

**Livable Human Settlement**

**Criteria 1:** The character of the Region, and each community’s identity, character and role in the Region, is recognized and preserved.

**Descriptor 1a:** Maintain diverse community characters

**Measure:** Amount of physical diversity

**Quantitative Indicator:** Percent of multi-family housing – #1 on Figure 5

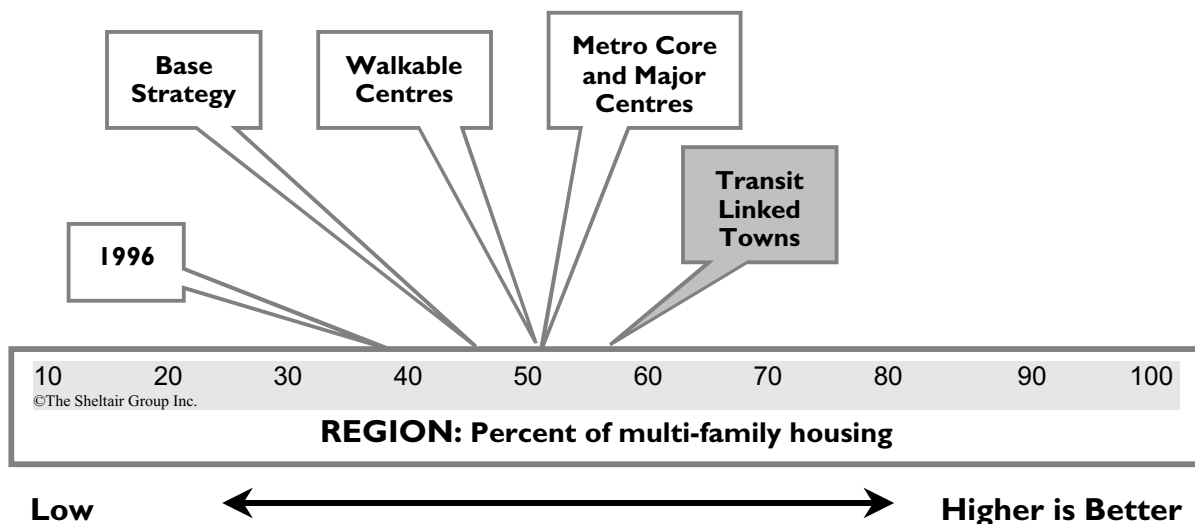
**Meaning:** Higher is better

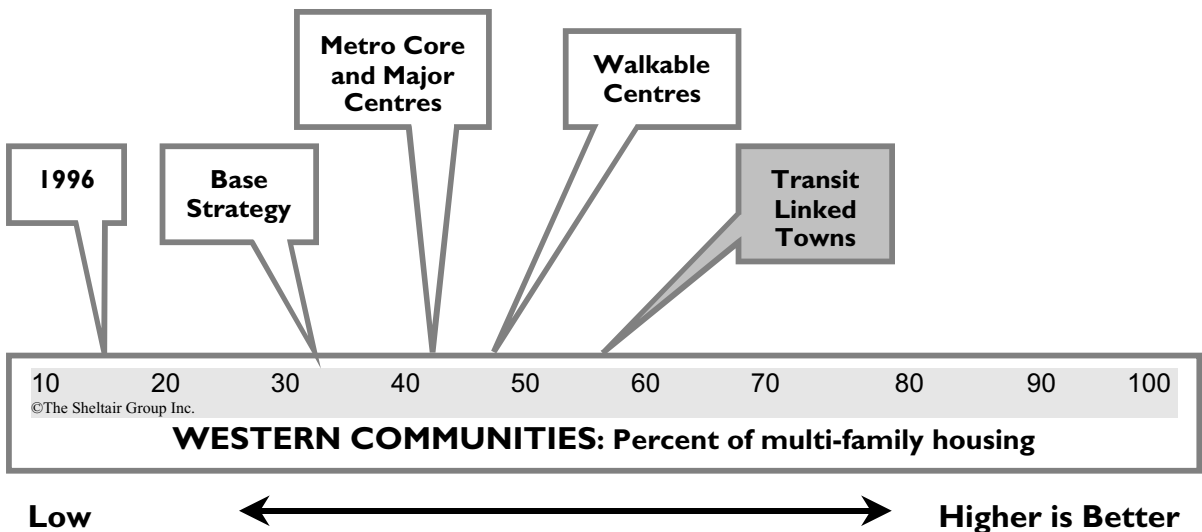
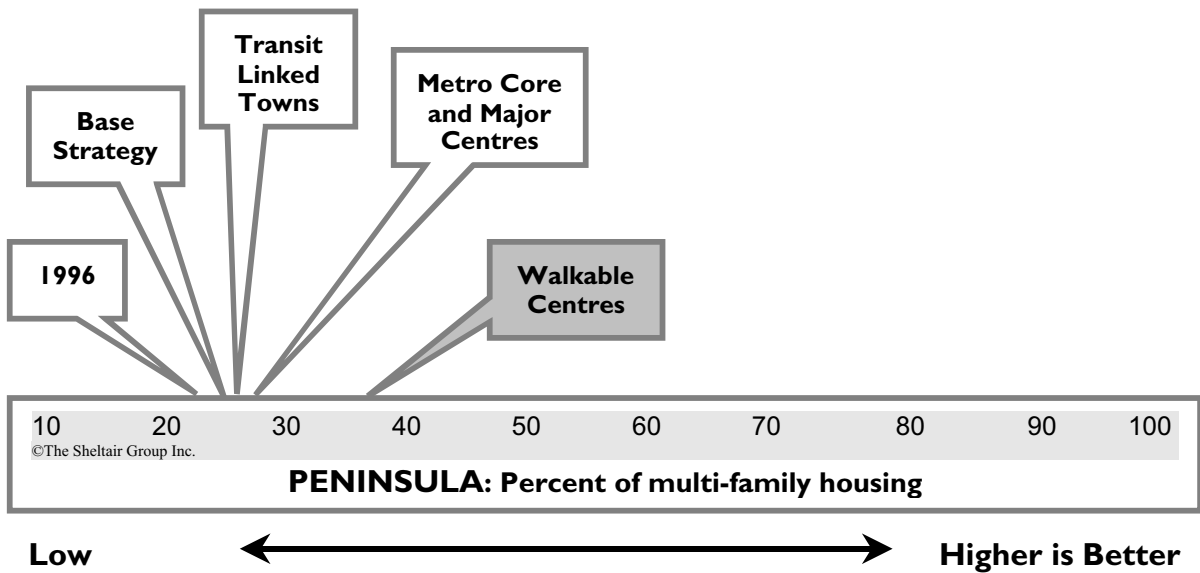
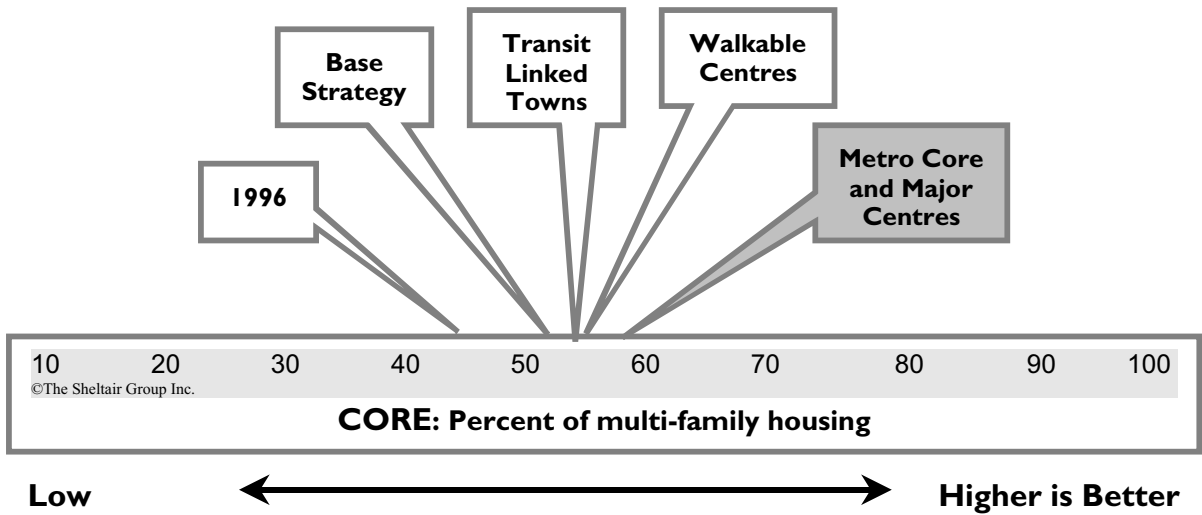
**Commentary:**

The amount of multi-family housing is used in this analysis as a “proxy” for physical diversity in 2026. The higher the amount of multi-family housing, the greater is the diversity of housing types and sizes within the region.

The accompanying graphic illustrates that, at a regional level, there is a shift to greater physical diversity in all options with the Transit-Linked Towns option having the highest amount of multi-family housing. On a sub-regional basis, the Transit-Linked Towns option also has the highest amount of multi-family housing in the Western Communities. However, for the Peninsula, the Walkable Centres option would have the highest proportion of multi-family housing and in the Core Area, the Metro and Major Centres option has the highest proportion of multi-family housing.

There is variation among the sub-regions with the Core Area, proportionally, having a much higher amount of multi-family housing (50% to 58% depending on the option) than the Peninsula (26% to 38%). In the Western Communities there is a substantial variation among the options (37% to 57%), up from 15% in 1996. Regardless of which option is selected, there will be substantial physical change taking place in the urban-west part of the region, particularly in Colwood and Langford.





**Livable Human Settlement**

**Criteria 1:** The character of the Region, and each community’s identity, character and role in the Region, is recognized and preserved.

**Descriptor 1b** Maintain community stability (at regional, municipal, neighbourhood level)

**Measure:** Rate of change

**Quantitative Indicator:** Average annual rate of population growth – #41 on Figure 5

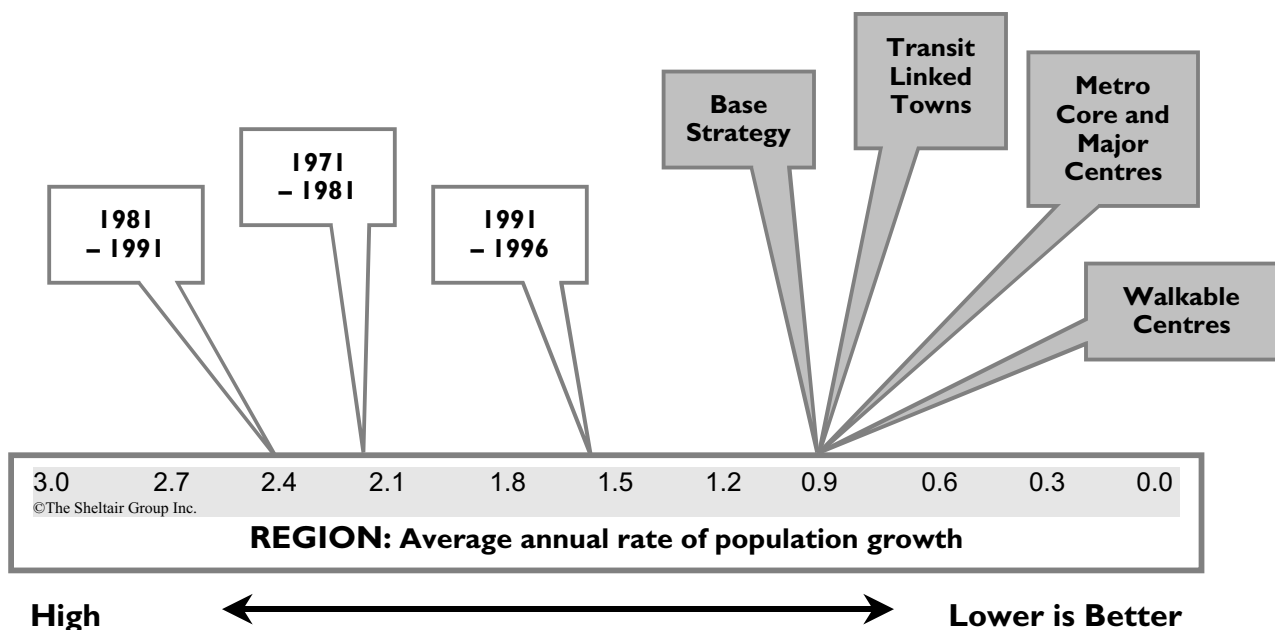
**Meaning:** Lower is better

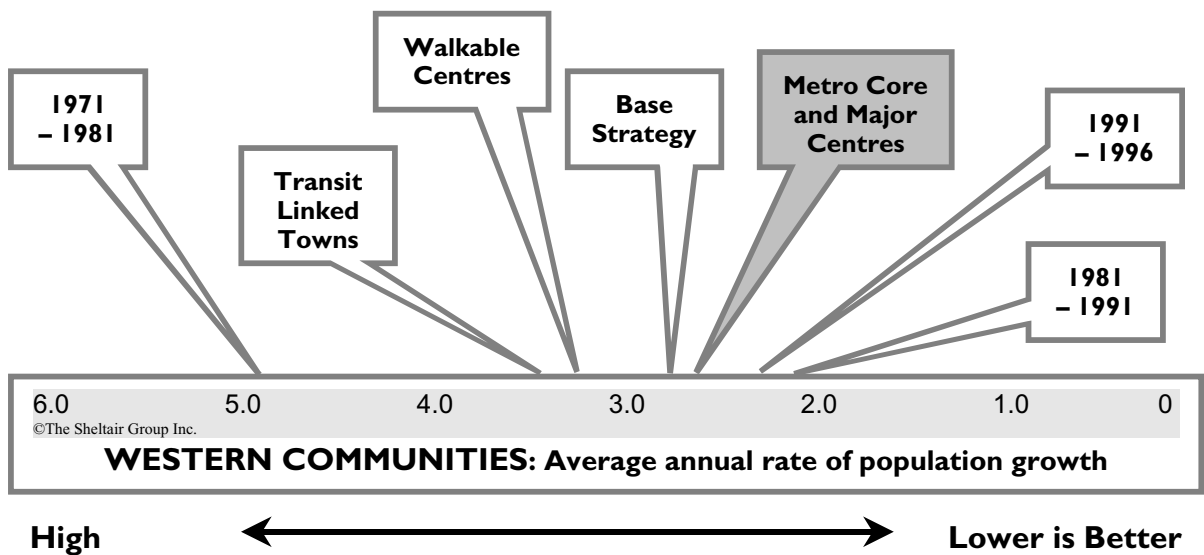
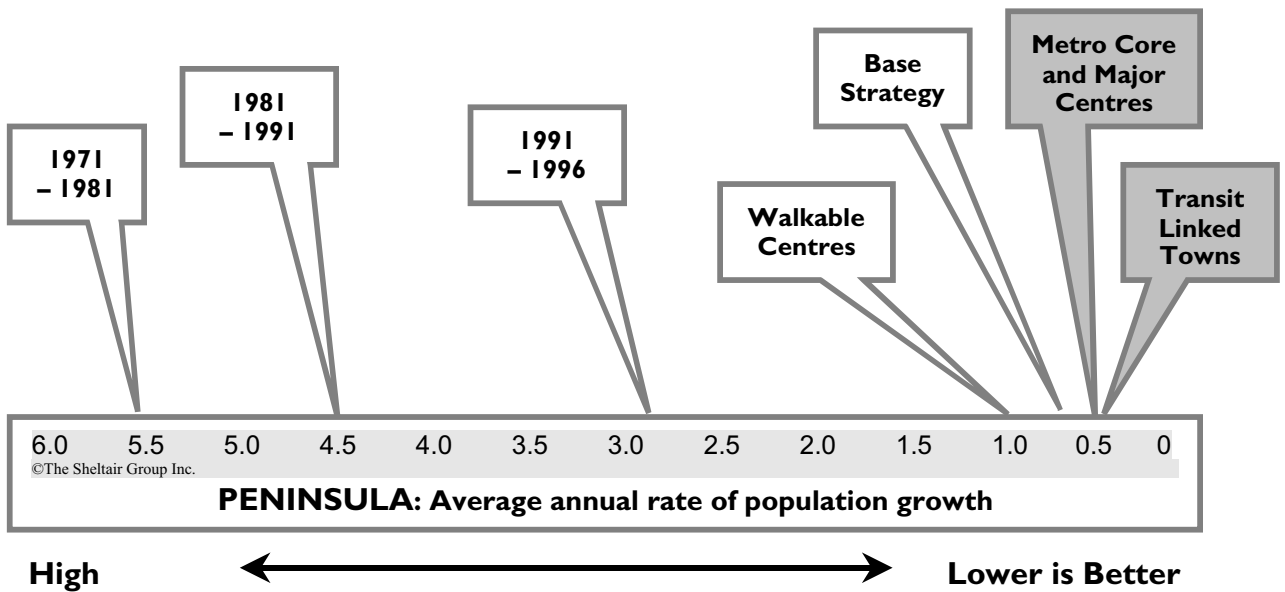
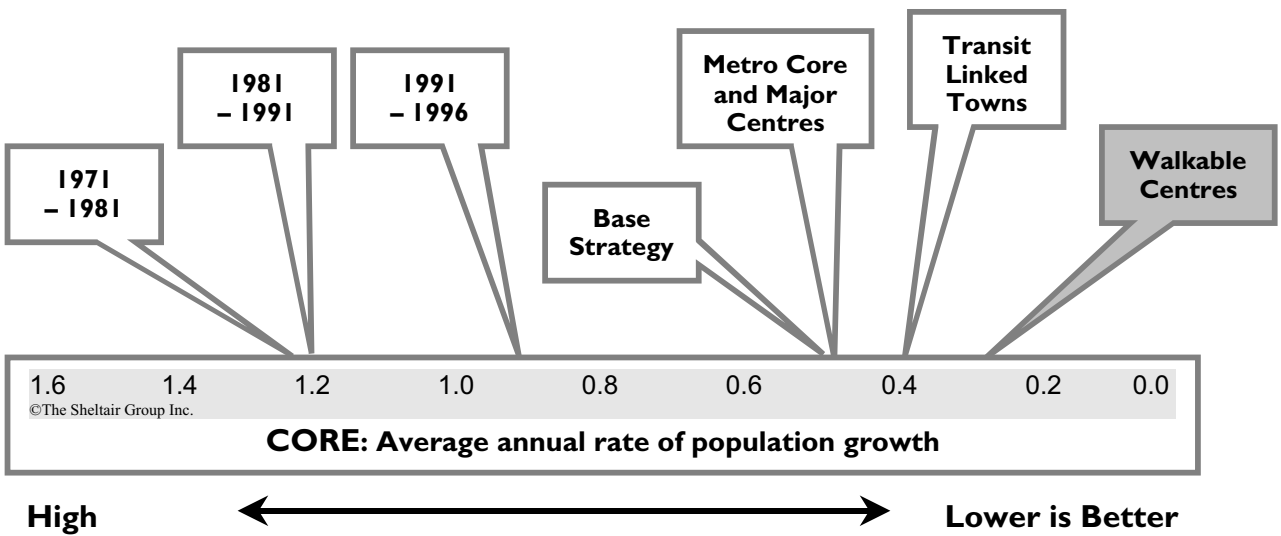
**Commentary:**

The rate of change affects how people feel about their communities and often affects their daily activities. If the rate of change is too great, individuals may have difficulty adapting and the physical and social character of existing neighbourhoods may be de-stabilized.

