

*Copies of this report
and its companion
Long-range Transportation Plan
can be obtained from:*

**GVRD Communications and
Education Department**
4330 Kingsway
Burnaby, B.C., V5H 4G8
Tel: (604) 432-6339
Fax: (604) 432-6399

A Medium-range Transportation Plan for Greater Vancouver



Transport 2021

CONTENTS

Preface	
TRANSPORT 2021 and its Objectives	3
Next Steps in the Decision-making Process	5
Steering Committee and Acknowledgements	6
 Executive Summary	
 Introduction	
Goals, Objectives and Criteria	17
 1. Growth Management: Using Transport Investment to Shape Growth	
1.1 Transport's Impact on Land Use	19
1.2 Interplay of Intergovernmental Relations and Transportation Investment Decisions	22
1.3 Livable Region Strategy and Partnership Agreements	22
1.4 Summary of Recommended Approach	25
 2. Transportation Demand Management: Changing Behaviour	
2.1 Medium-range Demand Management Package	27
2.2 Public Acceptance of Demand Management	27
2.3 Link Between Funding and Demand Management	29
2.4 Staging Approach for Demand Management	30
2.5 Next Tasks to Implement Demand Management	32
 3. Supply of Facilities: Improving the Transportation Network	
3.1 How the System Concept for 2006 was Derived	35
3.2 Transit System in 2006	37
3.3 Staging of Transit Improvement	44
3.4 HOV and Mixed Traffic System in 2006	45
3.5 Staging of HOV Treatment	47
3.6 Staging of Mixed Traffic Improvement	47
 4. Measurement of Results: Monitoring and Targets	
4.1 Tasks to Establish Transport Planning Cycle	49
4.2 Numerical Performance Targets for 2006	52
 Appendix 1: Note on Commuter Rail	
	55
 Appendix 2: Note on Lions Gate Bridge	
	58
 Appendix 3: GVRD Board Resolution on Implementation	
	61
 Appendix 4: List of Publications	
Working Paper and Final Reports	65
	66

Preface

TRANSPORT 2021 and its Objectives

This report is part of the output of TRANSPORT 2021, a joint, two-year project funded equally by the Province of British Columbia and the Greater Vancouver Regional District (GVRD).

The objective of the TRANSPORT 2021 project is:

"based on
the GVRD's Creating Our Future action plan,
its Regional Strategic Plan and
the mission statements of the Ministry of Transportation and
Highways and B.C. Transit,
to recommend,
by the end of 1993,
a long-range transportation plan for Greater Vancouver,
with associated policies, demand management measures
and priorities for transportation investment."

The project is guided by a Steering Committee of senior staff officials from provincial and local governments, with observers from the federal government and neighbouring regions.

Related Long-range Plans

Transport 2021 Long-range Plan

This TRANSPORT 2021 Medium-range Transportation Plan is founded upon the TRANSPORT 2021 Long-range Transportation Plan, which was published under separate cover in September, 1993.

The Long-range Transportation Plan identifies the current undesirable trends in the transport system, explains how governments can swing the trends towards a more desirable direction, and provides a numerical assessment of the projected improvements against a set of agreed criteria. Its planning horizon is the year 2021.

Readers interested in an account of the TRANSPORT 2021 public communications program should refer to the appendices in the long-range plan report.

Livable Region Strategy

Other strategic plans are closely related. The GVRD's "Livable Region Strategy: Proposals" incorporate the TRANSPORT 2021 Long-range Plan as their transportation component. Both the Long-range

and Medium-range Transportation Plans are based on the land-use plan in the "Livable Region Strategy: Proposals", which calls for a more compact metropolitan area than would be expected to occur if current trends and development policies continue.

Province-wide strategic transportation plan

At time of writing, a province-wide transportation plan is being assembled by the Government of B.C.; the TRANSPORT 2021 long- and medium-range plans contribute to its B.C. Lower Mainland portion.

Air Quality Management Plan

Also concurrent is the GVRD's Air Quality Management Plan, which shares analysis and findings with TRANSPORT 2021.

About This Report

This report presents the elements of a transportation plan for Greater Vancouver to the year 2006. It contains the principal findings and medium-range recommendations of its authors, the TRANSPORT 2021 Steering Committee.

Addressed to the GVRD and the Province of B. C. as the project's joint sponsors, this report is also a public document intended for all groups interested in the future of the transportation in the B.C. Lower Mainland.

Contents

The report offers more **guidance than prescription** for the future. It sets a direction; the medium-range actions it proposes are consistent with the long-range vision.

The report offers guidance as to **when** the initiatives in the long-range plan should be taken. There are recommended **targets** for the performance of the system according to measurable criteria derived from the goals and objectives.

The report recommends a phasing in of the **policies** recommended in the long-range plan.

The report also presents **investment** priorities for the development of transportation corridors. It does not present a **financial** plan.

The report also provides guidance on the **implementation process** for the medium-range plan. It identifies the tasks which have to be performed by the agencies of government and sets the stage for the next, more detailed level of planning.

A Technical Appendix to the Medium-range Plan, published under separate cover, gives more details on the analysis made to arrive at the medium-range recommendations.

Limitations of this Report

This report does not repeat the contents of the long-range plan, with which the reader is assumed to be familiar.

The report leaves to the implementing agencies the challenge of finding a way to make its proposals work. For example, it does not define precise alignments of facilities within corridors. Nor does it prescribe a specific technology (e.g. a particular type of light rail technology) for installation in a corridor. When more detailed project-

Next Steps in the Decision-making Process

by-project and facility-specific engineering studies are done, new information will come to light to guide decisions on how best to proceed.

In July 1993 the project's two sponsors agreed that the Long-range Transportation Plan and the GVRD Livable Region Strategy should be referred to Lower Mainland municipalities and others for their review. The deadline for comments was set for March 31, 1994.

The sponsors also agreed upon the timetable and process for this Medium-range Transportation Plan, which was then under preparation. The Medium-range Plan is expected also to be referred in the same way as the Long-range Plan, with the same deadline for comment.

There will need to be adjustments to this plan to accommodate the outcome of the detailed review of the "Livable Region Strategy: Proposals" by municipalities.

List of Interim Highway Improvements

To provide guidance to implementing agencies for their activities as they await the results of the review, the sponsors of TRANSPORT 2021 directed the project to produce a list of highway improvements which could be initiated in the short term.

A report titled "Interim Highway Improvements" containing this list and explaining the criteria used in selecting them is published by TRANSPORT 2021 under a separate cover.¹

¹Appendix 4 contains a list of publications including Working Papers.

Steering Committee Members

B. E. (Ben) Marr, GVRD Regional Manager and Chair, TRANSPORT 2021 Steering Committee
J. D. (Doug) Allan, Municipal Manager, District of West Vancouver
R. W. (Bob) Collier, Municipal Administrator, Corporation of Delta
N. A. (Norm) Cook, City Manager, City of Coquitlam
J. C. (John) Dyble, Regional Director, Ministry of Small Business, Tourism & Culture
G. (Glen) Leicester, General Manager, Product Development, B.C. Transit
B. R. (Bruce) McKeown, Assistant Deputy Minister, MoTH²
L. R. (Len) Roueche, Manager, Planning and Research, B.C. Ferry Corporation
D. H. (David) Rudberg, City Engineer, City of Vancouver

Steering Committee Observers

P. W. (Peter) Cave, Director, Planning, Regional District of Fraser-Cheam
P. J. (John) Gairns, Administrator, Dewdney Alouette Regional District
E. (Erik) Karlsen, Director, Planning Branch, Ministry of Municipal Affairs
G. H. (Gerry) Kingston, Secretary-Treasurer, Central Fraser Valley Regional District
P. R. (Paul) Moritz, Manager, Long Range Planning, District of Matsqui (Alternate to Mr. Kingston)
B. A. (Boris) Pavlov, Regional Director, Policy and Coordination, Transport Canada

Project Team

M. L. (Martin) Crilly, TRANSPORT 2021 Project Director
P. C. (Paul) Lee, GVRD Strategic Planning and TRANSPORT 2021 Technical Director
J. (Jim) Chim, GVRD Strategic Planning
S. (Stephen) Gardner, BC Transit Transportation Engineering
R. M. (Rob) Hodgins, City of Vancouver Engineering
G. L. (Lynn) Kimmins, TRANSPORT 2021 Administrative Assistant
K. W. (Karoly) Krajczar, GVRD Strategic Planning
R. A. (Ross) Long, IBI Group
D. G. (David) Marr, MoTH South Coast Region
S. M. (Susan) O'Connor, MoTH Headquarters, Victoria
R. A. (Ralph) Perkins, GVRD Strategic Planning
K. F. (Ryan) So, Consultant to TRANSPORT 2021
G. E. (Gary) Vlieg, GVRD Strategic Planning
C. G. (Chris) Voigt, GVRD Air Quality and Source Control

²B.C. Ministry of Transportation and Highways

The Steering Committee acknowledges and thanks the following people for their support and advice to the project and its activities.

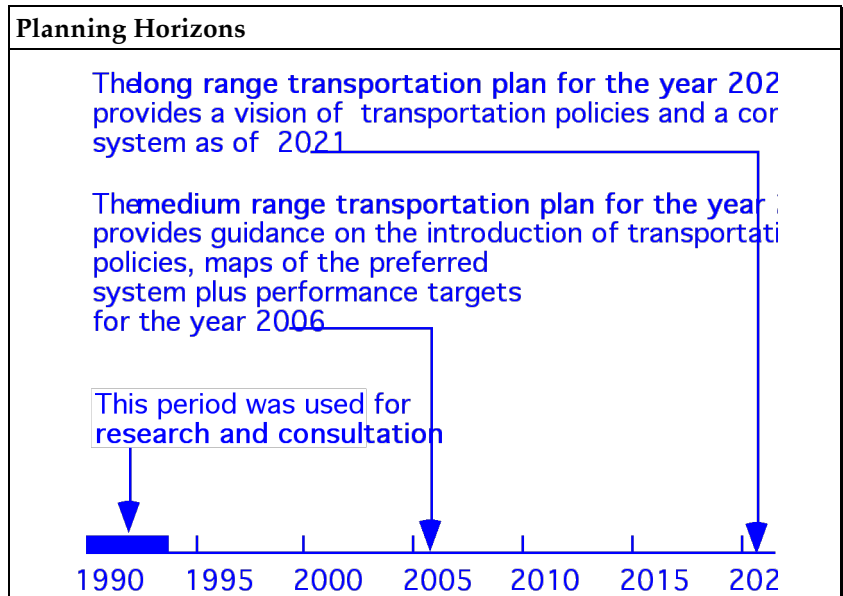
Academic Advisor	R. G. (Ron) Rice , School of Urban Planning, University of McGill
GVRD Management, Staff and Consultants	<p>K. D. (Ken) Cameron, GVRD Strategic Planning H. G. (Hugh) Kellas, GVRD Strategic Planning D. E. (David) Baxter, Daedelus Futures Incorporated D. (Delia) Laglagaron, GVRD Strategic Planning J. M. (Judy) Kirk, GVRD Communications and Education D. B. (David) Cadman, GVRD Communications and Education M. W. (Marilyn) Assaf, GVRD Communications and Education J. B. (Barrie) Mills, GVRD Air Quality and Source Control M. (Morris) Mennell, GVRD Air Quality and Source Control</p>
TRANSPORT 2021 Engineering Liaison Committee	<p>D. R. (Derek) Parkes, MoTH South Coast Region and Chair, TRANSPORT 2021 Engineering Liaison Committee I. (Ian) Adam, City of Vancouver N. (Neil) Atchison, City of Surrey L. (Lynn) Baxter, District of Maple Ridge C. (Carl) Berg, District of Mission D. (Don) Bridgman, City of North Vancouver G. (Gordon) Chan, BC Transit J. (Joseph) Dioszeghy, Corporation of Delta R. (Renate) Ehm, City of New Westminster T. (Tom) Gardner, District of Maple Ridge R. (Bob) Glover, City of Burnaby G. (Gavin) Joyce, District of North Vancouver M. (Mike) Lai, City of Surrey P. (Peeter) Liivamaagi, City of Burnaby G. (Gordon) Lovegrove, Township of Langley K. (Ken) Low, City of White Rock J. (Jim) Lowrie, District of Pitt Meadows G. (Gordon) MacKay, District of West Vancouver H. (Herb) Mueckel, Village of Anmore T. (Tim) Murphy, City of Coquitlam N. (Neil) Nyberg, City of Coquitlam R. (Richard) Page, Village of Belcarra J. (John) Paul, City of Port Moody H. (Henry) Pelzer, City of Richmond M. (Matt) Pongracz, City of Langley C. (Clive) Rock, City of Richmond I. (Igor) Zahynacz, City of Port Coquitlam</p>

Executive Summary

This Medium-range Transportation Plan springs from the TRANSPORT 2021 Long-range Transportation Plan, published in September, 1993.

