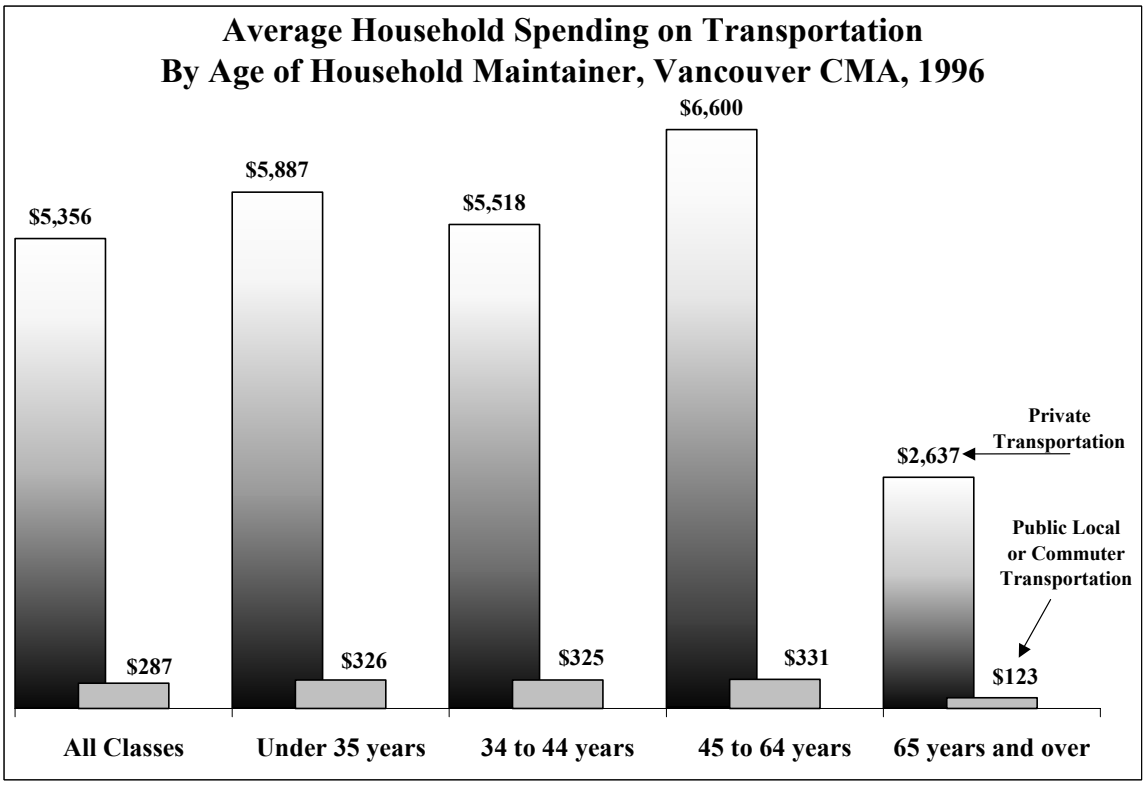
The Urban Futures Institute
Research on Population, Community Change and Land Use

Getting There:

A Discussion Paper on People, Jobs and Places as a Background for Five Year Strategic Transportation Planning in Metropolitan Vancouver



Prepared for Translink
The Greater Vancouver Transportation Authority

by David Baxter

The Urban Futures Institute Report 43

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Getting There:

A Discussion Paper on People, Jobs and Places as a Background for Five Year Strategic Transportation Planning in Metropolitan Vancouver

by David Baxter, January 2000

I. Purpose of Report

This report presents a discussion of certain demographic, economic and land use issues that are of relevance to the development of a 5 year regional transportation strategic plan and the review of regional strategic land use plans within the Metropolitan Vancouver Region. In reading these comments, it is important to keep in mind the 5 year time frame: this paper deals with factors that will be of relevance during this short to median term time frame, rather than changes that may occur in the long and very long run (see Section XI). Some of the comments in paper do have implications for planning horizons that deal with the fullness of time, but its focus is on the next five years, and on the subsequent five years that the first five will set a context for.

One of the immediate implications of this near term time frame is that there will not be much change in either the urban structure or the transportation technology of the region, just are there has not been much change over the past decade. Change in urban areas is measured in multiples of decades, not in months or years. Thus the strategic planning issues for the next decade will essentially be ones of service levels rather than of responding to significant regional changes with respect to behaviour, transportation or land use.

II. Transportation as a Link

To a large extent, the demand for transportation services (the services provided through the use of transit, roads, rails, airports, guide ways, paths, etc.) is almost entirely derived from the spatial separation of land using activities. While there are instances where there is a direct demand to consume transportation services ("Lets go for a drive"), most use is to go from one specialized land using activity site to another. Thus strategic planning for transportation services and infrastructure includes consideration of the specialized and spatially separate land using activities that generate transportation demand.

Traveling between spatially separate activity locations within metropolitan regions – the cliché being that of housing in the suburbs and work downtown – has been seen as the root of much evil. The Sierra Club refers to suburbs as the "Dark Side of the American Dream", causing congestion and commuting that steal time from family and work, pollutes air and water, destroys farmland and recreation space, increases flooding, and increases taxation to pay for new infrastructure while old infrastructure is underutilized. To deal with "the Dark Side", a number of what are at best simplistic, and at worst misleading, land use planning concepts have been advanced. These are intended to reduce the amount of travel that occurs in metropolitan regions by either shortening the distance traveled, or eliminating the need to travel, between activity locations. In the following sections, the major themes of these concepts are reviewed.

III. Living Close to Work – The Residential Location Decision.

One land use planning concept that is often suggested to reduce demand for transportation services and infrastructure is to get people to live close to work by maximizing "the opportunities for people to live close to work and work close to home". If not subjected to analysis, this concept has a strong appeal, as it appears to reflect irrefutable economic logic: a rational economic person would reduce their travel costs if they lived closer to work. According to this logic, if it was easier for people to live closer to work, they would. As a result not only would the demand for transportation services be reduced, but so would air and water pollution, floods, taxes, the amount of land used for transportation, etc. As well, supposedly not only would people save money by traveling shorter distances to work, but they would also reduce the amount of time commuting takes from work, friends and family. Clearly, if the underlying purpose of giving people more opportunity to live close to work is valid, anyone who chooses not to live close to work when they could is not only economically irrational, but anti-social as well.

Unfortunately, the logic on which this goal is based is not complete, as it ignores both the consequences of people trying to live close to work and the fact that travel cost minimization assumes that all other things are equal (ceteris paribus or partial equilibrium analysis). As the remainder of this section demonstrates, when these aspects of economics are considered, it is apparent that "maximizing the opportunities to live close to work and work close to home" will have little, if any, impact on transportation demand in metropolitan regions.

1. Land prices and accessibility.

Travel costs are a function of distance: the farther a person lives from a place of work, the greater the direct and indirect costs (gas, tire wear, time lost, depreciation, etc.) incurred by traveling between their places of residence and of work. Further, there is no question that these increased costs will reduce the amount of a household's income that is available to spend on other goods and services. All other things equal, a worker who lives close to work will have a lot more money to spend on things other than getting to work: assuming that the place of work is downtown, the further workers choose to live from downtown, the less money they will have to spend on other goods and services (Figure 1).

To examine the impact of travel costs on workers' location decisions, a spatial economic rent model is generally used. In the simplest form of this model, the only two things a worker would spend money on which are location specific are on travel costs and on places to live: all other costs (food, clothing, household operation, etc.) are the same regardless of where people live. In this case, the amount that can be spent on a place to live will decrease as distance to work (cost of transportation) increases (Figure 2). Living downtown means that a worker would have no travel costs and hence could use the entire housing/travel budget for housing. Workers would have less money to pay for housing the further they lived from work as travel costs would increase as a function of increasing distance from downtown. In the example shown on Figure 2, a worker would not live more than 17.5 miles from downtown, as the cost of traveling to downtown from places of residence located at this distance or further would leave no money for housing

An interesting effect of population growth is a steepening of the bid rent curve as more people have to be accommodated within the region. Note that the margin of urban development (17.5 miles in the example) will not extend outward as a result of population growth alone. With the same incomes, preferences, and transportation costs, all of a households transportation plus housing budget will be allocated to travel at mile 17.5 regardless of population size: no worker can afford the transportation costs of living further than 17.5 miles.

Figure 1: Transportation Costs Increasing With Distance From Downtown

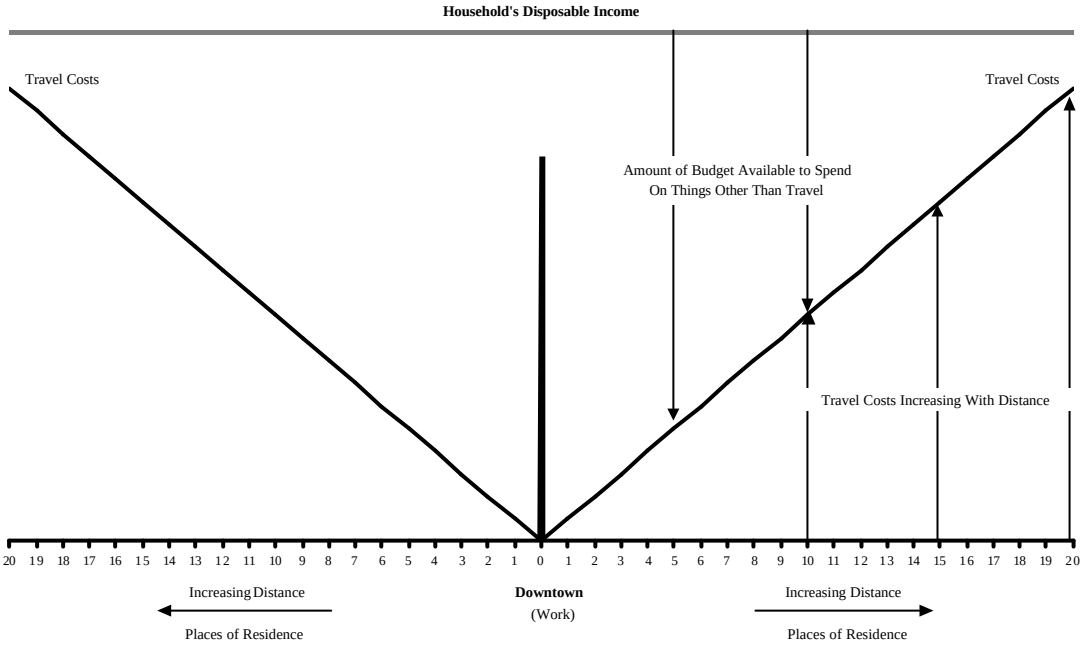
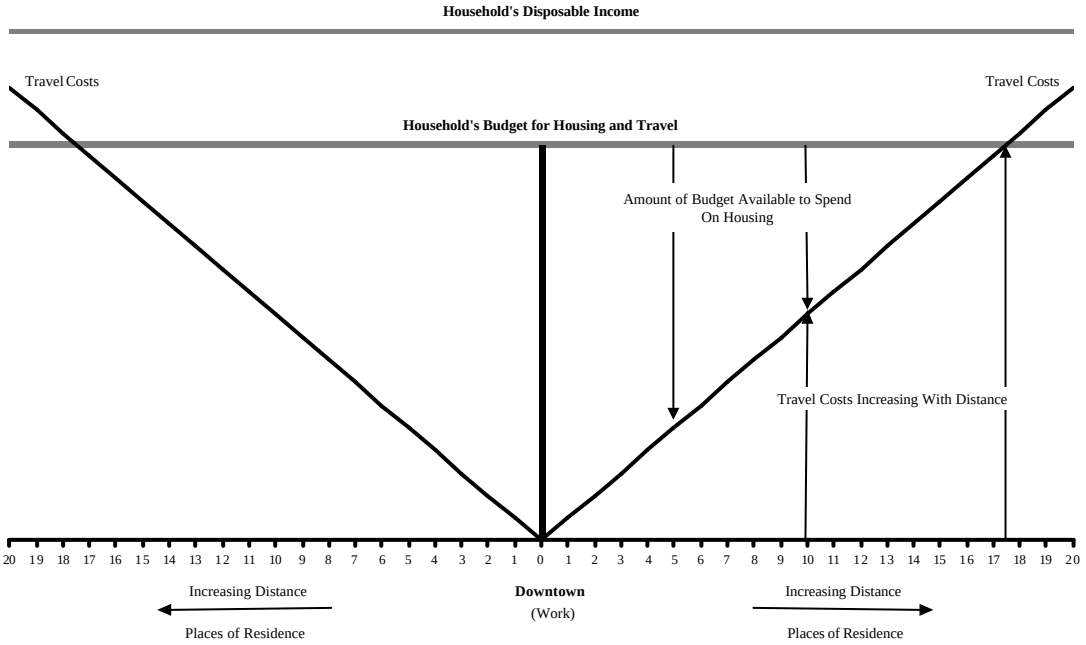


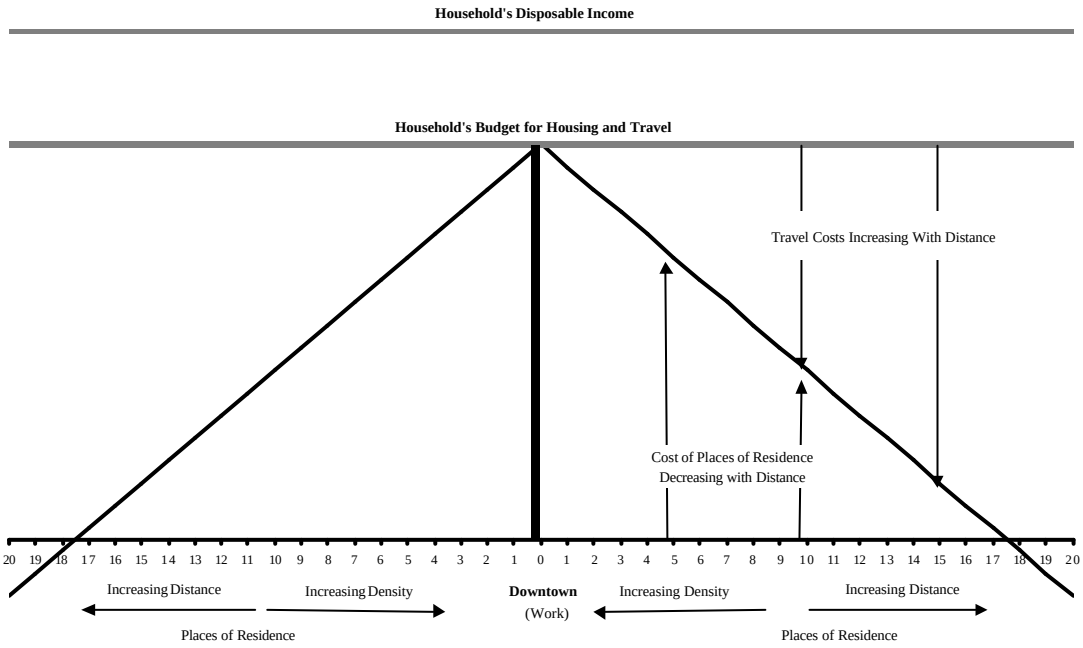
Figure 2: Transportation Costs Increasing With Distance From Downtown



Unless something changes, the urban boundary will not expand even as the population grows: the land within the urban margin will simply be used more intensely. Of course, something always changes. Households might choose to increase the amount they spend on housing and transportation, either because they reduce their consumption of other goods and services to travel further to lower densities or because the prices of other goods and services falls. Incomes might increase and transportation costs might fall. For the urban boundary to expand something must increase the amount of money that households have left over after paying in the travel costs to reach the urban margin so that they can have a positive bid for land. Note also that this model assumes that the margin is established solely by the amount that workers have left over after paying transportation costs: in reality the margin will be closer to downtown, as the amount workers bid for land for housing must exceed the amount that farmers bid for land for farming.