The rate of growth for the region as a whole is forecast by BC Stats to an average 0.9% per year over the coming quarter-century – this applies equally to the four options. On a regional level, this rate of change is modest in comparison with the growth rates of the early 1990s when annual rates were greater than 2%. Looking at the rate of change for the sub-regions, the Western Communities will experience the greatest rate of population growth (varying from 2.8% to 3.4%) with the most change taking place if the Transit-Linked Towns option is selected. It should be noted that although this appears to be a relatively high rate of change, much of the growth is intended to take place in specific areas that have been planned to accommodate more multi-family housing or in the new perimeter neighbourhoods in Langford and Colwood rather than in the redevelopment of existing neighbourhoods.

Although the population will increase considerably in the Core Area, the actual rate of population growth will be less (0.3% to 0.5%) than other sub-regions. In the Peninsula, the rate of population growth would be modest for all options (less than 0.9%) but greatest if the Walkable Centres option is pursued.





## **Livable Human Settlement**

**Criteria 1:** The character of the Region, and each community's identity, character and role in the Region, is recognized and preserved.

**Descriptor 1c:** Maintain rural character

**Measure:** Growth in rural areas

**Commentary:**

A possible indicator that would be appropriate for this descriptor would be one that measures the amount of rural land converted to urban uses. All of the growth options, however, assume the same amount of growth in rural areas (90% of the theoretical capacity in the existing OCPs), and therefore there would be no sensitivity amongst the options to such an indicator. For this reason, an indicator has not been developed for this descriptor.

Despite this fact, however, it is conceivable that if growth cannot be managed within the existing Urban Containment Boundary (UCB), development pressure would be exerted on rural areas. To this extent, it is important to consider which of the options directs the most growth into existing centres, as well as where proposed new neighbourhoods are located within each option.

## **Livable Human Settlement**

**Criteria 1:** The character of the Region, and each community's identity, character and role in the Region, is recognized and preserved.

**Descriptor 1d** Minimize land use conflicts between urban and rural areas

**Measure:** Amount of potential conflict

**Indicator:** Number of dwellings in traffic zones that lie along the urban side of the Urban Containment Boundary

**Meaning:** Lower is better

**Commentary:**

The amount of proposed development activity along the Urban Containment Boundary is one way to identify potential future urban-rural land use conflicts. Because the CRD's "traffic zones" data base has traffic zones that straddle the boundary, there was no practical or reliable way to model this future condition for the four options. Intuitively, the Transit-Linked Towns and Metro and Major Centres are the options which have the least population and employment adjacent to the UCB and therefore, the least long-term pressure on the rural areas of the region.

**Livable Human Settlement**

**Criteria 1:** The character of the Region, and each community’s identity, character and role in the Region, is recognized and preserved.

**Descriptor 1e:** Avoid sprawl

**Measure:** Amount of sprawl

**Quantitative Indicator:** Total regional peak hour travel by auto – #13 on Figure 5

**Meaning:** Lower is better

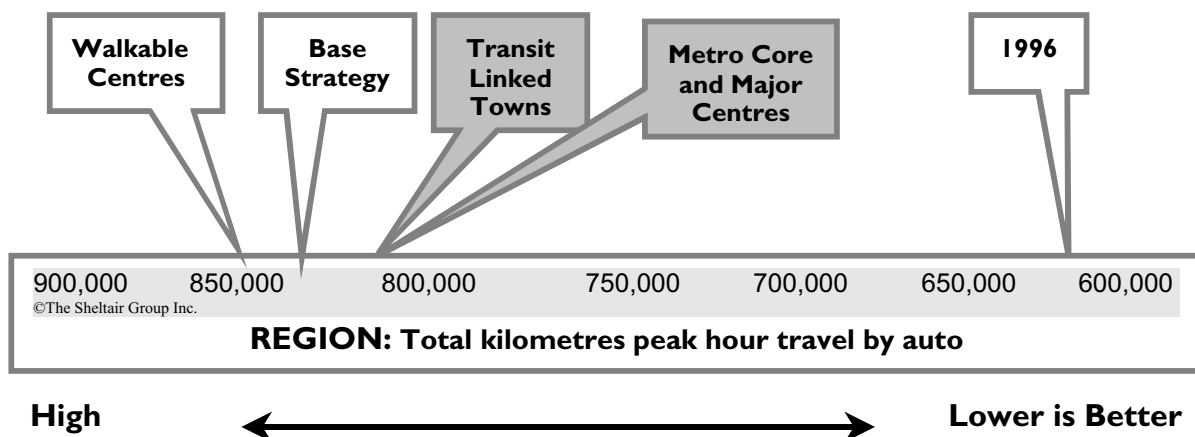
**Commentary:**

The regional transportation model gives estimates of peak hour travel patterns throughout the region. Statistics are provided for total travel in terms of the numbers of vehicle trips and the lengths of the trips on a typical weekday. From these statistics, and from the projected volumes of peak hour traffic on each road link in the regional network, the total vehicle kilometres of travel on the system are calculated.

Changes in the total vehicle kilometres of travel between growth strategy options with the same future regional population and employment totals provide a measure of the dispersion or sprawl of travel demands. The model results show the effects of increased densities of population and employment within the Core and the Western Communities areas where most of the growth takes place – these factors within these areas tend to reduce average trip lengths and reduce sprawl in a transportation sense. However, substantial increases in travel between these two areas and to and from the Peninsula have the opposite effect and push up average trip lengths.

Regionally, the average change in total vehicle-kilometres of travel is only 27%, yet there are some notable impacts. For example, the relative growth in vehicle kilometres of travel associated with the Western Communities is expected to be in the range of 35% to 50%. This trend is attributed to the significant change in population in the Western Communities and the growing phenomenon of suburb to suburb travel. The core and peninsula portions of the region have a more modest growth rate of about 20%.

The overall growth in the total vehicle-kilometres of travel is a major factor in the future “number of lanes – kilometres of congestion” and “total annual regional vehicle emissions”. These impacts are discussed in Descriptors 2a and 16a.



**Livable Human Settlement**

**Criteria 1:** The character of the Region, and each community’s identity, character and role in the Region, is recognized and preserved.

**Descriptor 1f:** Have urban areas that are compact and defined

**Measure:** Amount of compactness

**Quantitative Indicator:** Number of hectares of land in centres – #2 on Figure 5

**Meaning:** Higher is better

**Commentary:**

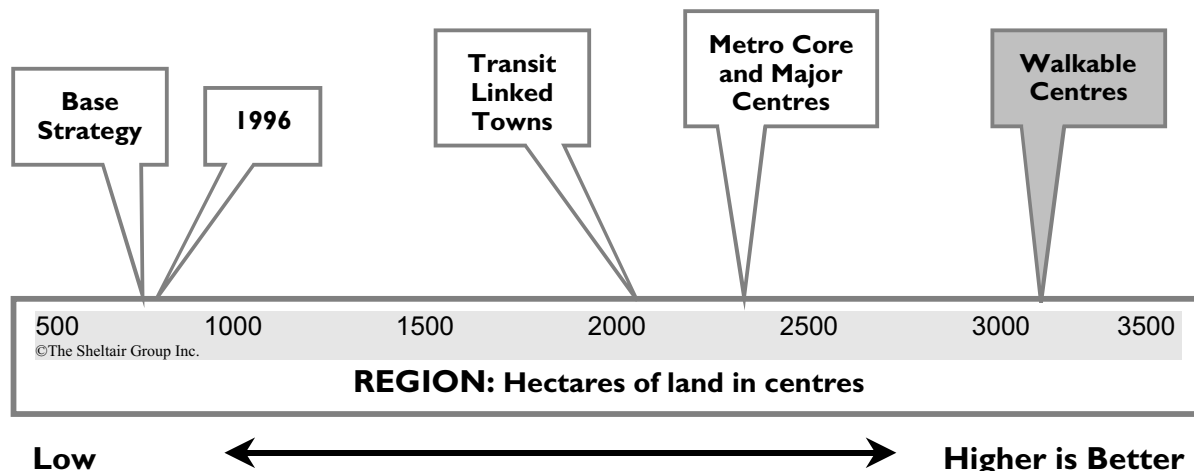
The underlying objective of this descriptor is to prevent low density, land consumptive patterns of growth from occurring. This indicator measures this by calculating the amount of land that is in a defined commercial centre. The assumption here is that the more that development occurs in centres, the more compact and defined the general settlement pattern will be.

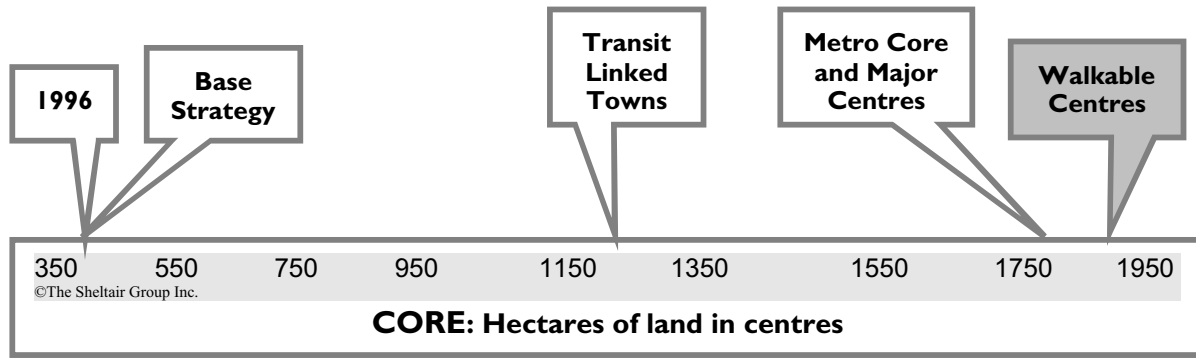
The measurement method for calculating this indicator differed slightly for the 1996 baseline/Base Strategy values and for Metro Core and Major Centres, Transit Linked Towns and Walkable Centres options.

For the 1996 baseline, commercial centres were determined according to two criteria. First, using SIC codes, 59 commercial land use types were selected as constituting relevant commercial activity. Areas zoned according to these land use types were flagged. Second, a minimum of 30 employees per hectare was set as the necessary threshold. Areas that satisfied both of these criteria were considered commercial centres, and the number of hectares was calculated using GIS (Geographic Information System) mapping tools. The Base Strategy was calculated using the same methodology as 1996 baseline, as it assumes the current zoning will remain in place.

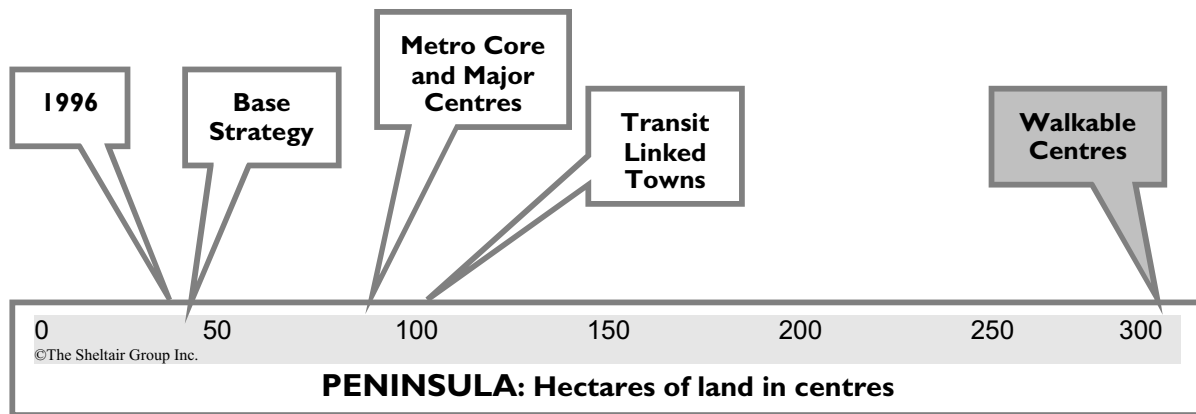
For the options, the measurement method followed for indicator calculation was based on the given area contained in the *Growth Strategy Alternatives for the Capital Region*.

Because of the discrepancy between the measurement methods used, this indicator does not entirely reflect the true performance of the Base Strategy/1996 baseline scenarios. By focussing only on

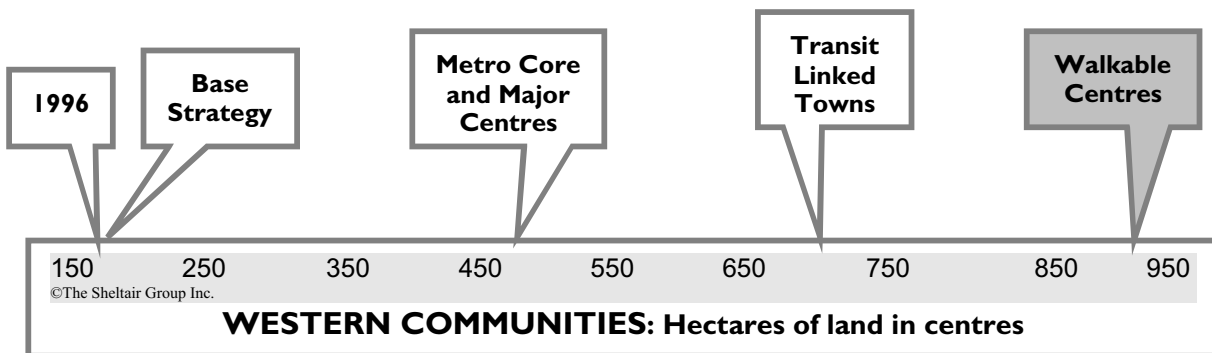




Low ← Higher is Better



Low ← Higher is Better



Low ← Higher is Better

commercial land uses for the Base Strategy and 1996 baseline, surrounding residential areas that currently are of a higher density and that were included in the three options were excluded. If this indicator is considered along with Descriptor 9b's indicator (percent of population within 400m of a commercial centre), however, it can be seen that the same basic relationship between the growth options would occur even with the expansion of commercial centres. The Base Strategy and 1996 baseline would be closer along the scale to the three options and the Walkable Centres option would perform the best.

**Livable Human Settlement**

**Criteria 1:** The character of the Region, and each community’s identity, character and role in the Region, is recognized and preserved.

**Descriptor 1g:** Have the majority of population growth occur within defined areas

**Measure:** Distribution of population growth

**Quantitative Indicator:** Percent of population in centres

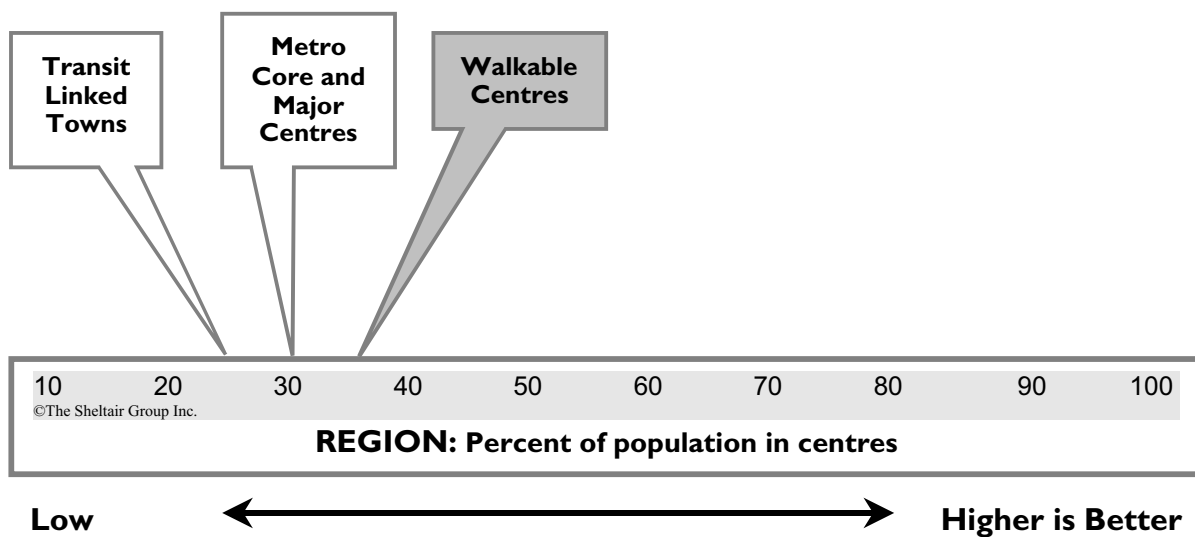
**Meaning:** Higher is better

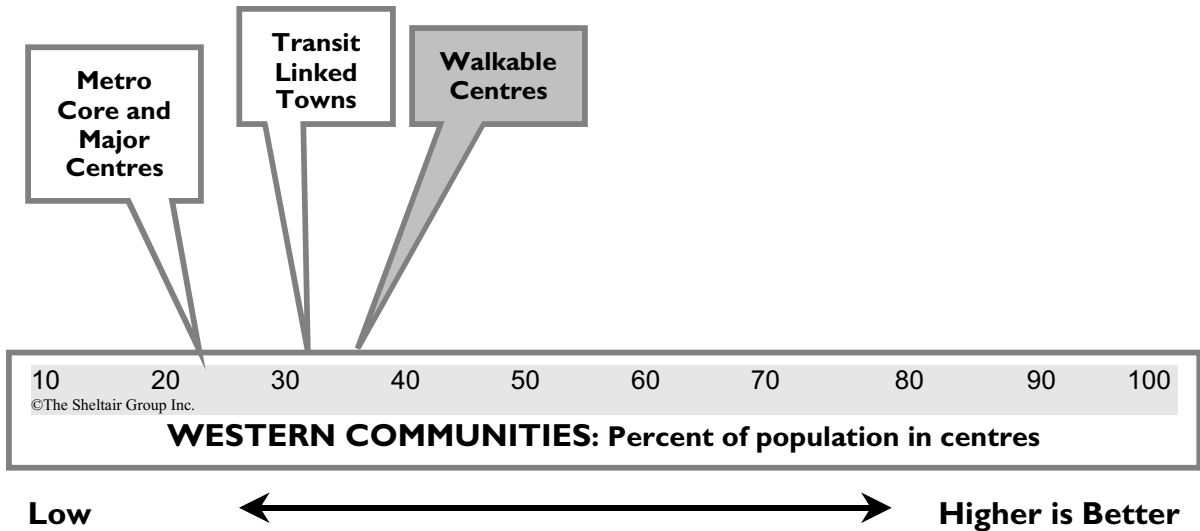
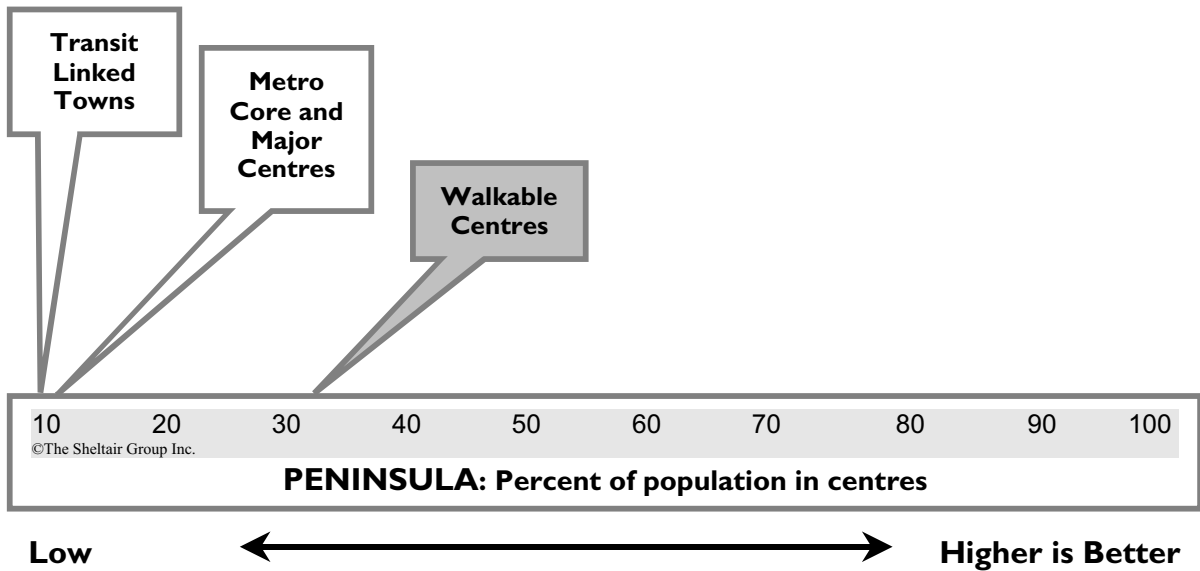
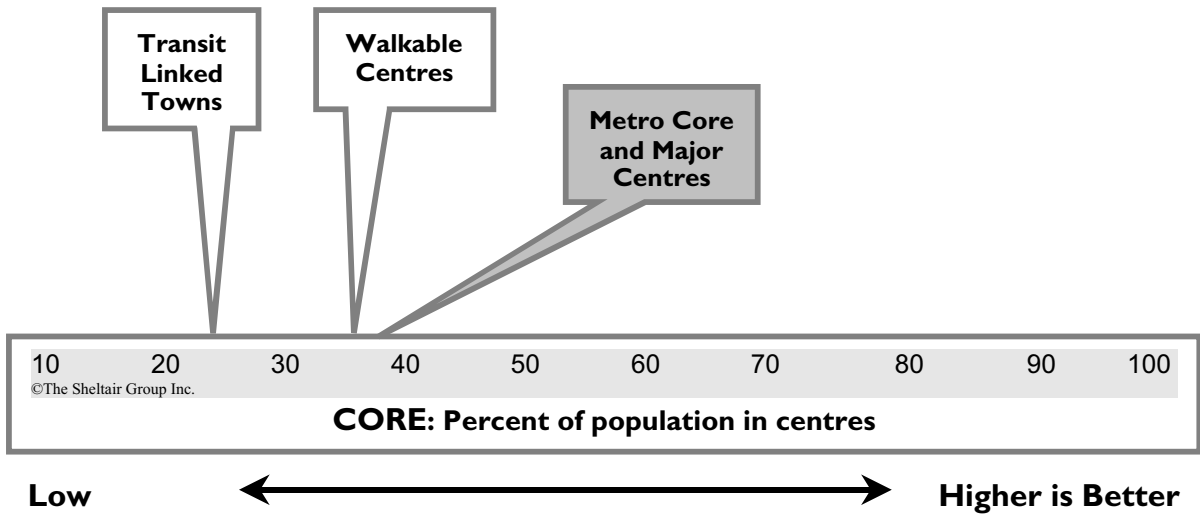
**Commentary:**

Three of the four options are built on the concept of mixed-use centres and accommodate the greatest amount of population growth, accommodating between 25% and 35% of the region’s population. This co-location of population, employment and amenities is viewed positively as it supports the realization of more “complete communities” and more support for transit, cycling and walking. The base strategy is not developed on the basis of centres.