That long-range plan provided a vision of the transportation system of the metropolitan Vancouver region in the year 2021, but did not describe a path to arrive at this vision.

Therefore, this medium-range plan addresses the question of what to do first. It looks forward to the period between now and 2006, offering guidance on the priority actions and staging of the items which appear in the long-range plan.



The plan finds that key decisions are needed soon in three areas which are:

- the interplay of **growth management** and transportation investment in the region;
- the introduction of **transportation demand management**; and
- the **supply of new and enhanced transportation facilities** and services.

Growth Management

This report deals with these decision areas in turn, devoting a chapter to each.

The GVRD's "Livable Region Strategy: Proposals" of 1993 provide the starting point³ for this medium-range transportation plan. The proposals set out "compact growth" targets for the number of residents and the number of jobs for various areas within metropolitan Vancouver.

The year 2006 pattern of target numbers of residents and jobs is quite different from the trend pattern expected to occur under "business as usual" development. For instance, the population of the southern part of the region (including Langley) would grow about one quarter as fast as it is projected to grow under current trends between now and 2006; whereas that of the Burnaby/New Westminster area would grow more than four times faster than under current trends.

The map below illustrates the contrast in terms of resident population. Other targets for jobs in each area (not shown) have a similar pattern. These figures have a very important bearing on the region's transportation requirements.



Because transportation investments are believed to shape the pattern of growth, the question arises as to whether and how they should be used to help achieve this target land use plan.

³Based on the long range land use plan (2021), a proposed medium-range land use plan ("brought back" to the year 2006) was developed by the GVRD Strategic Planning Department in conjunction with the TRANSPORT 2021 study team.

The decision to use pro-actively this land-use "shaping" power could affect what should be built first—i.e. the sequencing of the infrastructure investments within the plan horizon.

Furthermore, intergovernmental relations are crucial in a region where numerous authorities regulate the land use pattern through zoning and similar controls. Changes being considered in the current institutional arrangements could help an effort to incorporate major transportation decisions in growth management—and, conversely, transportation decisions could help advance efforts to coordinate growth management among local governments.

Accordingly, this report answers these questions:

- Should major transport investments and services be made only where demand warrants, which is the traditional approach? Or should they be used to try to shape growth?
- In particular, in the areas targetted for accelerated growth above the projected trend, can and should major investments be sequenced to shape growth and intensify development?
- Correspondingly, in areas (e.g. up-valley) which are targetted to slow down their growth below projected trend, can and should transport investments—which could reinforce the trend—be postponed?
- How can transportation investment commitments be dealt with in the context of the new institutional arrangements now being considered among local governments?

The report concludes that:

- where governments make transport investments aimed at helping to shape land use, they should be aware that the **strength of the shaping effect is not well understood**.
- despite this uncertainty, transport investments should be made **within the medium-range horizon with the goal of shaping land use**.
- the land-use shaping effects of transportation improvements mean that **governments should give priority to those investments which improve the accessibility of the inner suburbs** to and from each other, as opposed to making early improvements in accessibility for longer-distance commuting.
- governments should not make transport investments ahead of municipal land use plans and other supporting initiatives, but should **dovetail transport investment and land use plans**.
- governments should **hold in reserve major capital investment decisions** which require dovetailing with land use plans until it becomes clear that the appropriate land use policies are very likely to be put in place.

*Conclusions on growth
management and transportation*

Transportation Demand Management

- the mechanism of **partnership agreements**, identified in the GVRD Board resolution of July 30, 1993 offers an avenue for coordinating land use plans and transportation investments. This opportunity should be further explored and advanced.

The report offers guidance on decisions on **Transportation Demand Management (TDM)**.

So far in Greater Vancouver, there has not been a full-fledged attempt to change travel behaviour by using the incentives and disincentives in a demand management package.

Accordingly, the chapter addresses these questions:

- Given that transportation demand management is an important lever for changing travel behaviour under the long-range plan, how should it be introduced? For instance, should measures such as bridge tolls be introduced quickly and forcefully to obtain a rapid shift in travel habits, or should they be phased in gradually?
- How should TDM be coordinated with changes in supply (e.g. should bridge tolls or gas taxes be linked with physical improvements in a corridor)?

The conclusions are that:

Conclusions on demand management

- A program of public **education and incentive measures should precede the introduction of disincentives** such as bridge tolls, gas taxes and parking management. Incentives introduced early should be:
 - promotion of telecommuting, van pooling, a computerized match-up program for carpoolers, and programs to support employers in reducing vehicle trips to their worksites;
 - bus priorities on the street and high-occupancy vehicle privileges;
 - measures to give workers with free/subsidized parking the opportunity of receiving this employment benefit in cash or as a transit pass; and moves towards "pay as you drive" vehicle insurance allowing those who drive less to realize savings in their premiums.
- Tolls and taxes, which are revenue-generating measures, should be clearly **dedicated to transportation improvements** to improve the acceptability of the measures to the public.
- A **sector-by-sector package** approach, linking road, bridge, and transit improvements in a single sector will further assist public acceptance and behaviour change.

Supply of capacity

The report offers guidance on **Supply of Capacity**.

Major facilities will have to be built between now and the year 2006. They should be built over a period of time, not all at once, for a number of reasons:

- Availability of capital. The first major investments may use up the immediate supply of capital.⁴
- "Crash" programs are wasteful. Cost-effective construction means staging so that resources (design expertise, skilled labour, equipment) are steadily engaged.
- Overcapacity. If built too soon, facilities may not be adequately utilized.

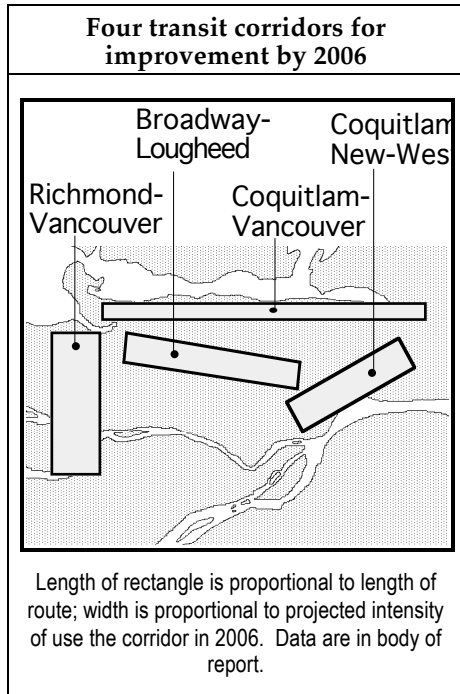
The report offers a staged approach to transit, high occupancy vehicles and mixed traffic facilities which emphasizes:

- first, enhancing and **making better use of the existing system** through moderate capital expenditures—while detailed engineering studies are completed and early experience with growth management and demand management is gained.
- second, **staging capital expenditures at a digestible rate**. Some sequencing decisions (notably on high-profile trunk transit corridors) will require policy decisions which strike a balance between transport efficiency and use of transport investment to achieve the re-shaping of growth.

A summary of the staging recommendations follows.

Transit Capacity Improvements

- For transit capacity, the **first** step is to enhance the existing area-wide bus services to keep pace with population growth. **Second**, four corridors (see diagram, left) warrant "SuperBus" treatment—meaning fast, frequent, comfortable, limited stop bus service (up to 5,000 passengers per hour), using bus priority measures and HOV lanes as available.
- On one of these corridors, Coquitlam-Vancouver, SuperBus could be (partially) replaced by a commuter rail service, if the detailed examination of commuter rail which is currently underway by the Province of B.C. demonstrates that this is the most cost-effective solution⁵.
- By 2006, the three other transit corridors (Richmond-Vancouver, Broadway-Lougheed and Coquitlam-New Westminster) warrant further upgrading to an "Intermediate Capacity Transit System" or ICTS, which is a system with



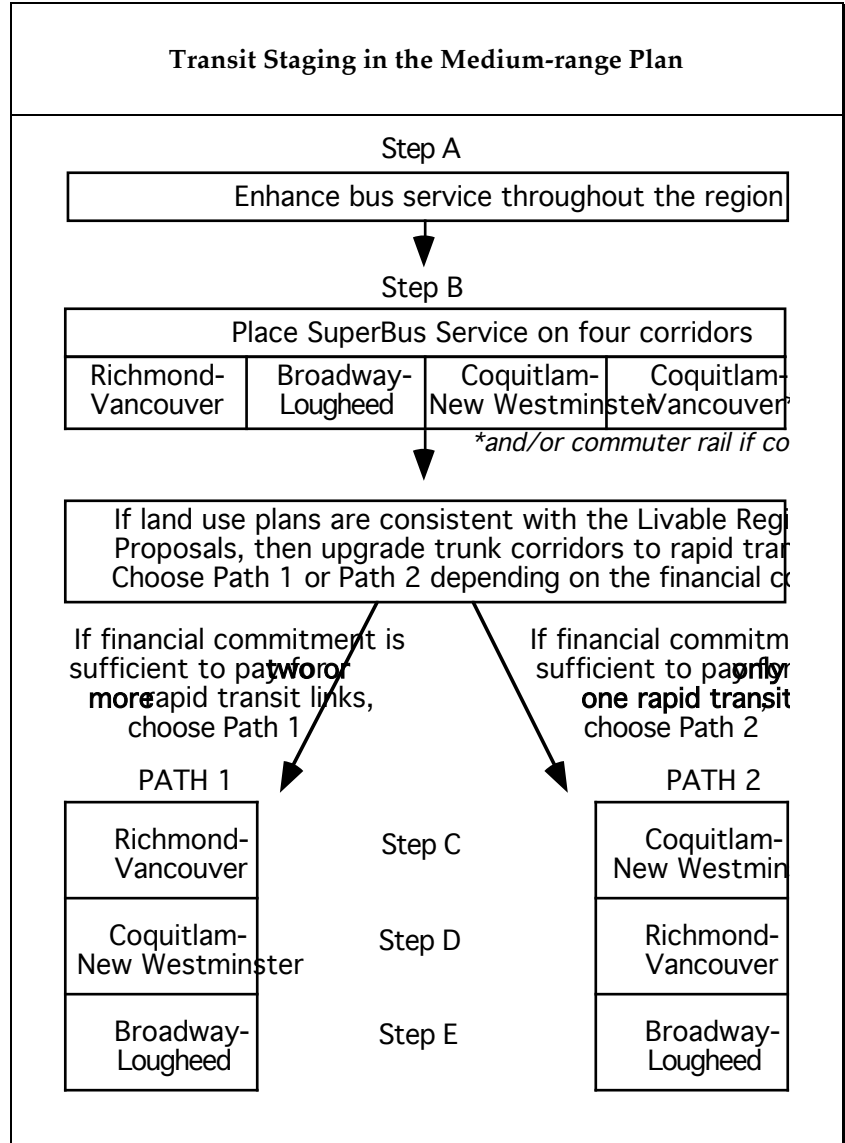
⁴However, in future the access to capital will depend more on the willingness of policy makers to dedicate a revenue stream (e.g. through increased gas taxes) to enable capital to be raised.

⁵Appendix 1 of this report provides more detail on the TRANSPORT 2021 perspective on commuter rail.

capacity of some 10,000 people per hour with regular peak and off-peak service over a separate right-of-way. These three corridor upgrades are the **third, fourth and fifth** steps.

The project offers a choice of staging paths, numbered 1 and 2 in the diagram below, for the ICTS corridors.

Transit staging strategy



The choice between Path 1 and Path 2 rests primarily on financial capability. **If the financial commitment is adequate to fund two or more of these links, the Steering Committee recommends Path 1.** This means that the corridor (Richmond-Vancouver) which is the most intensively used will be developed; in addition at least one corridor (Coquitlam-New Westminister) intended to shape land use will also be developed.

HOV and mixed traffic staging

If the financial commitment is for one corridor only, then the Steering Committee recommends Path 2. Coquitlam-New Westminster is likely to have the largest impact on land use.

TRANSPORT 2021's recommendations on staging new high occupancy vehicle and mixed traffic capacity are illustrated in the diagrams on the left.

The first stage of high-occupancy (HOV) facilities would give HOVs priority treatment at each of seven major bridges. The second stage would see HOVs given superior service along entire corridors, e.g. by the installation of continuous lanes for HOVs and/or giving them special access privileges to enter the corridors.

