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Transportation Planning: A Description, Analysis, and Critique of the Logan Urbanized Area's Long Range Transportation Plan

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TRANSPORTATION PLANNING: A DESCRIPTION, ANALYSIS, AND CRITIQUE OF THE LOGAN URBANIZED AREA'S LONG RANGE TRANSPORTATION PLAN

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Introduction

On January 21, 1997, a public meeting was held to obtain comment on a draft version of a document entitled the *Cache Metropolitan Area Transportation Plan.* The document was prepared to address the transportation needs of the Logan Urbanized Area for the next twenty years. Since work began on the document in April 1996, it had undergone three stages in the form of working papers, which had been reviewed by several committees and published for public comment over the course of its development. The document was being developed under contract for the Cache Metropolitan Planning Organization by Leigh, Scott, & Cleary, Inc., a consulting firm from Colorado Springs at a cost of $64,000. Turnout for the public meeting was marginal but lively. Of the more than 50,000 people that would be affected by the document, less than 50 attended. Approximately 30 gave spoken comments of which they were allowed two minutes to portray their thoughts. The overwhelming majority of the speakers stormed with disapproval for the "auto-centric" nature of the plan, its lack of consideration for "alternative" modes of transportation, and the simplemindedness of a solution that merely accommodated greater demand without attempting to ameliorate it. The planners seemed frustrated; the public appeared disappointed.

What went wrong?

This paper explores the contentious factors and differing opinions of transportation planning that led to such disapproval. By using the Logan Urbanized Area as a case study in transportation planning, several common themes can be identified which are problematic to many cities and to the intended functioning of the Intermodal Surface Transportation Efficiency Act which legislates the planning. After a brief overview of the community, its history, and its planning efforts, this paper will point out inconsistencies with the transportation plan and how it

relates to other planning documents of the area and the goals they have established for the community. It will analyze some broader questions related to transportation problems inherent in areas which allow extensive use of private, single-occupant vehicles and will prescribe several paradigm shifts and practical solutions that might help the Logan Urbanized Area achieve its future goals.

Background

The Logan Urbanized Area (LUA) consists of nine cities in northern Utah with a collective population of 63,576 in 1995. Logan, the county seat of Cache County, contains more than half of the population of the LUA, with Smithfield to the north being the next largest. The other cites are Hyde Park, Millville, Nibley, North Logan, Providence, and River Heights. Unincorporated areas also exist within the LUA boundaries (CMPO 1997).

The Logan area was settled in 1855, before which Paiute, Blackfoot, Shoshone, and Ute tribes inhabited the area. Led by Peter Maughan and sent by Brigham Young, the leader of the Mormons at that time, settlers incorporated the area on January 1, 1866 (Brenchley 53). Typical of most Utah communities, the LUA is bordered on the east by the Wasatch Mountains from which the area gets its water. Settlement patterns developed this way due to environmental constraints. A water supply for the area was only available from the watersheds of the mountains. Continuously flowing rivers from the mountains through the valley were widely spaced, causing scattered areas of development which are becoming more interconnected as they grow. During early settlement, the mountains were also necessary for supplies of timber and stone for construction. Agriculture also tended to be located near the water supply as irrigation was difficult and costly. Most of the cities in the LUA are located at the mouth of a canyon (Ricks 1964).

The city of Logan is located at the base of Logan Canyon and has developed residential districts on both the north-eastern and south-eastern benches of the canyon mouth which were created by a river delta in a prehistoric lake as it receded. The two benches are separated by a flood

plain area cut by the Logan River known locally as the "Island." The river flows through the Island towards the west. Due to the geography of the canyon and the Island, Logan is split in two. The steep embankments that skirt the Island are not suitable for perpendicular roads. Therefore, most residential traffic from the Island and the south-east bench must first go west to converge on Main Street before it can go north to where most of the services of the city are located, including Utah State University.

Most of the largest employers in the LUA are located in Logan, with a few large companies in Smithfield, Hyrum, North Logan, and Richmond. The largest employer in the LUA is Utah State University which is located on the north-east bench in Logan, directly above the Island. The university has over 5,000 employees and over 19,000 students.

Because of the settlement patterns typical of Utah, the city of LUA is essentially a linear development in the north-south alignment. Because of this phenomenon, the businesses of the area are located mostly on a strip of land that runs north-south. For Logan, it is along Main Street and extends into North Logan. Residential areas boarder this district on the east and west. Agriculture is still practiced on the west side of the LUA. Main Street is also the major thoroughfare for north-south travel through the valley and is usually traveled for at least some distance when the destination is out of the valley through the east or west.

Because of the growing population of Logan and the surrounding communities, the LUA was created after the 1990 census with a population in excess of 50,000 people. Because of this designation, the LUA is now required under the Intermodal Surface Transportation Efficiency Act (ISTEA) to plan for future transportation needs for the next 20 years. The Cache Metropolitan Planning Organization (CMPO) was assembled to address these planning requirements. The draft version of the *Cache Metropolitan Area Transportation Plan* is the result of the planning to date. The plan has been through three revisions; the most recent is dated April 29, 1997.

The Long Range Transportation Plan

The first draft of the plan that was presented for public comment, dated December 19, 1996, identified the purpose of the planning document and what it must address. "The transportation plan must be the result of a continuing, cooperative, and comprehensive transportation planning process which considers all transportation modes and supports the metropolitan community development and social goals" (CMPO 1996). The development of an integrated system of transportation modes within the LUA was the stated goal of the plan in addition to fulfilling the planning requirements of the ISTEA and other regulations for funding the transportation projects. The planning process was detailed, and three working papers had been presented as stages in developing the plan. The requirement of making the plan "financially-feasible" (I-2) meant that previous plans could no longer be used because of their needs-based nature and lack of fiscal constraints that are required by the ISTEA.

Guiding the plan were a set of goals and a mission to "develop an intermodal transportation system that facilitates the efficient and economic movement of people and goods" (II-1). The goals included enhancing mobility through various means, improving safety, protecting the environment, and coordinating actions among member jurisdictions. A description of the study area included a map of the LUA, demographics, and a description of the current transportation system. Roadways descriptions covered 6 pages, 3 figures, 2 tables, and a map. Public transportation was given two paragraphs, bicycle facilities one, and pedestrian facilities one also. Railroads were also identified in two paragraphs. Current and projected traffic volumes that conclude the study area section are automobile counts only. No counts are included of bicycles, pedestrians, or trains. The third and most recent version of the draft plan included maps and forecasts of land use and population densities, but did not include this data in revising the actual planned projects.