The Walkable Centres option performs best with over 140,000 people living in centres of different sizes. It should be noted, however, that the Walkable Centres option has a neighbourhood-level centre that accommodates 48,000 people. Although it was beyond the scope of this work to review the CRD’s data bases in detail, in our view some of the “neighbourhood-level” centres already exist to some extent, particularly in the core communities.

On a sub-regional basis, in the core area, the Metro and Major Centres option has the highest proportion of population in centres. On the Peninsula and in the Western Communities the highest proportion is found in the Walkable Centres.





**Livable Human Settlement**

**Criteria I:** The character of the Region, and each community’s identity, character and role in the Region, is recognized and preserved.

**Descriptor 1h:** Redevelop some urbanized lands and intensify uses to accommodate future needs

**Measure:** Amount of redevelopment and intensification

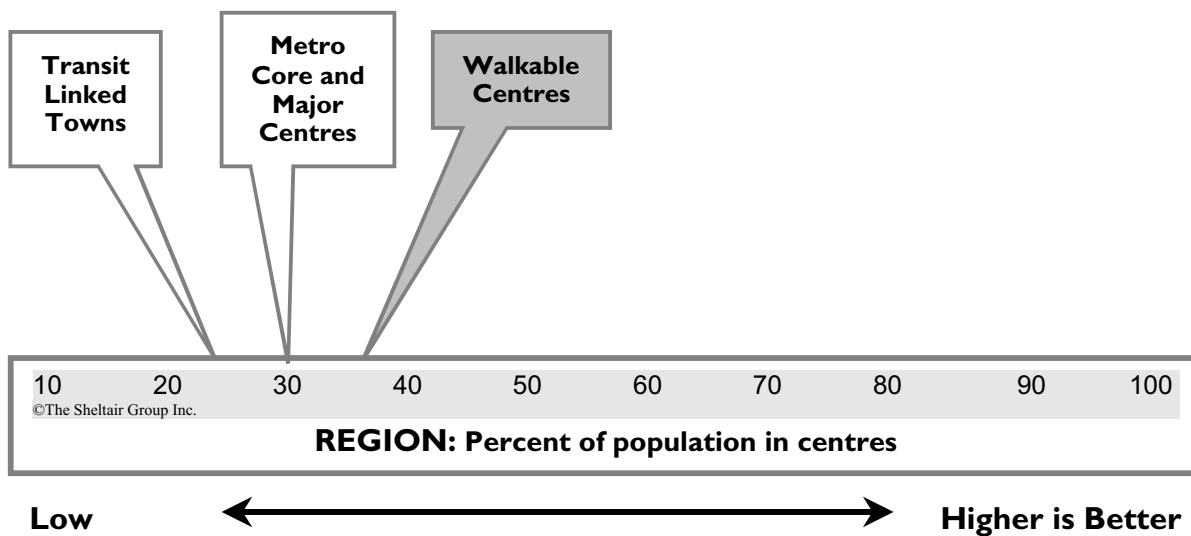
**Quantitative Indicator:** Percent of population in centres

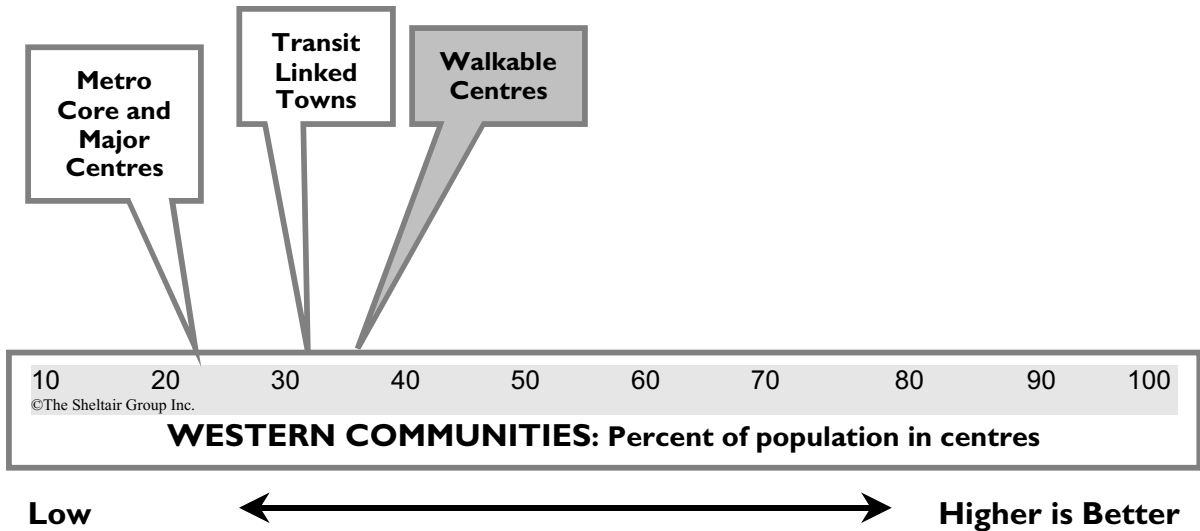
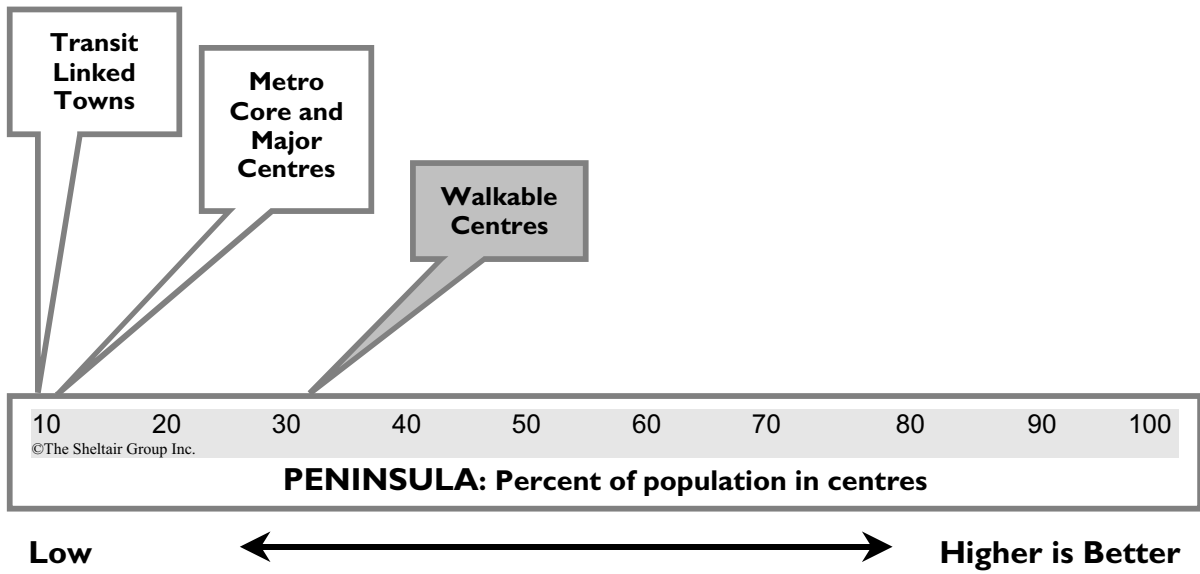
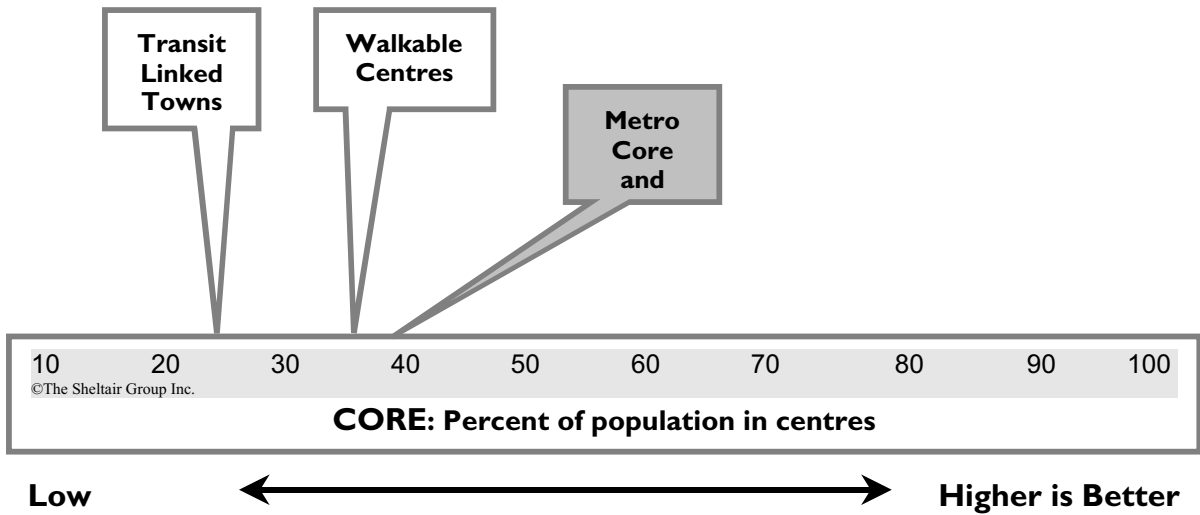
**Meaning:** Higher is better

**Commentary:**

The percentage of population in centres is a good indicator for this descriptor. The commentary is similar to Descriptor 1g.

On a regional basis, the Walkable Centres option appears to be the option that promotes most redevelopment and intensification. It should be noted, however, that when the options are examined from a population density perspective, the centres in the Walkable Centres option have a lower density (45 persons per hectare) than in either the Transit-Linked Towns (50 persons per hectare) or the Metropolitan and Major Centres (53 persons per hectare).





## **Livable Human Settlement**

**Criteria I:** The character of the Region, and each community's identity, character and role in the Region, is recognized and preserved.

**Descriptor 1i:** Support heritage conservation

**Measure:** Retain existing housing

**Commentary:**

It is difficult to identify an appropriate "forecast indicator" for supporting heritage conservation. Although consideration was given to using "percent of detached housing" as a proxy, this would have been a questionable choice. To have been effectively used to describe the loss of older housing stock or to illustrate the pressure on early 20<sup>th</sup> century neighbourhoods from infill and redevelopment, the data would have had to be normalized to 1996 conditions; that is, to look at the actual displacement in existing built-up areas, particularly in the Core sub-region.

Intuitively, those options which anticipate the greatest growth in municipalities with older housing stock (Metro and Major Centres, Base Strategy) may lead to increased redevelopment pressures in long-established neighbourhoods. Some pressure in these neighbourhoods is likely to occur even if most of the "new growth" is channelled into specific "centres".

**Livable Human Settlement**

**Criteria 1:** The character of the Region, and each community’s identity, character and role in the Region, is recognized and preserved.

**Descriptor 1j:** Have land for commercial, industrial, institutional and residential purposes available to meet stated goals

**Measure:** Relationship between supply and demand

**Indicator:** Ratio of supply/demand – ALL Housing – #4 on Figure 5

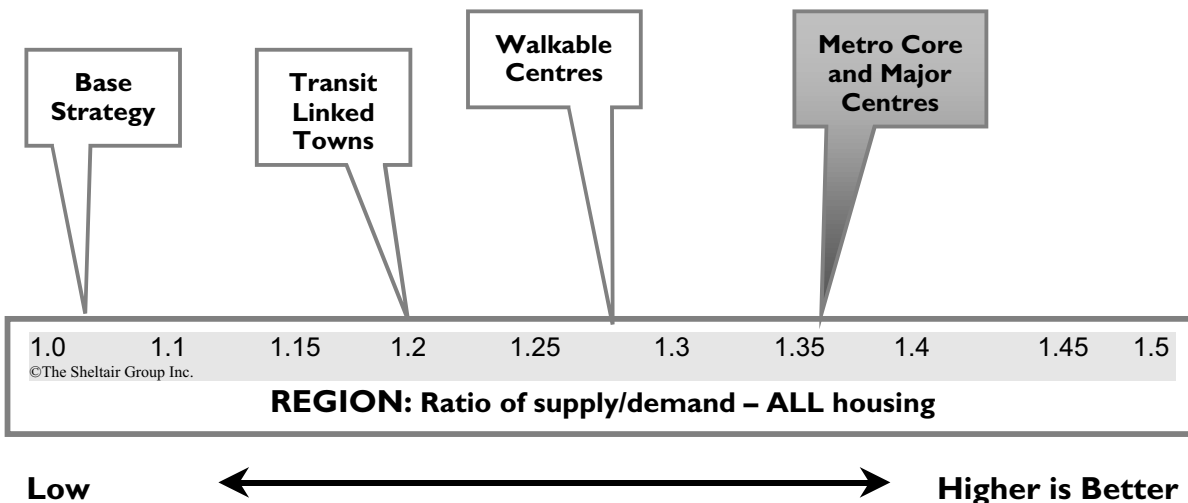
**Meaning:** Higher is better

**Commentary:**

The supply of housing should always exceed demand in order to meet community housing needs and to keep prices/rents affordable. A ratio of 1.0 means that there is a balance between supply to demand, higher than 1.0 means there is more supply than demand and, conversely, lower than 1.0 means there is less supply than demand.

The CRD has undertaken a comprehensive analysis of future housing demand in relation to the amount of land that is available for housing as derived from municipal Official Community Plans. This shows that, on a total basis, there will be enough housing supply to accommodate forecasted demand in the three options with the Metro and Major Centres having the greatest amount of supply relative to demand. The amount of housing runs out by 2025 in the Base Strategy.

[Note: The indicator readings for all options probably understate actual supply conditions somewhat as “secondary suites” were not factored into the CRD’s analysis. Secondary suites, while widely acknowledged as an affordable housing choice for small households in many areas of the region, remain illegal in most municipalities. It is for this reason that suites were not forecast by the CRD in the supply equation. In reality, however, suites are an important “hidden” supply of affordable accommodation. The actual number of suites in detached homes will vary from area to area within the region and with the economic circumstances of the day. For example, in a “tight” housing market accompanied by high interest rates, home owners will create suites as “mortgage helpers”. Suites will also commonly be more prevalent in areas near colleges, universities and hospitals.]



**Livable Human Settlement**

**Criteria I:** The character of the Region, and each community’s identity, character and role in the Region, is recognized and preserved.

**Descriptor 1j:** Have land for commercial, industrial, institutional and residential purposes available to meet stated goals

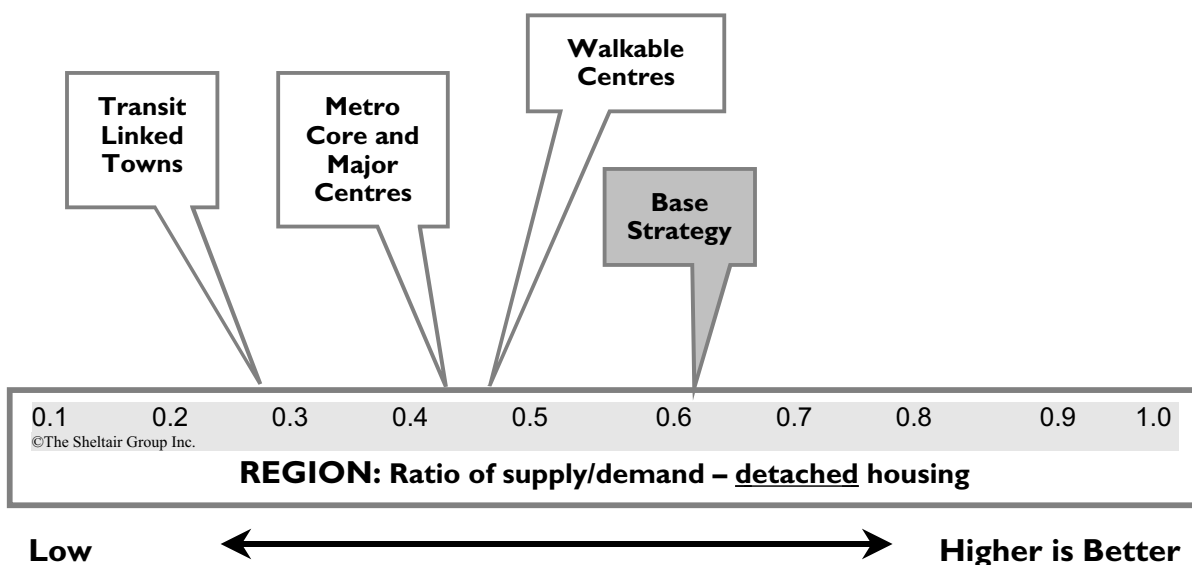
**Measure:** Relationship between supply and demand

**Quantitative Indicator:** Ratio of supply/demand – detached housing – #5 on Figure 5

**Meaning:** Higher is better

**Commentary:**

The supply of housing should always exceed demand in order to meet community housing needs and to keep prices/rents affordable. While there is forecast to be enough housing supply to meet overall demand, this is not true when only the relationship of supply and demand for detached housing is examined, as illustrated in the accompanying graphic. Drawing on the CRD’s housing analysis, none of the options would have sufficient housing to accommodate the anticipated need for detached housing. The Base Strategy performs the best but at only a ratio of 0.62, considerably lower than the desired ratio of 1.0 or higher.