In order to live close to work and save money and time, a worker has to be able to outbid all other workers who also want to live close to work in order to save money and time: competition between workers for sites will result in a direct trade off of transportation savings for higher housing costs (Figure 3). As all workers will be willing to exchange some of the economic benefits that result from living close to work in order to live close to work, competition between them will ensure that the travel saving benefit of living close to work will be spent on obtaining a place of residence which offers these benefits. Thus there is a direct trade off between the costs of travel and the costs of places of residence: in a perfect market, the sum of these two costs will be essentially the same at all sites. The benefit of living close to work is lower travel costs: the cost of living close to work is higher housing costs.

Figure 3: Cost of Places of Residences Decrease With Increasing Distance



The transportation costs associated with each site in the region will be capitalized into unit land prices. In a perfectly competitive situation, the difference in land values (all other things equal) between two sites will be the present value of the difference in transportation costs associated with living at each site. This is why land values in Abbostford are lower than those in Burnaby.

The land price/accessibility trade off ensures that rational economic people are indifferent (all other things being equal) to where their residence is, as any travel cost saving will be competed away in higher land prices. They would certainly welcome the opportunity to live close to work if they did not have to compete with other workers for the sites close to work: without artificial restrictions that reduce land prices this would not occur. With such restrictions, the lucky worker who gets the cheap site wins and the unlucky one that does not get it loses: their travel demand is in no way changed (in a more complex model, where density is considered, travel demand is shown to be increased by restrictions that keep land prices low).

In conclusion, the trade off between land prices and accessibility means that there is no economic reason to live close to work, as the total costs of living close to work and travel to work are the same regardless where one lives. People who do not live close to work are economically rational, as they pay lower housing costs in exchange for higher travel cost. So long as economics are permitted to determine costs, maximizing the opportunities to live close to work will bring no measurable change to travel demand.

If this discussion seems familiar, it is because it is a direct translation of the classic location bid rent model used in land economics to demonstrate the determinants of land prices and land uses. The example most often used in textbooks is agricultural, where the costs of transportation of farm produce increase with distance from the market. Consumers at a marketplace do not differentiate between otherwise identical produce from farms close to town and that from far away farms. As land distant from the market comes with higher transportation costs, farmers will pay less for it than they will for land with lower transportation costs closer to the market. All other things equal farmland prices fall directly in proportion to distance (increasing transport costs). As a result, farmers do not care where they locate: if they are on land that is close to market, they pay a greater land cost in exchange for lower transportation cost; if they are on land that is distant from market, they pay a lower land cost in exchange for higher transportation costs.

An economically rational farmer obtains no advantage from farming close to market and an economically rational worker obtains no advantage from living close to work. Competition for sites that are more accessible to destinations means higher land prices in exchange for lower transportation costs. In the simple homogenous worker model considered in this section, increasing the opportunities to live close to work will not reduce travel demand, as the advantages of those near to places to work will be reflected in higher prices. Only in a context where there are artificial restrictions on land use and land prices can increasing the opportunities to live close to work reduce transportation demand: the opportunities will come from removing the restrictions, which will result in an increase in land prices and, as is shown in the next section, in the density of land use.

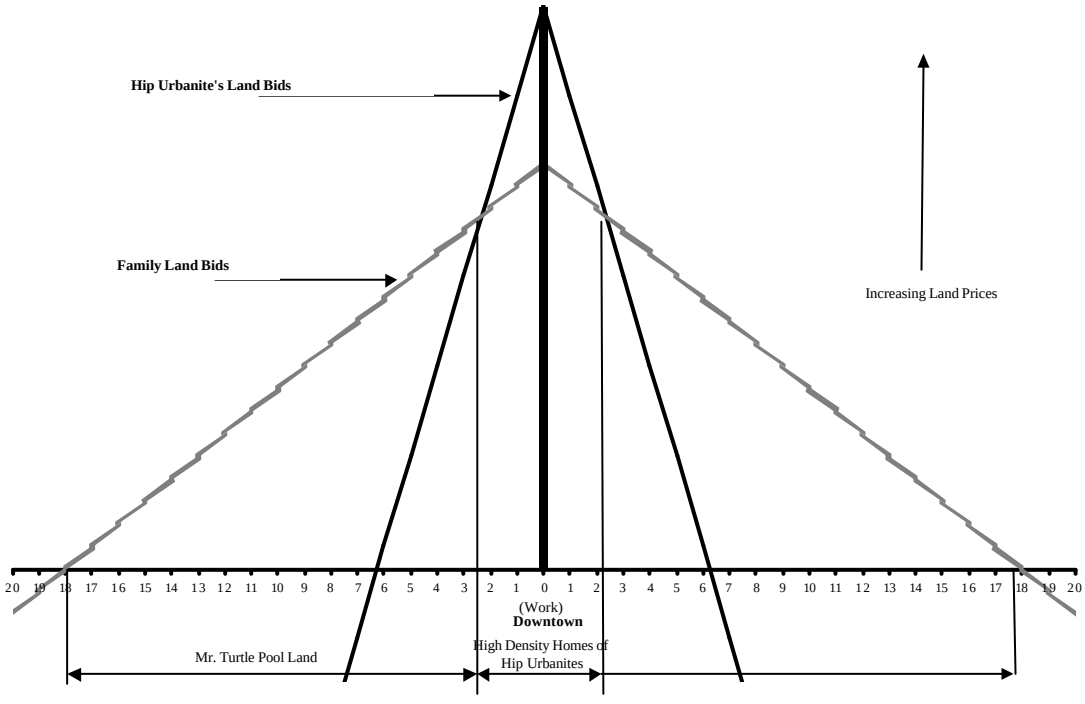
2. Intensity of Land Use. These two-factor accessibility/land rent tradeoff models are admittedly simple, illustrating as they do only a relationship that assumes all other things are the same. Consideration of other factors make these models more realistic, and more complex. For example, the higher land prices at more accessible sites have an impact on how intensely land is used. In production of goods and services, again all other things being equal, the more expensive a factor of production, the less of it that will be used in comparison with other factors. In the agricultural example, farmers where land prices are high will use a lot more labour, fertilizer, equipment, and even buildings, per acre of land than farmers will where land costs are lower: farmers where land is expensive (e.g., has low transportation costs) will use land sparingly compared to farmers where land is cheap (e.g., has high transportation costs).

The same situation prevails in the workers' housing example. At highly sought after, accessible and expensive sites, a lot of non-land resources (in the form of buildings, improvements and services) will be used to provide housing: where land prices are relatively low, more land and less of non-land resources will be used. In the absence of external (e.g., zoning) restrictions, sites that are highly accessible will have high prices and will be used at high densities. Sites that are not highly accessible will have relatively low land prices, and hence will be used less intensely. The result is that the competition for lower transportation costs that living close to work brings is both increasing land prices and increasing densities as transportation cost fall.

3. Non-homogeneous consumer/producer groups. If transportation and housing cost were the only variants in the residential location decision, a rational economic person would not care where they lived (all other things being equal) as housing costs would account for differences between transportation costs at different locations. But there are other factors in the residential location decision: the trade-off between housing and transportation costs is not the only thing that people care about. Further, workers/consumers are not homogeneous: they have different preferences about housing, travel costs and, particularly with respect to housing density.

To move just one step closer towards reality from the living close to work concept, consider the situation when there are two consumer groups. One has a requirement for some minimum amount of land associated with their housing (call them families with small children and Mr. Turtle Pools, or, in the agricultural context, ranchers), while the other group does not have any land requirement (call them hip urbanites or greenhouse tomato producers).

Figure 4: Land Prices and Land Use with Two Types of Residential Demand



In such a two-consumer market, the hip urbanites will live in the high density high accessibility areas closest to places of work because they will, collectively, outbid the families for the more accessible sites: the effective competition for the sites closest to the downtown will be between hip urbanites (Figure 4). The families, requiring some land associated with their dwelling unit,

while valuing accessibility, will not be able to outbid the hip urbanites for the accessible sites because the hip urbanites can live at a density that ensures that they get the land by collectively paying more for it.

Families will live further from work than hip urbanites not by choice, but because they require some land associated with their dwellings. It is not that families will choose to live further from work than hip urbanites: the fact that they require more space will means fewer of them will be able to use the same area of land, and hence they will have to live further away from work to be able to afford the land on which is housing is built.

It is the hip urbanites ability to live at higher densities that ensures them the most accessible sites. While hip urbanites' incomes might be a fraction of families' incomes, collectively there will be enough hip urbanites per acre to ensure that they outbid the families for highly accessible sites. Members of families do not live at greater distances from work than hip urbanites because they care less about transportation costs or the environment. Members of families live further from work because they need room for the Mr. Turtle pool, and they cannot afford to pay West End land prices for the space to put it on.

Of course, in reality there are more than two different worker groups, each with their own land and accessibility requirements. In the absence of land use regulation, their competition will lead to a pattern of land use where the highest land prices and the highest densities are found in the most accessible sites, with the lowest land prices and the lowest densities where transportation costs are highest. Because of this price density gradient, those consumer groups who have the highest tolerance (voluntary or otherwise) for density with be able to live close to work, while those who require lower densities will not be able to afford to pay for the land that would permit them to live close to work.

Maximizing the opportunities to live close to work can have an impact on transportation it removes restrictions on density on sites with relatively high accessibility. If density at accessible sites is regulated to be lower than that which would occur in the absence of regulation, then while the current users of the site are closer to work than they other wise would be, there are fewer of them using the site than there would be in the absence of the restriction. Remove the restriction, more people will live on the site at a higher density, and there will be (all other things being equal) a reduction in aggregate travel in the region. The single most important land use policy that could be introduced to maximize the opportunities to live close to work that would have an impact on travel demand would be to eliminate restrictions on residential density on all sites. To the extent that sites were under-zoned in terms of use and density, this would have an impact of increasing price and density: note however, that this impact would push those households who previously occupied the site who required lower density further out, bringing in only those households who tolerate higher density. For this to have any noticeable impact on transportation demand, there must be significant areas of relatively accessible land that are being artificially kept at a lower density than the market would dictate.

4. Density in the Neighbourhood. The ability of hip urbanites to live at greater density, and hence pay more for land, than families introduces conflict into urban development. As urban populations grow, there are both more families and more hip urbanites. The growth in the number of hip urbanites will mean that, without restrictions on change in land use and density, they would start to outbid families for land on the edge of the high density residential areas in and adjacent to downtown cores. The families in these transition areas, while supporting anything that maintains or improves their accessibility to downtown, will fight strongly to maintain the below market density of the area. It is not simply that they oppose change: they have a strong

economic benefit from being able to live closer to work than would happen in the absence of zoning restrictions. Thus in what are relatively accessible older neighbourhoods where higher density is justified by the accessibility/rent tradeoff, neighborhood preservation becomes very popular as existing residents attempt to maintain the benefits of greater relative accessibility without having to pay the price of greater density.

This introduces an interesting household income dimension to neighbourhoods where greater density is not allowed to match greater accessibility. All other things equal, higher income families will be able to outbid lower income families for family sites that are highly accessible. These areas experience rising land values as family households with high incomes win the bidding, and set the prices, for these areas. As a result, land prices in these areas rise without the density increasing. Moderate incomes families will then be faced with the issue of having to travel further to obtain the housing they can afford, or increasing the density of use of land in the "under-zoned" area by building an illegal suite to obtain the revenue to afford the close in location thereby bringing about an unauthorized higher density.

This does not mean that there is an income gradient that matches the price-density-accessibility gradient. Certainly there are high-income family areas in places close to work where competition from high-density activity is excluded. But there are also low income and moderate-income family areas with the same proximity to places of work, and low, moderate and high-income areas that are distant from places of work. In each case, the price and density of use of locations will be determined by travel costs, incomes, preferences for density and other preferences. Thus a high-income family with a very strong requirement for low density will be willing to travel considerable distance to find suitable housing, or will seek locations in highly accessible areas whose density is kept artificially low: in the first context, they will have high travel costs and consume a lot of cheap land, while in the second they will have low travel costs and consume a lot (but less than in the first context) of expensive land. Low-income families can outbid high-income families for more accessible sites if the low-income families live at sufficiently high densities to collectively bid more for land on a unit basis.