The plan then assessed possible costs and possible funding for the identified projects. Highway costs were meticulously described, however, "no work has been done to identify improvements for intermodal facilities. . . [and] . . . little work has been done to identify

enhancement needs" (VII-3). In the summary of the financial section, it was revealed that $206.3 million out of a proposed cost for the entire plan of $303.9 million was identified for increased or new capacity in the form of wider roads or new roads. $20.9 million was predicted for transit capital and $31.5 million for its operation. The Cache Valley Highway, a concept to divert north-south through traffic around the west side of the LUA and off of Main Street in Logan would cost an additional $34 - 129 million. Projected revenue was 41% of the total cost for all identified projects. Only 13%, or $26.3 million, of the new capacity projects were likely to be funded. $0.06 million of the funding was set aside for enhancements for alternative transportation. The estimated funding for the entire plan was $123.8 million (CMPO 1996).

The numbers differ slightly in the third revision of the plan. In this revision, the total cost of the entire plan had decreased to $247.1 million (down from $303.9 million) but capacity improvements had only decreased to $205.3 million (down from $206.3 million). Transit estimates had been expanded to 24 years with $24.2 million for capital and $48.4 million for operation. Projected revenues had dropped to 25% of the identified costs (down from 41%). Capacity improvements had sufficient funding for 9% of the identified projects (down from 13%). These capacity improvements would cost $19.2 million. $0.5 million had been allotted to new enhancements (up from $0.06 million), however, only $60,000 of this had actual plans to spend it on. Presumably this reallocation was due in part to pressure from the public in the first public comment meeting for more consideration of alternative forms of transportation. The total projected funding for the entire plan was $61 million in the third revision (compared to $123.8 in the first) (CMPO 1997).

After assessing each identified project according to criteria extracted from the goals of the plan, 23 highway, 9 transit, and 2 intermodal enhancements were chosen for the final, fiscally constrained plan. (The third version of the plan had reduced the number of highway projects to 19) The highway projects were predominantly widening, repaving, or creating new roads in order to create new north-south corridors on the east and west sides of the LUA as an alternative to Main Street The capacity improvements on Main Street were also aimed at decreasing congestion. The

transit projects included building a transfer facility, increasing the fleet of busses and the routes they serve, providing a maintenance facility and operating costs, and installing automatic vehicle location devices. The enhancement projects consisted of installing bicycle racks and lockers in the downtown area of Logan and building a pedestrian / bicycle path from the university to the Island district at the bottom of the steep embankment that separates the two.

Other Related Planning Documents

Planning and public documents describing the plans seem to be an inherent function of bureaucratic government; the municipalities within the LUA are no exception. Logan, where the majority of the residents of the LUA live and where the most of the traffic congestion and improvements are planned, has its own transportation plan known as the *City of Logan Transportation Master Plan* which is a sub-document of the city's general plan. This document was created in May 1996, after the LUA had been created but before the *Cache Metropolitan Area Transportation Plan* was produced. Logan City's transportation plan was developed by a different engineering firm than the one that was contracted by the CMPO in developing their transportation plan. The city plan states its goal of planning is to "eliminate unnecessary traffic, manage existing traffic, and adequately prepare for anticipated increases in traffic as a result of growth" (City of Logan 1996, p. 1). The plan also identifies the reciprocal nature of traffic congestion and land use and zoning, suggesting that transportation insights should be used for future land use planning.

Two basic paradigms are offered in Logan's plan to deal with traffic: "reduc[e] demand for transportation, and / or increas[e] capacity of the roads" (p. 1). The basic approaches to reducing demand are identified as projects that disperse peak traffic congestion over more space and time, increase passenger density per vehicle, and utilize public transportation. For the transportation master plan, however, "[t]ransit considerations are beyond the scope of" the plan (p. ES-1). Although the plan recognizes that a reduction in the demand for transportation is more desirable and cost effective, the "recommendations of this report focus mainly on increasing the capacity of

the system by modifying existing roads and building new roadways" (p. ES-3). These modifications are the answer to not only current demands on the transportation system, but also to anticipated growth of the Logan area which will create a greater demand for capacity. In this respect, the city of Logan's transportation plan parallels the LUA transportation plan by choosing to increase capacity and forgo projects that would decrease demand.

As an official document to guide all planning decisions, the city of Logan also has produced the *City of Logan General Plan* designed to "provid[e] direction to future Planning commissions, Mayors, and Municipal Council Members ensuring that City officials have guidance from the community in making land use decisions" (Logan Municipal Council 1995, p. 1-2). It is essentially a statement of what is important to the city and how these ideals can be implemented through various municipal services. The mission statement of the general plan reads: ". . . the City of Logan is to provide an all-encompassing program to enhance the quality of life which the citizens and businesses of Logan have come to expect and enjoy" (p. 2-1). This mission is nobel and broad, but lacks any assessable criteria for success. From this mission, three central themes are expounded: increasing safety and comfort, increasing housing affordability, and securing economic growth and jobs. Of course, a central aspect to achieving such lofty goals is an effective transportation system. "Transportation systems are an integral part of the City's social fabric, linking friends to friends, people to jobs, homes to shopping, business to supplies, and families to entertainment" (p. 5-1). Thus, the efficiency and maintenance of the transportation system is a contributing factor to the city's quality of life. This plan also makes recommendations for road improvements, new construction and alignments, and increasing alternative transportation options. Many of these options are similar in nature to the projects identified in the *City of Logan Transportation Master Plan.*

In addition to transportation's effects on quality of life, the *Cache County County-Wide Comprehensive Plan* also notes a connection between transportation and air quality. Cache County, acknowledges the importance of the transportation system of a community by recognizing that Cache Valley is extremely vulnerable to pollution problems due to common temperature

inversions during the winter months. When conditions in winter trap the air in the valley, pollution tends to accumulate. "Over half the pollutants in the air today come primarily from vehicles" (Cache County 1996, p. 52). The issue becomes critical because vehicular miles traveled in the county has increased 30.73% from 1990 to 1994. To address the issue, this plan developed four goals: develop convenient alternative modes of transportation, control urban sprawl through prudent county-wide land use planning, increase safety, and develop a county-wide transportation plan (which would be integrated with the LUA's plan). These documents affirm the importance of transportation planning and its connection to land use and air quality in the valley.

The transportation system, simply cannot be overlooked as something with little importance or impact. Multiple planning documents have acknowledged the relationship of transportation systems to quality of life, land use, air quality, and even the social fabric of a community. In a quasi-plan entitled *Logan, Utah: A 2020 Vision Strategic Plan*, transportation is again acknowledged as a pressing need for the area. This document is not a traditional plan because it was developed by a citizen's task force. It is an "overriding value statement that articulates the values that we, as a broadly based community task force, feel that Logan should consider as policies are developed which affect the future of the City" (Executive Alliance Group 1997, p. i). It's values are:

> a managed future, a community with natural beauty and a historic atmosphere, a vibrant, expanding economy, an active, viable city center, regional and community leadership, valley-wide cooperation, maintaining and building high quality services, [and] educational opportunities. (15-16).