**Livable Human Settlement**

**Criteria I:** The character of the Region, and each community’s identity, character and role in the Region, is recognized and preserved.

**Descriptor 1j:** Have land for commercial, industrial, institutional and residential purposes available to meet stated goals

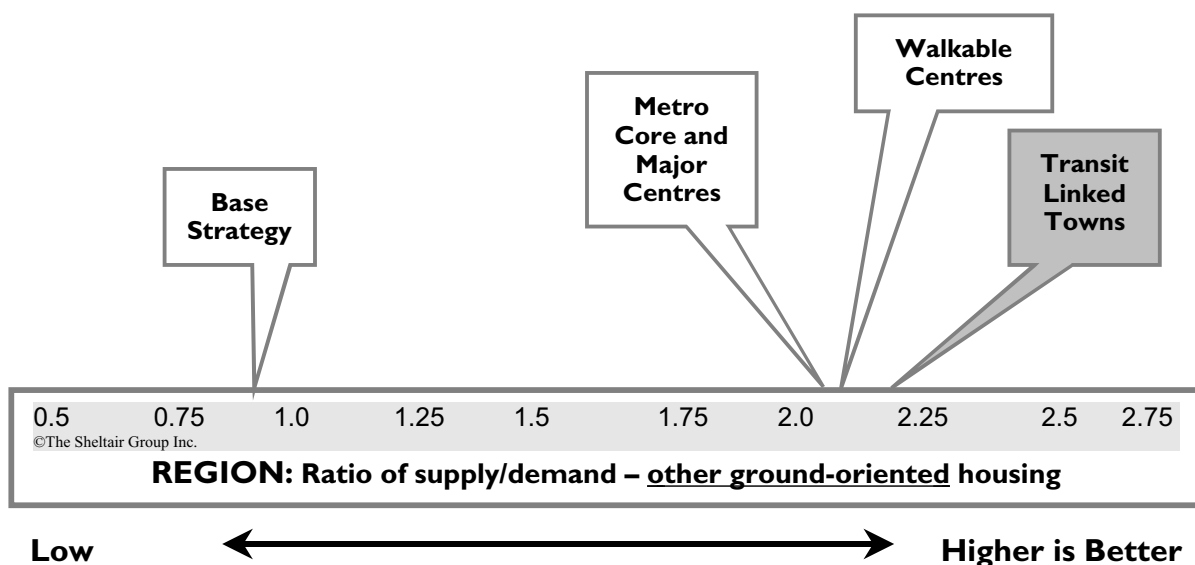
**Measure:** Relationship between supply and demand

**Quantitative Indicator:** Ratio of supply/demand – other ground-oriented housing – #6 on Figure 5

**Meaning:** Higher is better

**Commentary:**

The supply of housing should always exceed demand in order to meet community housing needs and to keep prices/rents affordable. Drawing on the CRD’s housing analysis, there is a good over-supply of land for townhousing, as illustrated in the accompanying graphic. The Base Strategy, however, performs poorly in this regard in comparison. All of the options would have sufficient housing to accommodate the anticipated need for this type of housing. The Transit-Linked Towns option performs the best at a ratio of 2.2



**Livable Human Settlement**

**Criteria 1:** The character of the Region, and each community’s identity, character and role in the Region, is recognized and preserved.

**Descriptor 1j:** Have land for commercial, industrial, institutional and residential purposes available to meet stated goals

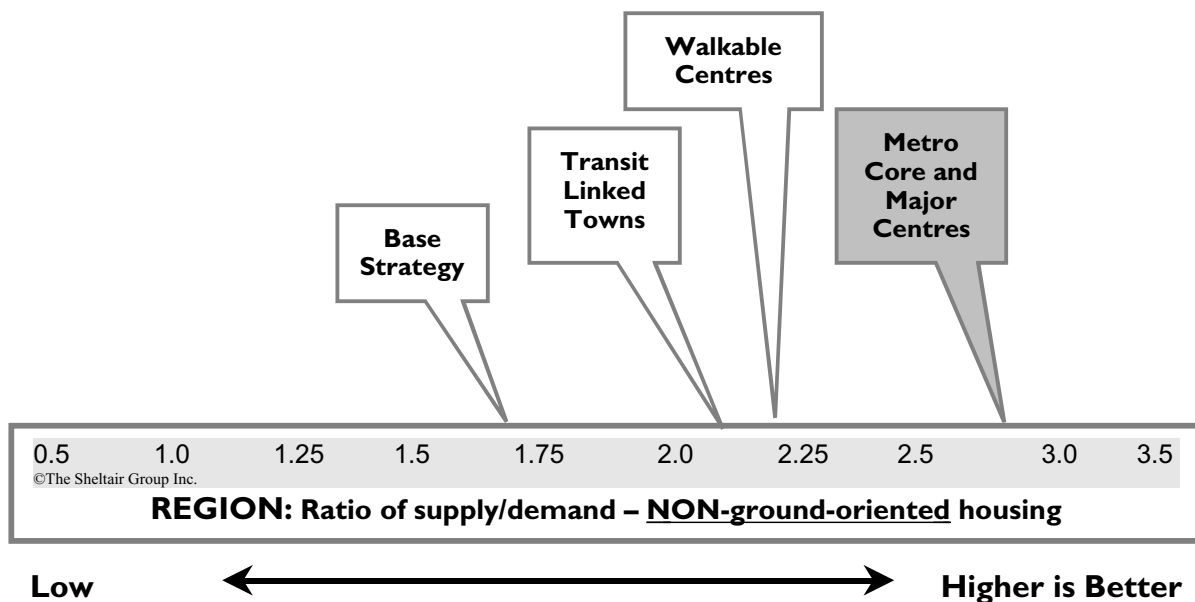
**Measure:** Relationship between supply and demand

**Quantitative Indicator:** Ratio of supply/demand – NON-ground-oriented housing – #7 on Figure 5

**Meaning:** Higher is better

**Commentary:**

There should always be more supply of housing than demand for it in order to meet community needs and to keep prices and rents affordable. While there is forecast to be enough housing supply to meet overall demand, there is a large over-supply of land for non-ground oriented housing (apartments), as illustrated in the accompanying graphic. Drawing on the CRD’s housing analysis, all of the options would have sufficient housing to accommodate the anticipated need for apartment-style housing. The Metro and Major Centres option performs the best at a ratio of 2.6.



**Livable Human Settlement**

**Criteria 2:** Supplies of suitable land, infrastructure and resources are provided to accommodate preferred future settlement

**Descriptor 2a:** Provide infrastructure efficiently and in a timely fashion

**Measure:** Provision of services

**Quantitative Indicator:** Peak day demand for water as a % of existing treatment capacity – #8 on Figure 5

**Meaning:** Lower is better

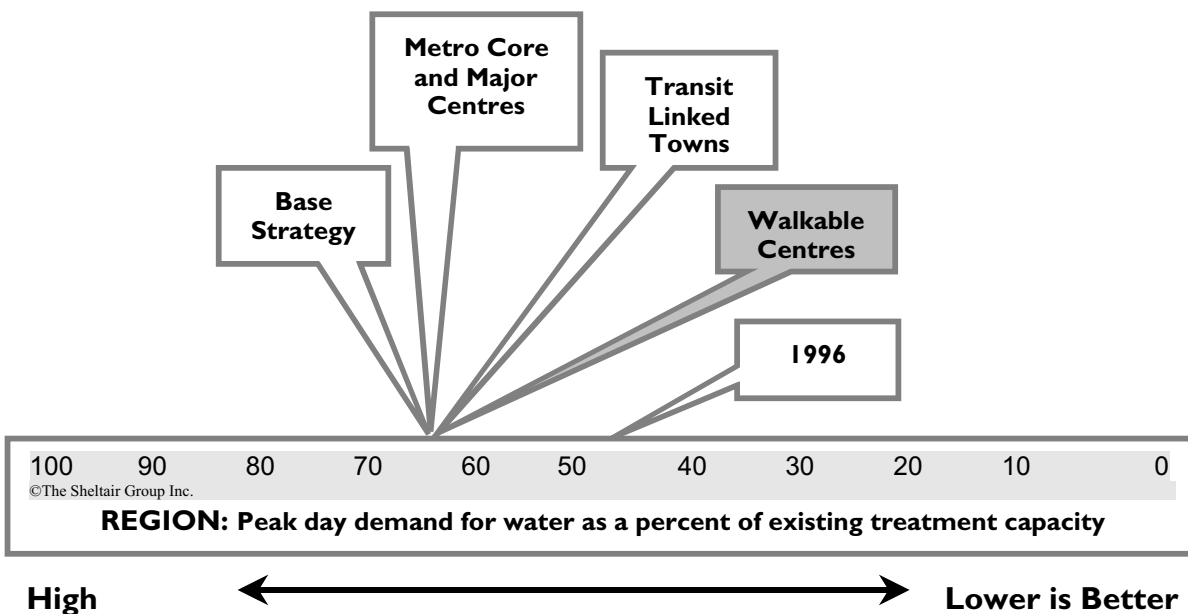
**Commentary:**

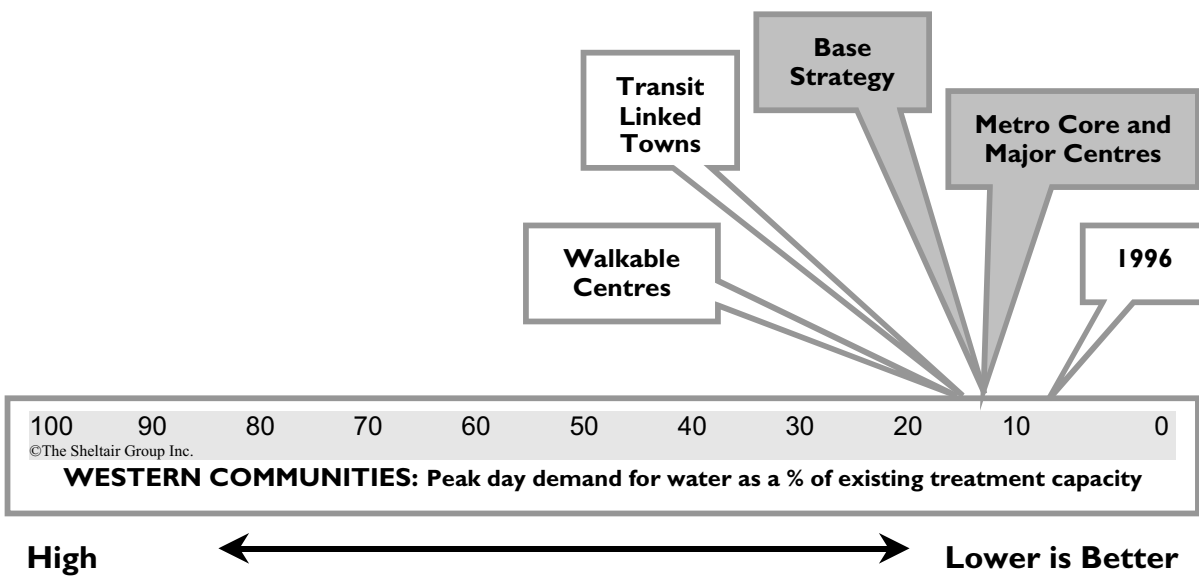
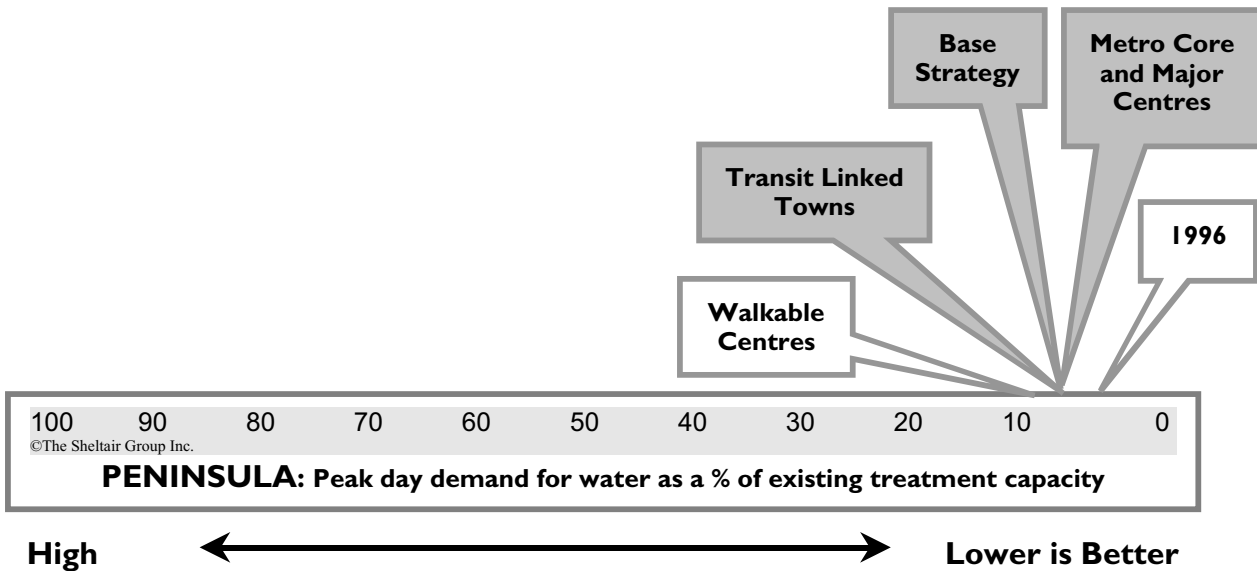
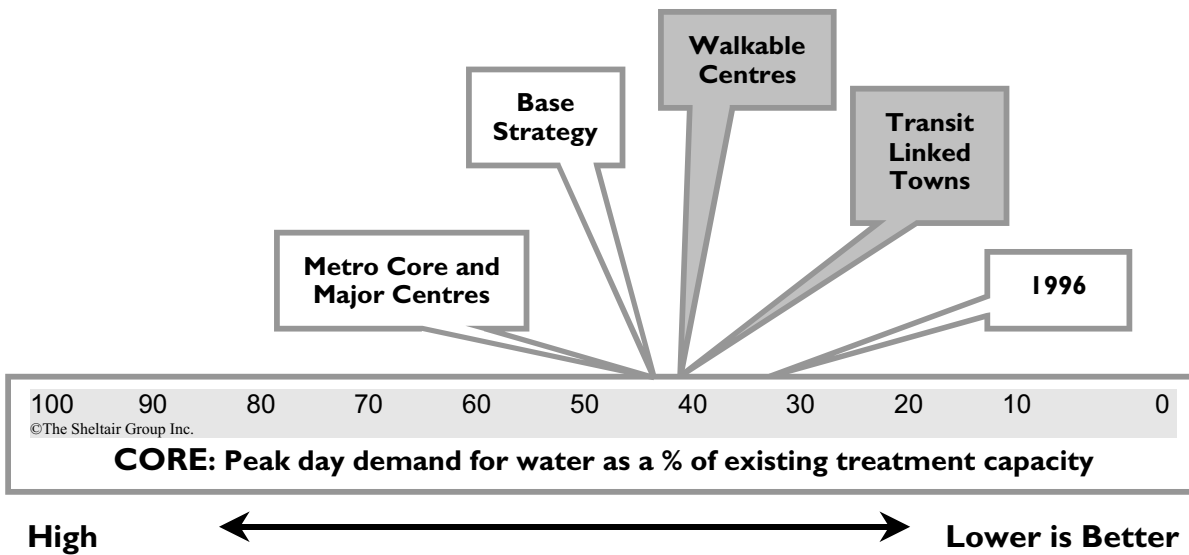
As growth occurs, increased pressure is placed on existing water supply and treatment infrastructure, and eventually new or expanded facilities are required. One of the key aspects of evaluating growth options is to identify the ramifications of growth on these infrastructure elements.

The preferred way of providing water infrastructure in an efficient and timely fashion is to identify the capacity of the existing infrastructure and then to select the growth option which can best be absorbed by the existing facilities. In the case of the CRD, because the supply of water far exceeds demand under any growth scenario, it is the treatment facility capacity that poses a constraint on growth. It is for this reason that this indicator was selected.

As can be seen, however, there is no sensitivity of the options to this indicator; there is no difference amongst the performance values for each option.

For the 1996 baseline, the housing stock in each municipality was obtained (CRD Regional Planning Services), and broken down by household type (single family, duplex, apartment, townhouse, mobile home). These housing types were then aggregated into the standardized categories used for elaboration of the growth options (ground-oriented, other ground oriented, non-ground oriented). Water





consumption statistics were obtained from CRD Water for each housing type. (Note that Sidney is excluded as data is unavailable). An archetypal value was calculated for each housing type in terms of volume per dwelling unit per day, and then multiplied through according to the housing stock calculations. This procedure was conducted at the sub-regional level, and then aggregated to the CRD level. These values were then correlated with the existing treatment capacity, which is equivalent to the maximum treatable amount at the Japan Gulch Disinfection Plant (CRD Water Department).

The same method was used for the Base Strategy and the three options except that the housing stock calculations were derived from the Results of the *Population, Dwelling Unit and Employment Projections and Allocations for the Capital Region's Growth Strategy Alternatives 1996 - 2026, Volume 1 - Results; Volume 2 - Methodology*.

**Livable Human Settlement**

**Criteria 2:** Supplies of suitable land, infrastructure and resources are provided to accommodate preferred future settlement

**Descriptor 2a:** Efficient and timely provision of infrastructure

**Measure:** Amount of additional road space

**Quantitative Indicator:** Lane-km of new road and lane-km with volume/capacity ratio > 1.0 – #14 on Figure 5

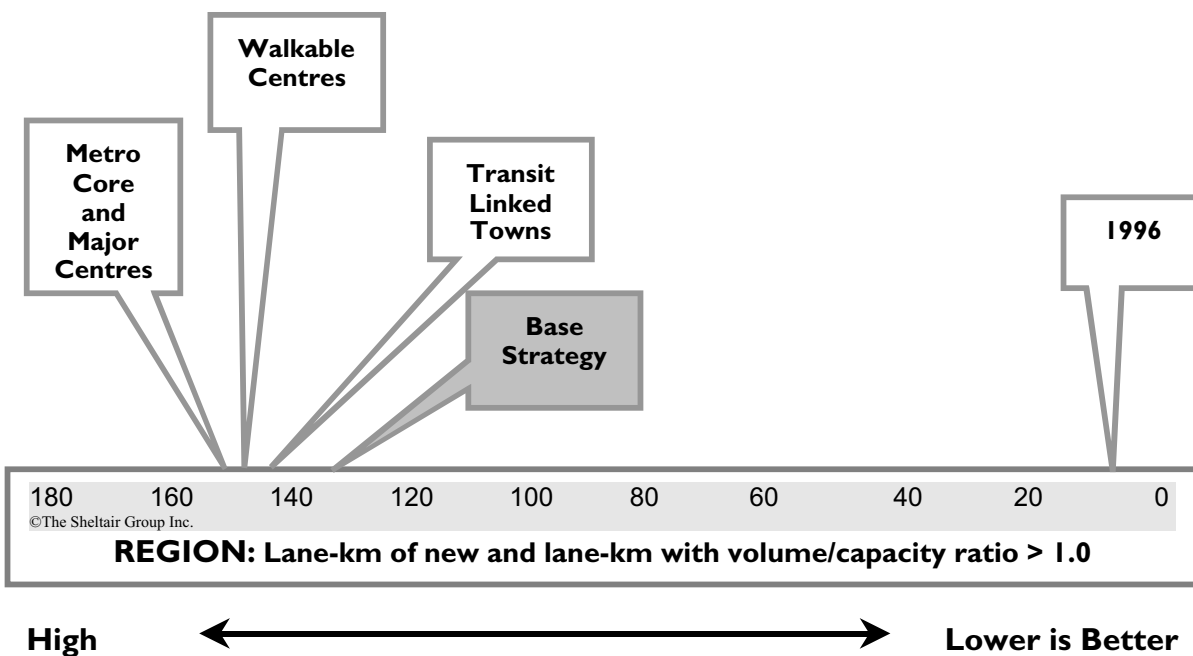
**Meaning:** Lower is better

**Commentary:**

Each option incorporates about 42 lane-kilometres of new major roadway in the Western Communities. The regional transportation model produces statistics on the ratio of peak flow traffic volume to peak flow carrying capacity for each link in the regional road network. High volume/capacity ratios refer to highly congested links with low peak-hour travel speeds. As a measure of difference between growth strategy options, the total lengths of roadway in the future road networks that are subjected to very high volume/capacity ratios (i.e. v/c ratios over 100) give guidance as to the relative requirement for provision of new road spaces to meet future travel demands.