Finally, while for purposes of discussion of the forces shaping residential location the focus is on the basic variables of transportation, density, price and income, there is a wide range of other factors that make up the preference functions of housing and transportation consumers. One of these factors is the "neighbourhood": the price accessibility gradient may "skip" over older areas that do not have the appropriate character for certain market segments, where they would bid less for housing in these more accessible areas than other, perhaps lower income, households. This "discontinuity" in the price-density-accessibility gradient will continue to exist as long as cost of the lower desirability of the skipped neighbourhood offsets the higher travel cost of more distant locations. Once this differential ceases to exist, the "pioneers" arrive and begin to change the character of the neighbourhood: as this occurs, prices climb up to that dictated by accessibility. Note that when this change does occur, it will mean that the density of the area may well decline.

While discussed in more detail in Section III-9 (Complete Communities) of this report, it is useful to briefly consider the impact of using restrictions to maintain low density family housing in areas close to work. While this would make for more complete (i.e., diverse) communities close to places of work, with lower density family housing in areas that the market would make higher density housing, it would also mean that land would be used less intensely than it would otherwise be, allowing more families, but fewer workers in total, to live close to work.

5. Places of work outside downtown. If you can't get the people move closer to work, can you get work to move closer to where people live? This is discussed in more detail in Section IV on Employment Location Decisions: in this section it is considered only in the context of the place of work end of the journey to work. There are always some employment locations proximate to family residential areas, those being population serving (convenience stores, shopping malls, dentists offices, pizza delivery services, etc.). To the extent that people working in these activities earn the same incomes as those working in downt owns, they will win by having their work close to where they live, as they will have the same housing costs but lower transportation costs than the commuters to downtown, so long as the downtown commuters set the housing prices in the residential area. If non-downtown workers have lower than downtown incomes, they will find themselves in the situation of having to travel far enough from their place of work to find the density of housing that they require at a price that they can afford.

If a non-downtown location becomes a major employment centre then employees competing for more accessible sites will create, in a scaled down version and land use controls permitting, the same price density gradient from the new employment centre as exists for the downtown core. This means increasing land prices adjacent to the employment centre, pressure for conversion of family housing to higher density housing, and a pushing out of the margin of urban development as family workers travel further to find suitable accommodation. If the pre-existing family residential areas do not increase in density, the extension of the boundary will be even greater, household incomes permitting. Non-downtown employment centres can lead to an expansion of urban development into agricultural areas even without an increase in income or reduction in overall transportation costs by creating another zero transportation costs point (a mini downtown) closer to the edge of existing urban development thereby pushing the commuting threshold out into areas previously that were previously too far to justify construction of urban housing.

6. The (Diminishing) Importance of the Place of Work Part 1: Uncertainty.

The classic accessibility/land price model is developed assuming that the place of work is the sole reference for the competition for sites by residential users. While this may have been the case decades ago, place of work is not the fundamental criterion for residential location decisions today. While residential location decisions will consider minimizing travel cost, they will do so after other, more important criteria have been considered.

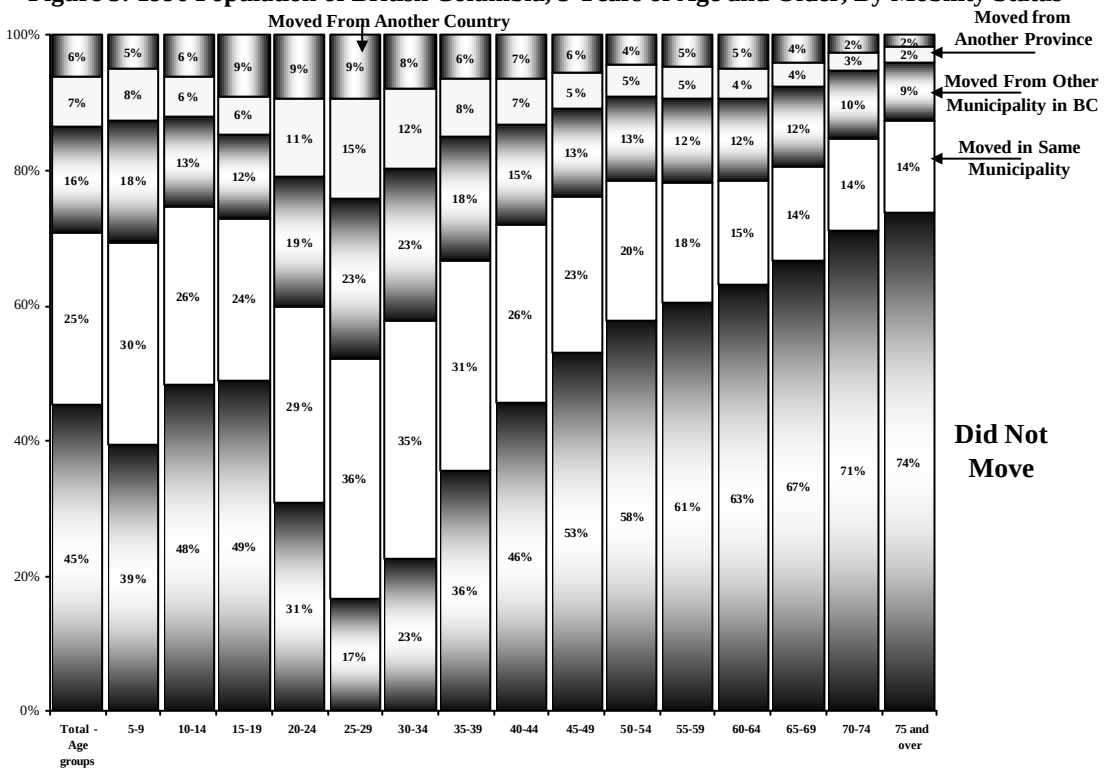
Transportation surveys, including those carried out by the Greater Vancouver Regional District, have shown that people make residential location decisions on the basis of residential criteria – neighborhood and community characteristics; dwelling structure type, tenure, and cost; safety, proximity to friends and family; quality of schools, recreation and community services, and the like. Certainly if there were two areas that were identical on these criteria, people would, as cost minimizers, attempt to select that area which involved the lower transportation costs (which would lead to the bidding gradient that makes land more expensive as transportation costs decline), but it is rare that there are two otherwise equal residential choices.

Even if there is appropriate structure type diversity in two areas of a commuter shed, the "character of the neighbourhood" is likely to have a more significant impact on choice than travel costs (including time). For examples, there are people who live in apartments in the West End and who work in Metrotown where there are apartments of similar quality and lower price: there are people who live in single detached houses on the west side of Vancouver and in West Vancouver who work in Metrotown where housing prices are lower. These people can afford to move, and would save both transportation and housing costs if hey did, yet they do not do so: they are willing to pay higher housing and travel costs to live in a particular neighbourhood. This

demonstrates that only over extreme distances does living close to work dominate residential location decisions. The fundamental purpose of housing may put many householders in a position where they have no options with respect to living close to work: by the time all of the higher priorities have been considered, there is no choice with respect to minimizing travel to the place of work. The journey to work, in these cases, is not a variable, but rather a price paid for achieving housing goals.

Not only is the place of work merely one of many factors taken into consideration in residential location decisions, it is also one of diminishing importance. Residential location, particularly for homeowners but also for tenants, is a major investment, one with significant transaction costs (both financial and otherwise) for both entry and exit. The fact that home location decisions are made for a long period of time is shown in the census mobility data (Figure 5): with each increasing year of age, the percentage of people in an age group who change their place of residence declines. If long distance movers (international and inter-provincial migrants) are removed from the data, between two-thirds and four-fifths of the people over the age of 45 do not change their place of residence over a five-year period.

Figure 5: 1996 Population of British Columbia, 5 Years of Age and Older, By Mobility Status



Perhaps in the past, when, for some workers at least, it was appropriate to make the assumption of a job for life with a single employer in a single location with regular schedule, the location of the place of work had a higher priority than it has now. Today there is no such thing as job security, either in tenure or location, with economic and technological variance reducing the certainty of where, when, who and for how long a job will exist. One person's current place of work is of no great significance today when most family households have two or more wage earners in them,

and many people work irregular hours and weeks, have car dependant jobs, work at or from home, and have no certainty how long they will have their current job, where they place of work will be next year, and what type of work they will be doing in two years.

The increased risk of variance in the location of work increases the discount rate used to incorporate the place of work in the residential location decision, thereby reducing its impact on the decision. If a person is not certain where they will work in five years, they will not give place of work much importance in deciding where to establish a home.

7. The (Diminishing) Importance of the Place of Work Part Two: Whose Place of Work? The concept of living close to work also implies that it is a single place of work that a household considers. With over three quarters of husband and wife families in Canada being dual wage earner households, compared to one-third in 1967, to the extent that place of work is considered at all in residential location decisions, it is two or more places of work that must be considered. If these places of work are not in the same area, the optimal household residential location with respect to work may be sub-optimal for both individuals, in that two medium distance commutes may be more efficient for the household than one very short and one very long commute.

8. The (Diminishing) Importance of the Place of Work Part Three: Complexity of life and life styles. Compounding the lessened importance of the place of work in the residential location decision due to changing work patterns is the lessened importance of work due to the growing complexity of life. Life style may not have been not a major factor in the residential location decision of the suburban boom of the1950s, but now, for many people, it is of great importance: people choose to live on the North Shore, in the West End, in Kitsilano, on the Heights, or in White Rock for the life style that these areas offer. The specialization of life styles (see Section V for a more detailed discussion of the impact of specialization) that urban and economic growth bring mean that the choice is not simply measured by price, accessibility to work and density, but rather by a complexity of life style and image considerations. Thus in recent advertisements for both Coal Harbour and Concord Pacific condominiums, the emphasis has been on waterfront, views, recreational and other on-site amenities, with scant mention to the fact that the properties are very close to a lot of places of work.

As well, with the increasing specialization of both the workforce and the urban landscape has gone an increasing emphasis on multi-purpose trips, with journey to work trips including stops to pick up groceries, go for a run, play old-timers hockey, visit an aging parent and a new grand child (giving rise to the term the sandwich generation for those who are making both of these visits), pick up the kids from hockey and take them to violin lessons, or go to a hospice or hospital to give volunteer services. Urban lives, be they those of a single person household or of extended families, are rich, diverse and complex, giving rise to matching transportation requirements. Even when a household has predictable places of work, and predictable morning journeys to work, it does not mean that it will have predictable journeys from work.

One image that captures the various forces that are changing the role of work, of housing, and of life styles on urban areas is that of a decline in the importance of space in urban areas. With increased diversity of work patterns, living patterns, and life styles, urban regions have become much more specialized, and hence much more interconnected, both in terms of communications and transportation. This is not a new concept, having been discussed in the mid-1960s by both Webber (in his seminal article "Community without propinquity: urban space and the non-place urban realm") and Marshall McLuhan. The declining importance of spatial proximity does not mean a decline in the need to traverse space: quite the contrary, its has meant an increasing need to travel. Accessibility rather than proximity defines contemporary urban society.

9. Complete communities – an incomplete concept. Another planning concept that is often seen as helping to reduce transportation demand by changing land uses is to build complete communities, the idea being that if there is everything in a community, there will be less need to travel to another community. While it may be possible to make some communities more complete, there is no reason to assume that completeness is an achievable goal. This is not to argue against compete communities and for incomplete ones, but rather to point out that, for a wide range of reasons, completeness is not attainable. Without massive subsidies, there will never be farms in downtown Vancouver nor a Swatch Store in rural Sardis. There will always be exclusively low-density family residential areas because they serve a purpose; they reflect a specialization of land use that is required (kids being able to go to a local school and have buddies that they can play with after school implies a very specific land use pattern).

On the employment side, there are two reasons why completeness will not occur. The first concerns population serving employment. Each good or service required by a population has some threshold of demand necessary to support it. In what are referred to as low order goods and services, relatively few households are required to support one establishment selling these commodities. Thus we find a pizza delivery service and a convenience store in almost every neighborhood. Higher order goods and services, for example general practitioners, require a larger population to support them (higher demand thresholds), and hence several neighbourhoods are required to support one establishment. By definition, the neighborhood that gets the doctors office will be more complete than the others in the trade area: the others will remain incomplete communities because there will be only one general practitioners office to be located.

At the next higher level will be establishments were there are only enough people in the region to support three or four establishments: universities for a good example of such higher threshold activities, with only a few communities being host to these establishments and people from other parts of the region having to travel to them to consume the services they produce.

The highest order goods and services are those for which there is only sufficient demand for one establishment in a region: this establishment can locate in only one community, making all the rest incomplete. People from all other communities will have to travel to the lucky (or unlucky, depending upon what the activity is) community to purchase the highest order commodity. No matter where NBA basketball is played in this region, it stadium will be in only one community, with people traveling from the rest of the region to the one where the games are played. The same is true for establishments as diverse as the Cancer Clinic and the Swatch Store: until the regional market grows sufficiently in size to support two or more of these establishments, all communities save one will be incomplete with respect to these high order commodities. [As there is a wide diversity of people who work at a highest order establishment such as the Cancer Clinic, there will also be a wide diversity of housing requirements and income. As a result, such establishments will also be the destination of people who reside throughout the region].

In the absence of subsidization, there is little that can be done to expand the range of goods and services offered in a community beyond what economic demand thresholds support. There is, however, the opportunity to expand the range of goods and services where non-demand related factors limit economic activity below what might be supported: increased zoning for employment activities, reduction of unit sizes in new commercial developments, or taxation that matches demand for services, might all lead to more employment in communities. Certainly if there are regulations that keep lower threshold goods and services out of a community that could otherwise support them, removing the constraints will lead to more complete communities, but nonetheless there will always be some more, and some less, complete communities.

The second employment related reason concerns non-population related employment: there cannot be a uniform distribution of non-population serving employment, because, as the name implies, the employment location decision is not made in terms of where the population of the region lives, but other criteria. For example, employment that is primarily related to airplane services will be in areas that are accessible to airports (see Section IV for a more detailed discussion of employment location criteria).