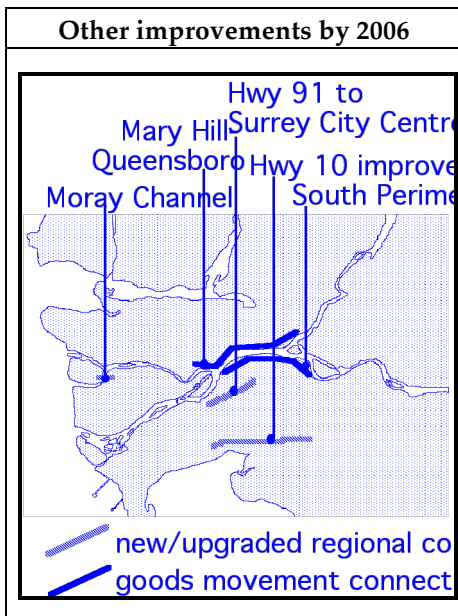
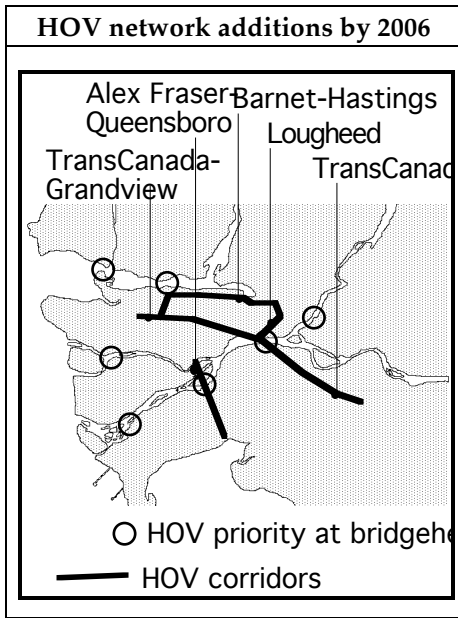
For mixed traffic improvements, the first step is to maximize the person-carrying capacity of existing facilities with a combination of new management techniques (e.g. access control, "green wave" signal synchronization, parking management on streets) to help buses move, and providing new local arterials to serve growing areas. The second step is to improve primary highway corridors to assist the movement of people and goods into and out of the region.

Monitoring, Tasks and Performance Targets

Finally, this report lists tasks that need to be done in order to implement the plan. It identifies a list of new tasks for which responsibility must be established.

These tasks include:

- Establishing a cycle of **regular reviews** to check that the region is developing according to plan.
- Concluding **partnership agreements** amongst authorities to coordinate transport and land use, and establishing a clearing house to help to check that they are not in conflict.
- Coordinating and **leading the introduction of transportation demand management**.
- Establishing **new financial arrangements** with new sources of capital such as outside investors.



Finally, the report proposes a set of numerical targets that permit the measurement of future success. Some key targets are:

Selected targets for the year 2006 under the Medium-range Plan	Current in 1991/2	Target for 2006
Number of people travelling in the morning rush hour, by all forms of transport	390,000	560,000
Number of kilometres driven by all vehicles combined, in the region, per year	11.1 billion	13.4 billion
Percentage of roads badly congested at rush hour	9%	8%
Emissions from motor vehicles (tonnes per year of five atmospheric pollutants)	380,000	107,000
Number of occupants per car in morning rush hour, region-wide average	1.28	1.35
Percentage of population living closer than one km to rapid transit	8%	25%
Percentage of population living closer than 400 metres to bus route	87%	90%
Transit's share of travellers in the morning rush hour, region-wide	13%	17%
Number of people bicycling to work in region, per day	4,000	12,000

The following page presents a schedule summarizing the steps which are recommended to be taken in the period between now and the medium-range plan's 2006 horizon year.

Medium Range Plan Phasing	1995		2000		2005	
1. Advance Growth Management	Advance partnership agreement mechanism to dovetail land use and transportation plans					
	Policy developmen					
2. Apply Transportation Demand Management	Mount public communications program					
	Public communications and education program on transport policy.					
	Introduce incentives (carrot measures)					
	Rideshare, v'pool facilitation, empl. trip red'n programs, telecommuting promotion					
	Introduce disincentives (stick measures)					
	Policy development Parking management, gas taxes, bridge tolls.					
3. Supply New and Enhanced Facilities	Pre-construction activities					
	Feasibility, functional and design studies, property acquisitions.					
	Ongoing minor improvements					
	Continue road rehab work & fixing safety, network continuity and maintenance probs					
	Enhance existing transit system					
	Improve bus service throughout service area. Place SuperBus on major corridors.					
	Low- capital projects					
	Bridgehead priority, excl. bus lanes, access management					
	Local transport initiatives					
	Local arterial road expansion in concert with population growth.					
	Major capital projects on stream					
	New major road (HOV) and transit (ICTS) links on stream.					
4. Monitor and Plan	Demand management tasks					
	TDM leadership: coord. of TDM impler					
	Land use monitoring tasks					
	Land use data collection and monitoring.					
	Land use plan review					
			Review			Review
	Local government growth management					
	Agreements on + maintenance of reg'l land use plan thru individual zoning decisions					
	Transport monitoring tasks					
	Transport data collection and monitoring.					
	Travel survey update					
			Survey			Survey
	Provincial government financing tasks					
	Revenue collection, financing and partnership/joint venture agreements.					
	Review	Review	Review	Review	Review	Review
	Transport planning: Medium-range Plan Review					
	Long-range Plan Review					
			Review			Review

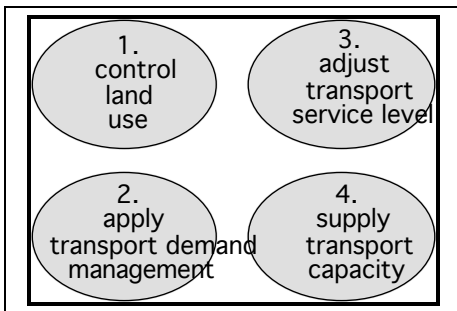
Introduction

Goals, Objectives and Criteria

This Medium-range Transportation Plan has the same goals and objectives for the transportation system as the Long-range Transportation Plan.

These goals and objectives are detailed in the TRANSPORT 2021 Working Paper "Goals, Objectives and Criteria for Developing a Long-range Transportation Plan for Greater Vancouver", published under separate cover. They are arranged under seven headings:

1. **LIVABILITY:** to minimize the impact of transport on the quality of life;
2. **ECONOMIC DEVELOPMENT:** to ensure that transportation systems support and promote desirable regional social and economic development;
3. **LAND DEVELOPMENT INTERACTION:** to ensure that the transportation systems are compatible with and promote regional development plans;
4. **SOCIAL EQUITY:** to ensure the equitable distribution of transportation services and costs;
5. **SYSTEM PERFORMANCE:** to maintain the effectiveness and quality of the transport service provided to the user;
6. **SYSTEM MANAGEMENT AND IMPLEMENTATION:** to ensure the effective management of the regional transport system; and
7. **PUBLIC ACCOUNTABILITY:** to ensure the effective role and participation of the public in the transportation planning process.



*Review: the Long-range Plan's
"Four Levers"*

The Long-range plan showed that current trends lead away from, not towards, these goals. It proposed that four levers available to governments should be used to turn the system away from current trends towards the goals. They are:

1. control land use (e.g. by zoning regulations);
2. apply transport demand management (to change travellers' behaviour);
3. adjust transport service levels (e.g. by letting congestion worsen); and

4. supply transport capacity (e.g. by building more roads and transit).

*The Medium-range Plan's Three
Decision Areas*

The Long-range Plan concluded that these four levers must be used simultaneously, in a coordinated fashion.

Note that the third lever (adjust service level) has a somewhat different character from the others. It is a passive lever compared with the other three. While service level (e.g. the frequency of bus service, or average vehicle speeds on the road) can certainly be manipulated, it can also be regarded as a consequence of how the other three levers are applied, and tends to merge into them. It was included partly to emphasize that the choice of service level can and should be a conscious decision, and that service levels directly feed back to affect the demand for transportation.

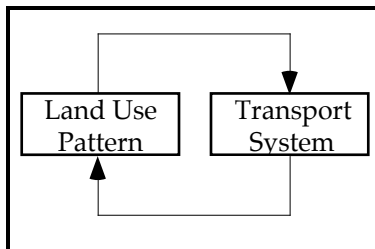
Accordingly, this medium-range plan report focusses on the timing of transportation actions in the three other, more pro-active areas—land use (or, more generally, growth management), transportation demand management and supply of transportation capacity.

Chapters 1, 2 and 3 respectively offer guidance on decisions which affect the timing of actions in each of these three areas.

Chapter 4 explores the question of how future decision makers will know whether the plan is working. It recommends that the future performance of the transportation system be monitored against targets. Numerical targets are presented for future reference.

1. Growth Management: Using Transport Investment to Shape Growth

1.1 Transport's Impact on Land Use



Transportation and land values

The geographical settlement or land-use pattern of people and economic activity is crucial to transport. It is one of the most important **drivers of the demand for travel**—how much travel is desired between any two points.

In turn, transportation investment is believed to influence land-use, by directing growth to areas which become more accessible via the new transport links. Transport shapes land-use by **selectively providing access**—better access to some areas compared with others.

The target land use pattern for the region under the "Livable Region Strategy: Proposals" is detailed in Chapter 4.

Can transport investments be staged in order to affect the pattern of growth of metropolitan Vancouver towards the target pattern—and if so, how?

First, it is helpful to explore just how transport is believed to affect land use patterns.

Based on a simple view of a metropolis as an employment centre surrounded by residential suburbs, one theory⁶ suggests that investments that lower the cost of transportation to the centre will simultaneously reduce the value of land at the centre and increase the value in the suburbs. This is because reduced commuting costs (or time, because time has value) allow commuters to spend more on housing, to travel further, or both.

⁶This discussion on theory draws heavily from a paper by Elizabeth A. Deakin, Department of City and Regional Planning and Department of Civil Engineering, University of California, Berkeley, titled "Jobs, Housing and Transportation: Theory and Evidence on Interaction Between Land Use and Transportation", Transportation Research Board Special Report 231, 1991.

Transportation improvements can lead to sprawl

If transportation is cheap relative to housing and one can buy more house per dollar farther from the centre, households will have an incentive to live farther away from their work places.

All else being equal, by themselves investments in transportation are likely to lower residential density and expand the size of the urban area, leading in extreme cases to "sprawl".

Theory also says that, overall, transportation improvements will simultaneously tend to increase employment at benefitted sites. On the other hand, worsening transportation services (because of physical deterioration, or through congestion) will favour decentralization of jobs but support higher densities of housing.

The interplay of these effects is likely to be more complex in a region such as Greater Vancouver, with several employment centres and residential areas distributed across a limited land base—but the above theory can be expected to remain broadly valid.

Location decisions also depend on housing types, crime rates, schools and other amenities.

However, transportation investment may not be as important as many people think. Surveys of how people choose where they live, work and travel show that **transportation is no more critical to location decisions than other factors** such as housing type, size and cost suitability of the home, crime rates and, for families with children, schools. Moreover, life-style and life-cycle variations have been found to be as important as (in some cases more important than) transportation.

Overall, studies find that while availability and quality of transport are indeed factors in location and development, **transport investments will do relatively little in the absence of other critical factors.**

Land development effects of highways . . .

Research literature suggests that **highway** investments can at least shift, if not increase, growth within the region. Where there are weak markets for development (unlike the Greater Vancouver region), some studies have failed to find an impact of any sort; whereas others find that highways can release pent-up development demand where real estate markets are strong.

For instance, it has been suggested that the opening of the Alex Fraser Bridge facilitated development south of the Fraser River.

However, the magnitude of the effect remains unclear and controversy exists over when and to what degree a highway improvement will induce trips, shift modes and alter destination choices.

. . . and of transit

Many look to **transit** to help restructure development into more compact, efficient patterns. For instance, it has been suggested that the construction of the SkyTrain rapid transit link helped to support the development of Metrotown, Edmonds, New Westminster and Surrey City Centre.

However, results of studies from a variety of cities are mixed. Localized benefits can be found, but overall the results for transit are similar to those on highways. Transit availability and quality affect land use, but so do many other factors. Unless these factors are supportive, transit investment will not make a significant difference to development.

Land development impact of tolls and higher user charges for transport

Increasing the **amount that people pay** directly for transportation is one of the principles behind the TRANSPORT 2021 long-range plan—through bridge tolls, higher parking charges and fuel taxes. Since these charges increase the "friction" associated with travel, they tend to increase residential density and decrease the size of the urban area, relative to what it would otherwise have been—other things being equal.

Impacts of development cost charges

Another form of pricing connected with transportation is the **development cost charge** or impact fee. This is levied by local government on a land developer, when land is developed. Revenues from this source may be dedicated to improve transportation or other infrastructure. Yet studies suggest that impact fees are often a fraction of what would be needed to offset traffic growth. Furthermore, their imposition may increase housing costs and direct development to fringe/rural areas where growth is relatively unregulated.

Summary of conclusions

In summary, the primary conclusions to be drawn from theory and literature are:

- transport investments which make long haul commuting easier will tend to encourage sprawl; therefore, to support the shaping of the desired land use, investments which encourage inner suburbs to develop should take priority;
- transport investments aimed at shaping land use should be made cautiously and only when other supportive factors are in place; and
- while the general direction of the impact of transportation investments on land use is understood, the size of the impact is uncertain; in general, the effect is expected to be more noticeable where the land development market is strong (as it is in Greater Vancouver) and also where the level of accessibility receives a large increase in relative terms (i.e. where there are relatively poor links currently, and a major improvement is made).