It is not intended to indicate that all severely overloaded sections of the road network will or should be relieved by provision of new road space – simply that this factor is an indicator of the differences as among options. The 1996 condition appears on the chart as a measure of current pressures for additional road capacity. Additional highly congested roads total between 94 and 108 lane-kilometres.

The model outputs of severely overloaded sections of roadway for each option are added to the 42 lane kilometres of new Western Communities major roads that are incorporated in the networks for each option. This provides a reasonable measure of comparison of future demands for total new road construction. Differences among options, as represented in the model results, come from the differences



in total travel (as illustrated in Descriptor 1e) and the extent to which additional traffic demands are placed in areas of the road network that are already relatively highly loaded during peak hour conditions. Most of the future overloaded sections of the road network are on the major routes in the Core area (where current pressures are greatest) and in the Western Communities (where future traffic growth is greatest). The range of results is fairly small – the Metro Core and Major Centres option suffers because additional vehicle travel demands tend to be more concentrated in areas of current high demand and limited road capacity. This is despite this option having the best future total of non-automobile travel (Descriptor 2c).

**Livable Human Settlement**

**Criteria 2:** Supplies of suitable land, infrastructure and resources are provided to accommodate preferred future settlement,

**Descriptor 2b:** Conserve renewable and non-renewable resources; manage demand for them

**Measure:** Consumption of non-renewable energy

**Quantitative Indicator:** Gigajoules (GJ) per year of non-renewable energy consumed by residences – #13 on Figure 5

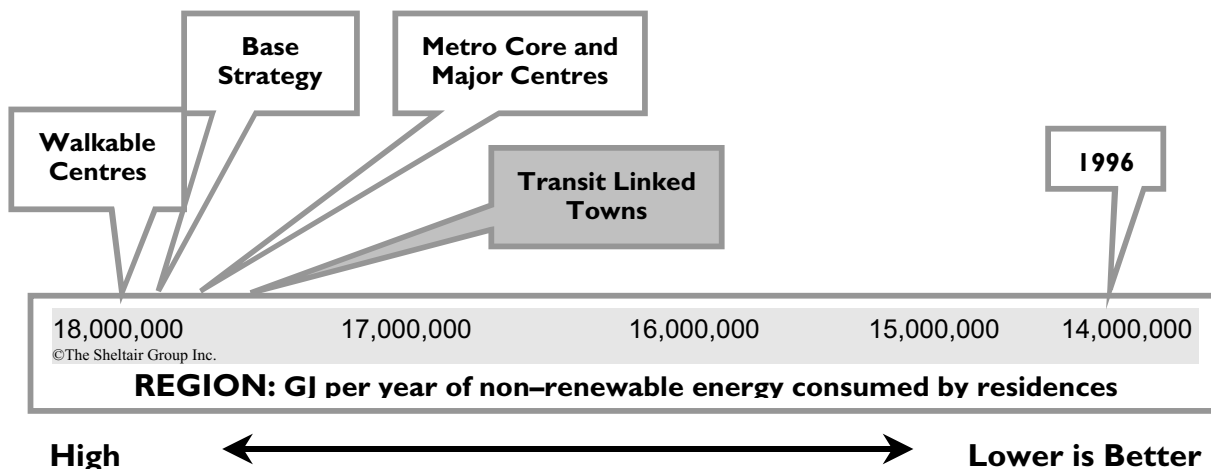
**Meaning:** Lower is better

**Commentary:**

This indicator measures the difference between the growth strategy options based on energy consumption in the residential sector.

The lower the energy consumption, the longer supplies of energy will be available for future settlements. Although the range between the performance values for this indicator is small, what the data indicates is those growth scenarios that feature greater densification of the housing stock perform better in terms of energy consumption. In other words, because multi-unit residential buildings typically have lower energy consumption than detached units, scenarios with fewer detached units result in lower energy use.

For the 1996 baseline, indicator calculations were based on housing stock data obtained from CRD Regional Planning Services. To this data, energy use factors were attributed. For example, current consumption values based on the B.C. average were utilized for attached/row housing and apartments (based on *Residential and Commercial Greenhouse Gas Reduction Cost Curves Project for the National Climate Change Secretariat Building Table* by the Sheltair Group Inc.). For detached units, a survey of 225 houses (by Building Technologies Ltd.) on Vancouver Island was used to determine the fuel mix and consumption levels. These consumption factors were then combined with the housing stock data, according to the housing categories provided by the *Population, Dwelling and Employment Projections and Allocations for the Capital Region’s Growth Strategy Alternatives*.



For the three options, the housing stock data was taken from *Population, Dwelling and Employment Projections and Allocations for the Capital Region's Growth Strategy Alternatives*. Future energy consumption factors were based on the new (marginal) units consuming energy at different fuel mixture levels than the existing stock. For example, new units were assumed to use natural gas and electricity rather than oil.

This marginal consumption was multiplied by the marginal units, and broken down into fuel types based on the B.C. average and the above-mentioned survey. These values were added to the 1996 values for a final number. (No assumptions were made, however, with respect to conversion of existing oil-reliant units to a different fuel type.)

**Livable Human Settlement**

**Criteria 2:** Supplies of suitable land, infrastructure and resources are provided to accommodate preferred future settlement.

**Descriptor 2b:** Conserve renewable and non-renewable resources; manage demand for them.

**Measure:** Consumption of treated water

**Quantitative Indicator:** Cubic metres (m<sup>3</sup>) per year of treated water consumed by residences – #29 on Figure 5

**Meaning:** Lower is better

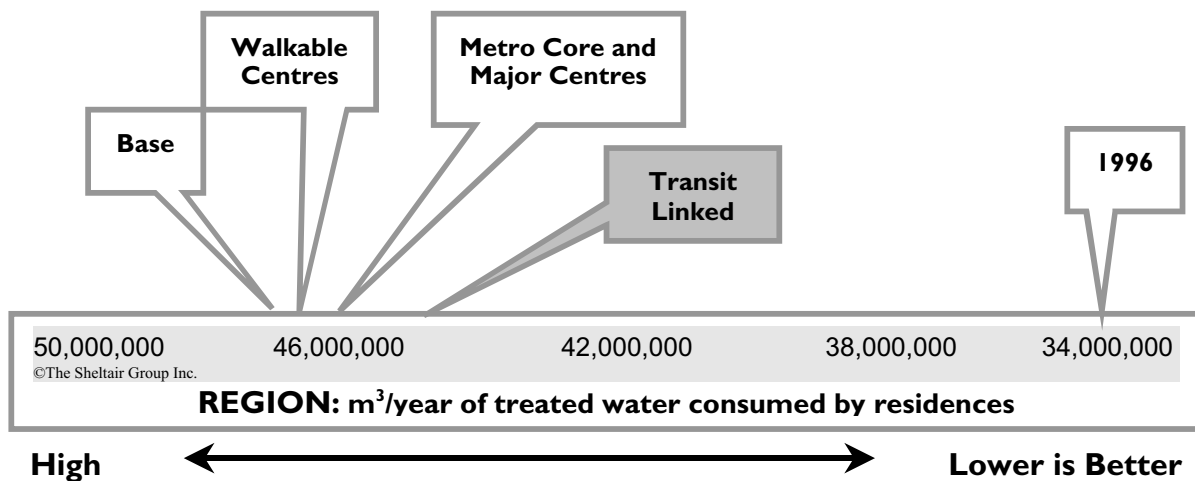
**Commentary:**

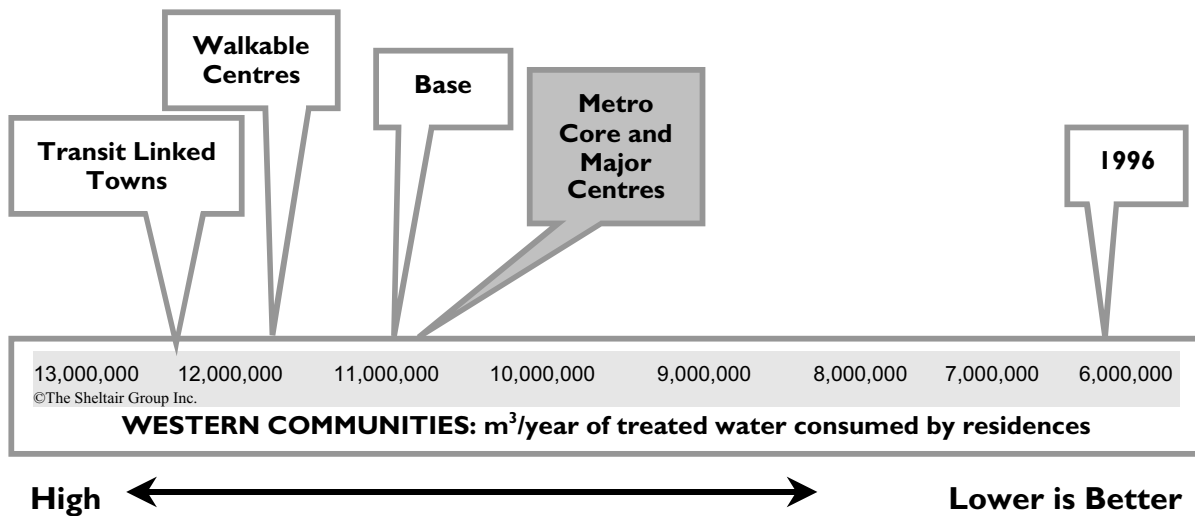
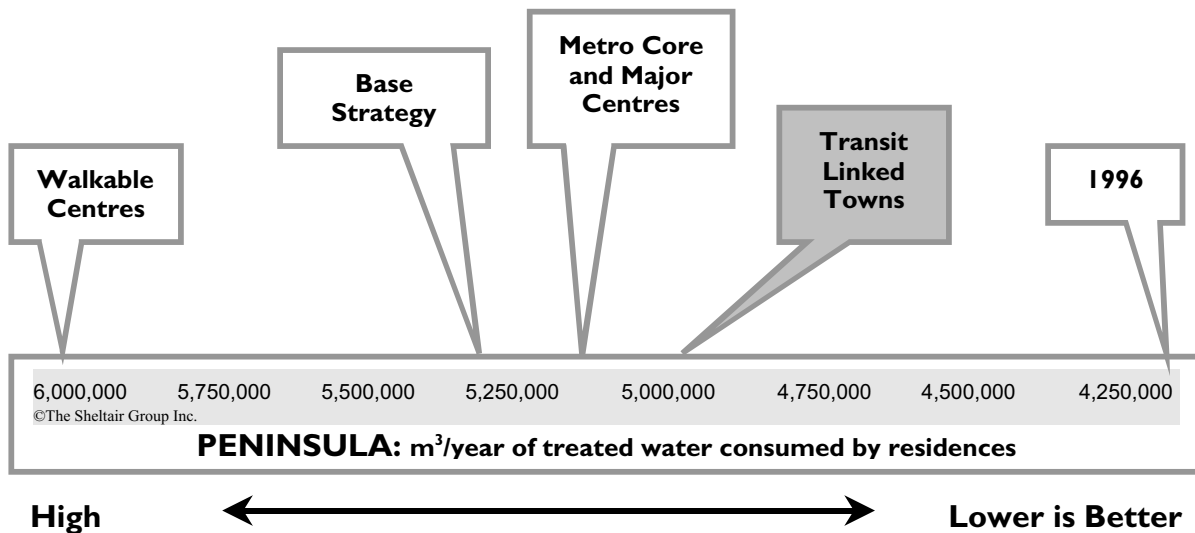
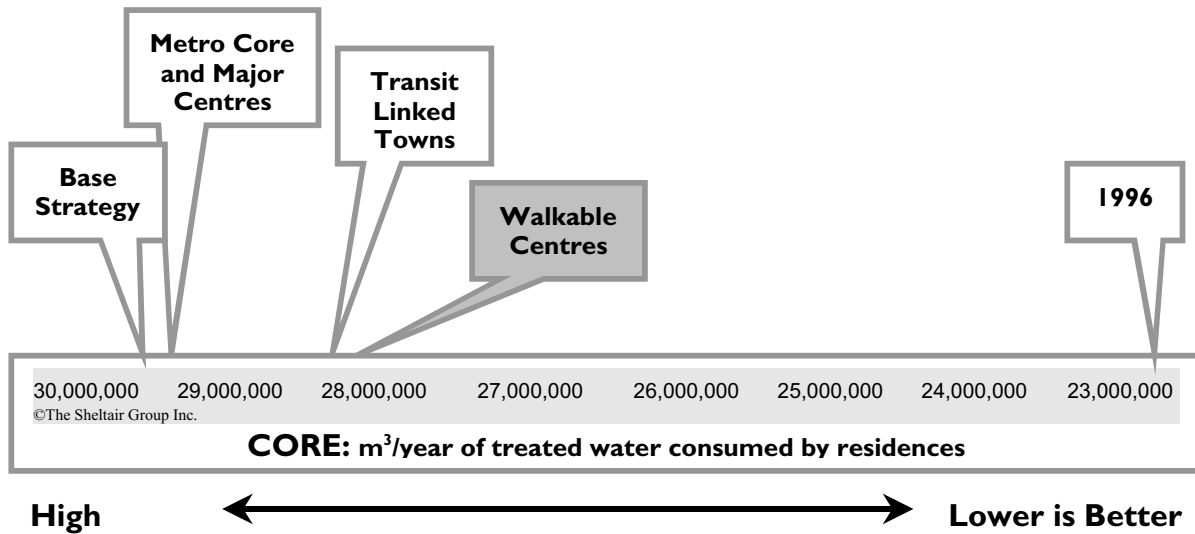
The amount of water used by residences is generally considered to be a good indicator of trends in resource use. For this particular indicator, treated water has been focused on. This refers to the fact that only public water supply has been included in the indicator calculation, and private sources of water including wells have been excluded. Because most of the residences in the CRD are connected to public sources of water, however, the indicator is a good measure of the overall amount of water being consumed.

Again, while variability amongst the options is small, there is some difference noted due to the difference in housing stock associated with each option. Because residential units with yards typically have higher water consumption rates due to landscaping, scenarios with a greater supply of detached housing generally result in higher water consumption.

The measurement of this indicator followed the same basic method as the indicator for Descriptor 2a (Peak day demand for water). Water consumption by each housing type was obtained from CRD Water, and applied to the housing stock data to derive the total amount of water used each day. This was then multiplied out to be represented as an annual value.

It is important to note that no future improvements in water consumption rates due to policy or demand-management measures were included in the calculation. This means that the indicator values obtained have assumed a continuation of “business as usual” and have not attempted to forecast potential changes in future water consumption rates.





**Livable Human Settlement**

**Criteria 2:** Supplies of suitable land, infrastructure and resources are provided to accommodate preferred future settlements.

**Descriptor 2c:** Reduce auto dependence

**Measure:** Amount of non-auto travel

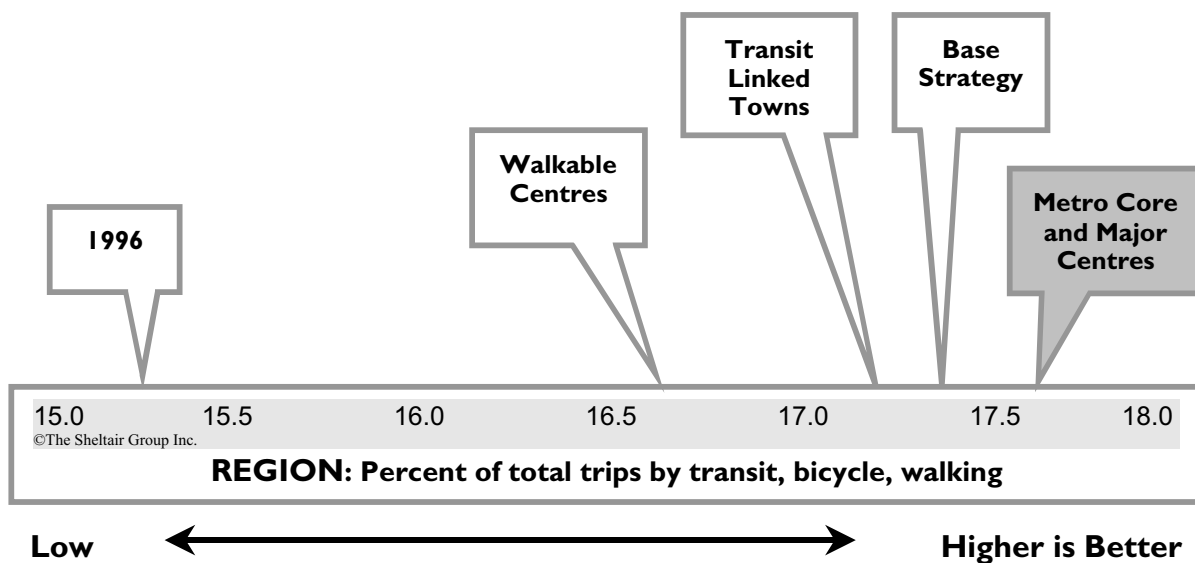
**Quantitative Indicator:** Percent of travel by transit, bicycle and walking – #20 on Figure 5

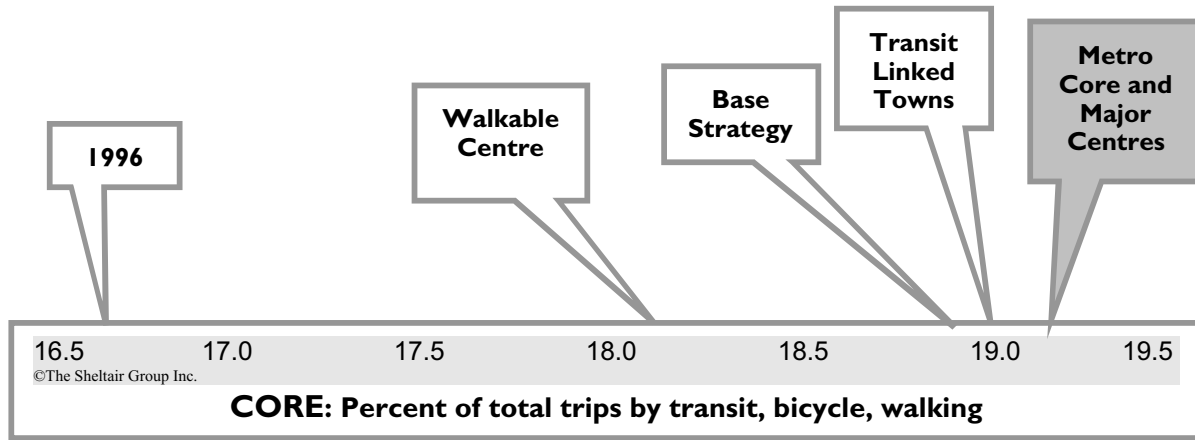
**Meaning:** Higher is better

**Commentary:**

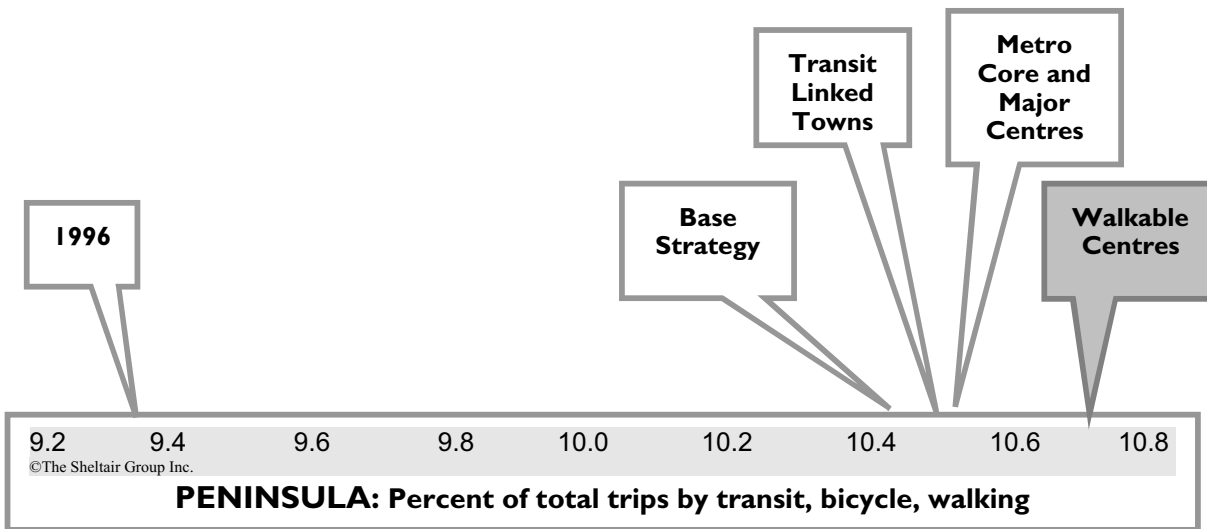
The regional transportation model produces matrices of total person trips by all travel modes within the region and matrices by individual modes. Simple proportional calculations based on these matrices provide the projections of the percentages of non-auto travel for the region as a whole and for travel to, from and within the three sub regions. All options provide modest improvements over 1996 conditions, mainly due to expanded transit services. Significantly lower population and employment levels in the City of Victoria offset the potential advantages of the walkable centres option.