On the housing side, arguing for a more complete community in terms of a wider range of housing types in a community makes sense if there is resident demand for a wider range of housing types, and is a policy that can be pursued in that context. From a transportation demand perspective, however, it should not be assumed that a more diverse housing stock in a community will necessarily mean a reduction in travel demand, and it fact it is possible to argue that it may increase it. For example, much of the region's apartment stock is in areas close to employment (e.g., the West End and Downtown). Building apartments in the family residential areas would permit people (for example, young adults who grew up in the community) to establish apartment households in the neighbourhood and commute to work rather than being forced to live close to work by lack of housing choice in the family residential area. The role of the apartment stock in North Vancouver City in providing housing for kids who want to remain on the North Shore and commute to work in Downtown is an example of this: more apartments in Point Grey may result in the same situation, where kids currently living in the West End or Kits could return to the old neighbourhood and commute to work. It is only when lack of housing choice pushes workers further from work than they would otherwise be and where the eventual occupants of the housing that results from increased choice are those excluded workers that more complete housing choices in communities will result in a reduction in travel demand. [Note that, in so far as economics are concerned, any polices aimed at increasing the range of housing in a community could do so only by removing restrictions on the density and structure types of housing].

10. Residential Communities.

Thus far in this report, there has been no reference to "suburbs" except in the context of the Sierra Club's characterization of them as the Dark Side. The reason for this is that the term "suburb" has become a pejorative term. The suburbs, family residential communities, have fallen out of vogue in the rhetoric of planning, being derided as incomplete, soulless, the cause of a litany of urban and environmental problems. They are, however, as important a part of the fabric of urban regions as the vital "24 hour downtown communities", the "urban villages", "neo-traditional towns" and the "complete communities" currently having their 15 minutes of popularity in land use planning theory. There is nothing "sub" about family oriented residential communities, nor are they are areas waiting to be more urban. They are what they are, areas of a land use that performs real, necessary and valuable roles in the lives of residents of urban communities.

While it is true that, as urban life and life styles continue to become more diverse and more specialized there will be a need for a greater diversity of communities within urban regions, it is also true that relatively low density residential areas will continue to exist. So long as people have children, gardens, craft hobbies, and dogs as pets, single use ground oriented residential communities will continue to play a fundamental role. Any strategic plan, and particularly any 5 year strategic plan, that assumes a radical change in the "suburbs", either in character or extent, will be sorely out of step with the transportation patterns in the region. Change in either "suburban" or "urban" communities will be marginal and evolutionary, rather than major and revolutionary: the suburbs will be with us in the future because they work, and work well, for the activities that occur in them.

The acknowledgement of this fact means acknowledgement that travel characteristics will not change much either. As was noted earlier, people living in low (and any other) density areas have a very strong incentive to see accessibility between their community and the rest of the urban region improve without experiencing a change in the density of the community. Thus there will always be calls for better transit service to low (and higher) density residential areas, but rarely will the same people call for higher density in their area.

It will be important in transportation planning to both acknowledge that the "suburbs" will be with us for a long time to come, and to acknowledge that they will be "suburbs". Relatively low density is a defining character of family residential areas, and one of the prices that must be paid for relatively low density is relatively low levels of fare box transit services. In areas where transit is to be provided as a matter of policy rather than a matter of economics, the costs of the subsidy must be calculated and capitalized to ensure that the cost of transit opportunities forgone elsewhere in the region as a result of subsidization of below minimum ridership areas is considered in decision making.

11. Conclusions. The changing nature of work, of labour force participation, of social interaction, and of technology have all made the role of space, and specifically, the minimization of geographical distance, much less significant on household location decisions than it might have been in the past. The complexities of the residential location decisions leave little room for a concept of "living close to work" to be converted into a set of policies that will have any noticeable impact on transportation demand.

Certainly policies that permit a greater diversity of housing forms within a community may permit a refinement of the density gradient with a range of intermediate density housing forming a transition between high density and low density. To the extent that this occurs, the change will come to high accessibility areas kept at low densities by regulations: the conflict that this brings has been well documented in almost every community in the region. Reducing regulation to allow a greater diversity of employment and housing in communities should be pursued in order to meet the aspirations and goals of members of those communities: they are not likely to have any great impact on transportation demand within the time frame under consideration here, and even over much longer time frames.

IV. Places of Work – The Employment Location Decision

As with the residential locations, employment location decisions are much more complex than policies such as "maximize the opportunities to work close to home" assume. Again, while all other things being equal employers will locate close to where their workers live, for most firms there are a lot of things that are more important, like rent, space characteristics, and proximity to related firms, when employment location decisions are made.

There is currently significant discussion about patterns of employment location in metropolitan regions throughout North America. One of the conclusions that have emerged from this discussion is that to a large extent there is no great competition between downtown and non-downtown areas. Certainly in the past there was the concept of "flight to the suburbs", and some people today talk about "flight from the suburbs", but the reality is, in regions with healthy economies and growing populations, both downtowns and "suburbs" are growing as a result of their own specific characteristics and the wide range of criteria that are now of relevance in employment location decisions.

1. Downtowns.

a. Population. Part of the employment growth in both downtown and non-downtown areas is population growth driven. While this is no surprise with respect to new non-downtown residential areas in growing regions, it is, in many regions, a surprise with respect to downtowns. While in this region it is smugly assumed that we have some kind of lock on downtown population growth, in reality many metropolitan regions in North America (most according to the Brookings Institute) are developing strong, attractive, vital residential downtowns.

As with most urban phenomena, there are a number of reinforcing factors that have combined to bring about the so-called renaissance of the metropolitan core. Certainly in the American context, the increased safety of downtowns as a result of greater police presence, law enforcement and sentencing is always cited as a reason for people "returning from the suburbs". Bringing balance to this rather simplistic explanation are those who note that one of the reasons for the increased downtown policing is the increased relatively affluent downtown resident population.

A more significant factor contributing to the downtown resurgence has been the availability of land adjacent to downtown cores on which to build urban housing. The creation of large vacant sites adjacent to downtown has been one of the by-products of the disappearance of the old commodity economy from the centres of many metropolitan regions: abandoned industrial, waterfront and rail yard lands have provided the locations for the renaissance to occur. As the non-residential opportunity cost on this land is essentially zero, it provides residential developers with a relatively cheap base on which to build new, large-scale high-density residential projects adjacent to downtown. The scale of the projects has also created the opportunity to include community amenities (such as safety, recreation and schools) within a single comprehensive project. In concept, these new communities are essentially downtown high-density "suburbs", complete with their own recreation centres and supermarkets. Many of the residents are not part of workforce for the adjacent downtown, but rather are out commuters who live in the core for its amenities but have jobs outside of the downtown: not all hip urbanites work in downtown.

Many of these "recycled" sites are riverfront or portside (reflecting the old goods transportation role of downtowns), providing the opportunity for creating public cultural infrastructure adjacent to the downtown core, including parks, schools, recreation centres, playing fields, walkways and aquariums. Further, the additional relatively affluent downtown resident population brings with it the demand for population serving activities, which adds employment to the downtown, making it even more attractive to tourists drawn by the stock of downtown hotels and traditional downtown museums and shopping, and to non-population serving employment that seeks urban amenities.

b. Employment. Downtowns are also attracting new forms of employment, particularly in the urban service and technology related industries. Many of the workers in these jobs tend to have downtown (rather than "suburban") interests and life styles, and hence find the restaurants, services and cultural amenities of downtowns a strong attraction. To a large extent, in the circular pattern of growth and change that explains urban development, the downtown residents of two and three decades ago – the singles, the never nested, the artists and the producers of new culture - presaged the downtown resurgence by never leaving it. Their spending, combined with the spending of daytime employees and tourists, ensured that there were sufficient resources to keep the downtown life style as a viable part of urban culture (witness the long term communities of North Beach in San Francisco and the Village, SOHO, and Tribeca in New York). In doing so, they proved the validity of a safe and vital downtown that the new, more timid urbanites are seeking and developers are facilitating with their downtown industrial and transportation site redevelopment projects.

Employment growth as a result of this new urbanity is not limited to population dependant and service sector activities. Many high-tech startup companies locate in downtowns to tap into the young, hip high tech and electric media labour force that lives in these areas. They see downtown as "cheap, chic and creative". The young techies that run these companies talk about the need to work in their community: they also benefit from the cheap rent that the older loft, industrial, and C-class offices in and adjacent to the core provide as an incubator and accelerator environment. They say that they want to skate (board or inline) home, to be close to clubs, and to work in buildings with wood ceilings, windows that open, and have a creative people in them. As startups, they also need to make use of the agglomeration economies of having services and resources close at hand that they can use when they need them but can't afford as overhead. These "electronic neighbourhoods" not only rely on the population, employment, entertainment and amenities of the downtown, they contribute to them, adding another level to their vitality.

One must put downtowns' electric neighbourhoods in perspective. In spite of their vitality and importance, they form a relatively minor part of the stock of office and commercial employment in the traditional downtown core. Certainly many of the hip young urbanites who work in the new economy live downtown, but most downtown workers are not hip, young, or urbane: they are the same people who have been commuting in from non-downtown family residential areas for decades. In a decade or two, many of the hip young urbanites are going to be raising little programmers of their own, and will be looking for a place for the Mr. Turtle Pool. This means that they may join the realms of the commuters, or that they, like other commuters, find their places of employment shifting to non-downtown locations, and they become part of the "suburb to suburb" commuting flow that has been the most rapidly growing share of the regional commuting flows.

To finish the set, the downtown urbanite whose employment relocates to the suburbs, or who finds their employment in the suburbs, does not stop being a downtown urbanite. With the increasing importance of lifestyles in residential location, and the growing richness of downtown amenities, many of the downtown dwelling urbanites become part of the downtown to suburb reverse commuting flow, with their living close to downtown supported by working in the suburbs. Thus, while the suburb to downtown journey to work flow may continue to have the single largest share of the regional transportation flow, it is a diminishing share, with suburb-to-suburb, downtown-to-downtown, and mobile workplace traffic increasing their share.

2. Growth and Change Outside of Downtowns. For all of the discussion about the resurgence of downtowns, non-downtown, and specifically "suburban" locations are where most of the growth in metropolitan regions is and will continue to be. This is true not only in the residential context, but the commercial one as well: in 1999, only 6% of the office floor space constructed in Canada was in downtown locations, with the other 94% in non-downtown areas.

a. Population. A growing economy in a growing region means a net increase in the number of households. While there will be some turnover in non-downtown residential areas as the rare "urbane suburbanite" baby boomer returns to the hip downtown as an empty nester, the vast majority people living in lower density ground oriented residential communities will stay because they like where they live and it is part of their life style. In spite of the hostility to suburbs in land use planning theory, they are much loved by many of their residents: as well, they form such a large portion of today's housing stock that even if new households have a dramatically different lifestyle, there will be little change in the scale and location of residential communities for many years.

With the aging baby boomers sitting in their houses (with the mortgages paid off) in the older residential neighbourhoods, new family household formation will require additional ground oriented housing. Thus new families, in anything but the very long run (about 50 years from now when today's 35 year old boomers, the region's typical residents, die), will require new ground oriented housing developments, either in or adjacent to existing urban areas: certainly there will be some shifting from the suburbs to downtown and/or to the old folks home, and some hip urbanites who raise kids in the core, but they will not be the norm within the next decade or two.

Changes in land use the suburbs could offset some of the shift of population to the downtowns: with an aging population in the suburbs, there will be an increased demand for apartment accommodation from people who wish to remain in their communities. Currently many suburbs do not have a suitable apartment stock, and the empty nesters have to move to the downtowns to find them. While this presents an opportunity for a more complete community, it is not one that will reduce transportation demand (as people will live in their family home for the first decade or so before retirement), and it is one that lies far in the future: the front edge of the baby boom is 54, and the big bulge is between 32 and 37. It is a quarter of a century before need will force the boomers to seek apartments: choice rather than need could motivate them sooner.

b. Employment. The land use format of **population serving suburban employment** will continue to reflect the reality of population density and transportation systems in non-downtown areas – auto oriented and relatively low density. This is not to say that there is not a role for transit, but rather to acknowledge that the transformation of suburbs into areas with sufficient density to support transit without subsidy, will (if it occurs) take much longer than the decade that is relevant in the context of a five-year strategic plan.

An example of new non-downtown population serving employment development on a major scale is provided by the Royal Bank, who is currently building an 800,000 square foot office development in two towers with 40,000 square foot floor plates in suburban Toronto. This is not a relocation of back office functions from downtown, nor a flight to the suburbs, nor a movement to be close to workers. It is a consolidation of current suburban employment, and to provide for expected rapid growth, in its insurance business, which is currently spread in a large number of small offices throughout the suburban portions of the region. Thus while the development is entirely related to population serving employment, it is leading to less, rather than more, complete communities, as it is a consolidation of activities that are scattered throughout many communities into a single location. The reasons for the consolidation and the requirements of the firm are instructive as two employment location patterns currently occurring in non-downtown areas.

Because the consolidation is of suburban offices, the new central suburban location must have a high level of access to a very large area of relatively low-density housing. This consolidation can take place because the bank has found a large site that is accessible to the regional freeway system. This allows it to provide an office base for its sales people, who work from their cars regardless of where their office is, and a consolidated single location for the large number of back office functions that are currently widely dispersed in small offices. What the net effect on regional transportation will be is hard to say: the centralization will give a better single point load for transit, but it will mean more suburb to suburb commuting. The firm has ensured that there will be transit access to the building, but the freeway location was the reason selecting the site. This underscores that fact that, with many regional transportation systems, while the theoretical point of highest accessibility is in the downtown core, if the downtown is not important in the market, non-downtown locations have much greater regional accessibility. This is as true for firms with inter-regional markets as it is for firms with family housing related markets.

There is much more growth in non-downtown employment than that justified by population growth. This growth in **non-population related employment** is the result of increasing employment in many sectors: high tech and suburban office developments merely demonstrate the reasons for this growth. As background to the following discussion, keep in mind that Silicon Valley is a low density suburb, and that while hip startups may be in funky conversion space in downtown, IBM and Motorola opened their Canada offices in the Toronto Suburb of Markham. The creative small companies may be downtown but the heavy end of high tech, the call centres, credit card and record processers, and the big employers are generally in non-downtown locations. Note that the word is generally: there are employment locations of this type in downtowns, just as there are creative startups in the suburbs. Perhaps the most accurate generalization about employment locations that can be made is that no strong generalization that can be made: neither downtown nor suburb are the exclusive domain of particular industries.