As long as these conclusions are borne in mind, and in light of the significant shift in land use sought under the "Livable Region

Strategy: Proposals", the **TRANSPORT 2021 Steering Committee believes that transport investments should be made to help to shape land use within the medium-range plan horizon.**

1.2 Interplay of Intergovernmental Relations and Transportation Investment Decisions

Regulation through zoning

Nevertheless, given the goal of achieving the target land use pattern in the "Livable Region Strategy: Proposals", government regulations such as Official Community Plans and **zoning controls** are clearly primary methods.

Though transportation is a shared responsibility between federal, provincial and local governments, land use—and its direct control through zoning—is predominantly a local government function.

In Greater Vancouver there are 18 municipalities and in the metropolitan Vancouver region as a whole some 70 cities, villages, district municipalities and Indian Band Councils) with powers over land use. In such a region, intergovernmental relations have a profound effect on whether land use and transportation can be properly coordinated and whether competition and conflict can be avoided.

Uncertainty for investor in a corridor

From the viewpoint of transportation decisions, the current intergovernmental framework creates uncertainty about future land use patterns and militates against coordination with transport investment.

In any given corridor, a transport investor (e.g. Provincial government) or operator (e.g. BC Transit or the Ministry of Transportation and Highways) faces normal market uncertainty—i.e. how the many private sector firms and individuals, operating within the real estate market, will choose among competing locations. Over time, the total of all these private sector decisions will affect the efficiency and adequacy of the transportation facilities.

However, the real estate market operates within the confines of the zoning and other land use regulations of local government. In metropolitan Vancouver, the long-range land use pattern currently rests on a patchwork of many independent local government zoning decisions which can change without relation to each other.

1.3 Livable Region Strategy and Partnership Agreements

Efforts are underway within the Greater Vancouver Regional District which would reduce this uncertainty by coordinating land use plans. These efforts are germane to transportation decisions—and to whether transportation can be used to reinforce the target land use plan.

On July 30, 1993, the GVRD Board approved in principle "A Resolution to Establish Procedures for the Preparation and Adoption of a Regional Strategic Plan for the Greater Vancouver Regional District".

The text of the resolution is reproduced in Appendix 3 of this report. It outlines the contents of a Regional Strategic Plan and procedures for its preparation and adoption by consensus. Adoption of the plan does not commit any of the bodies involved to proceed

with any action or project referred to in the Plan, nor does it reduce the powers of member municipalities.

To implement the plan, the resolution states that the Regional Board will make such partnership agreements with municipalities or others it considers necessary or desirable.

At time of writing, the resolution has been sent to member municipalities of the GVRD for their review together with the "Livable Region Strategy: Proposals". How quickly this development will lead to a functioning mechanism for coordinating municipal land use plans is not yet clear, but the concept of partnership agreements presents an opportunity to link transportation policies to land use policies.

Possible approaches in partnership agreements

There are numerous ways in which partnership agreements could be crafted to help coordinate land use and transportation.

For example, various "creative" zoning practices could be included in partnership agreements to reduce uncertainties for transportation and other infrastructure items. Among those agreed in other jurisdictions are the following approaches:

- agreed consistency between local land use plans and local and regional transportation plans, as well as other infrastructure plans;
- requirements for the provision of adequate public facilities concurrent with development, or attainment of minimum level-of-service standards;
- agreed balancing of job growth and housing development, priced and located to meet the needs of the work force;
- minimum as well as maximum development densities and floor-area ratios to ensure adequate development for transit to work;
- incentives and bonuses for desired land uses and for developments that provide desired transportation and land use amenities; and
- site design emphasizing pedestrian access and transit serviceability.

Transport facilities in return for density

As the GVRD's "Livable Regional Strategy: Proposals" and the long-range transportation plan evolved, and in public and private meetings with elected and staff officials of municipalities, the issue of linking regional transport investments to local agreement to land use changes was raised. It was argued that the consent of local residents (e.g. for higher zoned densities) could be more easily achieved if transport benefits (e.g. a transit line) were offered in return.

To speculate on the results of such negotiations, should they take place, goes beyond the scope of this report. However, the Steering

*Negotiating transportation
and land use partnerships*

Committee notes that there is an opportunity to incorporate their outcome into the partnership agreement mechanism contained in the GVRD resolution.

Such agreements could come about in a number of ways. For instance, governments could designate a body to negotiate on major corridor improvements with municipalities. The body could be an existing provincial or local government entity, or a new grouping established for this purpose.

The body should be able to make commitments to cause major facilities to be built—and therefore should be in a position to make financial commitments, on a "best efforts" basis, conditional on environmental and other reviews being successfully completed.

The body could be directed to negotiate and authorized to conclude partnership agreements with municipalities (and commercial agreements with major land owners and real estate developers where possible and appropriate) on capital projects which are consistent with a finalized Livable Region Strategy and long-range transportation plan.

Municipalities, in turn, could position themselves to make contractual commitments to control land use as it affects the transportation system. This too would have to be on a "best efforts" basis, recognizing that they may be required to obtain the consent of their citizens to the terms of the agreements through public review processes for Official Community Plan or zoning amendments.

For major candidate transport corridors, the body could approach all municipalities which are located along or near the alignment of the corridors.

An agreement could tie changes in land use plans in a municipality to the municipality's support or accommodation of toll charges in the corridor, parking management measures, changes to municipal roads and regulations to support the regional high-occupancy vehicle network, and other conditions required for the effective functioning of the corridor.

The body could conduct negotiations on several corridors simultaneously. It would be mandated to proceed with developing those corridors which best satisfy agreed-upon evaluation criteria.

In summary:

- the staging of transport investments is linked with the changes in the intergovernmental framework, through reduction in uncertainty that results from coordinating land use plans.
- the proposed mechanism of partnership agreements provides a starting point for transportation and land use decisions to be coordinated.

1.4 Summary of Recommended Approach

Based on the above considerations, the Steering Committee recommends the following guidance for governments regarding the use of transport investment to shape the pattern of growth:

- where governments make transport investments aimed at helping to shape land use, they should be aware that the **strength of the shaping effect is not well understood**;
- despite this uncertainty, transport investments should be made **within the medium-range horizon with the goal of shaping land use**;
- the land-use shaping effects of transportation improvements mean that **governments should give priority to those investments which improve the accessibility of the inner suburbs** to and from each other, as opposed to making early improvements in accessibility for longer-distance commuting;
- governments should not make transport investments ahead of municipal land use plans and other supporting initiatives, but should **dovetail transport investment and land use plans**;
- governments should **hold in reserve major capital investment decisions** which require dovetailing with land use plans until it becomes clear that the appropriate land use policies are very likely to be put in place; and
- the mechanism of **partnership agreements**, identified in the GVRD Board resolution of July 30, 1993 offers an avenue for coordinating land use plans and transportation investments. This opportunity should be further explored and advanced.

2. Transportation Demand Management: Changing Behaviour

Long range (2021) TDM Package

The long-range plan proposes a package of seven mutually supportive transportation demand management (TDM) measures to be in place by 2021. Items in the package would:

Incentives or "Carrots"

1. promote telecommuting;
2. encourage medium-sized and large employers to help cut vehicle trips to their worksites;
3. install high occupancy vehicle lanes (note that this particular measure would require significant work and is not a low-capital measure—it is described in more detail in chapter 3);
4. give bus traffic priority on the street;
5. increase and broaden parking charges (50% increase of average all-day parking charges in the downtown core, and increases in all-day parking at other major town centres to equal 3/4 of today's downtown levels by 2021);
6. raise fuel prices, through higher fuel taxes (50% increase in the real price of gasoline by 2021); plus
7. introduce bridge tolls (\$2 peak hour toll on all bridges leading onto the Burrard Peninsula—roughly equivalent to a 2-zone transit fare today).

Disincentives or "Sticks"

Impact of TDM

The long-range plan analysis showed that TDM can have the following impact on the transportation system. It could:

- postpone the need for capital investment and reshape travel demand to boost transit and carpool use;
- decrease rush hour vehicle trips by 10% and increase transit ridership some 25% compared with current trends for the year 2021, other things being equal; and
- raise \$1 billion per year (in 1992 dollars) in user charges by 2021 which would service debt raised to pay for infrastructure improvements.

2.1 Medium-range Demand Management Package

The introduction of TDM into the region will be staged, with each stage being dependent on the experience gained in the previous stages. In this sense, the introduction of TDM will be iterative—by checking the response of the system to see if the desired changes are taking place.⁷

However, in order to develop targets for the future performance of the transport system, the project had to make some assumptions about the status of TDM in the region in 2006. These assumptions are not intended to be a prescriptions for those who will implement TDM, but rather indications of the type of measures which current work suggests will be required to effect behaviour change. Other measures with similar results could be implemented.

In this context, for the year 2006, a modified version of the long-range (2021) TDM package is assumed to be less significant than the package for 2021,⁸ as follows:

- Items 1 through 4 above (all incentive measures): in 2006, these are assumed be in place as for the 2021 package.
- Item 5 (parking): a full parking strategy for the region is unlikely to be in place in 2006, due to its complexity. The effect of the proposed 2021 measures would therefore not be felt by 2006, with the actual effect being equivalent to about 70% of the parking charges used to project the impact of parking management in the long-range plan.
- Item 6 (fuel prices): by 2006 fuel prices will not likely reach the 2021 level. They are assumed to be half way there.
- Item 7 (tolls): same as 2021, i.e. by 2006 bridge tolls would be fully in place as for the long-range plan. The assumption is that authorities will recognize the need for an aggressive tolling program.

2.2 Public Acceptance of Demand Management

Opinion research

In a democratic society, public attitudes are a vital consideration to policy decision makers. **Public attitudes** are the primary consideration in the recommendations of this report on staging the introduction of items in the TDM package.

In 1992 and 1993 there was a widespread interchange of ideas about transportation tolls and taxes through the media and public meetings in metropolitan Vancouver. Demand management issues,

⁷Recently, BC Ferries began experimenting with differential pricing of ferry travel (by day of the week and time of day) in an early example of demand management.

⁸The logical support for a less significant TDM package for the medium-range plan is explained in Chapter 3.

though not always named as such, became a matter of general public interest.⁹

In 1993 the TRANSPORT 2021 project convened two focus groups of randomly selected citizens to discuss issues of growth management and transportation. It also commissioned a public opinion survey (1200-person telephone sample) on the acceptability of TDM measures. This work offered a number of insights, as follows.

Awareness of growing traffic problems

The rapid growth of the region is recognized by most residents. The desirability of reducing dependence on the private automobile—on broad environmental and social grounds—is not generally disputed.

Some fear that, in the absence of better alternative modes of transport, restrictions on automobile use will cause economic damage and loss of opportunities.

Public view of transit vs. road improvement

When asked for solutions to traffic problems, the citizen's most common initial response was to call for more attractive and convenient public transit service.¹⁰ Some clearly favoured this approach because they believe their own driving will be easier once the road is cleared by others taking transit.

Road building was generally disfavoured: when asked whether building more roads in Greater Vancouver was a good way to solve traffic congestion, only 32% of respondents agreed, while 62% disagreed.

Acceptability of incentives

The incentive TDM measures—telecommuting promotion, HOV and bus priorities, employer-based trip reduction programmes (non-mandatory)—receive public favour and are not contentious, even when it is made clear, for instance, that giving buses and carpools priority may mean longer delays for other traffic.

Acceptability of disincentives

The public is reluctantly willing to accept some restrictions on the use of the automobile—especially on single-occupant vehicles operated during peak travel periods. Asked if "the region should implement some strong measures right now to discourage people from driving alone to work", 75% of respondents agreed while 22% disagreed.

The disincentives—parking controls, tolls and gas taxes—while not popular, varied in degree of unacceptability.

⁹At various stages, the public debate was stimulated by: statements by the Provincial Minister of Transportation and Highways of his interest in using bridge tolls to finance construction; by the consultation process for the GVRD Air Quality Management Plan; and by the release of the results of the 1992 Travel Survey and of the TRANSPORT 2021 long range plan, and the joint Livable Region Strategy Plan/TRANSPORT 2021 public communications program.

¹⁰note that this solution is classed as a supply measure as opposed to a demand management measure and is addressed in Chapter 3.

Parking controls were rated unacceptable by 60% of those who use a car to get to work, but by only 40% of those who use transit.

All toll options were unacceptable for the majority of respondents. Peak hour tolls were more acceptable than 24 hour tolls. Almost a third would accept a \$1 bridge toll, either during peak (34%) or at all times (32%).

Significance of dedicating proceeds to transport improvement

While gas tax options were not popular among a majority of respondents, they became more acceptable when it was stated that taxes collected would be used to maintain and improve the transportation system.

For instance, asked about a three-year gradual increase to add 25¢ per litre to gas prices, 64% rated the option unacceptable, 21% were neutral and 14% rated it acceptable. With dedication of the revenue to transportation, these figures changed to 45%, 22%, and 33% respectively.

