because of the discrepancy between areas that were classified as rural in 1970 that had then been developed as suburbs by 1990, the growth of rural areas was masked in the report. Though it was not mapped or charted in the report the Profile states that areas defined as rural in 1990, had an 8% growth rate in population and 49% growth (30,000 jobs) in employment from 1970-1990.</p>
<i>Suburban Sprawl in Central and Western Montgomery County: Changing Development Patterns: 1965-1990</i> (June 1993 Montgomery County Planning Commission)	In 1965 there were 177,000 jobs in the county, by 1990 a 144% increase to 431,000 jobs. In the same time period 46,000 housing units were added representing a 137% increase in housing stock. In 1965 26,000 acres of developed land in the study area, by 1990 the acreage of developed land increased to 88,000 acres, representing 30% of the study's entire land area. Planning area 4, (Salford, Upper Salford, Marlborough, Hanover, Upper Frederick, New Hanover, East Greenberg, Pennsburg And Red Hill) saw the amount of developed land per household jump from .97 acres in 1965 to 2.25 acres in 1990, representing an 132% decrease in land efficiency. Campus Style development has contributed to a decrease in density of office and industrial parks and recently developed shopping centers have consumed more land than those built prior to 1965.
<i>Once There Were Greenfields</i> F. Kaïd Benfield, Matthew D. Raimi, Donald D.T. Chen (NRDC/STPP 1999)	A comprehensive compendium of national research on the costs of sprawl, including research on the environmental costs, fiscal impacts, growth in transportation/travel costs, and quality of life costs. The book makes the case that "smart growth" or planned growth is the rational antidote to the costs of sprawl.