As an example of how a firm comes to be located in a suburb even though it is not population serving, consider the ongoing life of a high tech firm. The preceding section discussed the reasons for these firms locating in downtown areas: it was "cheap, chic and creative". It is, however, most true for young startup companies (pre-IPOers), who are in the incubation stage of development. These young firms value the downtown life style, and have become the demand side of significant redevelopment of older core industrial and loft space in many cities in North America. What these firms are looking for is proximity to a labour force of hip urbanites and to other linked and supporting firms: as they are small, they fit perfectly into the incubator and accelerator space adjacent to downtown cores. As startups they cannot afford the rents, the long lease terms, and lease covenants required for the A and B class office space market.

Firms do not stay as startups forever. As they grow and mature, many of the factors that attracted them to downtown locations fall away in importance as space and the cost of space move up the list. Interactions within the firm become much more frequent than external ones, the firm can support internally many of the activities that were initially out-sourced, and it needs space with characteristics that cannot be found in conventional spec downtown developments.

Building new downtown space is expensive: the land is expensive, sites are small (so high rises must be built, which is more expensive than low rise development), and adding to the stock of commercial space in a downtown is a long and complex process. Retrofitting an older building is also expensive, particularly when the floor plate of the older building is relatively small, it is not built to current building codes, it has heritage character, it is old tech, and it is close to other buildings. One surprising problem with redevelopment downtown is restrictions and regulations concerning the gas generators that high tech firms require to ensure standby redundancy of electrical supply: in low density suburban locations these can be planned into developments (and have been to the extent that suburban firms are using their generators to produce electricity that they sell to power grids during peak load periods). And finally, perhaps one of the biggest long-term structural limitations of downtowns is the small building size: a big floor plate can always be subdivided, but a small floor plate cannot be expanded.

Non-downtown locations offer the offsetting advantages: development is cheaper and easier than downtown locations, and any firm who does not have to be downtown will at some point look at going suburban. Land is cheap and comes in big parcels: as a result, to quote Philip Norwood, Vice President, Trammell Crow Development Corporation, one of the largest North American office developers "companies can do more lateral and less vertical construction, can put in fiber optics cabling and other systems necessary for computing and telecommunications at a relatively cheap cost. The (suburban) product is cheaper to build, and is more flexible and accessible".

In this context, it is appropriate to briefly consider the False Creek East areas as locations for new developments. First, and perhaps most significantly, these are not downtown, or even core fringe locations: they are, for all intents and purposes, suburban locations. They are on major automobile travel routes and they are in new, low rise, large floor plate buildings, on large sites with lots of parking. Second, while these developments may suit the clients for whom they are being developed, other firms in the same industry have elected to seek sites much more distant from the downtown, as downtown was never given consideration as a possible location.

In additional to the **lower cost** lateral format of development and the lower land costs, the level of finish in suburban locations is less costly than that of the downtown tower: suburban users are not looking for marble foyers. **Taxes** are lower in suburban locations, in part because of the lower land and construction costs. As well, there is a general impression that suburban municipalities want new development, and that the time required for development (as little as one year from site to occupancy compared to a year just to get a permit in downtown) is so much shorter and friendlier than it is in downtown locations.

The large land parcels mean larger floor plates which gives the firm more **flexibility** in arrangement, re-arrangement and, if need be, downstream subleasing or re-tenanting. It also gives it a greater degree of control over where its future expansion space will come from. Firms in new suburban developments can build to match their corporate culture rather than having to fit it into the standard box. Downtown office locations are formatted for offices (the proverbial manager's corner office), but most high tech firms are much more egalitarian, where people have workspaces and a lot of common areas: in many firms the goal is to have as many people on as few floors as possible to increase the opportunity for interaction between people and teams. This is not merely a matter of interior design: the small floor plates of existing buildings, and particularly the rigid layout around an elevator shaft and service core imposed by conventional office space, do not support the open space with adjacent workstations sought by many larger companies. Further, the large floor plate gives the option of subdivision that the smaller office tower module does not permit.

These firms also find suburban locations more **accessible**. Parking matters, and matters a lot. When employee retention is of importance, the "undemocratic" situation, in the words of a principal of national digital media firm, of only enough parking for the senior managers, or the creative staff, or the partners, is not seen as a bright idea. In downtowns, parking stalls are very expensive to construct (as they must be underground) and have a very high revenue generating opportunity cost: in non-downtown locations, they can be at or above grade, and hence much cheaper to construct and with virtually no revenue opportunity costs. The large parcels of suburban land provide the opportunity for firms to provide free parking to everyone: in many of the new developments for high tech firms, an employee's parking space is bigger than their workspace. Not only is this a big plus on the equality scale, but it helps with another characteristic of these firms, the flexible workday/week/month.

The work patterns in many growing industries are not the 9 to 5 of the banker, but rather what is called 7/24. With workers coming and going 7 days a week, 24 hours a day, transportation that is both flexible in timing (i.e., on command) and is perceived to be safe is essential: this is generally not met by public transit systems. It is not that the transit system itself is not safe, but rather that the front and back ends of the transit trip - the walk to and wait for the bus or train and the walk back from the station - are not seen as being safe. A car reduces the unsafe streets part of the transit journey: with a car, workers can get closer to the front door in their relatively controlled access private and on command transportation system.

Many of the workers of firms locating or relocating to non-downtown locations will be traveling to work by car, because many of them will be living in non-downtown locations. With a firm that becomes large enough to consider the option of a suburban location, the employees are no longer all creative, all young, and all hip urbanites. The original founders do not remain young hip urbanites forever: they establish families and have children, and start acting like generations of families before them. Many more of their workers will be involved in the "non-creative" clerical, sales, distribution, and administrative functions of firms. Thus with time and scale the startups become mature, and have a workforce that will, to a large extent, have the same residential location criteria of other, non-high tech firms – Bill Gates does not live downtown, and his campus is not near anything.

The locations where this growth is occurring are not "soulless wastelands" that suburbs are often painted to be. Office parks (intention or informal) contain jogging trails, fitness clubs, day care centres, restaurants, and banks, with great malls just a quick drive away, and, for the 7/24 crowd, the best in pizza delivery offered by firms who have been serving the neighboring residential areas for decades. For someone who works non-standard hours, the suburbs often offer a much higher level of work related services that downtowns do, albeit located over a much larger area.

This growth in non-downtown employment locations bodes well for increasing employment in areas that are currently predominantly residential – but, given the scale of the suburbs in terms of area, it does not imply that the journey to work will be shortened by increased employment in non-downtown locations. It may in fact result in a lengthening in distance, and even increased travel time, as the suburb-to-suburb travel pattern becomes the norm. Free parking for everyone is raised in almost every suburban office location decision: being geographically closer to everyone is not (see the discussion of labour force specialization presented in Section of V).

Does the non-downtown employment boom imply that suburbs can become downtowns? Yes, in the sense that there will be a much closer ratio of employment to population in suburban locations than in the past. No, in the sense that little of the employment will be located in high-density areas similar to high-rise downtowns. The reasons why firms are selecting suburban locations are not congruent with high-density locations, whether they are in core or the suburbs. Large floor plates, abundant parking for everyone, cheaper lateral construction, ease of vehicle access to family housing and interregional transportation – these are not reasons for locating in a high-rise development area, regardless of where it is in the region.

The non-downtown employment centre does not, and will not, look like a traditional downtown. Downtown cores have a form that relates to their function, and suburban employment centres have a different form that is determined by their different function. If suburban employment is "clustered" it will be in corridors measured in acres, rather than the blocks of downtowns. This does not preclude office towers and funky retail streets with a pedestrian orientation in non-downtown locations: amenity and ambiance, lifestyle and a sense of place all play a role in a successful suburban employment location. But it must always be kept in mind that suburban employment is different from downtown employment, and will have a different density and form. Much of the employment that exists in suburban locations does so as a direct result of low density: if the suburb were to become high density, the employment would not be there.

From a planning point of view, there is a need to drop the artificial "downtown or no-town" dichotomy, and understand the fundamental reasons why suburbs, in both the residential and employment contexts, exist. They exist because they work: the planning goal should be to make them work better. While it may be fashionable in academic and environmental circles to characterize suburban development as the "Dark Side", it would be irresponsible, particularly in a

5 to 10 years strategic plan for transportation, to plan on such an ideological basis. Realistically, the suburbs exist now, and will continue to exist within the time frame under consideration here. In acknowledging this, a strategic plan must also acknowledge that they are suburbs, not downtowns, and plan for a level of service that is appropriate to this density: if the mandate of the strategic plan is to lead, rather than follow, human behaviour, then the cost of the subsidy required to provide service above the level justified by the level of development should be explicitly considered in the decision to provide the service.

In closing, it must be noted that the spread of employment throughout the metropolitan region, diversification of work patterns, and the increasing role of life style in housing choice suggest that change in traffic patterns will continue to be less focal, with the journey to work peak spreading not only in duration but spatially as well, as space becomes less significant in urban life.

V. Specialization and Interdependence – The Increasing Demand for Transportation

Perhaps the most important aspect both of economics and social development in the past few hundred years has been the growth of specialized and hence interdependent activities. Two hundred years ago, in The Wealth of Nations, Adam Smith explained the basic rationale for specialization in his discussion of the division of labour:

> To take an example … the trade of the pin maker: a workman not educated to this business (which the division of labour has rendered a distinct trade), nor acquainted with the use of the machinery employed in it could scarce, perhaps, with his utmost industry, make one pin in a day, and certainly could not make twenty. But in the way in which this business is now … divided into a number of branches … [where] one man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on, is a peculiar business, to whiten the pins is another; it is even a trade by itself to put them into the paper; and the important business of making a pin is, in this manner, divided into about eighteen distinct operations, which, in some manufactories, are all performed by distinct hands, though in others the same man will sometimes perform two or three of them.

The result of this specialization of stages in the process of making pins, which was later extended to the automobile assembly line by Henry Ford, was an average production approximately 5,000 pins per employee per day. The advantage of specialization is a dramatic increase in worker productivity: its prerequisite is a market large enough to absorb the level of production required. Population growth and inter-regional trade have provided this scale.

Along with specialization goes its logical implication, interdependence. In order to achieve the high level of productivity offered by specialization, each worker becomes dependant upon all of the other workers. It is this combination of specialization and interdependence that first permitted the specialized land uses that required people leave their cottage (and cottage industry) to go to a centralized place of work to take their place in the specialized production process. It was specialization that gave rise to the journey to work, and it is continuing specialization that is changing, not eliminating, spatial interaction between residences and places of work.

While specialization continues at the worker level, it now also characterizes firms, with each firm specializing in the core business that reflects its comparative advantage, and being linked to specialized suppliers of goods and services that support this core business. This is reflected in the changing pattern of land use in urban regions. The traditional example of this emphasizes the interdependence of firms, with linked businesses locating in proximity to each other to minimize

interaction costs. Increasingly, however, the emphasis has shifted from the interdependence to the specialization. As firms become more and more specialized, they are linked to a smaller and smaller part of any one other firm, and to more and more other firms. As a result, rather than seeking proximity, they seek accessibility: rather than snuggling up to any one firm, they must find a location that allows them to be accessible to many.

This is significant in terms not only of firms producing goods that must be transported, but of the increasingly specialized labour force as well. Rather than having a single employer of their skills, the specialized workers in service (and some goods) producing activities must consider how to access a range of employers, either within the same firm, or increasingly in several firms, which are spread across the regional landscape. Doctors and lawyers now have several offices, equipment service experts spend as much time driving around the region as they do servicing equipment, and advertising and accounting are no longer departments down the hall, but consultants who work for a wide range of clients in a wide range of locations.

All of this means that travel within metropolitan regions increases with the specialization and interdependence that accompanies economic development. Increasing interdependence and specialization mean the regular, predictable journey to work patterns and the worker who stays at one place of work during the day, are increasingly artifacts of the past rather than omens of the future. With the increasing interdependence and mobility of work has gone a declining importance of the place of work.

Specialization of work has facilitated specialization of life styles as well. The standardized worker no longer exists from either a workplace perspective or a life style perspective. Significant diversity of lifestyles is often not compatible within traditional downtown or non-downtown residential areas. Families who require a yard for kids to play in the Mr. Turtle Pool, people who want to have horses, those who are into serious gardening, those with wood working as hobbies, all seek homes in lower density housing areas. Those who want to roller blade into a club for a rave are not going to seek the tranquility of a single detached neighbourhood. There are people who wish to live in buildings, and neighbourhoods, where there are no pets or children, and there are people who wish to live in places where they can have both. Tolerance of diversity means not unnecessarily imposing it on those who don't want it.

It is often argued that a greater diversity of housing stock in a community will assist in reducing travel requirements, assuming people who work in the area but who cannot find the kind of housing they seek are forced to travel from the chosen type of housing. This oversimplifies the meaning of housing to people: housing is not just a structure type, it is a neighbourhood and a life style. It is just a probable that increasing the diversity of housing in a neighbourhood will increase travel distances as people who were living elsewhere move to a neighborhood for its lifestyle, thereby increasing their journey to work distance. This is not to argue that neighborhoods should not have a greater diversity of housing, but rather that they should have this to meet the needs of the diverse and changing needs of residents, not on some suspected relationship between the relationships between housing and work.