There is a preference for people to pay tolls not gas taxes, which may rest on the assumption that tolls are to be dedicated to improvements.

Caution

Assessing public acceptability is a complex task. Note that this survey did not put TDM disincentives in full context of the long-range transportation plan. Public attitudes to disincentives are likely to be different (i.e. more positive) when not treated in isolation and when the public is given information about the type of scheme proposed and what other measures are introduced simultaneously.

2.3 Link Between Funding and Demand Management

At the November, 1992 public conference jointly sponsored by TRANSPORT 2021 the B.C. Minister of Highways stated that, given the current financial circumstances of governments, "it is clear that traditional transport funding will not be enough to build and operate the urban transportation systems needed in the future." He went on to say that "funding for transportation improvements should be derived primarily from transportation users."

It is unlikely that large capital projects will proceed until new sources of capital are available. Sources include private capital which could be raised by dedicating revenues from tolls, gas taxes and other user charges. The Transportation Financing Authority, established by the Government of B.C. in 1993, is intended to operate on these principles.

Therefore, the timing of the introduction of the TDM "stick" measures is linked to the timing of large capital projects.

2.4 Staging Approach for Demand Management

Early, not late

Early decisions to introduce and sustain a package of measures are needed because of early potential benefits:

- the sooner action is taken, the sooner the desired changes to travel patterns can be realized; and

*Education and communications
program first*

- funds are short today, and TDM generates a revenue stream helpful in funding infrastructure improvements which are also needed.

First, a communication/promotion programme should be mounted, addressed to the inhabitants of the region. This would not be a consultation program. Instead it would keep reminding the public why governments are taking these steps and exhort them to take alternatives. The "GO Green" cooperative of agencies has already been active in this area with an awareness programme.

In an expanded phase, the program would help to prepare the driving public for a TDM package which will inevitably have unpopular elements. It would prepare drivers to practise some self-denial. It would call for social responsibility in transportation habits. The communications program could have the following core messages:

*Core messages for TDM
communication plan*

- The region is growing fast. More people are coming. If we are going to have growth and preserve livability, we will have to change travel habits.
- There are serious consequences if we do not change our habits, including an even more automobile-oriented society, consumption of land and other environmental damage.
- There are hidden costs to the automobile that we should start to pay for. Higher cost of driving is coming.
- Everyone should start thinking about modifying lifestyle, even where you live/work. Travelling long distances will not be as easy in the future as in the past.
- However, more job opportunities and amenities will be closer to home. Transit is going to get better.
- The "Creating Our Future" program is moving forward; local and provincial governments are working together.
- Citizens have said they want to preserve the livability of the region. Livability will improve if we follow this path.¹¹

Incentives (carrots)

Incentive measures should be implemented immediately to start behaviour change early and to prepare the ground so that disincentives are more acceptable when they are introduced later.

Such incentive measures are:

- Promotion of telecommuting (e.g. by allowing a tax credit to employers for partial or total substitution of computers or

¹¹Air quality may continue to be a focal point for public concern for a few more years. However, it may become a less compelling argument as the region's vehicle fleet gets cleaner and air quality gets better. Other concerns will become increasingly powerful as the region becomes more populous, e.g. anti-sprawl measures for conserving land, agriculture, green space, and the notion of steering away from "L.A. North".

telecommunication technologies for the commute to work by employees residing in the region; or implementation by a large government entity of telecommuting on a large scale).

- Vanpooling promotion, which is already underway in Greater Vancouver by the Jack Bell Foundation. The Foundation has made it clear that its role is coming to an end and that responsibility for the programme is ready to be assumed by some other agency.
- Region-wide rideshare computerized match-up programme. This would allow those who wish to car or van-pool an easy method of reaching potential rideshare partners.
- Promotion of employer trip reduction. Training of Employee Transportation Administrators has been offered for two years by BC Transit. Additional promotion and support may be required to maintain the programme.
- Measures to "cash out" parking subsidies, whereby employees, when offered subsidized parking by their employers, should have the option of taking cash or a transit pass to avoid the pro-auto modal bias of the employer's parking subsidy. This measure is a carrot from the employee's viewpoint but a stick from the employer's viewpoint.
- Move towards more "Pay as You Drive" vehicle insurance where premiums are more directly related to vehicle usage. This is a product development matter for ICBC; it appears as a carrot to drivers by allowing them to adjust their premium expenses by adjusting travel habits.

Later, disincentives (sticks)

Disincentives should be started when significantly better alternatives to solo driving are actually available (SuperBus, carpool options) and/or infrastructure improvements for drivers are clearly committed though not necessarily in place and functioning.¹²

Parking strategy

Parking management would be introduced concurrent with improved transit access (e.g. in Vancouver downtown, Richmond, Coquitlam, Surrey City Centre). A regional parking strategy should be formulated as the basis for this approach.

Gas prices

Gasoline tax would be increased steadily with the overall goal of a 50% increase in the real price of gasoline over 30 years. Since gas taxes are a "blunt" TDM instrument which do not discriminate as to time and location of driving, they are primarily a revenue-generating measure. The rate can be adjusted depending on:

- the revenue requirements for financing infrastructure improvements. Increments in the gas tax would be dedicated

¹²This is the approach taken with the Airport Improvement Fee at Vancouver International Airport, a user fee designed to help finance airport expansion.

to the financing of the transportation system. The gas tax would make up the difference between what is required and what is available through toll/parking tax financing; and

- the degree of concern about the comparison of gas prices in Washington State compared with those in the Lower Mainland. Loss of local trade—due to residents crossing the border to buy gas—is a strong public perception; however many factors influence cross-border activity and the link with gas prices has not been substantiated.

Bridge tolls

The introduction of **road bridge tolls** is a complex issue. It would be operationally difficult to introduce tolls simultaneously at all water crossings. Yet not doing so raises the issues of (1) equity among groups, some of whom will be paying tolls while others will not and (2) diversions of traffic to toll-free bridges.

It could also be argued that there should be some regulatory control on the level of bridge tolls, as there is upon the level of telephone rates, electricity prices and natural gas prices.

A comprehensive tolling policy and strategy is needed and should be developed.

Sector package approach

One option, which partially addresses the concerns about equity and diversion of traffic, is to introduce tolls one sector at a time or corridor by corridor. Public objections could be moderated by demonstrating actual improvements (on any mode—not just road—but including transit) for that sector or corridor, and by providing lower tolls at off-peak times, HOV exemptions where possible, etc. Examples are shown in the table opposite.

2.5 Next Tasks to Implement Demand Management

There is a both a regional and provincial interest in TDM. The Province has suggested a single committee to coordinate the interests of various provincial government ministries on this topic and to provide an interface with regional programmes.

The GVRD has been preparing to play an integral role in the development and implementation of future TDM policies and programs within Greater Vancouver and is presently working on the design of a system for delivering TDM services to employers and individual commuters in the Lower Mainland.

Tasks to lead and coordinate the introduction of TDM are identified in Chapter 4.

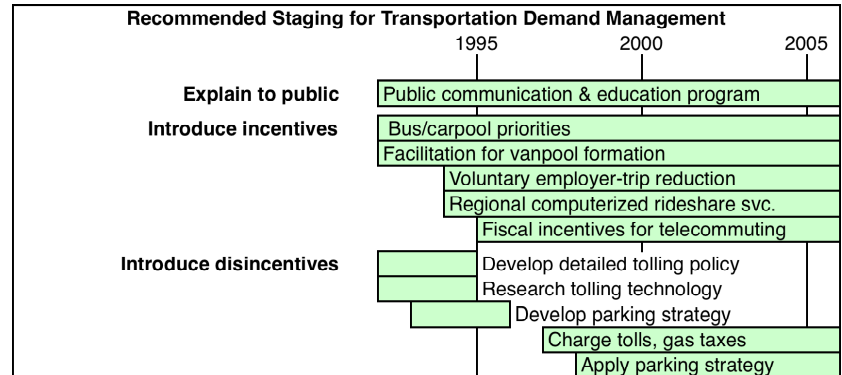
Introducing Demand Management by Sectors: Examples	
Sector/Corridor	Package
North Shore/Burrard Inlet	Tolls could be introduced on First and Second Narrows simultaneously when rehabilitation of the Lions Gate bridge is undertaken and improved bus service and/or carpool priorities are available across both bridges. Second Narrows recently received a major improvement in Cassiar Connector, for traffic headed into Burnaby. Second Narrows travellers headed into Vancouver benefit from First Narrows improvement.
Richmond/North Arm of Fraser	Tolls (Knight, Oak, and Arthur Laing) could be introduced when commitment to build Vancouver/Richmond ICTS is made and/or Oak Street Bridge is rehabilitated/seismic retrofitted.
North Surrey and North Delta/Alex Fraser-Queensborough	Tolls on Alex Fraser could be introduced concurrent with improvements at north end and Stormont/McBride.
Pattullo	Tolls on Pattullo could be introduced when SkyTrain links with Surrey City Centre, and/or Port Mann is twinned.
Port Mann	Tolls could be introduced with ground breaking to twin the bridge and provision of exclusive HOV lane through to Langley border and/or HOV priority on the TransCanada through Burnaby and/or Lougheed through to the North East Sector.

Several incentive TDM measures (vanpooling promotion, regional rideshare, and employer trip reduction programmes) could be undertaken by government¹³ directly or could be tendered out to service providers under contract with performance requirements.

¹³ They could be financed initially from internal government budgets. Later, tax room could become available from current transportation revenue sources (motor vehicle licensing fees, etc, as capital costs are removed and assumed by the Transportation Financing Authority). The logic for drawing on these sources is that capital investments are being postponed by TDM, and it is reasonable to draw on a portion of the savings from sources which would otherwise have had to provide capital budgets.

Legal changes to require employers to allow employees to "cash out" parking subsidies should be investigated; responsibility for action (federal, provincial or local) would follow.

A staging approach is summarized in the following diagram.



Summary conclusions on demand management

- A program of public **education and incentive measures should precede the introduction of disincentives** such as bridge tolls, gas taxes and parking management. Incentives that should be introduced early are:
 - promotion of telecommuting, van pooling, a computerized match-up program for carpoolers, and programs to support employers in reducing vehicle trips to their worksites;
 - bus priorities on the street network and high-occupancy vehicle privileges;
 - measures to give workers with free/subsidized parking the opportunity of receiving this employment benefit in cash or as a transit pass; and moves towards "pay as you drive" vehicle insurance allowing those who drive less to realize savings in their premiums.
- Tolls and taxes, which are revenue-generating measures, should be clearly **dedicated to transportation improvements** to improve the acceptability of the measures to the public.
- A **sector-by-sector package** approach, linking road, bridge, and transit improvements in a single corridor will further assist public acceptance and behaviour change.

3. Supply of Facilities: Improving the Transportation Network

3.1 How the System Concept for 2006 was Derived

This chapter explains how the project approached the questions of how much, where and what type of new transport capacity should be supplied by the year 2006. It provides a description of the proposed 2006 system concept.

The chapter also offers guidance on the staging of the improvements between now and 2006; it addresses how the sequencing of the improvements can best be arranged to meet the overall goals and objectives of the transport system.

Four Steps

The project team approached the problem of deducing the preferred system concept for 2006 in four steps.

Step 1. The team took the transportation infrastructure network (or "recommended system concept") from the long-range plan (year 2021) and applied to it the land use pattern for the year 2006. This land use pattern was supplied as the 2006 target by the GVRD Strategic Planning Department.

Some elements of demand management were assumed to be in place by 2006, boosting transit ridership and reducing in the number of vehicles to be accommodated on the roads.

Because there will be fewer people and jobs in the region in 2006 compared with 2021, the team expected to find that some of the transport links from the 2021 network would be underutilized. This was indeed the case. By inspecting utilization link-by-link, the team was able to remove the least utilized links from the 2021 network in order to create the 2006 network.

For example, the long-range plan's extensions of intermediate capacity transit east and south from the end of the current SkyTrain line (within Surrey) were removed as candidate for the 2006 network as a result.

Option approach

Step 2. Using the remaining elements of the 2021 network, the team constructed two initial options for the year 2006 network. The number of options was limited to two—judged to represent

reasonable extremes. They amounted to different mixtures of the modes of transport:

- Option 1 relied on **road investment**, using carpool lanes and mixed-traffic road capacity, plus enough transit to handle projected demand. The major transit (ICTS) corridors were given service equivalent to fast bus, but not a level as high as could be provided by a rail-based system. It was thought that this would minimize capital costs and capital investment, and serve demand adequately.
- Option 2 saw less road development, but put **transit service** on major corridors up to rail-based equivalents—a relatively aggressive transit investment strategy. The idea was to provide a higher level of transit service along major corridors. It was thought that this would be more expensive, but with the benefit of a greater shaping effect to assist in reaching the land use targets—since higher-service transit would be in place earlier than in Option 1.