This plan also points out the need to control congestion and improve the safety and capacity in the city's roads. Of the greatest identified threats to Logan's community, 8 of the 12 are linked to an influence of the transportation system.

The abundance of municipal documents and their references to transportation affirms the paramount nature of transportation planning and the influence of transportation systems on a community. Each shares common ideals of transportation systems free of congestion and worry but in the end few consider any alternative other than increasing capacity to answer ever growing demand. In addition, few have any assessable criteria for meeting the goals that set forth.

Conflicting Paradigms

The paradigm of the planning commissions that create these documents becomes clear when modes of transportation other than the automobile are considered. For the *Cache Metropolitan Area Transportation Plan*, the transit system, which the residents voted for and funded with a 0.25% sales tax increase, is given two short paragraphs, with no analysis of the usage statistics or detailed discussion of the routes other than a vague description that "the operations of the LTD [Logan Transit District] are limited to the city limits of Logan" (CMPO 1996, p. III-9). A map of the routes is included in the third revision of the plan. Bicycles are given a single paragraph, stating that although there are no specific facilities in the urbanized area, the roads are wide enough to accommodate bicycles. Pedestrians are similarly treated, stating that sidewalks exist within most of the Logan City limits, nothing more. The description of the roadway system, however, implying automobile traffic only, was given two tables, four classifications of capacity, three classifications of ownership, and 4 figures — one map and three cross section of different types of roads. A level of service measurement was also created to rate the efficiency of traffic flows on the roads in the third revision. Present and future traffic volumes are shown for more than thirty points throughout the LUA. There are no counts for bicycles, trains, pedestrians, nor bus usage statistics. Sadly, the ideals of the ISTEA have fallen short in this auto-centric paradigm.

The purpose of the ISTEA, the legislation that is the impetus behind the *Cache Metropolitan Area Transportation Plan*, was to increase awareness of the role of land use, air quality, traffic congestion, and water quality in transportation planning. The theoretical outcomes of this consideration should be increased environmental awareness, increased alternative transportation access and use, and a subsequent decrease in deleterious effects. Because of the conditions and planning that currently exists in the LUA and mimicked in similar urbanized areas throughout the nation, the ISTEA has been ineffectual because of a rise in single-occupant vehicles, a decrease in

mass transit demand, and increasing suburban sprawl (Imhoff 1996). The Clean Air Act Amendments of 1990 also strive for planning consideration of the connection between transportation, land use, and air quality (Shrouds 1995). The LUA is an attainment area and consequentially not restricted by many of the mandates in the amendments. However, lack of air quality considerations and the anticipated increase of traffic demand in the current transportation plan could lead to non-attainment status in the future with a host of restrictions that the current paradigm is not ready to face. Several of the planning documents reviewed previously acknowledged the delicate nature of air quality in the LUA. The lack of a proactive, preventative approach now will also prevent the additional choices possible only when an area is not labeled as non-attainment. It is possible that pollution in the LUA does presently exceed air quality limits, but light winters and a short length of monitoring time may have made the air quality seem better than it really is (Wennergren 1996).

The lack of consideration for the true intentions of the ISTEA and the Clean Air Act Amendments reveals the plan's paradigm — an auto-centric world where automobiles are the only acceptable, recognized, legitimate means of moving throughout the urbanized area. The other municipal plans also seem to adopt this paradigm. In a public-access radio interview on April 23, 1997, Andy Huneck, senior planner for the CMPO, was asked why comments from the public regarding the auto-centric nature of the LUA's transportation plan and the lack of alternative transportation considerations were ignored in revision of the draft plan. Huneck replied that the plan was only created to be in compliance with federal regulations for planning and that pedestrian and bicycle planning would be added later. The central theme of the question, and of the objections to the plan, seems to have been missed as a result of this paradigm. The caller was not suggesting that alternative forms of transportation be considered in the plan, rather, they should be considered first as the essence of future transportation in the LUA and recognized as legitimate means of transportation. This radically different paradigm is the source of much contention between the CMPO and the public. In the draft plan, the answer to congestion and capacity focuses on more accommodation for automobiles as the answer, with alternative forms of

transportation as supplemental accessories that will add marginal benefits. What the opponents of the plan seem to claim, and what considerable research and theory in urban planning seems to corroborate, is that by reducing accommodation for single-occupant automobiles while increasing opportunities and feasibility for alternative forms of transportation, the problems associated with traffic congestion will be addressed in a more sustainable fashion.

For example, the geographic funnel of traffic in Logan from the Island and the south-east bench, in part due to shortsighted planning and zoning, has been identified as a problem in the LUA's transportation plan. One suggestion to ameliorate the resulting congestion was to build a gondola from the Island area over the embankment to the university campus above, but this idea would provide little benefit for such a tremendous cost and was thus ruled out. Currently, however, one route of the transit system serves the Island, but it is also the least used route, in part due to the very low-density, residential nature of the area. The route to the Island alternates with a route to the south-east bench. Thus, all other routes in Logan are serviced every half-hour by the transit system, but the Island and south-east bench development must share a route, thus receiving service once per hour. The amount of people living on the Island and south-east bench is not large, but when all the residents use single-occupant vehicles to get to services or work on the north-east bench or center of town, congestion occurs.

In reaction to the congestion produced by these residential areas, the *Cache Metropolitan Area Transportation Plan* proposes to increase the capacity of the road connecting the Island and south-east bench areas to Main Street — a road that also happens to run through a historic district which the city is trying to preserve. The project would effectively increase the capacity of the road so that automobiles could quickly get to Main Street where congestion is even greater. It is also in this congested area that one of the two enhancement projects are proposed. It involves paving a pedestrian / bike path up the steep embankment from the Island to the university to the north. Not only does this path terminate on a major principal arterial, but it still provides little alternatives for other destinations in the LUA. Many existing paths already lead up the embankment which are used by students of the university, however many of the roads in the Island area are without paved

shoulders or sidewalks. The pedestrians and bicyclists would therefore have to brave a narrow, dangerous street full of automobiles rushing to Main Street to use the path.

This example is typical of the plan's reactive approach to transportation — major improvements for automobile capacity and token gestures for alternative transportation. It's understandable however. "Enhancing automobility — the ability to get from place to place in the convenience of one's own car — is and has been the dominant paradigm guiding transportation investments throughout this century" (Cervero, 1995, p. 120). This type of response to transportation strains is a band-aid fix for much deeper problems that require a more encompassing, holistic policy (MacKay 1987). Land use is one of the deeper problems that is making this automobility paradigm into an imperative that, if followed, will lead to a future where that paradigm has no possibility of being questioned. For example, suburban sprawl, a relic born of the WWII era, divides and classifies land use into distinct districts and uses and has consequentially mandated transportation to the point of frustration rather than an enhancement of life. "Suburban sprawl increases pollution, saps inner-city development, and generates enormous costs . . . ." (Calthorpe, 1993, p. 15). It is precisely the invention of the automobile that has allowed such segregated land use to continue developing, entering builders and planners into a positive feedback loop of automobile dependence. The paradigm of those contesting the LUA's transportation plan seems to focus on incorporating the concept of interconnectedness between many civic issues such as land use with the transportation issue.