VI. Telecommunications and the workplace

Another cherished simplistic concept is that telecommunication technology will reduce or eliminate the need to go to a place of work. Working at home, telecommuting, email, voice mail, and conference calls were supposed to reduce the need to travel: if you didn't need to be there to be there, then you didn't have to travel there. Experience, and not just recent experience, has shown that things are not as simple as this. First, in the past similar claims have been made for almost all telecommunications technology improvements including the telegraph, the telephone, the two-way radio, and the CB, and yet we still have places of work, shopping, and recreation. Second, it turns out that most often you have to be there:

> Five years ago TBWA Chiat/Day, an advertising agency, led the charge into the "virtual workplace" when its offices in Venice California, proved too small for its fast expanding workforce. The company gave everyone a mobile phone, a laptop and a locker, and told them to come into the office only when they needed to. The experiment proved a disaster: workers complained of isolation and lack of creative interaction. Last year the company traded virtual communication for the real thing, moving into large offices where everybody has their own desk, along with plenty of open space for informal meetings. TBWA Chait/Day is only one of a huge number of companies to discover that people need to "share the same air" as well as to "share the airwaves". (Adrian Wooldridge, "Telecommunications", The Economist, Oct. 9th, 1999)

Contemporary telecommunications appear to have increased mobility rather than replaced it. Those who have to be mobile are no longer tied to land lines, and hence travel where they want and still stay in touch. Thus not only did telecommunications not replace the need for people to share air, it made it easier for them to do so, as it made it easier to be mobile. Rather than reducing travel, telecommunications have increased its volume and spread it around.

Another technological change that was seen to have the potential of reducing travel, by both eliminating jobs and the need to go places to get things, was the advent of e-commerce. As with many technological trends (TV shopping, network selling, e.g.), the hype is much bigger than the reality. In the first instance, e-commercial will account for no more than 10% of retailing. There is a wide range of goods that cannot be sold in an e-commerce format, and few services outside of bill paying and financial transactions can: advertised yes, sold no. Amazon.com is an excellent example of this: while it burns through funds raised by repeated share offerings, it continues to loose money from its business operations.

Where the biggest gains in e-commerce appear to being made are in b2b (business to business) commerce, where between firms sales using e-commerce technology to replace catalogs and published notice of tenders. Ironically, the leaders in the application of b2b technology are the big three U.S. auto manufacturers.

Even within the sectors of retail where e-commerce will be viable, it is difficult to argue strongly that it will lead to a significant reduction of travel demand. The customer has to get the goods. In the case of e-sales, rather than the customer going to get the goods, the goods are delivered to the customer. Further, when goods are acquired by a customer traveling to the stores, multi-purpose trips mean that several objects from different retailers can be acquired on one trip. With e-commerce each product from each retailer involves a separate courier trip (plus, from experience, a couple of return attempts and then the customer has to go to the warehouse any how). Certainly the courier van as a retailer will become a noticeable, but minor, part of the retail landscape: to the extent this happens, travel may well increase and will be less predicable than would occur with the Saturday shopper model.

Even working at home has been shown in some cases to generate more, and less predictable, travel that the old journey to work model, with home based workers making business day trips to clients and related services, receiving more trips from courier firms delivering documents and products, and more personal day trips as boredom sets in and diversions are sought.

VII. Tolls and Behaviour – Within a five to ten year framework, tolls (while a source of revenue), will not be significant modifiers of behaviour, travel or land use. There are a number of reasons for this. First, the current residents of the region will be the majority of the residents of the region for the next twenty-five years (approximately 48% of the region's residents in 2026 are already here). Only on the margin can/will they adjust their behaviour in response to tolls: many are homeowners with mortgages to pay and children to raise, or homeowners who have already paid off the mortgage and raised the children. The out-of-pocket cost of tolls may anger these people, but it won't make them move within the next decade or two.

Further, as discussed earlier in the section on living close to work, tolls may just be seen as a cost of a location, with their introduction resulting in a fall in the land values in areas where tolls initially increase travel costs. To the extent that this capitalization of tolls into land value occurs, it will be a once only and inescapable tax on the owners of land within the affected areas, but will have no effect on the behaviour of subsequent purchasers. Capitalization of tolls into land values renders them neither a carrot nor a stick but rather as a way of transferring wealth from landowners to the tolling authority.

It must also be remembered that tolls are income regressive, having their greatest proportionate impact on low-income households. The reason for this is that the amount of the tolls is the same regardless of the income of traveler (as is sales tax), and hence account for a bigger percentage of a low-income travelers household's income. Thus tolls will not have anywhere the impact on higher income households' behaviour that they (or increasing bus fares) will have on low-income households behaviour.

To the extent that tolls did reduce travel by forcing lower income households to modify their behaviour, they could, perversely, increase land values and travel by higher income groups. If tolls reduced the use of a transportation link sufficiently to increase the average speed on the link, thereby reducing the travel time cost by more than the cost of the toll, then higher income households would find their travel costs (which include time costs) reduced by tolls. They would not only travel more, but may change their current congestion avoiding travel time by shifting to travel closer to the peak. To a group where time is money, if tolls meant greater speed, they would find it a plus, leading to a greater, rather than lesser, attraction to both travel and suburban development.

VIII. Demographics and transportation

Over the next two decades, the metropolitan region will continue to growth and change in a generally predictable way. Its population will increase by approximately 38%, adding 869,000 people (43,500 per year) in growing from its 1999 population of 2,272,000 people to 3,141,000 in 2019 (Figure 6).

Its population will also change, with aging shifting the current 33 to 52 years of age population bulge up to a 53 to 72 bulge in 2019, and migration broadening the base of the population age profile (Figure 7). Over the next decade, most of the region's population growth will be in the 45 to 64 age group (Figure 8). The 45 to 49 age group will increase by 54,800 people (32%), the 50 to 54 by 57,700 (39%), the 55 to 59 by 68,900 (63%) and the 60 to 64 by 59,500 (69%).

Figure 6: Population of Metropolitan Vancouver, 1999 to 2019

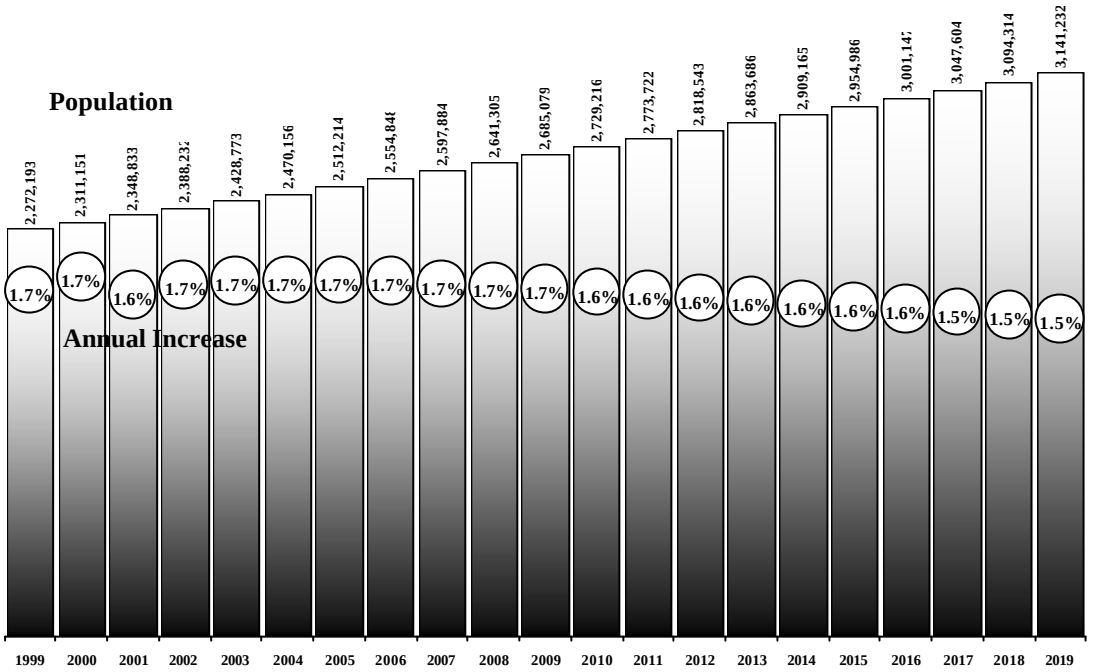


Figure 7: Age Profile, Metropolitan Vancouver, 1999 and 2019

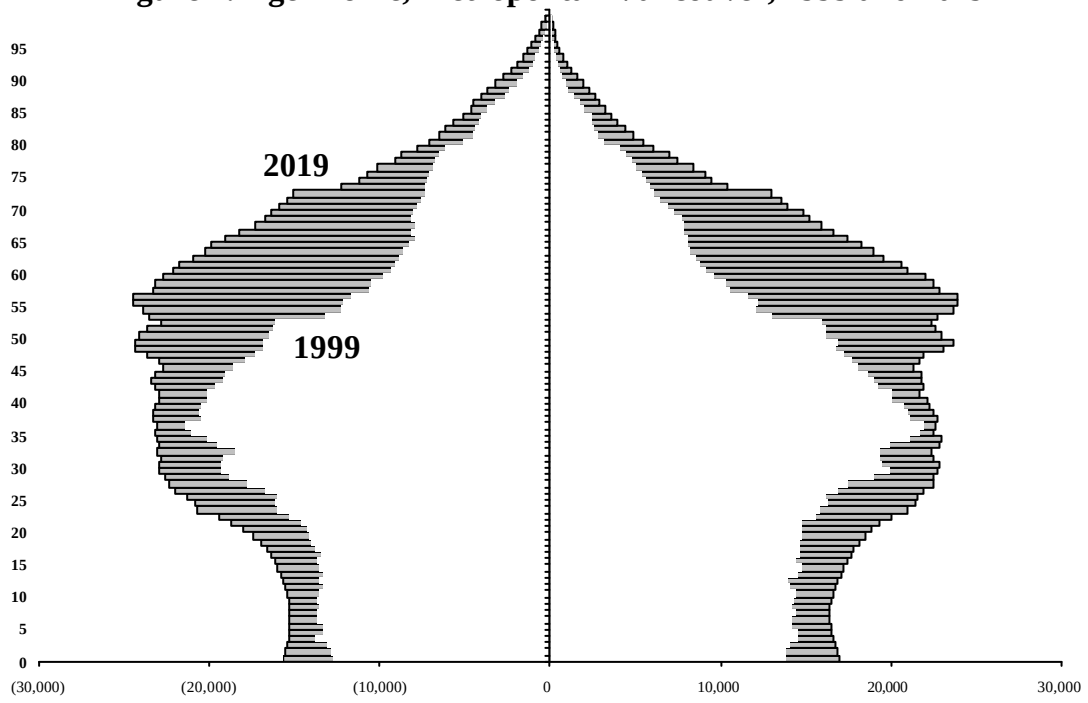


Figure 8: Projected Population Growth by Age Group, Metropolitan Vancouver, 1999 to 2009

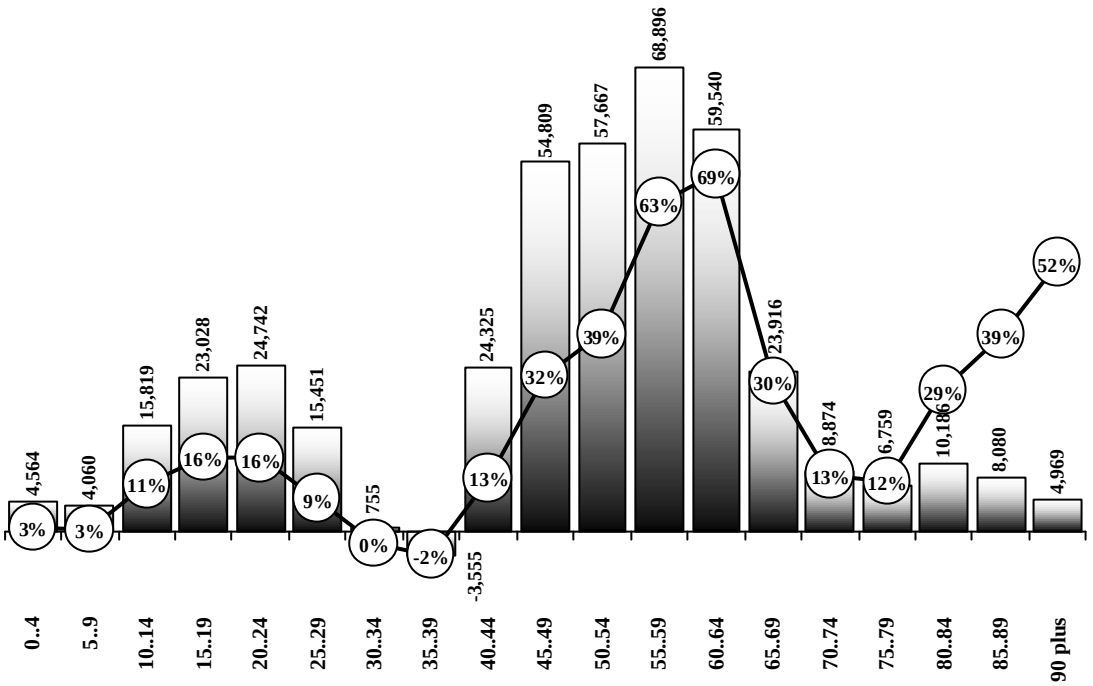
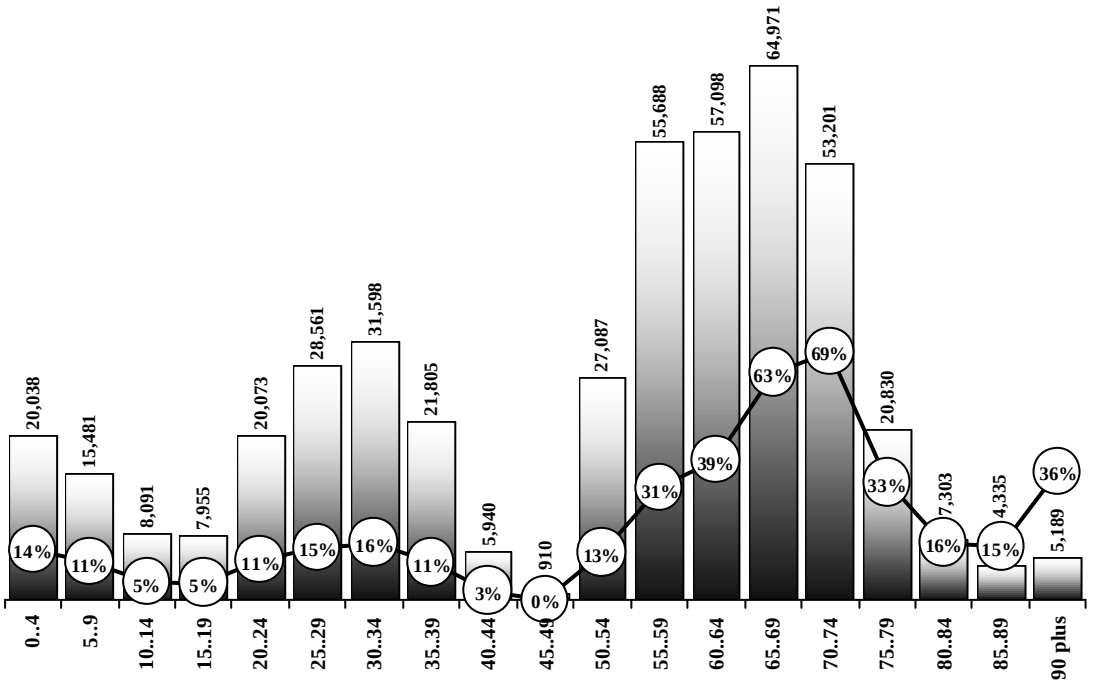