The model shows that 50% of the current peak hour bicycle and walking trips are within the City of Victoria and that the highest use of transit is to and from the City. While the Walkable Centres option produces better results in the Peninsula area, this relatively small sub-regional effect is overwhelmed by the reduced non-automobile travel levels in the Core area as compared to the other options. As indicated in the body of the report, the current modelling of bicycle and walking trips may not be fully sensitive to local conditions in responding to the provisions of improved facilities. It is possible that higher than projected short-distance bicycle and walking trips may occur as more attractive and safer routes become available. The opposing factor is that of higher conflict with increased general traffic flows in those areas where separated facilities are not feasible – this could tend to reduce the future attractiveness of walking and cycling activity. These considerations are generally common to all growth options.

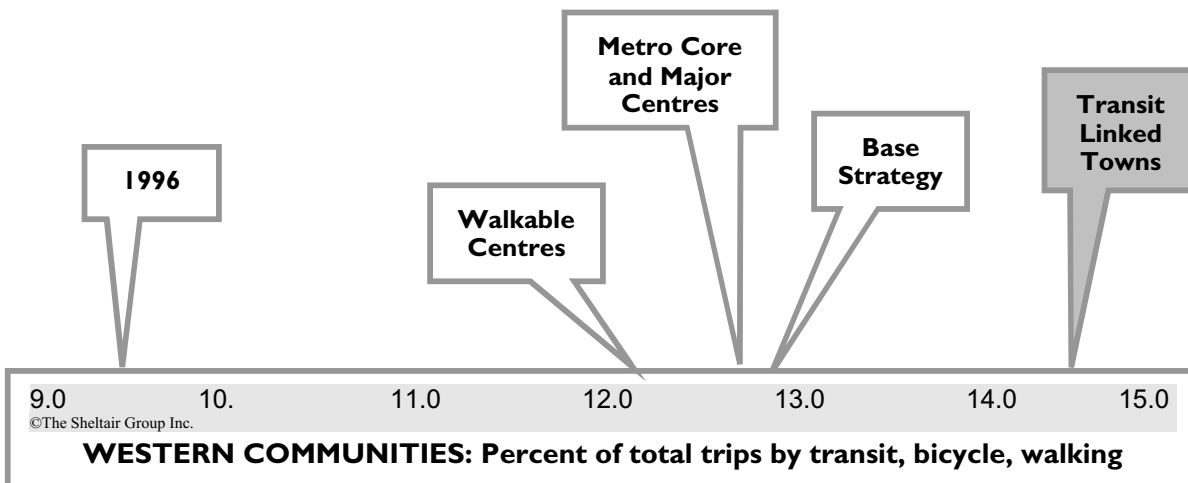




Low ← Higher is Better



Low ← Higher is Better



Low ← Higher is Better

**Livable Human Settlement**

**Criteria 3:** Transportation infrastructure for all modes adequately and safely serves the Region.

**Descriptor 3a:** Reduce congestion

**Measure :** Amount of congested travel

**Quantitative Indicator:** Percent of vehicle travel on congested links – #18 on Figure 5

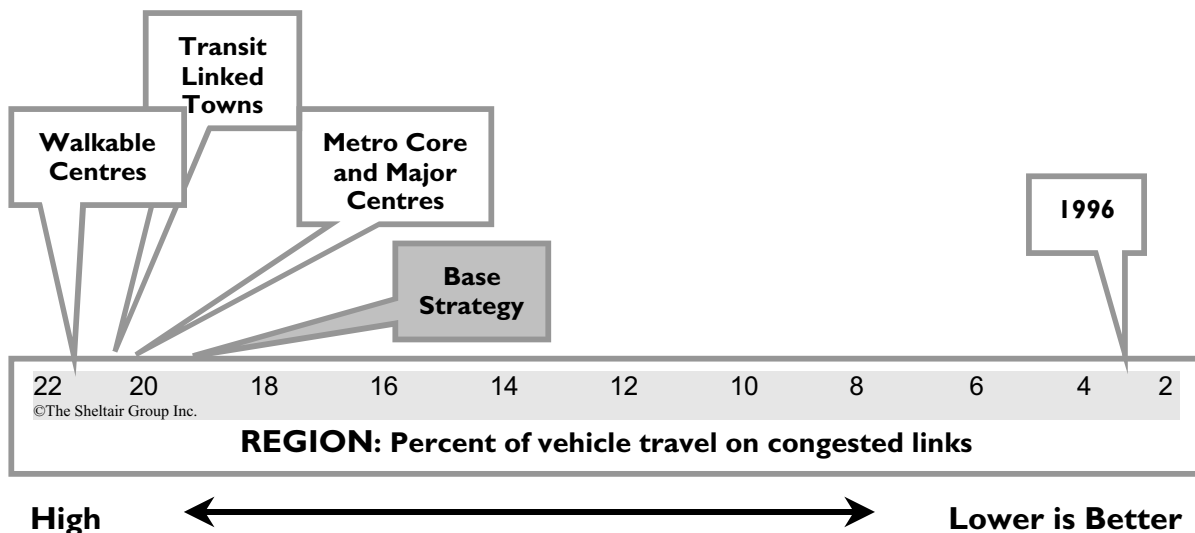
**Meaning:** Lower is better

**Commentary:**

For the purposes of this analysis, only very limited additional road capacity was modelled, mainly in the Western Communities to ensure that a reasonable estimate of the magnitude of potential future impacts could be assessed. CRD in conjunction with the municipalities and the Ministry of Transportation and Highways, identified approximately 42 lane kilometres of new major road capacity that is included in long term road network plans for the region. This represents less than 2% expansion of the total road space in the region.

On a regional basis, the model documents all the links in the network in terms of projected peak-hour traffic volume/capacity ratios. The vehicle kilometres of travel are identified for the full range of volume/capacity ratios observed in the network. A near to capacity v/c ratio of 0.9 has been used to illustrate overall levels of traffic congestion and the percentage of total regional travel experiencing v/c ratios of 0.9 and above provides the comparison between options.

A volume/capacity ratio of 1.0 represents the maximum capability of a section of the road network to carry peak traffic flows. Traffic delays are rising rapidly, particularly at major intersections, when the volume/capacity ratios exceed 0.9. With all the growth strategy options, the proportion of total regional travel under these congested conditions rises six to seven fold over 1996 conditions by year 2026. The areas of increased congestion are mainly on the major routes in the Core area where current peak flow conditions are closer to maximum capacity and in the Western Communities where growth is highest in percentage terms with all the options.



Within the Core area in particular, increasing congestion and lower travel speeds (as outlined in Descriptor 3b) are major concerns for bus system operations. Peak period operational costs rise and bus system passenger capacities drop in direct proportion to bus travel times. Within Western Communities, the increased road space provision is not sufficient to avoid significant increases in congested peak flow travel. For total travel in the region, the Base Strategy shows a slightly lower percentage of future congested travel.

**Livable Human Settlement**

**Criteria 3:** Transportation infrastructure for all modes adequately and safely serves the Region.

**Descriptor 3b:** Move goods and people efficiently

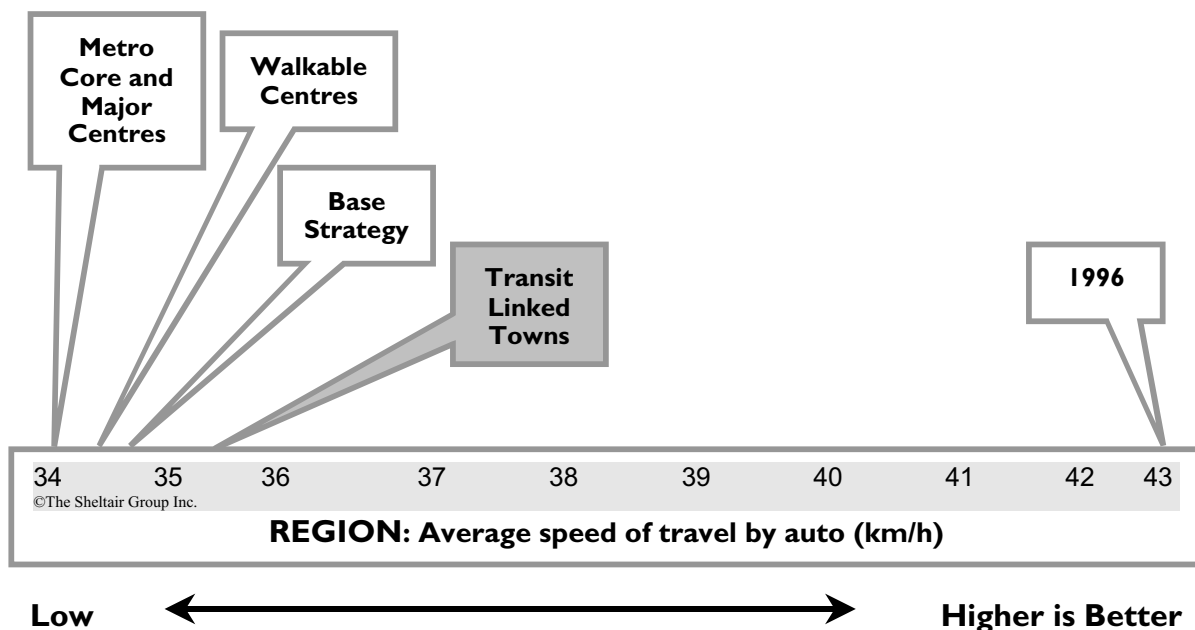
**Measure :** Vehicle travel speeds

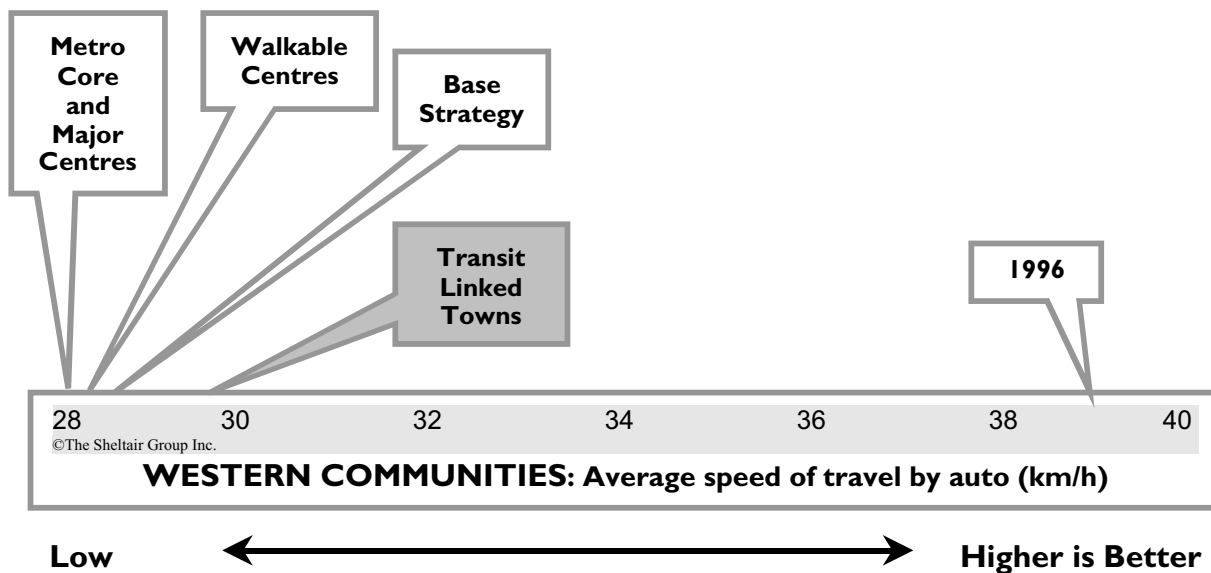
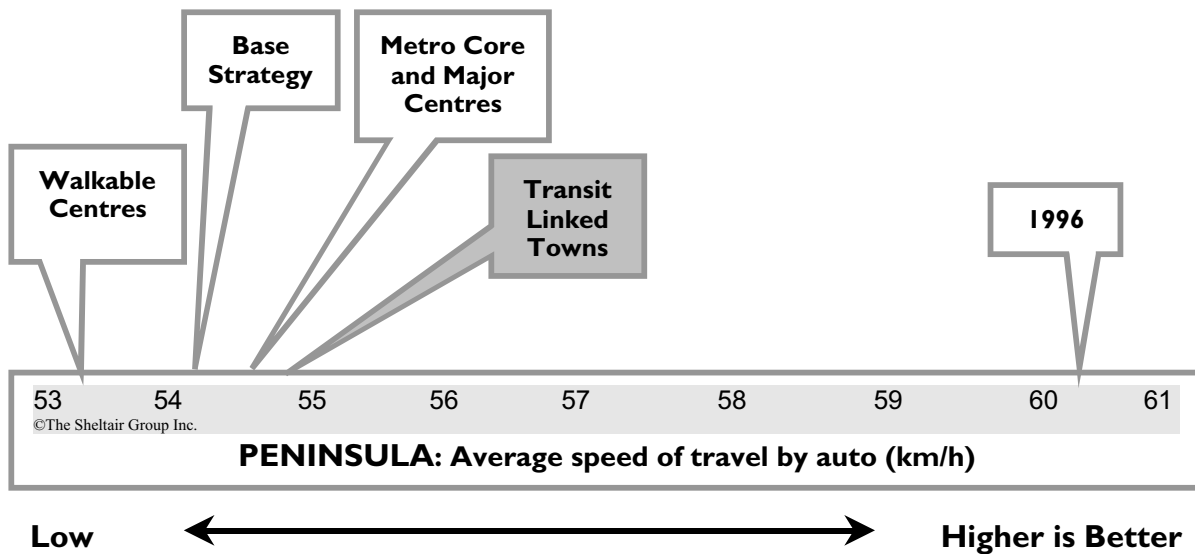
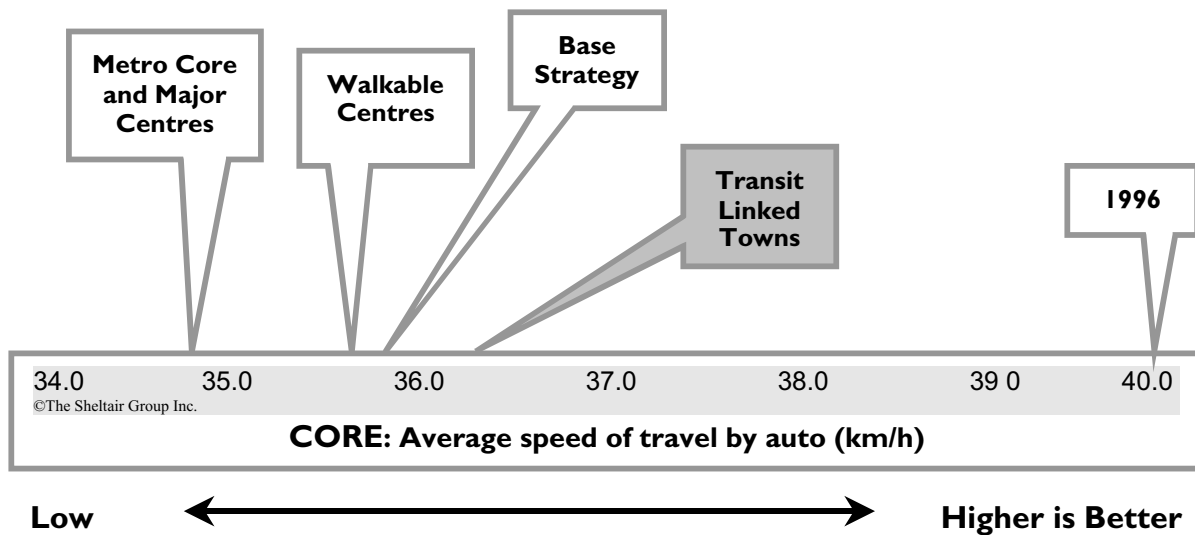
**Quantitative Indicator:** Average speed of travel by auto (km/h) – #19 on Figure 5

**Meaning:** Higher is better

Based on the transportation model results, the municipal level tabulations of vehicle kilometres and vehicle hours of travel have been consolidated to the sub-regional level to permit calculations of average travel speeds for 1996 and 2026 conditions. Adjustments have been made to all the sets of travel speeds based on ensuring a good fit between observed and modelled speeds at 1996 levels. Over the region as a whole, travel speeds during the peak hour are projected to drop by about 20% by year 2026 from 43 kph to 35 kph. This represents an increase of about 25% in average travel time during the peak. There is a small but significant advantage to the Transit Linked Towns option to increased transit use and slightly lower regional automobile travel.

Overall travel speeds drop by about 10% from 1996 levels in the Core. The Metro Linked Towns option has the lowest Core area speed due to the highest total traffic pressures. Overall travel speeds drop by about 10% from 1996 levels in the Peninsula Area, where current speeds are highest in the region. Overall travel speeds drop by almost 30% from 1996 levels in the Western Communities, where projected growth is the highest in the region. The Transit Linked Towns option provides marginally the best 2026 conditions.





For all options, the future road system in the Western Communities directly contributes to the estimated congestion and low travel speeds for this area of the region. In the Western Communities, most vehicle trips must use the major route network to access other neighbourhoods. This trend adds to the congestion level on the major routes and in turn reduces travel speeds.