A new movement has begun in urban and transportation planning that redefines the principle user of a transportation system as the pedestrian, not the automobile. It is a movement away from capacity, away from even mobility, and into the realm of accessibility. The capacity paradigm, like the paradigm of the LUA, strives to move more vehicles more efficiently. However, this paradigm has been shown to be a positive feedback loop. Increasing capacity will lead to increased traffic (Sherret 1992). The mobility paradigm focuses on moving people instead of automobiles. From this point of view, busses, ride sharing, and similar projects help alleviate the demand for more vehicles on the road. However the accessibility paradigm questions

movement itself and suggests that services and residential areas should be within reach of each other (Carlson, Wormser, and Ulberg 1995). Mixed-use development is essential to this paradigm. Under this new paradigm, transportation planning must take more into account than simplistic measures of traffic counts and road capacities. The social needs of residents, the needs of residential districts and commercial development, land use constraints, air quality, and the city as a system must all be included in a well balanced transportation plan. Many cities are responding to these pressures by building more sidewalks and pedestrian trails, better multimodal roads, and better mass transit ("Liability Issues" 1996). This paradigm shift has arisen from a larger, interdisciplinary perspective on the problem of transportation and its multifarious effects which, if adopted, may help the LUA plan its transportation future in a more sustainable, less contentious fashion.

A Global and Ethical Perspective

The LUA, although located in a valley surrounded by mountains, is not an island. The LUA is a constituent of the many urbanized areas that form the United States. The policies and actions in one area of the country can and do affect conditions in the LUA. Likewise, the United States is a member of the nations that make up the world and therefore affected by actions elsewhere in the world. The planet itself is a closed system which, although large, is finite in its resources. It is easy to ignore events and conditions in far away places as insignificant to one's daily life, but it can not be ignored that the LUA is a member of this closed system. Events that occur in the LUA do affect different areas of the world in subtle ways, and vice versa. Therefore, it would seem unethical to disregard the greater ecology when planning for local futures. The two futures are one in the same.

Part of the ethical problem with the unquestioned accommodation to the automobile is that the social, political, and environmental effects of automobility transcend the individual driver's local actions; the LUA is no exception. Pollution of the air from exhaust, ground water from

spilled fuels and road salts, and of the land from mining of the materials required to make the automobile and replacement parts all affect people who receive no direct benefit from driving an automobile in the LUA. Congestion in the transportation system and the subsequent loss of time for drivers is another effect of the proliferation of the private single-occupant vehicle and a planning paradigm that is compliant to it. Finally, injures and death from automobile-related accidents or pollution are a great social cost that is shared inequitably (Greene, Sperling, and McNutt, 1988).

A larger look at the transportation systems of the nation might help put the ethical ramifications and environmental consequences of automobility in greater perspective. From 1982 to 1994, after the shock of the oil crises of the 1970s, the United States has seen gasoline prices fall by 0.5% per year in price — the only country out of 7 other comparative industrialized nations to see such a drop. Additionally, the United States enjoys the lowest price for gasoline with Canada a comfortable second before the gap widens significantly.

If dollars are held constant at 1990 value, almost all nations in this comparison show a decrease in prices during the same time period, however the United States' discount is virtually double the others: 4% per year. Because of these decreases, it is not surprising that the average annual miles traveled in the United States by personal vehicles has increased between 1970 and 1993 by 0.7% per year. In contrast, countries such as Japan, Finland, Holland, and West Germany have decreased their miles traveled by 1.7% per year. Some other European countries kept annual growth to 0.3% or lower. Put into a more specific context, the average American vehicle traveled 13,186 miles in 1993, more than 4 times the distance from New York to San Francisco. To complete the equation, when the number of automobiles are factored in, America produced 3,055,000,000 passenger miles by personal vehicles in 1993 compared to the next highest nation, Japan, which logged a mere 458,000,000 — a ratio of 6:1. The volume of data point to the fact that the United States is the greatest consumer of energy per capita, including fossil fuels-based energy than any other country (Davis and McFarlin 1996).

In fact, transportation in America uses more oil than the combined use of oil by all developing countries for all purposes. This oil comes at a tremendous cost to the United States. Because the transportation sector is the largest consumer of oil products and the most dependent on them, it is in the interest of national security to protect the supply of oil. However, more oil is imported than produced domestically. This leads to a dependence on foreign oil supplies. The cost of this foreign dependence is slightly hidden from the cost of fuel at the pumps. The United States must maintain stability in a volatile Middle East where most imported oil is produced. The Gulf War exemplified the monetary costs and loss of lives that result from foreign oil dependence. Another cost directly related to this dependence is possible economic loss due to fluctuations in fuel prices that are uncontrollable by the government. The OPEC embargoes are testament to this possibility. The costs of pollution and green house gasses are the final great hidden cost of massive consumption of oil by the transportation sector. Increases in lung cancer and respiratory diseases, along with associated deaths, are all by products of inhalation of exhausts from automobiles. Carbon dioxide is also produced in great amounts by automobiles which is considered a green house gas. The costs of rising world temperatures and the associated effects of such a scenario are impossible to calculate (Greene, Sperling, and McNutt 1988).

These effects transcend country boundaries. Air pollution in America can cause acid rain in Canada or global warming around the globe. Wars to protect American oil interests can affect the people of the war zone for years to come and have detrimental effects on their futures. Even economic instability within the United States can cause other markets to fluctuate. According to Mill's principle of harm, any personal action that has consequences on other people, is considered a public action which is liable for public scrutiny and control. In this case, the extensive reliance on private automobile use and the disproportionate consumption of fossil fuels in comparison to other countries, are public acts that should be carefully controlled to minimize harm to those people affected by these actions. When the above facts are taken into consideration, it is ethically reprehensible to encourage transportation by the private automobile.

The government, however, has continued to subsidize private, fossil-fuel burning automobiles in an indirect fashion. Through the building of free-use highways and roads, absorbing the costs of air and noise pollution, providing funding for police and judicial systems to handle traffic problems, and funding other programs that indirectly foster automobile use, the United States spends $300 billion per year in subsidies (Renner 1988). These subsidies are ethically questionable considering all of the effects that a single automobile may have on other people throughout the world. The immediate results of driving appears to only affect the individual driver, however, if the ripple effects are followed, however minute, they do transcend to other areas.