Figure 9: Projected Population Growth by Age Group, Metropolitan Vancouver, 2009 to 2019

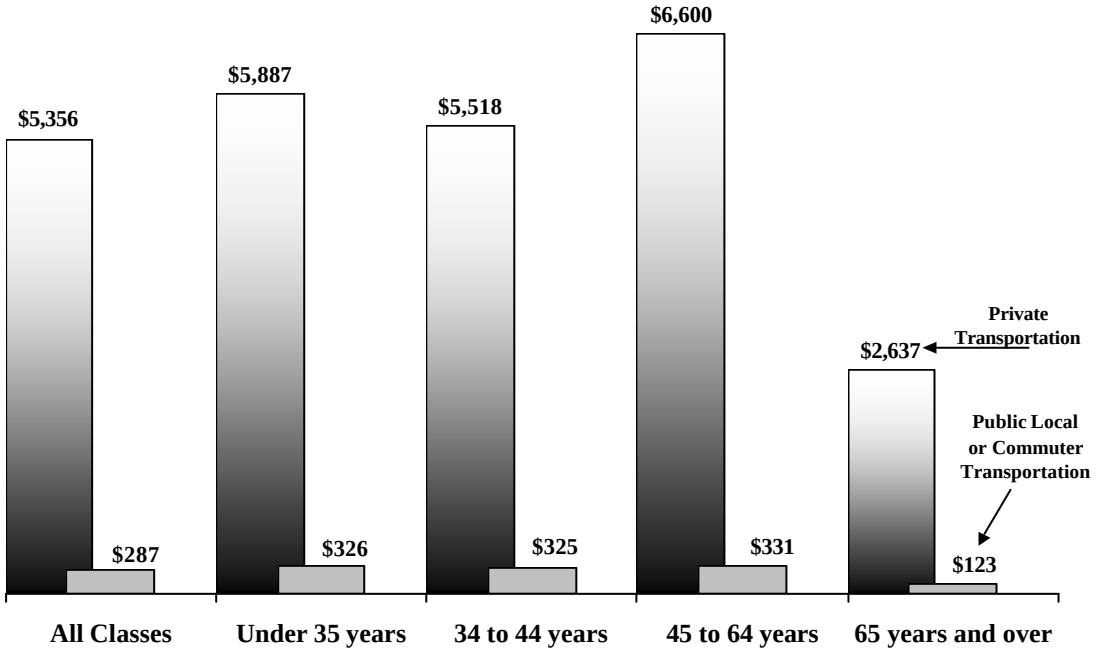


Combined, the 45 to 64 age group will increase by 47%, with 240,900 more people in this age group in 2009 than there are today. The 65 plus age group will increase by 23%, growing by 62,784 people over the next decade. The younger age groups will increase by much smaller amounts and percentages: the 0 to 14 age group will increase by 6% (24,400 more people), the 15 to 34 age group by 10% (63,975 more people), and the 35 to 44 age group by 5% (20,800 more people). The reason for using these somewhat irregular age groups is that they correspond to the age groups to which household expenditure data on transportation is available.

Between 2009 and 2019, the aging of the region's baby boom bulge will move the population into a transformation period of major significance: this will be the period of retirement of the front edge of the baby boom, which will bring with it as much social change as their entry into the labour force in the 1960's. The largest and most rapid growth will shift into the 55 to 74 age group (Figure 9). The 55 to 59 age group will increase by 55,700 people (31%), the 60 to 64 age group by 57,100 (39%), the 65 to 69 age group by 65,000 (63%) and the 70 to 74 age group by 53,200 (69%).

When combined into larger age groups, the biggest increases will be in the 65 plus age group, which will increase by 47% (155,800 people) between 2009 and 2019, with the 45 to 64 age group increasing by 19% (140,800 more people). Again, the younger age groups will increase by smaller increments and rates: the 0 to 14 age group will increase by 10% (43, 600 people), the 15 to 34 by 12% (88,200 people) and the 35 to 44 by 7% (27,800 people).

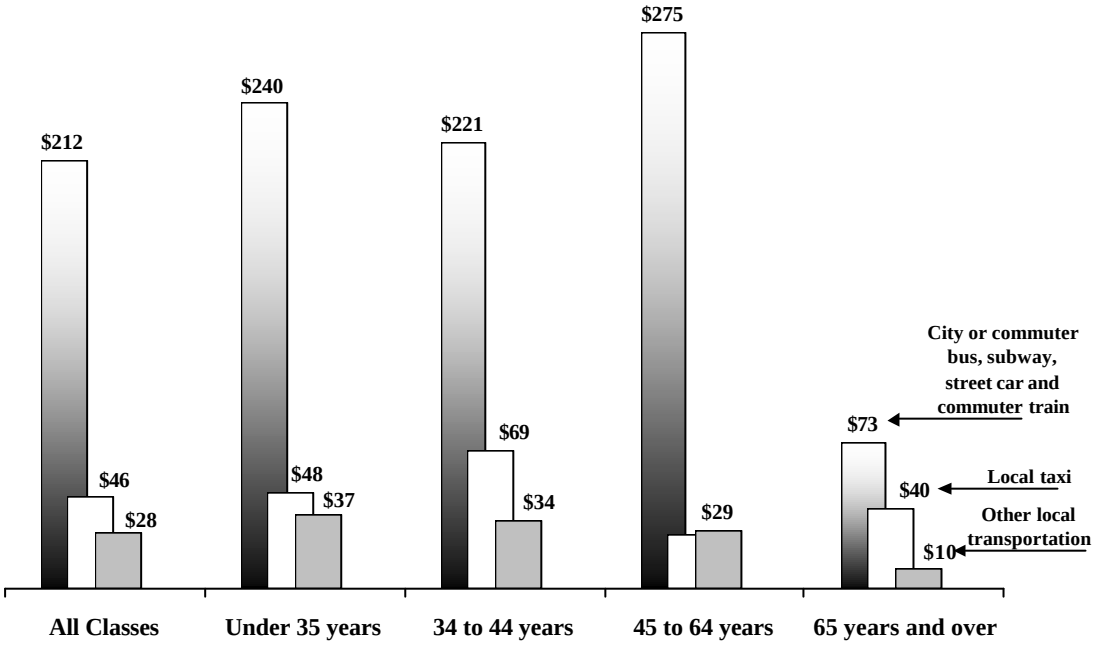
Figure 10: Average Household Spending on Transportation
By Age of Household Maintainer, Vancouver CMA, 1996



The significance of this pattern of aging is derived from the life cycle pattern of household spending on transportation. The 45 to 64 age group, which will grow the most over the next decade, has the highest average household spending on private transportation ($6,600 for a household maintained by someone aged 45 to 64, compared to an average of $5,365 per year for all households, Figure 10). It also has the second lowest average spending on local and commuter (i.e., public) transportation, reporting an average of $331 per household, compared to the $325

average for households with maintainers under the age of 45, and $123 for household 65 and older. The decline in average household spending on local and commuter public transit as the population reaches age 45 is the result of a decline in spending on taxis and other local transportation: spending on city or commuter buses, subway, street cars and commuter trains reaches its maximum in the 45 to 64 age group, with $275 spent per household with maintainers in this age group compared to an average of $212 (Figure 11). Assuming that this pattern prevails in the future, the next decade should be a good one for public transit in terms of fee generation.

Figure 11: Average Household Spending on Public Local or Commuter Transportation By Age of Household Maintainer, Vancouver CMA, 1996



The reason for the emphasis on fee generation is that the increase in average spending is combined with a decrease (albeit a small one) in the number of households reporting expenditure on public transit (Figure 12). In the under 45 age groups, 71% of the households report expenditure on public transit, compared to only 69% in the 45 to 64 age group, and 61% in the 65 plus age group. Thus the increase in average household spending on transit in the between the 35 to 44 age group and the 45 to 64 age group is the result of an increase in spending by a smaller percentage of households. The average household reporting expenditures on public transit in the 35 to 44 age group (the 71%) spends an average of $311 per year (compared to the average of $221 for all households in the age group). The average household reporting expenditures on public transit in the 45 to 64 age group (the 69%) spends an average of $399 per year on transit (compared to the $275 average for all households in the age group).

Assuming that the 1996 expenditure pattern by age of household maintainer remains constant, matching it with a forecast of household formation by the same age groups permits projection of the growth in household expenditure on transit ignoring inflation (Figure 13). Given the rather large span of the age groups used in the available data, such a projection must be regarded as indicative rather than definitive. It would be useful to obtain data for more disaggregated age groups for the region: the ten year age groupings available for the province as a whole show a decline in transit use between households in the 45 to 54 and the 55 to 64 age groups. As travel

behaviour in the rest of the province is not necessarily the same as it is in this region, it is not possible to generalize on the change that might occur in the metropolitan region using the provincial data.

Figure 12: Percent of Households Reporting Spending on Public Local or Commuter Transportation, Age of Household Maintainer, Vancouver CMA, 1996

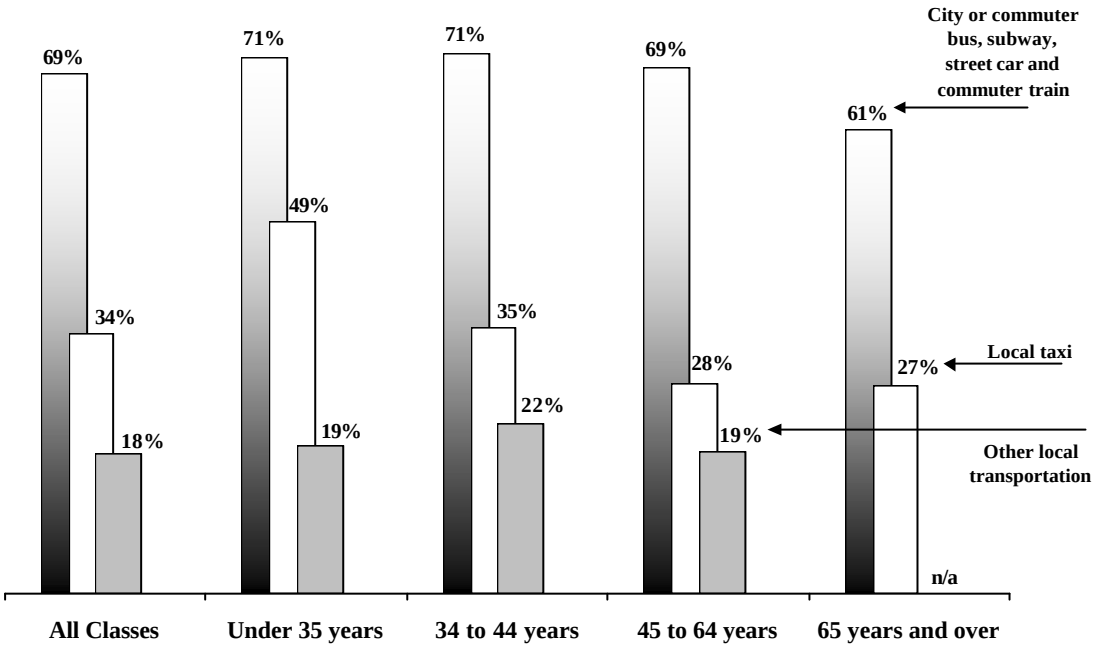
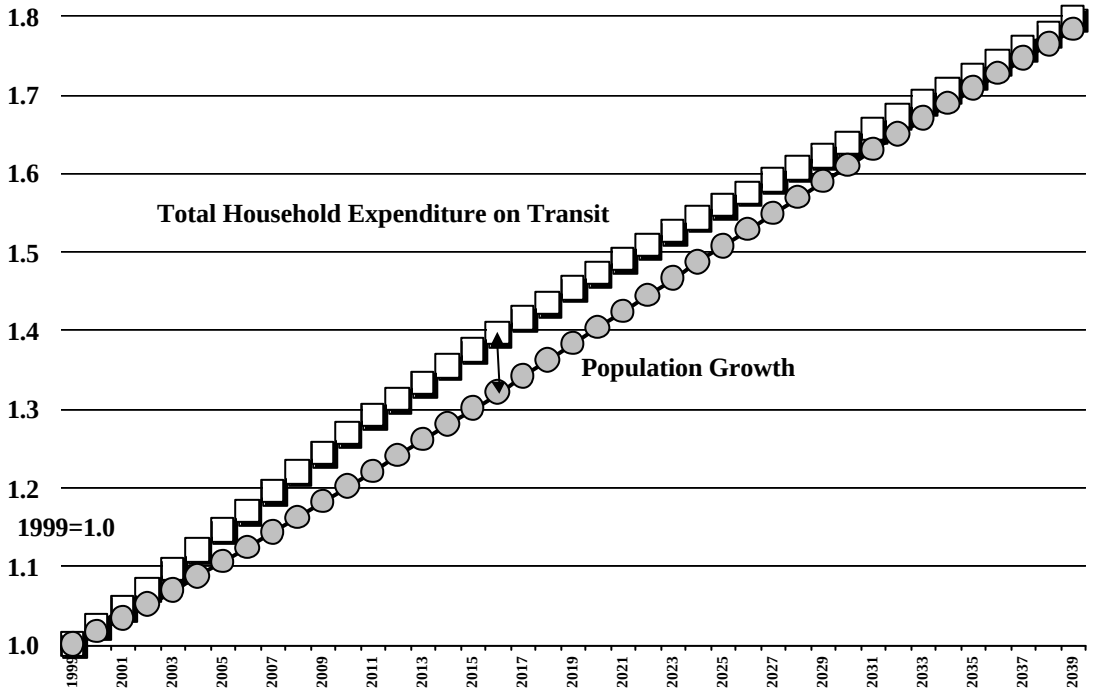


Figure 13. Projected Household Expenditure on Transit, 1996 Expenditure Pattern, No Inflation



With the projected 47% growth in the 45 to 64 age group over the next decade, compared to an increase of only 18% in the population as a whole, household expenditures on transit will increase by 24%, more rapidly than the total population. In fact, from now until 2016, under this scenario household expenditures on transit will increase faster than the population: in 2016, households expenditures on transit will be 40% higher than they are today while the population will have increased by only 32%. From 2016 on, assuming 1996 expenditure patterns, the population will increase more rapidly than consumer expenditures on transit, as the bulk of the baby boom generation (today's 35 to 50 year olds) reaches the 65 and older age group, where spending per household on transit drops significantly, from $275 per household per year in the 45 to 64 age group to $73 in the 65 plus age group. By 2040, household transit expenditure and population growth will have both increased by 80%.