By comparison, other examples of urban land use patterns in this region are supported by a balanced grid of interconnected local and major routes. These examples include Sidney, Oak Bay, Victoria and Esquimalt. For these examples, the internal/local traffic has direct access local neighbourhoods and adjacent municipalities by either local or major routes. This pattern of dispersion reduces congestion and improves mobility.

**Livable Human Settlement**

**Criteria 3:** Transportation infrastructure for all modes adequately and safely serves the Region.

**Descriptor 3c:** Optimize settlement patterns to ensure opportunities for, and encourage travel by, a variety of travel modes

**Measure:** Amount of non-auto travel

**Quantitative Indicator:** Percent of travel by bicycle – #15 on Figure 5

**Meaning:** Higher is better

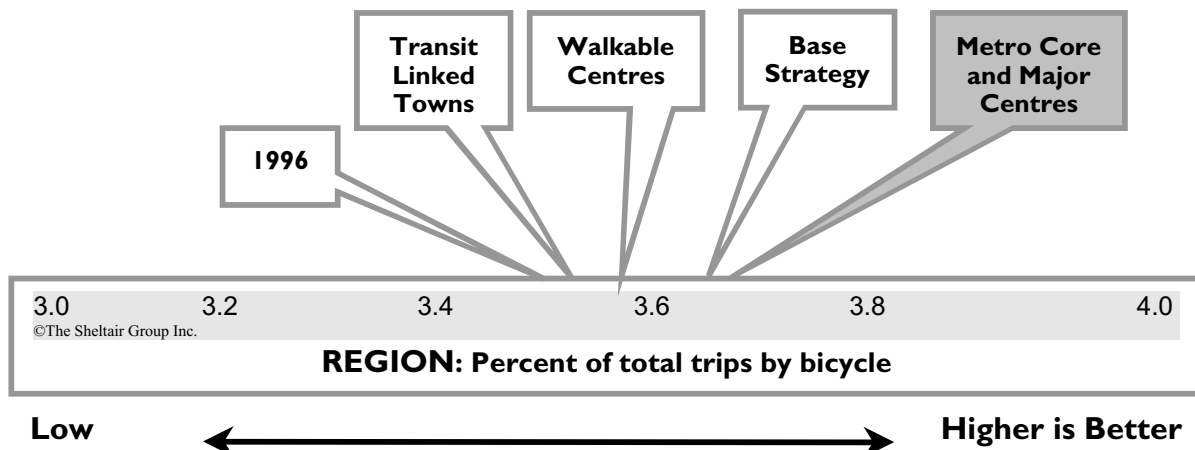
For the region, a small overall improvement is seen over 1996 levels – very small with the Transit Linked Towns option. In the Core, a small overall improvement is seen over 1996 levels – again very small with the Transit Linked Towns option.

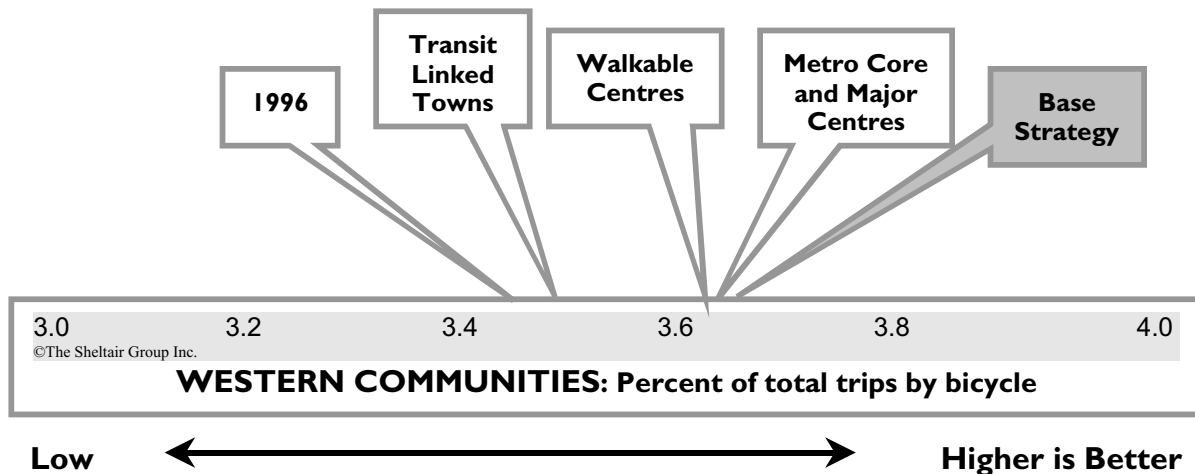
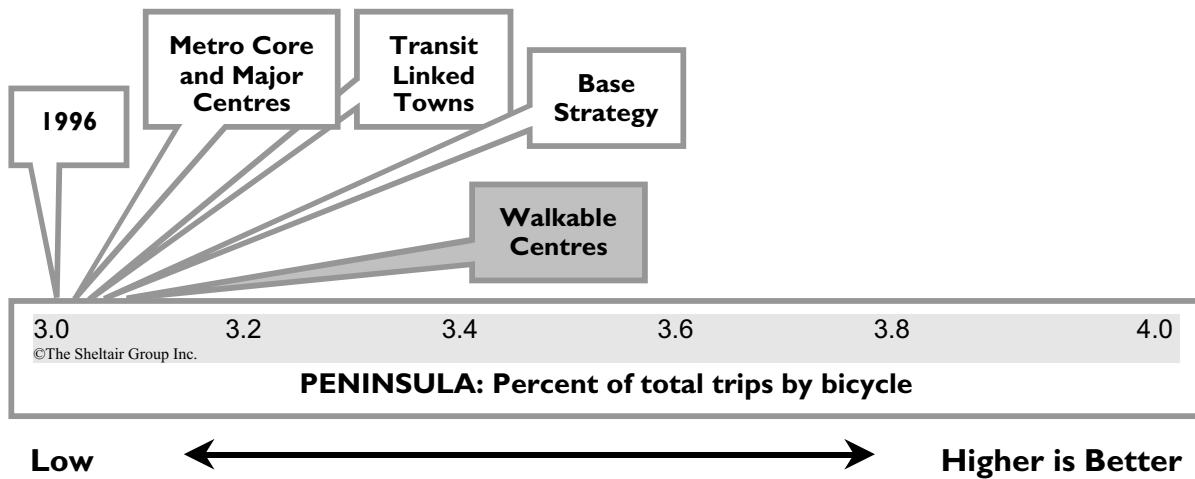
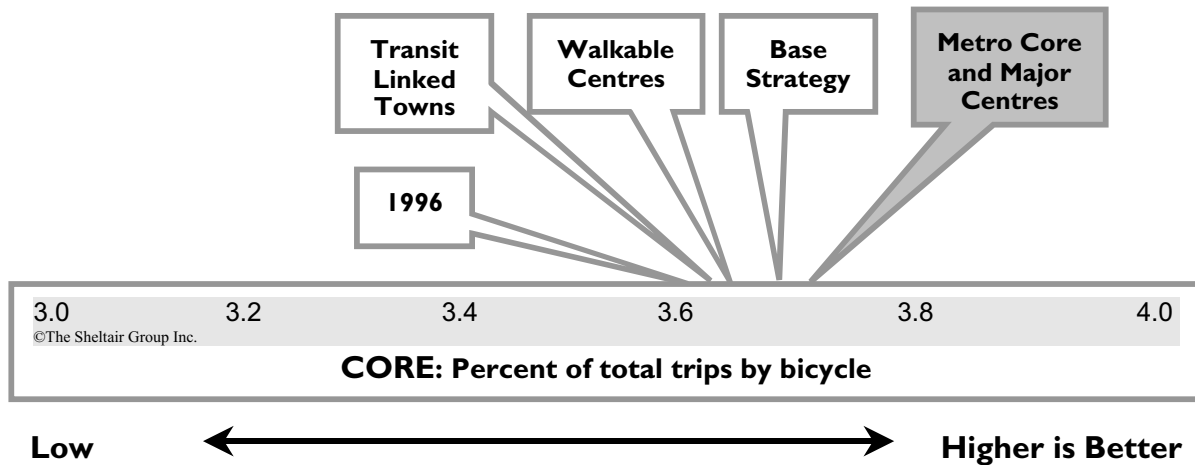
On the Peninsula, some minor increases are evident over 1996 levels – the Walkable Centres option is the best by a small margin over the Base Strategy. In the Western Communities, some minor increases are evident over 1996 levels – the Transit Linked Towns option rates poorly due to additional relatively low-density development.

Note: The current regional transportation model estimates number of bicycle trips based on the total person trips projected for each traffic zone and proportions applied to the distributions of the lengths of those trips. As outlined in the main report, there are limitations to this modelling procedure, particularly with regard to the effects of different levels of available facilities.

From a regional perspective, cycling as a mode choice will continue to face many challenges if it is to play a more dominant role in the future. For example, the general aging of the regions’ population by 2026 is expected to reduce the number of people that will likely cycle. This trend is factored in the modelling process.

Another factor influencing this mode today is route safety. The described future congestion issues will affect all major routes which is expected to also be a factor in people choosing cycling as a mode choice. More information is needed to fully understand the impact of this factor on cycling as a mode choice.





**Livable Human Settlement**

**Criteria 3:** Transportation infrastructure for all modes adequately and safely serves the Region.

**Descriptor 3c:** Optimize settlement patterns to ensure opportunities for, and encourage travel by, a variety of travel modes

**Measure:** Amount of non-auto travel

**Quantitative Indicator:** Percent of travel by transit – #16 on Figure 5

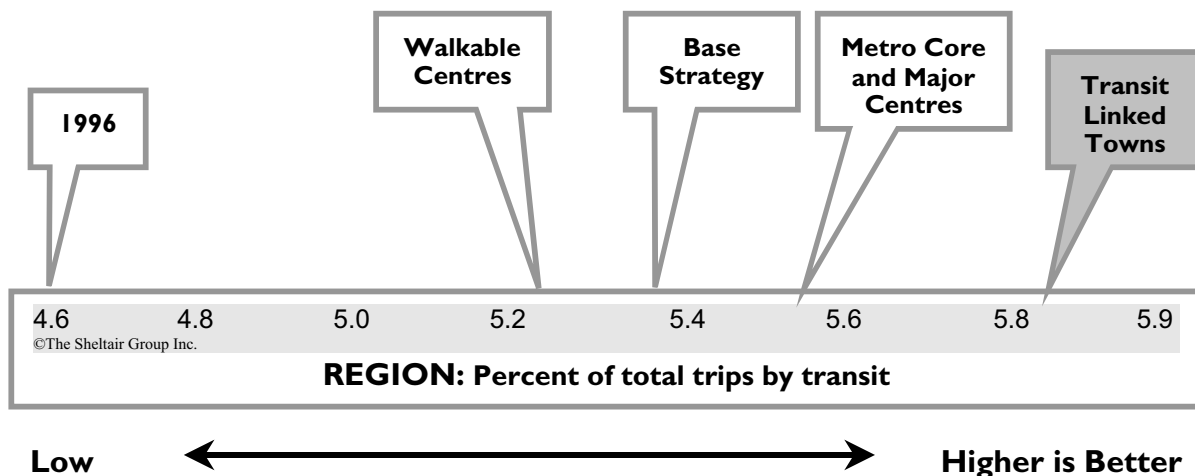
**Meaning:** Higher is better

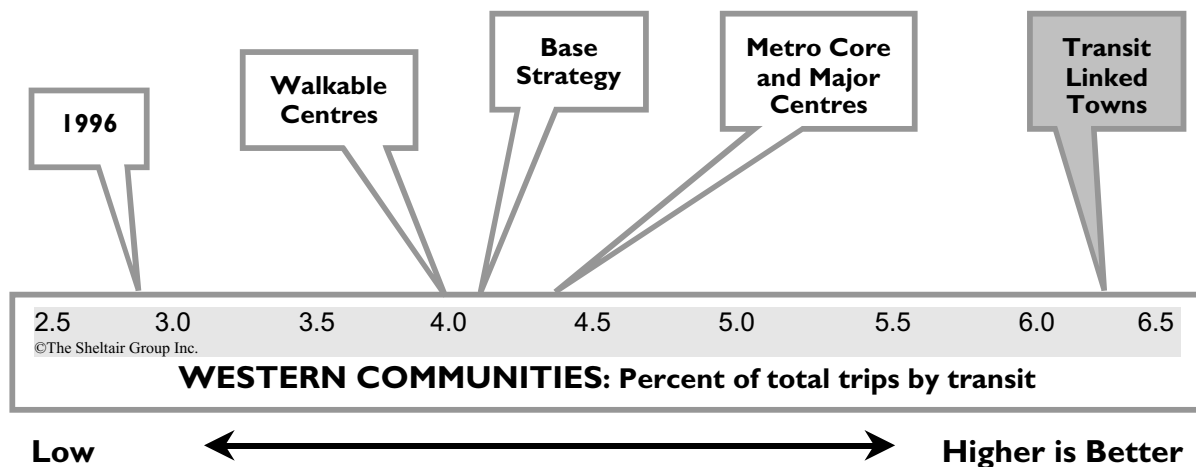
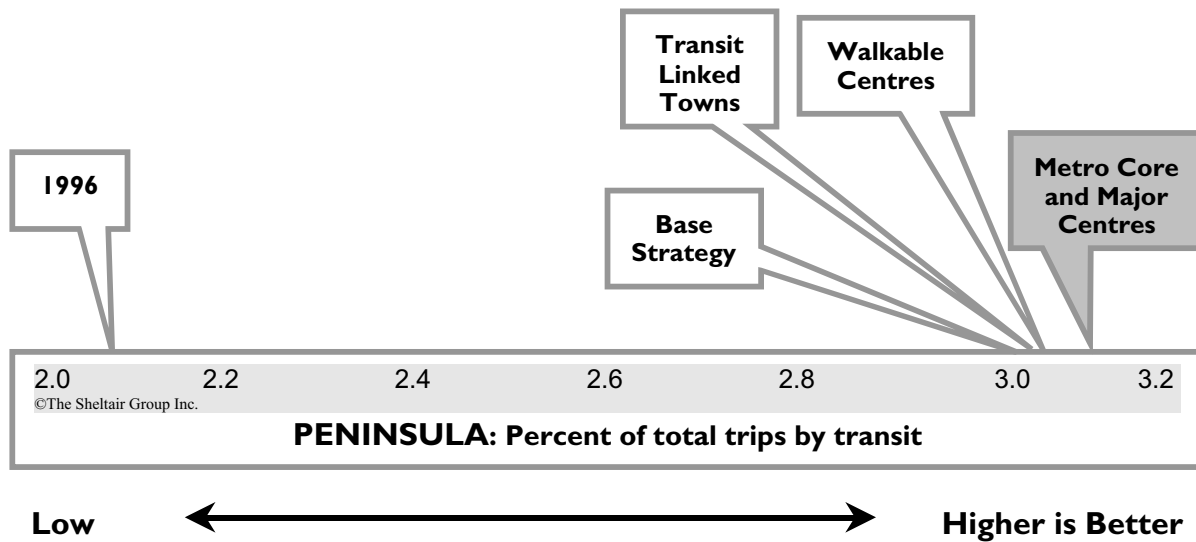
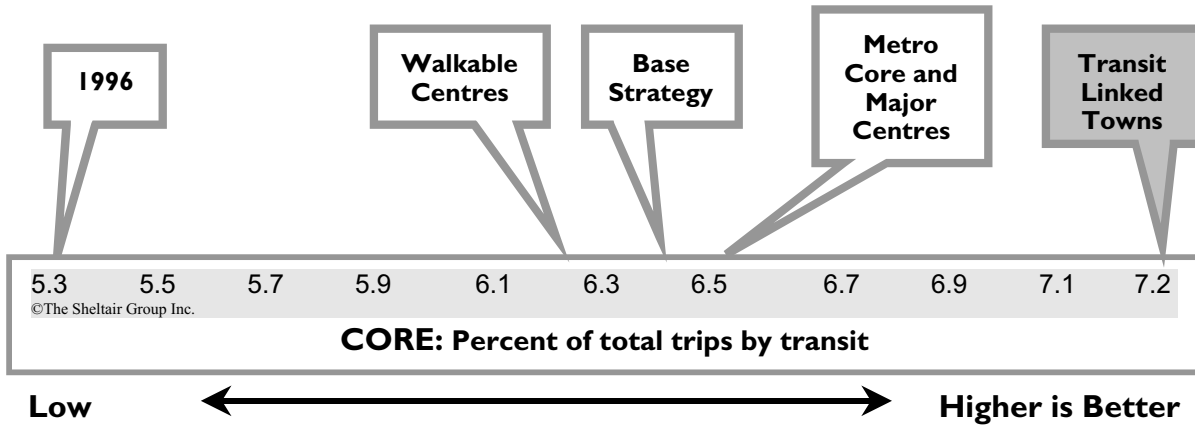
**Commentary:**

The model matrices of total person trips by all travel modes within the region and matrices by individual modes have been examined. Simple proportional calculations based on these matrices provide the projections of the percentages of travel by transit, by bicycle and by walking for the region as a whole and for travel to, from and within the three sub regions. Long range plans for transit service throughout the region based on buses have been incorporated into the modelling. Projected growth in the provisions of peak period transit service exceeds population growth up to year 2026 so that about 20% more transit service per capita is provided than in 1996.

The percentage of total peak travel by transit in the region increases by 15% to 20% with the bus-based systems with the Metro Core and Major Centres being the best, essentially due to projected additional transit service provisions higher than population growth. Much of the increased transit service is focussed on the Core and the West. The Transit Linked Towns option LRT (Light Rail) system raises the transit percentage to about 25% above 1996 levels. The Transit Linked Towns option provides 5% to 10% extra ridership.

The percentage of total peak travel by transit in the Core increases by about 20% with the bus-based systems, with the Major Core and Metro Centres option being the best. The Transit Linked Towns option raises the Core area transit percentage to about 35% above 1996 levels. Much of the increased transit service and ridership is between the Core and the West. The Transit Linked Towns option provides 10% to 15% extra ridership.





Peninsula transit usage is better in 2026 than 1996 but remains low with very little difference between options. The percentage of total peak travel by transit in the Western Communities increases by about 50% with three bus-based growth strategies. Much of the increased transit service and ridership is between the Core and the West. The Transit Linked Towns option raises the transit usage percentage to more than double the 1996 level.

Note: Recent changes in the regional transportation model procedures introduced a new category of short-distance trips in commercial areas within and between adjacent traffic zones. This change provided a better model fit to observed 1996 traffic levels in such areas and significantly increased the total number of individual peak hour trips in the region. As a result, the estimated proportion of transit trips in 1996 fell from about 6% of the total as previously reported to 4.6% of the total.