Even from a strictly environmental viewpoint, automobiles produce carbon monoxide, nitrogen oxide, hydrocarbons, lead, fine particulate matter, photochemical oxidants, acid deposition, and carbon dioxide. Ozone is also created from the exhaust. These chemicals alter the environment and endanger the health of those that inhale contaminated air. These health effects are not just limited to human populations. Trees and plants are inhibited by ozone during photosynthesis and animals are affected by carbon monoxide in the same way as humans. Many of the environmental problems that are plaguing western cities are results of transportation and land use planning that allowed for suburban sprawl and fostered the private ownership of automobiles as transportation (Frost 1995).

From this global and ethical perspective, the LUA must place itself in context and accept a duty required of a member of a larger community. The population of the area is a small fraction of that of the world's population, however it consumes more per capita that most other people of the world. Likewise, it is true that because of the small population, conservation and efficiency measures would make a small impact on the energy usage of the entire nation, but the impact has potential if other urbanized areas follow in attempts to decrease the harmful effects of transportation. In order for transportation planning to be ethical and ecologically sound, it must strive for efficiency, convenience, and equity in the availability of transportation for people, goods, and services. Implementation must therefore include short-term programs to change driving

habits, long-term programs to change the nature of transportation, and fundamental changes in land use and facilities for modes of transportation other than the single-occupant vehicle (Johnson 1994). With this in mind, it seems highly unethical and unsustainable within this larger context to continue building the LUA into an automobile-dependent community.

Local Perspectives and Consequences

In March 1997, after several months of meetings with over 100 voluntary community members representing a cross section of the community, a statement of values aimed at guiding future policy decisions for the city of Logan was published under the title *Logan, Utah: A 2020 Vision Strategic Plan*. As explained earlier, the purpose of the document was not a plan in the traditional sense, but rather a statement that "will serve as a resource for present and future policy makers to know the will of the 'silent majority' of Logan City" (Executive Alliance Group 1997, p. i). The process of identifying these values included interviews with consultants, reviews of the city's master and other plans, and economic forecasts. In order to ensure equity, representatives were chosen to cover all geographic areas, business and industry, education, and other organizations. What they decided upon is an interesting contrast to what the LUA's long range transportation plans will do. It is a statement of goals that the residents of the city want for themselves, but the planning that is occurring does not fulfill these goals.

According to census information and estimates from the county wide planning office, the population in Logan will rise from a 1995 count of 39,227 to 57,732 in the year 2020. The entire county population, of which the LUA represents about 77%, is expected to grow from 70,183 to 141,889 within the same time frame. The assumption that projected growth of 50 - 100% over 35 years will effectuate economic prosperity is explicit in the plan: "This kind of growth will spur even larger economic growth as retail franchises driven by population numbers begin to move into Cache County" (p. 3).

There is doubt, however, as to the reality of such a relationship. The plan states a desire for an expanding economy, but trends seem to suggest this is not what is occurring. Although the unemployment rate was 2.7% in January of 1997, the percentage of the population in poverty rose from 14.3% in 1980 to 21.6% in 1990. Home prices have almost doubled in the last seven years, requiring approximately $42,000 in annual income for purchase. In addition, a bachelor's degree or higher is held by 36% of the population. The data are inconclusive but obviously do not point to an expanding economy. Growth continues as populations fail to stabilize. However, the connection with economic prosperity is slightly more complicated. Land use, transportation systems, and economic development are intertwined in a complicated relationship that is not fully understood. The best approach to economic development, which the residents have stated that they want, includes managing growth and developing transportation systems that are reflective of local land use issues. "[T]he economic foundation of cities is trade" (Jacobs 1961, p. 340). Two crucial aspects that help foster trade in an economically successful city link together in a tenuous balance — high population density and fluid transportation and communications systems that facilitate trade and "multiplicity of choice" (p. 340) for its citizens. The transportation system of a city that trade depends on can be thought of as the decoction of prosperous city.

Despite an implied understanding of the interconnectedness of economic growth and transportation systems, the *Strategic Plan* concedes that growth in Logan will create demands on transportation that will require increased capacity or reduced travel demand. The plan chooses to modify the "existing infrastructure in order to handle the anticipated increase in traffic" (Executive Alliance Group 1997, p. 7). This type of paradigm will not lead to the desired goals set forth in the plan.

Other key issues were identified that include: economic vitality, roadways and transportation, and quality of the environment. The priorities in dealing with these issues were: maintaining clean air and water, maintaining and expanding a high quality of life in Logan, public safety and fire protection, quality of education, and economic vitality within the county. The group envisioned a future for Logan that includes the city as a "regional commercial and industrial center"

(p. 11) with mixed development and preservation of open spaces, managed growth that is limited to specific areas, and strong city planning that would be more than reactionary. Again, the relationship to an efficacious transportation system is undeniable. An efficient, sustainable transportation network is inherent in achieving the priorities set forth.

The group identified certain threats to this vision for the future of Logan. The inclusive list states: "unplanned, unmanaged growth; pollution; traffic congestion; crime; losing retail business; loss of open space; over building; low paying jobs; lack of communication between cities and county; and uninformed and apathetic citizens" (p. 12). It appears that an embryonic understanding of the interconnectiveness of many issues is beginning to form by identifying these threats, but the paradigm has still not shifted to one that will functionally integrate transportation into the equation.

For example, the report admits that Main Street, which runs through the heart of downtown Logan, has reached average daily traffic of 35,000 which is "near or over capacity" (p. 7). The need for high density, close proximity development is also implied to reduce the amount of roads needed to bring distant populations into the city. However, when the specifics of how this will be accomplished are set forth, land use development continues to focus strictly on density as a function of dwelling units per acre, ignoring services location and transportation patterns.

Logan is in a serious predicament that is greater than the plan gives credit. The city is really divided into parts. High traffic demands on 400 North, 200 North, and Main Street are the result of these being the only roads to transect the valley. If a driver is travelling North, Main Street must be used. Highway 89 and Highway 91 both happen to also be Main Street. Increasing capacity on these roads will only serve to divide the city into more distinct sections, but it is almost impossible to built alternative routes. Because development has increased on both sides of the canyon on to great heights, it is impossible to build a bypass in which canyon traffic on Main Street and 400 North could avoid the city center. A north-south route to the west could divert through traffic around the city, but there are several problems with this. First of all, a route was constructed in the 1970s - 10th West. This was meant to be a road that would accommodate large loads of traffic at

high speeds, but an elementary school was built on that street which mandated slower speeds that now dissuade drivers. Also, to the west is the only real place for development of the city to go. Factories and businesses have grown up along this road, along with some residential development to the south. One final limitation is the presence of wetlands to the west of Logan which adds constraints and mitigation requirements.