The options had common elements. They both assumed that:

- the existing transportation infrastructure would be maintained and rehabilitated as necessary;
- the land-use plan would be as given in the 2006 target in the "Livable Region Strategy: Proposals";
- transportation demand management would be applied as described in Chapter 2; and
- the system is to continue to accommodate international, interprovincial, and inter-regional passenger traffic and goods movement (not changed by demand management).

Step 3. The team **measured** the performance of the options along a list of "measures of effectiveness" or criteria. These criteria came from the project's formal goals and objectives for the transport system.¹⁴ For instance, travel speeds and congestion, time lost for goods movement, the degree of automobile dependence, atmospheric emissions, amount of farmland consumed, and other factors were estimated for each option.

The team gained insights into the trade-offs involved by comparing one option to another.

Step 4. Based on these insights and on guidance of the Steering Committee, the team **constructed a preferred option 3**, which aimed to combine the best features of the initial options. This was refined with further work and became the proposed 2006 system concept illustrated in the accompanying maps.

¹⁴Summarized in the Introduction to this report.

3.2 Transit System in 2006

This list shows transit system improvements recommended to be in place by 2006, not in order of priority.

Item numbers are keyed to the map.

A. Provide basic transit improvements

1.	Add SeaBus capacity across Burrard Inlet
2.	Increase the existing SkyTrain capacity
3.	Increase main-line and feeder bus coverage and service hours

B. Apply bus priority treatment across:

4.	Burrard Inlet at or in the vicinity of First Narrows Bridge
5.	Burrard Inlet at or in the vicinity of Second Narrows Bridge
6.	the Pitt River in the vicinity of the Pitt River Bridge - Fraser North to Coquitlam Town Centre
7.	the South Arm of the Fraser in the vicinity of the Highway 99 corridor- Ladner to Richmond

C. Provide bus lanes across the:

8.	Middle Arm of the Fraser River - Vancouver International Airport to Richmond ICTS (see 14 below)
----	--

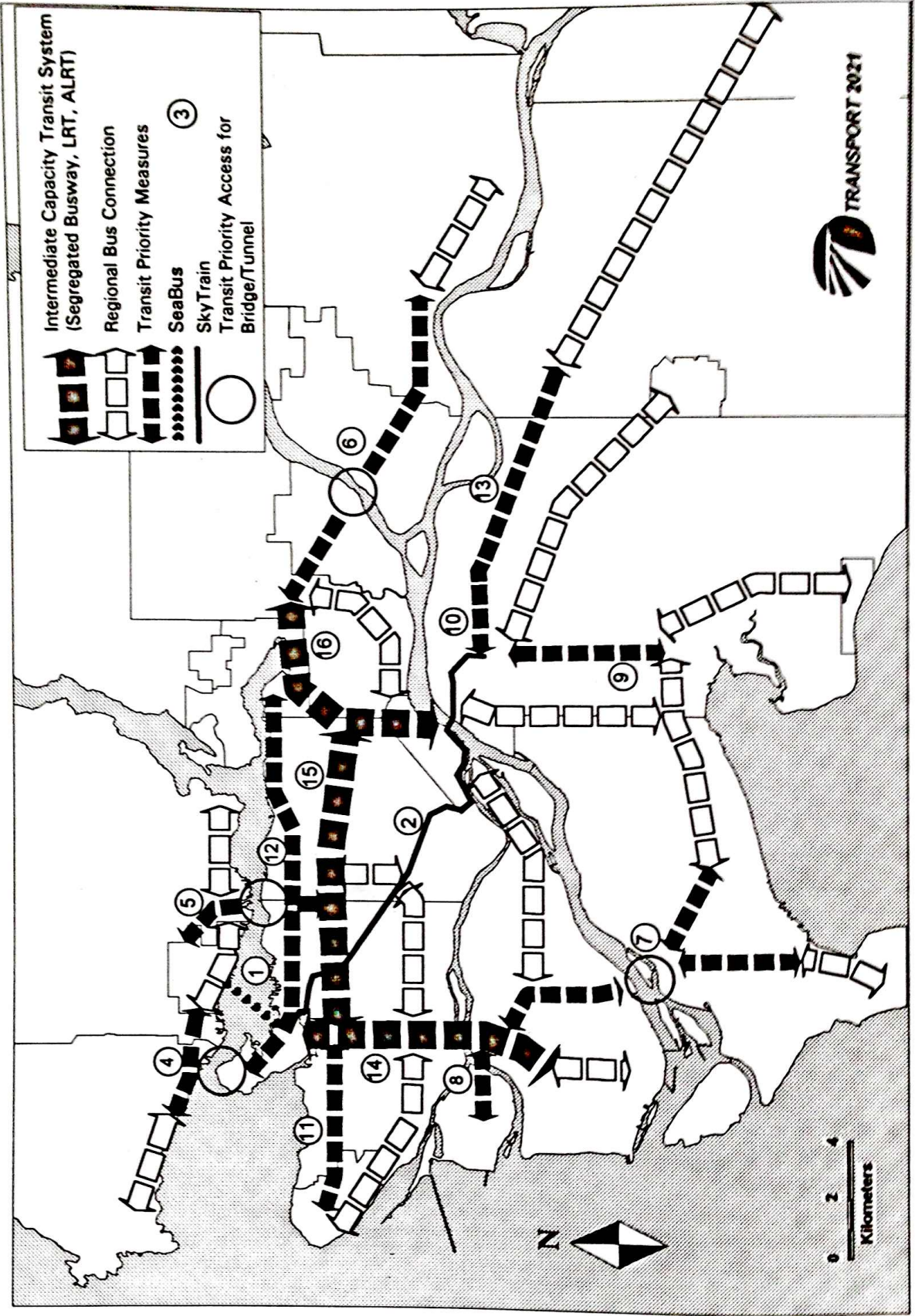
D. Provide transit priority measures:

9.	from Surrey City Centre south to Newton and Surrey Municipal Hall
10.	from Surrey City Centre east to Guildford Municipal Centre
11.	along Broadway Corridor - UBC to the Vancouver-Richmond Rapid Transit
12.	along Hastings corridor - North Burnaby to Vancouver Central Business District
13.	along Trans Canada Highway corridor - 200 Street to Guildford Municipal Centre

E. Provide Intermediate Capacity Transit System (ICTS) from:

14.	Richmond to Vancouver Central Business District
15.	Lougheed Municipal Centre to the Vancouver Broadway business district
16.	Existing SkyTrain Line to Coquitlam Town Centre

Medium-Range Transportation System Concept - Transit



Transit System Concept and Staging Strategy

Population and employment growth, as targetted in the GVRD "Livable Region Strategy: Proposals", together with transportation demand management, will result in a dramatic increase in travel by public transit in metropolitan Vancouver.

Area-wide transit expansion

To handle this demand will require an expansion in transit service, in terms of hours of operation, frequency and geographical coverage. The transit system will have to be re-oriented to provide appropriate services to regional town centres and medium-density communities as well as downtown Vancouver.

Three trunk transit corridors

Under the proposed growth management strategy, three "trunk" transit corridors would each attract a level of ridership high enough to warrant some form of Intermediate Capacity Transit System (ICTS)—having peak hour capacity of about 10,000 passengers—by the year 2006. These corridors, from west to east, are:

- Vancouver-Richmond;
- Lougheed-Broadway; and
- Coquitlam-New Westminster.

ICTS systems are needed in these corridors because of:

- **operational imperatives:** without ICTS, additional new road or bridge capacities would be required to accommodate the 2006 transit demand;
- **cost effectiveness:** at these levels of transit demand, it would be more cost-effective to handle the passenger traffic by ICTS than by conventional bus; and
- **level of service:** ICTS would provide a better level of service, in support of TDM measures. It would attract midday and off-peak ridership especially in urban areas with activity centres.

The medium-range transit plan could be staged as follows:

Five steps

Step A: provide cost-effective bus priority measures, extend and enhance service coverage, and provide a family of cost-effective transit services for various time periods of the day. The challenge in Step A will be to design and fund a service plan which will match the increasing demands expected on the system. This will require additional financial resources (since the fare box will not cover all operating expenses).

Step B: in corridors with high transit demand, provide fast, frequent, comfortable, limited stop bus service (up to 5,000 passengers per hour), using bus priority measures and HOV lanes as available. This service is termed "**SuperBus**" for the purpose of this report, is recommended in four corridors (see below).

Comparative performance of trunk transit corridors

- Step C: upgrade to ICTS in first trunk corridor (see below)
 Step D: upgrade to ICTS in second trunk corridor
 Step E: upgrade to ICTS in third trunk corridor.

The following table summarizes the characteristics of the three trunk transit corridors.

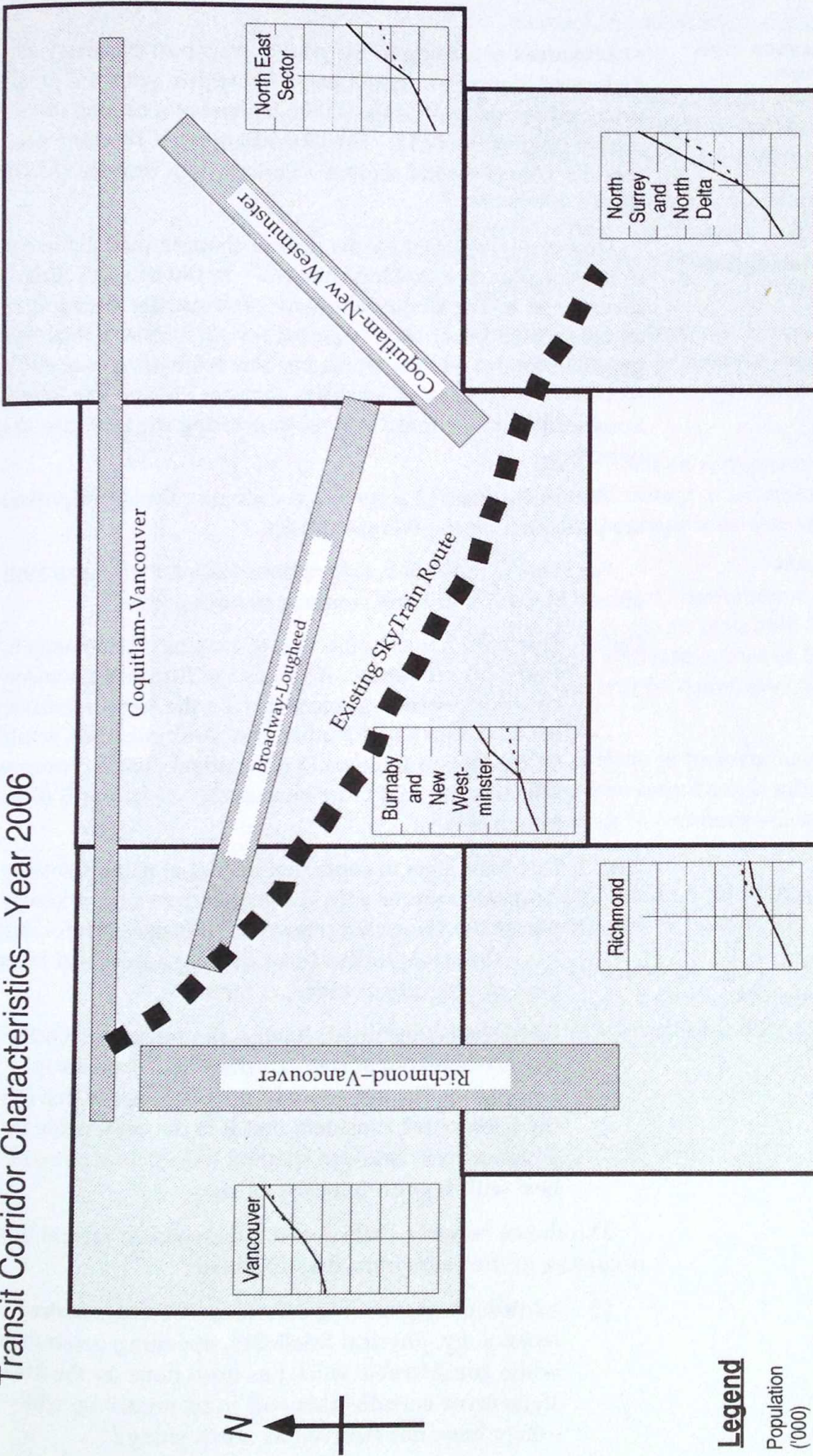
A fourth corridor, Coquitlam-Vancouver, is also shown. Though not an ICTS corridor, it warrants SuperBus service and/or a commuter rail service presently under consideration by the Province.¹⁵

Transit Corridor Performance (during morning peak hour)	Projections for year 2006 are based on:			
	<ul style="list-style-type: none"> • Livable region strategy land use targets for population and employment being achieved by 2006 along each corridor • The recommended medium-range transportation demand management package in place as described in Chapter 2 of this report • The given corridor being the only one in place at the time (other combinations, not shown, were also tested) 			
	Three Trunk Corridors			Coquitlam Vancouver SuperBus
	Richmond Vancouver ICTS	Broadway Lougheed ICTS	Coquitlam New West ICTS	
Ridership at maximum load point/hr ('000)	7.2	5.3	4.1	4.3
Total boardings/hr ('000 psgrs)	15	11	9.2	6.1
Total Psgr-km/hr ('000)	119	85	71	103
Route length	15 km	18.5 km	13.5 km	34 km
Intensity of use ('000 psgr km/route km, per peak hour)	8.0	4.6	5.2	3.0
Land use: difference between trend and target corridor populations	Low	High	High	High

The schematic map on the next page illustrates the relative intensity of usage and also shows the population growth, both trend and target under the "Livable Region Strategy: Proposals", for the areas served by the corridors .