**Livable Human Settlement**

**Criteria 3:** Transportation infrastructure for all modes adequately and safely serves the Region.

**Descriptor 3c:** Optimize settlement patterns to ensure opportunities for, and encourage travel by, a variety of travel modes

**Measure:** Amount of non-auto travel

**Quantitative Indicator:** Percent of travel by walking – #17 on Figure 5

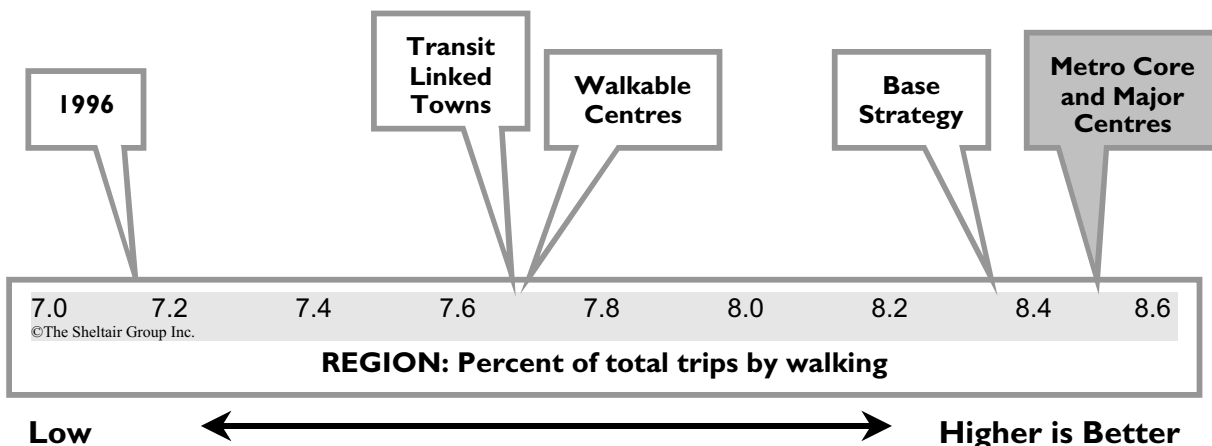
**Meaning:** Higher is better

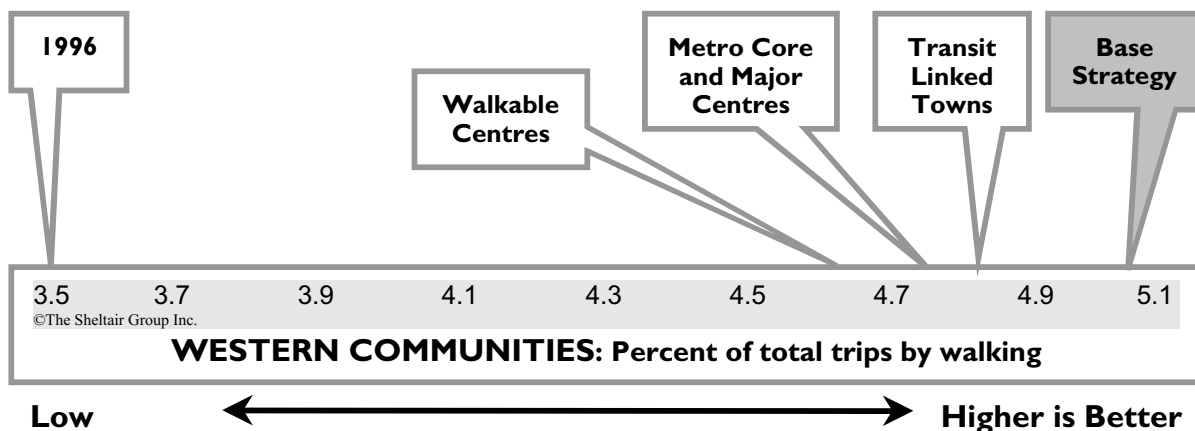
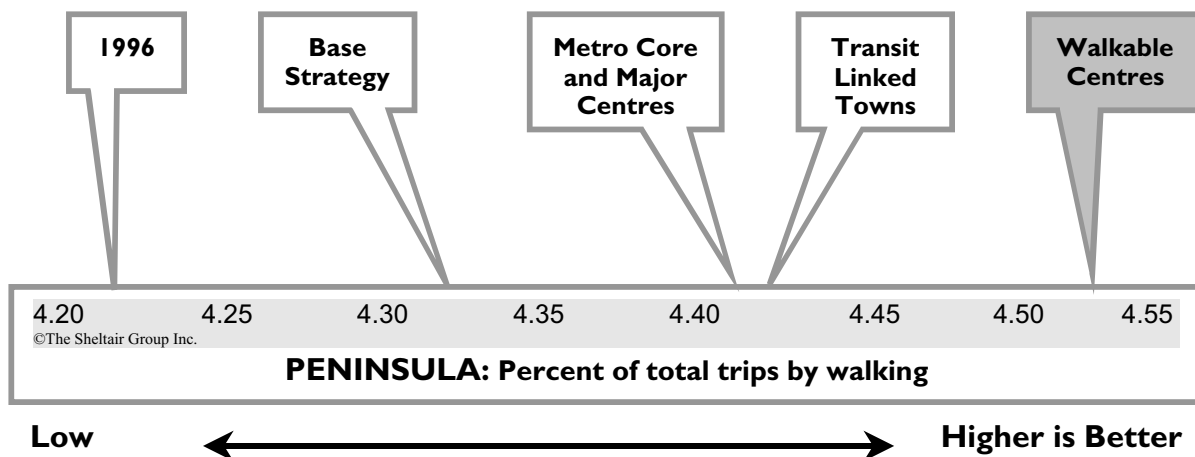
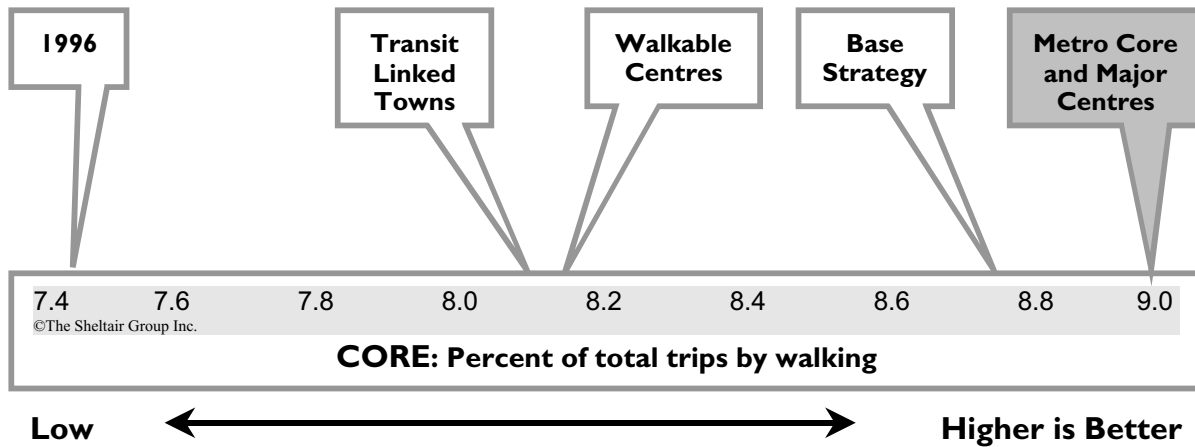
**Commentary:**

Region-wide: One of the most positive results of the technical assessment is that for all options walking, as a mode choice, will increase at a greater rate than auto-trips. From 1996 to 2026 the average growth in walk-trips is 60%.

In 2026, the urban core would continue to be the most dominant area for walking with about 80% of all walk-trips in the region. This is a small decrease from today’s share of 84% of all walk-trips. This change reflects a greater potential for pedestrian traffic in the suburban municipalities where this mode choice could more than double (from 1,600 to 3,800).

Most of the walk-trip growth in suburban areas will occur in the Western Communities (Colwood and Langford) as a result of the change in population densities. Walk-trips for this portion of the region currently represent about 7% of the regions total trips by all modes, or about 800 walk-trips. This total could increase to over 2,400.





**Livable Human Settlement**

**Criteria 3:** Transportation infrastructure for all modes adequately and safely serves the Region.

**Descriptor 3d:** Provide for travel within and beyond the Region

**Measure:** Travel time to major gateways – Ferry, Airport, Malahat

**Quantitative Indicator:** Average vehicle time (minutes) from all areas of the Region– **#21 on Figure 5**

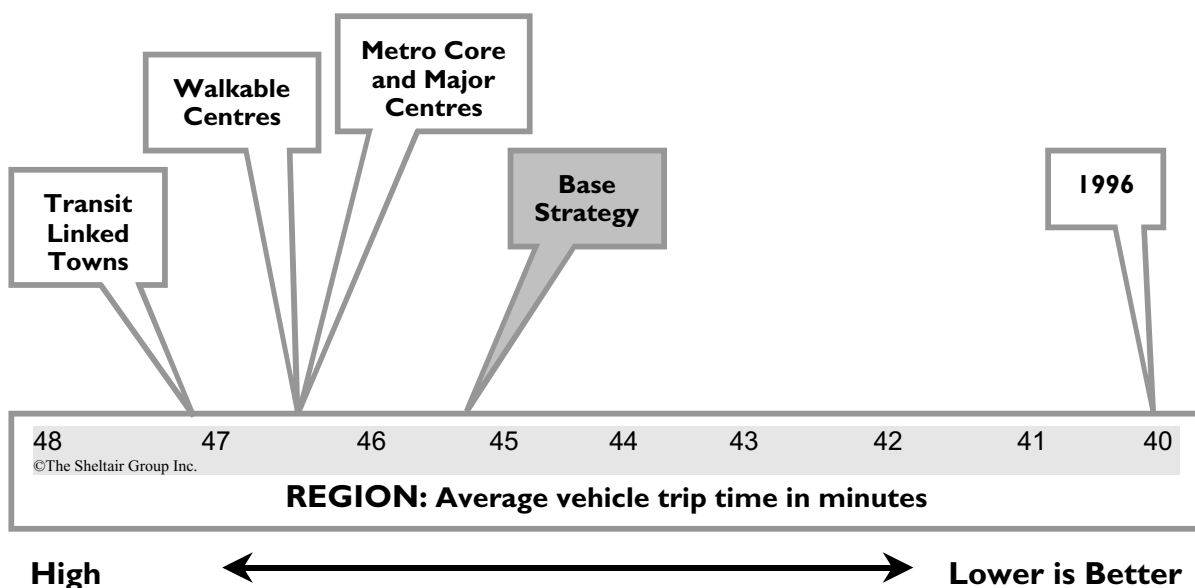
**Meaning:** Lower is better

**Commentary:**

The regional transportation model provides average travel times from all parts of the region to each of the three regional gateways (ferry terminal, Victoria International Airport and the Malahat). An unweighted average of the travel times to the three locations has been used to compare the options.

Average peak travel times to the key entry and exit points to the region increase by about 20% between 1996 and 2026 due almost entirely to increased road congestion and reduced travel speeds. This represents a modest increase of about five to seven minutes over 25 years. The Base Strategy performs slightly better for external travel than the other options. However, there is less than a two minute difference among the options.

Using average travel time as an indicator does not fully reflect the impact of travel congestion along major corridors. For example, today the average travel time from the intersection of Douglas and Yates streets to the airport is about 35 minutes in the peak p.m. hour. By 2026 the same trip could take 1 hour (70% longer). This pattern can be expected for most trips between the heart of downtown Victoria and all outlying areas of the region such as to the Malahat, Sooke and BC Ferries.



**Livable Human Settlement**

**Criteria 3:** Transportation infrastructure for all modes adequately and safely serves the Region.

**Descriptor 3e:** Range of accessibility in terms of physical and financial ability within the system

**Measure:** Accessibility to transit service

**Quantitative Indicator:** Percent of persons within 400 m of a transit route – #22 on Figure 5

**Meaning:** Higher is better

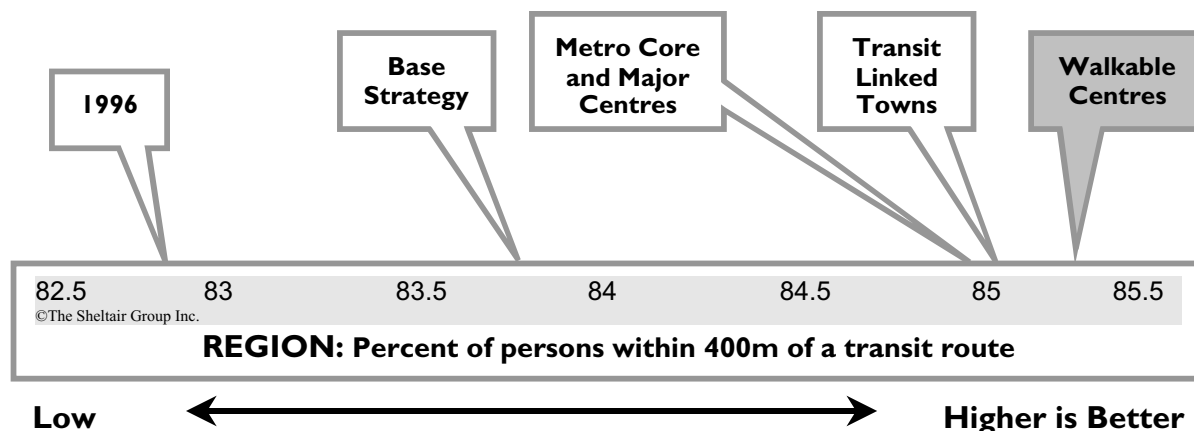
**Commentary:**

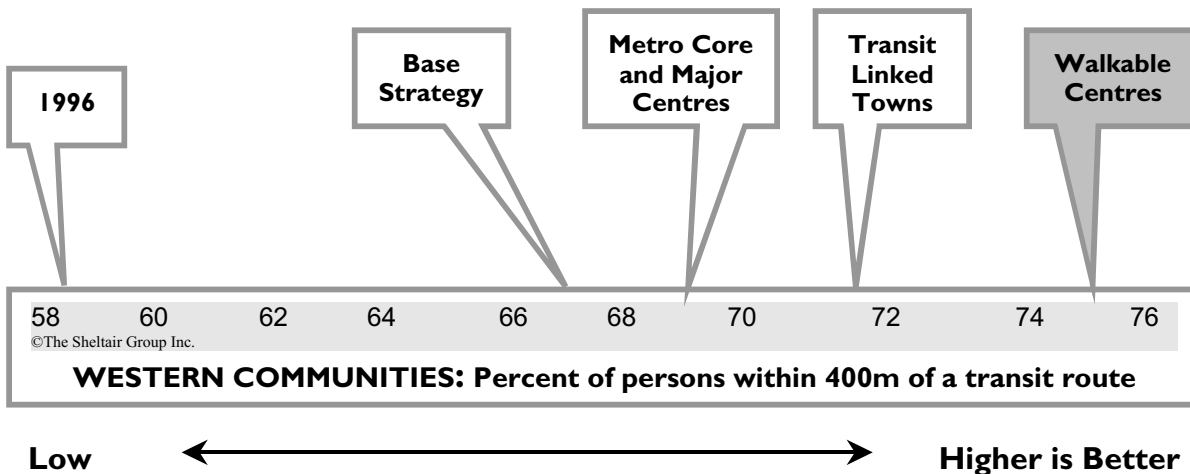
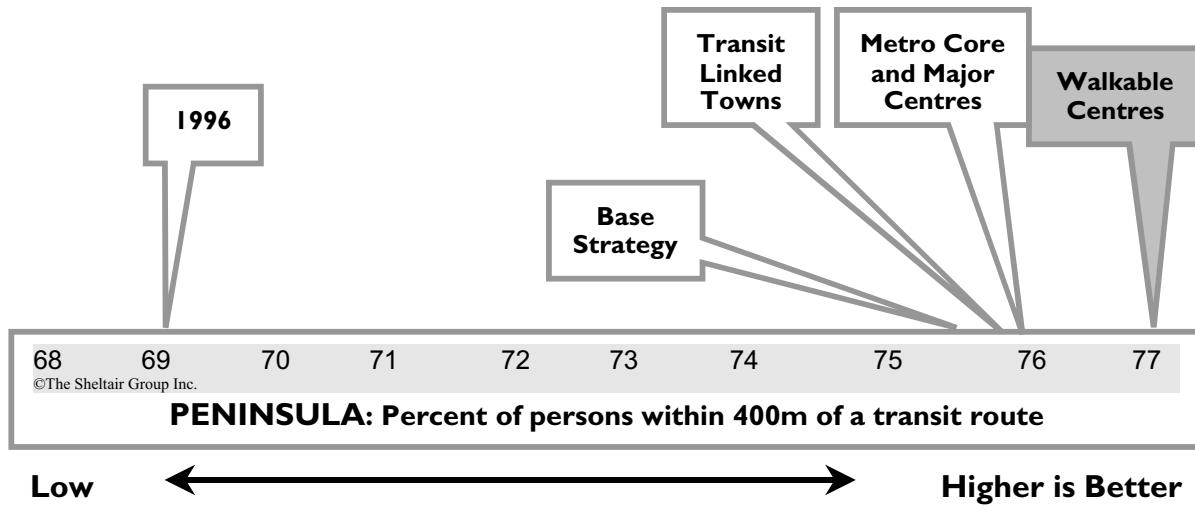
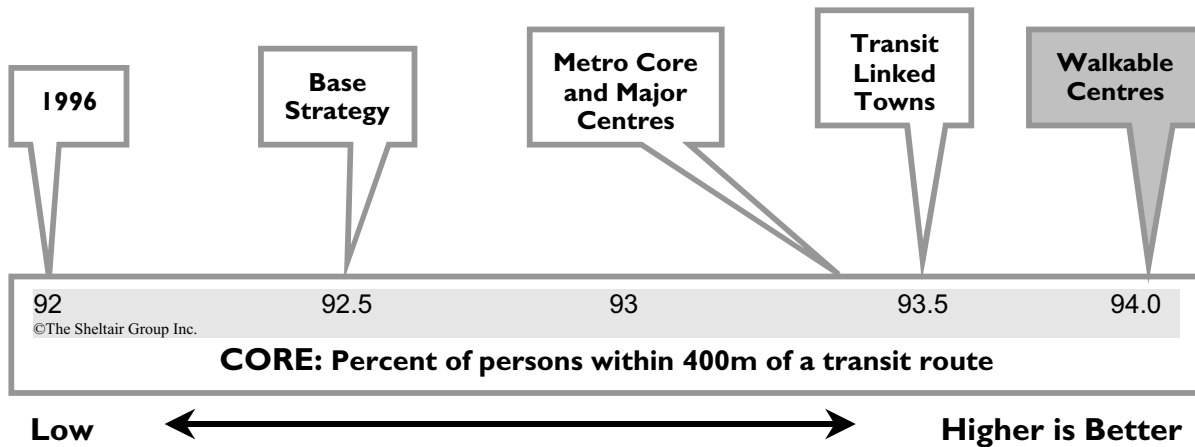
Based on transit route and population data provided by CRD, the areas of each traffic zone within 400 metres of a transit route were identified for the 1996 base and the option growth strategies. For each zone, the population was multiplied by the percentage of the area of the zone within 400 metres of a route to provide an estimate of the transit accessible population. The zone-by-zone accessible populations were then summarized to provide regional and sub-regional totals. Finally, the population numbers with access to transit were identified as percentages of the total populations at the sub-regional and regional levels.

**Region** – Increased overall density together with substantial expansion of transit services by 2026 produces significant improvements in regional transit coverage – the best coverage is provided by the Walkable Centres option, but due to reduced Core area development growth.

**Core** – Increased overall density together with substantial expansion of transit services by 2026 produces significant improvements in transit coverage in the Core – again, the best coverage is provided by the Walkable Centres option, but due to reduced Core area development growth.

**Peninsula** – Some expansion of transit services by 2026 produces significant improvements in transit coverage in the Peninsula – transit system coverage in relation to the Walkable Centres option needs some re-examination – the other three options provide almost equal levels of transit coverage.





**Western Communities** – Increased overall density in the Western Communities together with substantial expansion of transit services by 2026 produces significant improvements in transit coverage – the best coverage is provided by the Walkable Centres option – the additional improvements to transit service in the Transit Linked Towns option are accompanied by some increased low density development remote from the LRT line so that overall transit coverage diminishes slightly.

**Note:** Accessibility distances to transit represent one factor in the estimation of transit usage throughout the region. Within the modelling procedures, walking times, waiting times (dependent on service frequency) travel times, including transfer, all affect the attractiveness of transit services. These many factors, together with the distribution of travel demands into areas well served and poorly served by transit mean that total transit ridership does not exactly parallel transit accessibility.