One of the core values in the *Strategic Plan* is an "active, viable city center" (Executive Alliance Group 1997, p. 15). By increasing capacity and traffic volumes along Main Street, the goal may be unattainable. In order for the goal of a viable city center to be reached, the problem of these great dividers must be answered instead of creating new corridors to move more people around. Indeed, the new corridors may produce even more divisions throughout the LUA as traffic becomes heavier. With the size of the road and the volume of traffic, two things become apparent. Pedestrians don't like to walk next to such a spectacle and businesses that currently occupy the downtown area are painfully discovering that such a road is not conducive to small stores and close storefronts that pedestrians favor. Instead, strip malls and outlet stores with huge parking lots in front that are adjacent to this road are the fittest beasts.

Currently there are two roads designated in the LUA transportation plan as existing principle arterial roads. These roads are Main Street and 400 North street — the same streets that form the heart of Logan. According to the road classification system adopted by the CMPO, a major arterial (labeled principle arterial on the figure depicting it), is designed to

> move traffic to destinations within Cache County and to provided access in and out of the County. During the peak hours, these roads handle most of the traffic demand within the County. These roads should have limited access to adjacent land use (CMPO 1996, Table III-2).

Unfortunately, being located in the middle of town, having "limited access to adjacent land use" is just impossible. The land surrounding these arterials is the same land that forms the historic district, the university, major food markets, and the majority of commercial / retail stores are located on these roads. A few of the area's fine dinning establishments have outdoor seating that is located on Main Street, making for an interesting dinning experience as large trucks roar by.

The LUA plan calls for improvements to increase the capacity of Main Street, but one small paradox remains. In efforts to increase capacity in order to relieve congestion, traffic demand may increase as a result. By increasing efficiency, drivers will perceive the advantage for their own use and respond by using the transportation system more rather than less. The opposite also seems to be true. By allowing for a certain amount of congestion, drivers will perceive the hinderance and chose an alternate course or lesson their discretionary driving demands (Hills 1996). The "Parkinson's Law" of highways affirms this idea and adds yet another factor: new roads spawn development which increases traffic demand in a self-fulfilling prophecy (Malone 1996).

It is possible that the decreasing attractiveness of downtown Logan may be somewhat attributable to increasing traffic volumes on the street. Not only do the high traffic volumes seem to deter pedestrians and shoppers in an area that was created for strolling shoppers (store fronts to the streets), the suburban sprawl and concomitant reliance on the automobile, has made malls and mega-stores on the outskirts of town a more attractive option. Malls are essentially a viable city center turned inside-out, with the store fronts facing inward with places to socialize between them away from the annoyance of traffic. Again, the fundamental goal of a viable city center for Logan seems to be undermined by the LUA's transportation plan.

It is the same result for residential districts. As traffic volumes on a street increase, the sense of community within a neighborhood is eroded away. People lose a connection with the road as a part of common property and begin to view it as a dividing line between them and the other side (Appleyard 1981). The LUA transportation plan overlooks these high social costs which directly undermine many of the values set forth in the residents' *Strategic Plan*. By increasing capacity along new corridors, the sense of community that exists along these corridors might decrease. Street noise and heavy traffic represent the highest complaints of residents in neighborhoods, even above crime. A study in San Francisco found that higher traffic levels not only produced higher levels of noise on residential streets, but also decreased the number of acquaintance relationships among residents on more heavily traveled streets. The area of a

resident's personal territory decreased as traffic increased along streets and the level of awareness and concern for local surroundings decreased (Appleyard 1981).

The goals and values, ends and means of the LUA's transportation plan seem to be confused and disjointed insofar as achieving any goal other than increased automobility. The transportation plan purports to "suppor[t] community development and social goals" (CMPO 1996, p.I-1), however the means seem to result in just the opposite results. The plan seems to not only overlook the values set forth by the community in the *Strategic Plan*, but also leave unfulfilled its own mission. If this is true, the plan of the LUA seems to actually undermine the economic and social goals of the *Strategic Plan*. By increasing capacity and possibly increasing demand, the transportation system of the whole area will suffer even more. As inefficiency increases in the system, it's possible that the economic vitality of the area will decrease and the attractiveness of locating new businesses in the area will be tarnished. The increased capacity on Main Street will decrease the attractiveness of the downtown area which the residents have said they want to be viable. The clean air and water they desire will be threatened as more automobiles create more pollution, and the new corridors that the transportation plan calls for will decrease the sense of community within the neighborhoods they cut through.

Possible Futures

Fortunately, Logan has a working prototype of what might provide a model for future transportation planning in the LUA. Utah State University, being the largest employer in the area and arguably the driving force of the growth of the area (its importance is signified by placing the tower of the oldest building of the university on the official seal of the city of Logan), requires thousands of people to commute there every weekday. For the people that live on campus, however, and to some extent, even the people that work there or live nearby, the university campus is almost a micro planned community with mobility and accessibility as the resident paradigm. All services are within walking distance, with a generous network of walking paths and crosswalks

that require drivers to yield to pedestrians, not vice versa. Bike racks are installed near every building and are always in use. The paths are landscaped with trees, grass, and flowering plants during the spring and summer. Places to sit, rest, and socialize can be found with a minute or so of looking for one. The paths are religiously cleared and maintained for pedestrian travel during the snow season (sometimes before the roads). Phone numbers are posted throughout the campus to report icy areas for additional maintenance. This makes the high pedestrian traffic bearable although there are still certain nodes with high congestion. There are many paths to get to the same destination which are all utilized because they do not take the traveler very far out of the way to avoid congestion. All within walking distance are: places to eat, stores, theaters, laundry mats, parks and recreation, an elementary school, housing, libraries, computer facilities — all the amenities that make campuses across the country into mini cities. In fact, the university campus offers services that are superior to similar services in the LUA, such as a football and basketball stadium, theater and concert facilities, and libraries.

Despite 20,000 students and 5,000 employees (the LUA is only twice that population), there is little vehicular traffic on the few roads through campus. The roads are also all single lane roads. What accounts for the difference in vehicular traffic demand between the Logan's Main Street and the university campus? One explanation is an efficient, although arguably unnecessary, bus system that transports people almost 16 hours a day from a central parking area to the main campus area. The bus travels on a three block circuit, turning left every three blocks. The bus system in not really necessary as students walk at least that distance between classes once they are on the main campus. Nevertheless, it keeps traffic congestion to a minimum.

Land use is another contributing factor to the university's unique transportation situation. The densest population areas in the LUA are butted against the campus, facilitating easy access by foot or bicycle for many students. Although this density is extreme compared to the rest of the LUA, it is not a detestable place to live, work, or spend time in. Tunnels under 400 North (the highway that goes east through the canyon from Main Street) that defines the university's southern border, allow safe access to additional parking on the other side, again within walking distance.

Even parking density on the campus is high. The university sports one of the only parking terraces in the LUA, and charges heavily for its use. Not only is it always full, it allows for a maximum use of space on prime campus soil (the terrace is located on the main campus near a convention center).