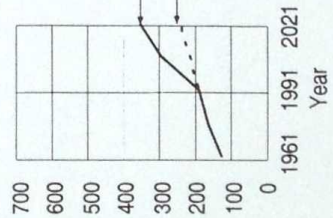
¹⁵See Appendix 2 for a further discussion of commuter rail.

Transit Corridor Characteristics—Year 2006



Legend

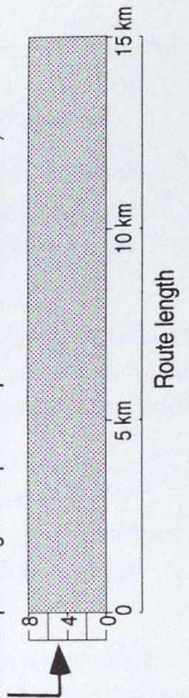
Population ('000)



proposed target populations for the entire municipalities named (not just corridor catchment areas) under GVRD Livable Region Strategy

trend projected under current development policies

Projected corridor intensity of usage in year 2006, on a "one at a time" basis, i.e. assuming the measured corridor is the only one in place at 2006, and also assuming target populations and associated employment (not shown) are achieved, as measured by ridership density (peak hour passenger-km. per hour per route km. in thousands)



Richmond-Vancouver ranks highest on transport efficiency grounds

Measured according to the goal of transport efficiency alone, the Richmond-Vancouver trunk transit corridor, with the greatest projected intensity of usage, ranks highest as a candidate for a capital upgrade to ICTS. The Coquitlam-New Westminster corridor comes second on this criterion, with Broadway-Lougheed third.

Coquitlam-New Westminster ranks highest on land-use shaping potential

However, measured by the goal of shaping the land use pattern in the corridor, the ranking changes. In the project's judgment, investment in the Coquitlam-New Westminster corridor, serving an area which is not only targeted for significantly above-trend growth, but also an area which has low relative accessibility today, would have the greatest land-use shaping impact. The Broadway-Lougheed corridor ranks second in meeting the land-use shaping objective.

The recommended priorities for staging transit improvements are presented on the following page.

Two possible paths

For Steps C through E, two options (called Path 1 and Path 2) are given. Steps A and B are common to both paths.

Path 1: This path has the objective of making investments for transport efficiency. It places the Richmond-Vancouver corridor, which is projected to be the most intensively used, at Step C. The other two trunk corridors would also be developed in Steps D (Coquitlam-New Westminster which is the next most intensively used), and E (Broadway-Lougheed).

Path 2: This path aims to combine the goal of using transit to shape land use patterns with the goal of transport efficiency. It places the Coquitlam-New Westminster corridor, judged to have the strongest land-use shaping power and second highest intensity of usage, at Step C.

Richmond-Vancouver, having the highest intensity of use, should be placed at step D, rather than Broadway-Lougheed. The latter would not be placed at step D because, the Committee considers that it is not reasonable to advance **two** land-use shaping links before advancing the link with highest intensity of use.

The choice between Paths 1 and 2 depends on several things occurring in the years immediately ahead:

- (a) additional engineering information being acquired (cost, technology, physical feasibility, operating constraints, etc.; while considerable work has been done on the Richmond-Vancouver corridor this will need revisiting, while the others have not received as much study);
- (b) success in introducing demand management including disincentives;

- (c) success in dovetailing transportation investment decisions with land use plans, for instance through partnership agreements as elaborated in Chapter 1 of this report.

Assuming that there are no major surprises or difficulties arising from items (a) through (c) above, for reasons explained below the Committee believes that the choice between Paths 1 and 2 will depend on:

- (d) the level of financial commitment, which will determine whether one or more of these trunk ICTS links can actually be started and completed in the period between now and 2006.

While the Committee recognizes the importance of transportation efficiency, it recommends that transit investment should be used to shape land use within the medium-range horizon.

If there is financial commitment to build two or more links within the 2006 horizon, then Path 1 will achieve the goal of using transit to shape land use—since at least one of the links intended to shape land use will be committed, in addition to the Richmond-Vancouver link.

However, if there is financial commitment sufficient to build only one link, then only Path 2 will assure that the goal of having a land-use shaping investment—Coquitlam-New Westminster—is achieved.

Accordingly, based on all information available to date, the Project recommends as follows:

Recommendation on choice of path

If a financial commitment to build two or more ICTS corridors is made, then Path 1 should be chosen. If the financial commitment is adequate for only one corridor, then Path 2 should be chosen.

3.3 Staging of Transit Improvement

First Priority

Enhance existing transit system.
Time frame: 1993 through 2006

Second Priority

Make major capital investment to develop trunk transit corridors.
Time frame: 1995 onwards.

*Choose either Path 1
(if there is a commitment to
finance two or more ICTS
links)*

*or Path 2
(if there is a commitment to
finance only one ICTS link)*

Step A	Provide improved bus services throughout service area by developing wider range of services which reach further into existing residential and commercial areas, and which support medium-density low-rise residential development.			
Step B	Trunk Corridor Improvements. Timing: 1993-mid 1990s Requires limited capital expenditures in fixed plant			
	Richmond Vancouver	Broadway Lougheed	Coquitlam New West	Coquitlam Vancouver
	SuperBus	SuperBus	SuperBus	SuperBus and/or commuter rail

Make a choice dependent on (a) additional knowledge through research on capital costs, transit technology, alignment options, physical constraints in each corridor, (b) achievements in introducing transport demand management package, (c) success in growth management, i.e. advances by municipalities in coordinating their official community plans and zoning with transportation, e.g. through partnership agreement(s) and (d) the level of financial commitment.

PATH 1	PATH 1 weighs the efficiency of transport investments MORE heavily than their effect on pattern of growth			
	Trunk corridors all developed by 2006			
Step C	Richmond Vancouver	Broadway Lougheed	Coquitlam New West	Coquitlam Vancouver
	Install ICTS	Maintain SuperBus	Maintain SuperBus	Maintain SuperBus or commuter rail
			Install ICTS	
Step D	Install ICTS	Install ICTS	Install ICTS	Phase out the above
Step E				

PATH 2	PATH 2 weighs the efficiency of transport investments LESS heavily than their effect on pattern of growth			
	Trunk corridors all developed by 2006			
Step C	Richmond Vancouver	Broadway Lougheed	Coquitlam New West	Coquitlam Vancouver
	Maintain SuperBus	Maintain SuperBus	Install ICTS	Maintain SuperBus or commuter rail
Step D	Install ICTS	Install ICTS	Install ICTS	Phase out the above
Step E				

Definitions

SuperBus means fast, frequent, comfortable, limited stop bus service (up to 5,000 passengers per hour), using bus priority measures and HOV lanes as available. **Commuter rail** means limited-stop rush-hour trains on heavy rail tracks hauling conventional passenger coaches, trackage shared with heavy rail freight. **ICTS** means intermediate capacity transit system (about 10,000 passengers per hour) with regular peak /off-peak service, including segregated (separate right-of-way) busway, conventional (at grade) light rail transit and advanced (grade-separated) light rail transit.

3.4 HOV and Mixed Traffic System in 2006

This listing shows system improvements recommended to be in place by 2006, not in order of priority.

Item numbers are keyed to the map.

F. Provide HOV lanes in the vicinity of the:

21.	Barnet-Hastings corridor - Northeast Sector to Boundary Road
22.	Lougheed corridor - Highway 7 to the Trans Canada Highway
23.	Trans Canada Highway and Grandview Highway corridor - Cape Horn Interchange (North of the Port Mann Bridge) to Clark Drive
24.	Trans Canada Highway corridor - 200 Street to the Cape Horn Interchange (North of the Port Mann Bridge)

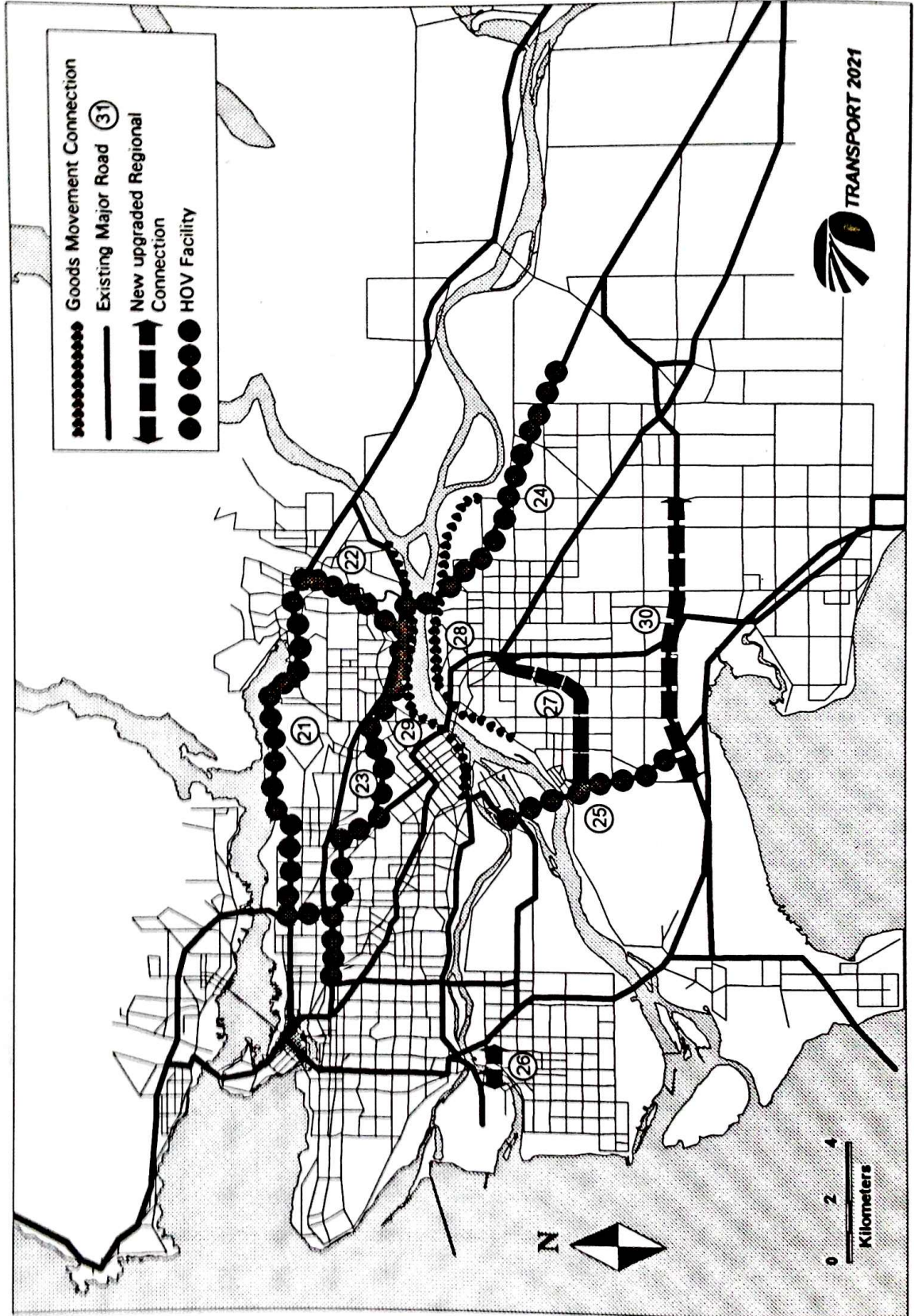
G. Provide HOV lanes across the:

25.	North Arm of the Fraser River at or in the vicinity of the Alex Fraser Bridge-Queensborough Bridge corridor
-----	---

H. Provide other improved connections as follows:

26.	Provide an improved Moray Channel Bridge and associated roadway improvements - Highway 99 to the Vancouver International Airport
27.	Improve road access from Highway 91 at Nordel Way to the Surrey City Centre
28.	Improve east-west connection from Highway 17/99 to Highway 15/Highway 1 (South Perimeter Road)
29.	Improve east-west connection Southeast Port Road - Mary Hill Bypass/Highway 1 to Queensborough Bridge/Marine Way
30.	Improve Highway 10 from Highway 99 to Trans Canada Highway
31.	Provide new arterials and widen existing arterials to serve development.