IX. The Cost of Green Space – Trip Length and Opportunity Cost

An extremist position that is widely held in land use planning is that "green space" has an infinitely high value relative to all other uses of land. While it is never presented this way, the approach that all space that is green today must always remain green implies that there is no better alternative use for the land. Saying that a parcel of green space is irreplaceable, and then acting as though it was true does not make it true. Responsible policy decisions with respect to society's resources should be based on knowledge rather than unproven statements in order to ensure that society's resources are used wisely. This is not to say that having a parcel of land as green space is, or is not, the highest and best use of the land, but rather to say that without research nobody knows.

The reason for raising this issue is that keeping a particular parcel of land as green space has a cost beyond excluding other uses from the site, as the excluded uses must occur on some other site. This trade-off is most cogently presented in the conflict between green space preservation and neighbourhood preservation (the Land Commission's "up not out" model of urban development and the "neighbourhoods are important" campaign of the recent municipal election).

This is not the only long term trade off keeping a particular parcel of land green or developing for some other use that has relevance for transportation planning: keeping a particular piece of land green may be harmful to the environment as a result of the environmental costs of pushing urban development to sites that lie beyond the green parcel, and the resultant transportation of goods and services through green space between urbanized areas.

There is an oft mentioned image of the lower mainland being comprised of "islands in a sea of green" – clumps of urban development in a landscape of green zone. While a charming image, it is not complete, as it fails to mention that the islands are connected by bridges. It takes land and resources to build and maintain these bridges, and it takes energy resources to move people and commodities across them. Before advocating continuing to expand the use of bridges or expand the bridges themselves as is implied by the "islands in a sea of green" planning model, there is a need for research into the costs of this and alternative forms of urban development in the region.

One alternative, as an example, would be to convert some of the green zone with a lot of travel through it into destination uses (e.g., housing) and not developing these uses in more distant locations, thereby reducing the amount of travel across bridges to far away islands. This would involve trading off some of the green space closer to existing urban areas for green space farther away in exchange for less investment in bridges (transportation infrastructure) and fewer energy resources used in moving people and goods. In the long run, the environmental objectives of regional growth management may mean a more compact in terms of both density and extent.

Suggesting that there be a valuation of the costs and benefits of the "island in the sea of green" planning model, and a comparison of these to those of other forms of urban development, does not mean that the sea of green should not exist. It fully and simply means that there are direct and indirect cost of preserving the current pattern of green space in the region, that these costs have never been measured, and that research should be carried out to identify the economically and environmentally best form of urban development for the region.

Having said this, from a 5 year strategic planning perspective, islands in a sea of green is the pattern that must be planned for, because the overall land use pattern in the region today is that which, except for change at the margin, will characterize the region a decade from now. The 5 year strategic planning questions that must be addressed, therefore, relate to service levels between communities through this green zone and where the marginal changes to the communities and the green zone will occur.

X. Minimizing and maximizing don't happen at the same time.

Last year a task force from Sydney Australia that was identifying strategies for the development of the Sydney metropolitan region traveled around the world visiting other metropolitan regions seeking to benefit from others' experiences. In their summary report they concluded that the Metropolitan Vancouver's Livable Region Strategic Plan in specific, and planning in this region in general, were at best indifferent, and at worst hostile to economic development:

> "There is a strong environmental theme to Vancouver's Livable Region strategy, to the detriment of economic development in the city. … The strategic approach adopted is notable for the lack of initiatives to directly foster economic growth." Sydney 2020, PriceWaterhouseCoopers, Page 25

This perspective on the Livable Region Strategic Plan is presented here as an example of the reality that some goals are mutually exclusive, and hence they cannot both be attained simultaneously. One can maximize attainment on one goal for a given level of all other goals, but, unless goals are effectively synonymous, one cannot maximize all of them at the same time. One cannot maximize food consumption and minimize weight gain.

Thus, for example, the goals of maximizing "the maintenance and enhancement of natural areas and open space" and minimizing "the pressure for the development of agricultural land for non-agricultural purposes" may be compatible, and hence can be achieved simultaneously. Given the pockets of urban development within a sea of green that characterize this region, it will be difficult to minimize "the transportation, electrical and other energy requirements of the region", "provide the most effective structure of major centres and transportation necessary to support a growing region", and "support the efficient movement of people and goods both within the region and with other regions". Each of these goals implies a particular form of urban development that will not necessarily be compatible with the pattern implied by other goals.

The fact of life, and of strategic plans that can be implemented, is that trade offs and compromises must be made, and it is generally better to do this in a comprehensive rather than ad hoc way. Goal setting is easy, as it means simply articulating a wish list that reflects everyone's objectives: unfortunately a plan that list everyone's goals but cannot be implemented is not of much use. Goal setting is pointless unless the next step – priority setting – is taken.

It is through the process of priority setting that planning that can succeed emerges: it results in a plan that annoys everyone a bit but which can achieve reasonable objectives. Without the painful

step of making the trade-offs, getting a plan accepted is easier, but it also ensures that it will not meet the expectations of many of those whose wishes are on the list, and probably will not provide any useful basis for implementation. Rather it will emerge as a plan that everyone accepts in concept but few if any accept in application. Without a ranking of importance of objectives, decisions about change and investments cannot be practically made: if a plan does not provide guidance on how much green space should be given up to an activity that will strengthen the region's economy, or even whether green space is more important than economic activity, then if is useless when specific decisions have to be made.

There is currently a well developed list of goals, objectives and criteria for transportation and land use planning. What is necessary now is that these be put in order of priority, with clear identification of what is of greater and what is of lesser importance. With few greenfield sites outside of the region's green zone left for development; strong preferences for neighbourhood, site line, and heritage preservation; increasing fiscal constraints of government spending as a result of the pre-emption of government discretionary spending by debt-service, health care, and education; increased competition for the region's exports; and an aging population, hard choices will have to made in the future. Strategic planning must address the priorities and trade-offs that must be made when these hard choices arise.

XII. Time Frames and Strategic Planning

As strategic planning most often deals with the planning for the allocation of scarce resources to alternative uses, it is appropriate to consult economic theory for a consideration of the time frames for such planning. In economic theory, planning time frames range from the very short run to the very long run.

The very short run is a period of time when a firm or organization can, in response to changing external conditions, only change one of the things it uses to produce goods or services. This is a period of where the firm has few choices or alternatives to choose from in response to a change in demand for its products or in the supply of the things it uses to meet this demand. The very short run is often thought of as a scheduling time frame. The short run is a period of time when an organization has a wider range of factors that may be changed. These include all of the things (factors of production) an organization uses with its fixed physical plant to produce goods or services. The only thing the organization cannot change in the short run is the size of the durable investments used in production.

In the long run even the size of the physical plant can be changed: the organization can expand its productive capacity, reduce it, or even eliminate it. The only thing that cannot be changed in response to a changing environment is the fundamental nature of the technology used in production and/or of the commodities used in production or produced. These final fundamental changes occur only within the purview of the very long run, the period of time when everything is assumed to be variable, with an organization's choices limited only by reality.

The stages from the very short run to the very long run do not exist as discrete increments: rather they represents points along a continuum from where there is only one option that can be exercised in response to change to where every option is open. Nor are these stages of the same calendar duration for all activities: for some organizations, the very short run can be very long (such as the operators of a hydro electric dam) while for other the very long run is very short (such as organizations in the telecommunications industry).

In the case of a five year strategic plan for metropolitan region transportation systems, the time frame (five years) is a given. The question is the degree to which the organization can choose from alternatives within a 5 year planning cycle. Does a five-year strategic plan have to account for a wide range of variability in both what the organization can do and in the conditions that will prevail within its external environment? If it does, then the plan will be characterized as dealing with long run strategies. In contrast, if there are few alternatives that the organization might exercise and if there will be a relatively small degree of variance in its external environment, then the strategic plan will have to reflect the shortage of options available.

Five years is a short run time frame in metropolitan transportation planning: only marginal change will occur within the external environment for the system (land use and people), and only marginal change will occur to the stock of capital that is used to produce transportation services in the region. Not only will the physical characteristics of the overall system be essentially the same, so will the human capital (the workers) and most of the system users. Five years is a very short period of time in metropolitan development, and for all practical strategic planning purposes what exists or is under development today will be what is in use five years from now.

This is not to say that there will not be significant changes in single specific aspects of the system or the environment: some single intersections, individual routes, and the use of specific parcels of land, will all change dramatically. At the regional and strategic level, however, little will be different in 5 years, and even in a decade, from today. The transportation and land use pattern of this region, at the regional and strategic level, in 10 years will not be dramatically different from that of today, just as today's is not dramatically different from that of 10 years ago.

There are a number of reasons for why change in metropolitan regions occurs at a glacial pace, all of which relate to the durability and immobility of the improvements made to land to make it useable for urban purposes. The physical additions to land – buildings, roads, bridges, rail lines, guide ways, and tunnels – last for a very long time, and, once attached to the land are essentially immoveable. As a result, over time, a large inventory of sidewalks, paths, buildings, streets, bridges, rails and right of ways build up that establish the context for subsequent development. In contrast to this inventory of land uses and infrastructure, net annual additions are both small, and spread incrementally throughout the region.

Simply put, a region whose population is growing at the rate of 1.6% per year will see additions in the range of 1.6% per year in the demand for accommodation and services. Depending upon the why, how, where and who of this growth, the demand for specific goods and services will vary from this 1.6% per year core. As a generalization, more than 90% of the use/users in five years will be accounted for by the current stock.

If all of the growth were located in a single part of a region, then, while overall demand may only increase by 1.6% or so, this one part would be subject to much greater increases. Rarely, if ever, does this happen, as to a lesser or greater extent, urban growth is spread across metropolitan regions, with some growth occurring in its core, some in its older suburbs and some at its urban margin. The issues of where additions to a region go are of import in long term planning (when cumulative new additions are larger than the current stock) and hence in setting directional terms of reference for shorter term planning.

Not only do the physical characteristics of urban areas change slowly, so do the behavioural characteristics of a region's population. Almost 85% the people who will be in this region in a decade are in the region now. While it is true that these current residents will be ten years older in a decade, human behaviour does not change – on average – much within a decade. There are

certain demographic break points, such as leaving school or retiring, but as the typical resident of this region is 37 years old to day, and the bulk of the population is between the ages of 34 and 53, we should not anticipate much in the way of behavioural change in the next decade.

Thus, a five strategic transportation plan involves a situation where the overall demand, use and supply components of the system will be as they are today, modified at the margin by population growth and change of less than 10%, forthcoming system additions and changes that are known today (given the long lead times in producing them), and forthcoming land use changes in sites that are generally known today (by virtue of their long lead times and the guidance of community land use plans). Longer term strategic planning that identifies where change is to occur over the following 25 to 50 years is required to provide the context when major alterations of infrastructure may occur in the short run.

XIII. Conclusions.

From the forgoing discussion, one may conclude, among other things, that:

1. The demand for transportation services in the region will continue to grow faster than population growth. The ongoing specialization that economic and technological change will bring will continue to generate a greater level of interdependence and specialization of land uses, firms, employment and life styles. This will continue the trend of increase in demand for transportation services that is system wide, rather than focusing on traditional concentrated employment locations (downtowns and regional town centres).

2. Places of work will continue to decline in importance in residential location decisions. Places of residence will continue to decline in importance in employment location decisions except for population serving employment. Employment locations will continue to disperse rather than concentrate.

3. Single use areas, particularly relatively low density ground oriented residential areas, will continue to be a significant part of our urban landscape, at least for the next quarter century. Over the longer run, there will be change in existing single detached neighbourhoods as their aging population dies, something to be anticipated 30 to 50 years in the future.

4. In the next two decades population growth will be most rapid in the age groups that have the highest per household spending on private transportation **and** on public transportation in the forms of city or commuter bus, fixed rail transit such as subway and skytrain, street cars, and commuter trains.

5. Tolls will, within the next decade, be most effective as sources of revenue rather than ways of modifying behaviour.

6. Transportation during the next decade will be largely dominated by issues relating to serving the stock and pattern of land uses that currently exist.

7. Research should be done about the cost of communities in a sea of green with transportation bridges connecting them versus alternatives such as an urban area behind a green wall. The next step in strategic planning - priority setting - should be taken to provide a basis for the hard choices that must be made in the next decade of urban development in the region.