The opportunities to use bicycles to get around ensure a high number of bicycle commuters. Bike facilities are ubiquitous throughout the campus whereas they are completely lacking in the downtown area. Despite a steep hill on which the university is situated, bicyclists are still willing to expend the energy for the convenience of bicycle travel. Sometimes during the spring and fall it is almost impossible to find a place to park a bicycle. The use of a bicycle becomes even more attractive because of the nearly *de facto* ban on automobile traffic due to centralizing parking away from the campus. Thus bicycle travel is one of the fastest modes on campus. The university has also begun to sponsor an annual "Bicycle to Work Day" to promote cycling among faculty and staff.

Overall, the campus layout seems to follow the new urbanism movement that advocates a design "to accept automobiles, but to resist their taking over completely (Quoted in Malone 1996, p. 140). The result is pleasing. The campus is very sociopedal and relaxing, conforming nicely to the paradigm of accessibility.

Obviously the example of the university was overlooked. In producing the *Cache Metropolitan Area Transportation Plan*, many consequences of transportation were left out of consideration. In this case, planning has primarily focused on the movement of automobiles, without regard to other modes of travel. Because of this single focus, many of the goals and values that the area has espoused for itself are unintentionally undermined. A more holistic, integrated approach that takes issues beyond the immediacy of transportation into consideration is requried if planning is to be effective.

Many of the alternatives to increased capacity become almost intuitive if the planning process is taken on from a paradigm similar to that used in planning the university campus. A successful paradigm should consider land use, air quality, human scale, all associated costs

involved with different modes of transportation, the social and physical needs of residents, topology, zoning, building codes, education, bicycles, and pedestrians. The university example seems to have considered most of these factors. The list is virtually endless because of the ripple effects that transportation decisions produce. Some of the following are ideas that could be incorporated into the LUA's transportation plan. The list is by no means inclusive, nor decisive; it is not the mission of this report to dictate what would be best for the LUA. Only through public involvement and consensus can a set of workable projects be selected to help the community achieve the goals it sets for itself with assessable criteria.

Public Involvement in Planning A city and its residents must decide what the future should be for the city. Different goals dictate different approaches and steps to be taken to achieve these goals. Variations in the public's perceptions of what is best for the city may have been a source of the contention that was experienced in the first public meeting on the LUA's transportation plan. By including public involvement throughout the process, and clearly defining what goals the plan is trying to achieve, inconsistencies may be avoided. In the planning process, goals should be stated in specific, assessable language instead of broadly sweeping generalizations that may be interpreted differently and cause contradictions (MacKay 1987). In some ways, the city of Logan is ahead of the game on this one. In the *Strategic Plan* mentioned previously, goals and values have already been set forth by the community in this document.

The importance of public involvement is written into the ISTEA. According to the planning regulations, the urbanized area should strive for "informed and involved citizens who have access to public records and the decisionmanking process" that results in "full public access to key decisions, and opportunities for early and continuing involvement" (*CFR* 1993, p. 58067-72). This can be done through promotions much like advertising for a product. Brochures, talk show interviews, regular newspaper stories, block parties, newsletters, and speeches to established groups such as the Rotary Club are all strategies for keeping the public informed about transportation issues (Lalani and Gerard 1995). In this case, the LUA's transportation plan failed to consider "land uses, urban growth boundaries, socioeconomic conditions, and other factors"

(Weibel 1997, p. 3) that the residents felt was important. "[S]everal residents . . . have criticized the proposed plan for failing to recognize long-established neighborhoods," the residents of which did not want increased traffic in their area (p. 3). Greater communication with the public might have avoided these failings.

By defining what is valued and desired in the LUA by those who will be affected, effective plans can be made to reach those goals. In the LUA's transportation plan, goals and a mission statement are clearly stated, however limited consideration of the effects of the planned projects and the efficacy of the plans themselves limit the solvency of the plan. Therefore, a more holistic, interdisciplinary approach must be encouraged.

Land Use and Zoning "Large areas of single land-use zoning clearly create a compulsion to travel. . . . The creation of dispersed, mixed, land-use developments would clearly reduce this compulsion to travel" (MacKay 1987, p. 85). When the reciprocal nature of land use and transportation demand are understood, zoning can easily be incorporated into a transportation plan to help alleviate transportation demand. By creating neighborhoods built to human scale, with an emphasis on mixed-use cores within walking distance of residences and transit stops, the focus for travel demand will move towards pedestrian and transit modes (Atash 1994). In Toronto, Ontario's attempt to decrease carbon dioxide emissions, it promoted alternatives to automobile transportation by changing its land use policies (Harvey 1993). Establish neighborhoods can also be modified to encourage alternative transportation usage. Zoning codes can be rewritten and incentives offered to encourage infill (Hensher 1993) which will result in higher densities and less travel demand. This is particularly important in the LUA where population densities have been kept very low.

Land use can also be affected by changing building codes for new development that requires accommodation for alternative modes of transportation. For example, new stores could be required to install a number of bicycle facilities in proportion to the number of parking stalls that are built for automobiles. By changing local legislation, simple incentives could be created to bring pedestrian-friendly business back to the city center. Property taxes could also increase as the

number of parking stalls increased in comparison to the floor space of the building it serves or as a function of the distance that the business is located away from the city center. Conversely, tax breaks could be offered for businesses that choose to remodel existing facilities to conform to voluntary building codes. These codes could include moving parking lots behind buildings, providing seating in front of the building, installing showers in places of employment for bicycle commuters, and converting portions of unused parking lots into small urban parks. The philosophy behind making new development conform to specific designs and layouts is that traffic demand arises from the need to get to and from these places. The introduction of the automobile into American life allowed for suburban and commercial suburban development to develop by allowing mobility between jobs, services, and home. Businesses have moved into these large residential ares creating a new commercial district often on the fringe of some central city (Chappell 1993) which creates an increased need to travel without bearing the costs of increased travel demand. By moving the cost of getting around to the places that people are going to and from, more efficient transportation systems may evolve naturally in a more centralized pattern.

New residential development should can also be carefully considered in its future impacts on the transportation system. Zoning requirements that mandated transit-oriented design, traditional neighborhood design, or pedestrian pockets would aid in reducing future traffic demands. These types of residential design are examples of the accessibility paradigm that tries to reduce the demand for travel by making everything more convenient.

Bicycling Many immediate solutions to traffic congestion are not very capital intensive if the bicycle is treated as a legitimate form of transportation. Increasing the opportunities for bicycle usage through changing of building code ordinances and zoning laws as mentioned above are simple, cost effective strategies at reducing traffic by making bicycling feasible and viable. The costs, compared to increasing capacity for automobiles through new road construction, is minuscule including the reduced costs on the environment which are hard to calculate in terms of economics.

The National Bicycling and Walking Study: Transportation Choices for a Changing America, issued by the U.S. Department of Transportation in 1994, presents guidelines and suggestions for implementing a successful program to increase the use of a city's infrastructure by non-automobile users. The bicycle / pedestrian coordinator for Gainsville, FL observed,

> Our long-range [transportation] plan calls for widening roads as a way of meeting transportation demands, but we have maintained the idea that if we promote alternative transit modes, we might not have to build them as quickly, or we can exist with four lanes rather than six (Quoted in Feske 1994, p. 9).

The suggestions included a full time coordinator for alternative modes of transportation, an advisory committee that includes citizens, creating standards and ordinances to accompany alternative modes of transportation, and funding new facilities. Gainsville, FL passed a bicycle parking facility ordinance and a zoning restriction that required all new roads to have bicycle lanes. Boulder, CO decided to halt road construction in its congested downtown area and instead create a shuttle bus system that stops at major points of activity to help accommodate pedestrians (Feske 1994).

Education and data collection on these modes of transportation are also essential to successful integration into a transportation plan. Additionally, most funding that would be used for road construction can be used for such projects.

> Specifically, bicycling and walking projects may be funded by the National Highway System, Surface Transportation Program, including Transportation Enhancement Activities allocations, Congestion Mitigation and Air Quality Improvement Program, Scenic Byways Program, Federal Lands Highway and the National Recreational Trails Organization. In addition, pedestrian and bicyclist safety are priority areas subject to expedited approval for Section 402 highway safety program funding (Feske 1994, p. 72).

The report concludes that steps to balance the transportation system of an urban area will create real alternatives for the individual and community. The efficacy of such projects can be seen in Minnesota where weather is often inhospitable to bicycle travel. Through the assistance of a full-time coordinator for bicycle travel and street modifications that include shoulder paving and traffic calming devices, bicycle usage has increased to twice the national average. Considering that the Department of Transportation study found that 25% of all automobile trips are a mile or less, making bicycles a viable alternative may reduce congestion significantly (Malone 1996).

Education Some studies suggest that driving choices are more habit than rational choice. One survey found that many people don't take the time to find alternatives to the automobile to satiate their transportation needs (Malone 1996). Opportunities for alternative modes of transportation will be of little use if the public they are designed for is unaware of their existence or incompetent in their use.

Such education could take place not only in the local schools by modifying the curriculum to include lessons on transportation and its consequences, but the public at large could be educated by offering opportunities for car pooling with a matching service. Car pooling should be a viable alternative to the single-occupant vehicle. Sophisticated computer systems similar to those used in scheduling airline reservations could help match potential riders. Congestion-related delays could be reduced by 50% in rush hour if car pooling could reduce traffic by 10% (Stix 1995). By investing in these types of systems and offering the service to the public or businesses, the public could learn about this and other transportation alternatives. Again, local ordinances could even mandate that places of employment with a large number of employees instigate measures and incentives to encourage car pooling or using alternative modes of transportation. Additionally, compared to the costs of new roads, the costs involved here are minimal.

Similar in nature to including the public in the planning process, the public should also be constantly informed of the issues involved in transportation. These sorts of measures are aimed at changing the habit of driving. Air quality measurements could be printed in local papers for example to show the effects that driving is having on the air — a sort of semi-real-time feedback. Promoting a day to bicycle to work or other events, like that done at Logan's university, would also help in showing the public that alternatives exist and are condoned in the LUA.

Building for Multimodal Transportation Informing the public of alternative forms of transportation will not produce any meaningful results if the infrastructure is hostile to them. Planning projects must be willing to modify existing infrastructure to accommodate alternative forms of transportation while in some instances decreasing the accommodation for automobiles.

In most cases, sidewalks exist throughout Logan and in other parts of the LUA. In addition to building more sidewalks for pedestrians, they should also be maintained in the winter with prompt snow removal. Failure to do so will leave walkers with little alternative than to drive which will increase pollution during the most sensitive time of the year for air quality. A serious effort to clear the sidewalks quickly and thoroughly will show a commitment to pedestrians.

Other modifications range from simple and inexpensive to radical modifications. Bus priority systems (Hensher 1993), such as giving buses rights of way, special travel lanes, or devices to change stop lights to green, increases the efficiency of mass transit with little monetary cost and minimal infrastructure modification. Another cheap modification to the transportation system is limiting access to single-occupant vehicles. This can range from establishing high-occupancy vehicle lanes to an outright ban of single-occupant vehicles on certain roads at peak hours of travel. Singapore has established a permanent ban on all single-occupant vehicles in its Central Business District to alleviate congestion there. This policy has been very effective also in decreasing air pollution in the area (Chin 1996).

Conclusion

The lack of planning for the needs of the future and consideration of the impacts has been shown through history to be the major cause of today's crises. It is catastrophic to ignore the lessons of the past and continue to allow sprawl and private transportation instead of alternatives such as defined urban growth boundaries and public mass transit (Frost 1995). Of course no one can predict the future and what constraints and demands will bear upon the LUA in 20 years, but holistic, community-centered planning can at least offer a way of being involved. A movement from reactionary quick-fixes to pro-active, visionary projects will bring the LUA into the 21st century in sustainable fashion. Planning should not be approached as a burden or constraint, but as an opportunity to uncover problems and opportunities before its too late.

In this case study, the *Cache Metropolitan Area Transportation Plan* is an honest and understandable reaction to the problems of congestion and increasing demand for transportation within the LUA. Considered solely on the criteria of increasing capacity to decrease demand, the plan is essentially well thought out. However, when compared to other planning documents and the goals that the residents have set for themselves, the plan falls short and in some instances even undermines those goals. A lack of consideration of the multifarious effects that transportation has on a city and the people living there is the primary cause of the plan's shortcomings. A broader consideration of the LUA as an organic system within a global context, with a set of community-defined goals as the desired end, would result in transportation planning that was sustainable, agreeable, and ethical.

A paradigm shift is essential in creating an effective transportation plan for the future. Environmental constraints and consequences are playing a greater role in every aspect of life as resources begin to dwindle and pollution continues to increase. An approach must be made that accepts the closed-system nature of the Earth and the far reaching consequences of one's actions. The movement towards the accessibility paradigm in city planning takes such factors into consideration and strives for the greatest efficiency possible with the smallest amount of movement. New paradigms may emerge in the future that weigh other factors of the ecosystem into transportation planning as ecological knowledge increases. An effort to consider as many factors as possible will likely prove to be the best approach.

The LUA is still in the process of revising its transportation plan. If it is adopted in its present form, unpleasant consequences will probably result because of its limited scope in planning. The possibility does exist, however, for the LUA and other urban areas in similar situations to take a pro-active approach towards their transportation futures as recommended and described in this report. The concepts involved are simple and often proven to be highly effectual, but old habits are hard to break.

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