Medium-Range Transportation System Concept - HOV and Mixed Traffic



3.5 Staging of HOV Treatment

Time frame: 1993 through 2006

A significant increase in car-pooling is projected when transportation demand management (TDM) and a policy of restraint on single-occupant vehicles is applied. Two-step development of facilities for high-occupancy vehicles (HOV) is recommended (see table, right).

Step A	High Occupancy Vehicle Priority Treatment at Bridgeheads			
	Required to serve vehicles with high occupancy (e.g. 3 or more) across the major water bodies in Greater Vancouver. They could be joint with bus priorities where operational considerations permit. General locations are:			
	Lions Gate	Second Narrows	Oak Street	Deas Tunnel
	Alex Fraser	Port Mann	Pitt River	
Step B	Provide Superior Service Level for HOVs in Selected Corridors. Continuous HOV Lanes			
	Treatments could include installing continuous HOV lanes and/or selective preferred access for HOVs. General corridors are:			
	Surrey-Vancouver (vicinity of Trans Canada corridor)	Northeast Sector-Vancouver (Barnet/Hastings corridor)	Within Northeast Sector (vicinity of Lougheed corridor)	

3.6 Staging of Mixed Traffic Improvement

Time frame: 1993 through 2006

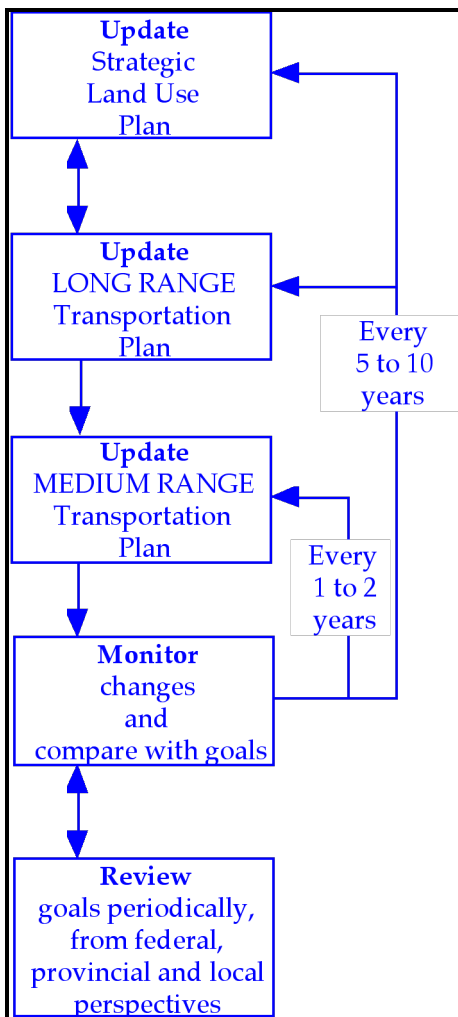
More capacity for mixed traffic would not be provided across the Burrard Inlet, the North Arm and South Arm during the medium-range planning period, in order to complement the TDM and HOV treatments above.

The strategy is first to make best use of existing capacity, and then to expand facilities required for vital movements of people and goods into and out of the region.

Step A	Maximize person-carrying capacity of existing facilities, area-wide			
	Apply modern system management techniques; apply parking controls on major streets to help movement of buses and/or bicycles; strategically improve roadway network to provide most efficient movement of people and goods; Build new arterials and widen existing ones to serve growth . These will be needed to maintain the viability of growth centres.			
Step B	Enhance Inter- and Intra-Regional Roads			
	These highway corridor improvements should give weight to several factors:			
	<ul style="list-style-type: none"> • Efficient movement of goods to, from and within the region • Deterrence of long haul commuting in single occupant vehicles • Use by transit and high occupancy vehicles • Continuity, safety, community and environmental impacts 			
	TransCanada Highway Horseshoe Bay-Hope	Hwy 99 US border to Oak Street	Hwy 91 from Hwy 99 south to Hwy 99 north	Hwy 10 between Hwy 99 and Trans Canada
River Road extension from Scott Rd to Hwy 15	SE port road from Mary Hill to Queensboro'	Moray Channel bridge and associated improvements	Hwy 91 at Nordel to Surrey City Centre better access	

4. Measurement of Results: Monitoring and Targets

4.1 Tasks to Establish Transport Planning Cycle



Future planners and decision makers will need to know whether today's plans have worked; they will need information on which to base future decisions to maintain or change course.

It is important to maintain continuity of the planning effort and to measure the impact of each step taken in policies and infrastructure improvements.

The geographical territory will have to go beyond the GVRD borders, seeing all of the B.C. Lower Mainland as an economic unit. The trade gateway function will also be a factor in the transportation strategies and plans and requires inclusion in planning.

For this purpose, a monitoring and forecasting process should be established early. This requires both data and analytical capability.

While various agencies will be responsible for collecting data, it must be brought together to form a single picture. Data needs to be assembled on:

- passenger and goods movement (travel surveys plus transit ridership plus road traffic counts, vehicle occupancy counts, origin-destination surveys, etc);
- physical changes in transport facilities and services (e.g. road and transit improvements);
- demographics (population, work force, and household growth and distribution, place of work/ residence data, etc.);
- municipal land use plans and actual changes on the ground (due to construction of new housing , commercial, retail or other industrial capacity, and areas planned to be left undeveloped); and
- macro-economic factors (unemployment rates, changes in industrial structure, etc.).

It is crucial that a stable planning cycle be established (see diagram) under which the land use and transportation plans are

regularly reviewed, travel surveys are regularly taken, and the transport plan (as regards both policies and infrastructure improvements) re-worked. The geographical territory covered should be the B.C. Lower Mainland and the activity associated with the region's trade gateway function should be captured.

Through a stable planning cycle, the uncertainties of the future can be dealt with and the transport system can respond to changing and unforeseen events.

*TRANSPORT 2021 process
as starting point*

Significant capabilities already exist and can be built upon. Collaboration among agencies in the late 1980s and early 1990s worked well: its existence made possible the production of the TRANSPORT 2021 long-range and medium-range plans.

Assembly of data by a cooperative team from contributing agencies has proved fruitful. Agencies are willing to contribute information where they have knowledge of and influence over how it is manipulated and used.

Land Use Data and Analysis

Land use data was collected using published and unpublished sources. They included Statistics Canada, the census of Canada, data supplied by municipalities on their own plans, aerial photographs, topographical maps and (in the case of employment data) interrogation of local firms directly by telephone.

A land use model, constructed from scratch, was brought together with the regional transportation model. This work, undertaken for the GVRD's "Livable Region Strategy: Proposals", is essential for transportation planning and should be further developed and refined in future years.

Transport Data and Analysis

Contributions of historical traffic data and cost projections were made by agencies represented on the Steering Committee, notably the South Coast Region of the Ministry of Transportation and Highways (MoTH) and BC Transit. Such traffic counts are vital input and will need to be continued.

In addition, the two above-mentioned groups and the GVRD jointly paid for and organized a travel survey in late 1992. This was the basis for calibrating the transportation computer model. The model was validated against BC Transit and MoTH historical traffic count data. Additional surveys will be needed in the future and could be approached in similar fashion.

New Tasks and Functions

Some important new tasks and functions will have to be performed in order to implement the medium-range plan. It is important that responsibility for these be agreed upon to reduce the risk of their being neglected.

- One task is to **conclude partnership agreements** as a mechanism for coordinating transport investment and land use decisions. The agreements could involve two or more parties.

- As experience is gained with partnership agreements, a body of expertise surrounding them, or "soft database", can be accumulated. A **clearing house function** for partnership agreements would be important service which could focus this experience and help to check that agreements are not in conflict with each other and that they are consistent with the agreed regional strategic plan.
- **Coordination and leadership of transportation demand management** will be required to ensure that key measures are not missed, and that measures are mutually supportive and not in conflict with one another.
- Given the new financial climate and the link between funding of infrastructure and demand management (through tolls and other user charges), there will also be new tasks in **revenue collection**, and **establishing new financial arrangements with outside investors**.

Any private financiers of transport infrastructure can be expected to draw heavily on the services of traffic forecasters in making proposals and business plans for their ventures. This underscores the need for solid data collection and analytical expertise to be maintained.

In conclusion:

- The **collaborative experience** of recent years should be built upon to establish a stable planning cycle for land use and transportation in the metropolitan Vancouver region.
- Among **new tasks and functions** needed are: making partnership agreements linking transportation, land use and other decisions; a clearing house and coordination function for such agreements; leadership and coordination for transportation demand management; and revenue collection and making new financial arrangements to fund infrastructure development.
- **Responsibilities should be agreed upon** soon to help ensure that these important tasks are undertaken.

Summary

4.2 Numerical Performance Targets for 2006

This section recommends a **method of measuring success of the plan** by setting targets against which actual performance can be compared in the future.

When the plan is reviewed in coming years there will be a yardstick against which any adjustments, considered appropriate at that future time, can be made. They will prompt questions as to the reasons for discrepancies between actual and target values. Lessons may be then drawn and corrective actions may be taken.

The targets for population and employment by geographical area are contained in the GVRD's "Livable Region Strategy: Proposals", 1993. The population targets are compared with trends in the table below. Employment targets (not shown) show a similar pattern.

Shares of Total Population Growth in Metropolitan Vancouver
of 680,000 (=100% of growth) Additional People Between 1991 and 2006

Subregion	Target share of growth under the Livable Region Strategy	Trend share of growth under current land use policies	Difference*
North Surrey/North Delta	+30%	+12%	+18%
Burnaby / New Westminster	+16%	+4%	+13%
North East Sector	+20%	+10%	+10%
North Fraser Valley	+6%	+7%	-1%
North Shore	+2%	+4%	-2%
Vancouver	+9%	+13%	-5%
Richmond	+5%	+10%	-5%
South Fraser Valley	+3%	+10%	-7%
Southern Region/Langley	+8%	+29%	-21%
Total	100%	100%	0%

*Apparent discrepancies in differences are due to rounding of numbers

Land use targets

Transportation system targets

The transportation system targets are actually the desired values of those quantifiable criteria which come from the agreed, formal goals and objectives for the transport system. The TRANSPORT 2021 project today considers these values achievable in the future.

The target values for the years 2006 and 2021 stem from extensive numerical analysis. The targets are internally consistent with each other and draw on surveys of past traffic patterns and behaviours in the B.C. Lower Mainland.

Transportation System Criteria	Actual 1991	Target 2006	Target 2021**
Person Trips in Morning Rush Hour (millions)			
Total by all modes	.39	.56	.70
As car drivers	.23	.30	.37
As car psgrs (non-drivers)	.06	.10	.12
As transit riders	.05	.10	.13
As pedestrians/cyclists	.05	.06	.08
As cyclists to work only (not school)	.004	.012	na
Transit's Share of Person Trips in Morning Rush Hour			
For people travelling:			
- to downtown peninsula*	37%	45%	49%
- to 6 regional town centres	13%	23%	30%
- within region overall	13%	17%	18%
Average Number of People in A Car in the Morning Rush Hour			
For people travelling:			
- to downtown peninsula*	1.29	1.35	1.37
- to 6 regional town centres	1.24	1.30	1.32
- within region overall	1.28	1.35	1.33

³Includes central business district plus "West End" residential area
 **The above targets for the year 2021 represent the latest estimates of system performance as of the date of publication of this medium-range plan report. They supersede those previously published in the TRANSPORT 2021 Long-range plan of September 1993.

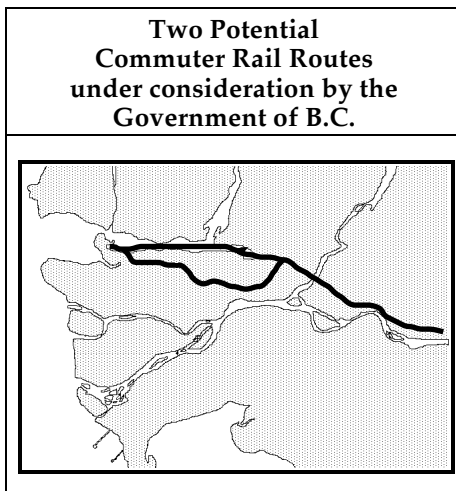
Selected Additional Parameters of the Medium range Plan	Current		Targets or estimates	
	1991	2006	2021**	
Environmentally related measures				
Atmospheric emissions ('000 tonnes/year, 5 pollutants)	380	107	130	
New roads in protected areas (lane-km)	na	0	150	
Transit availability measures				
Rapid transit (Route-km)	23	83	99	
Percentage of total population close to transit service (in census metro area):				
<400 metres of bus route	87%	90%	90%	
<1 km of rapid transit line	8%	25%	30%	
Congestion measures				
Cars: rush hour avg speed (kph)	38	40	37	
Trucks:				
- 24 hr avg truck speed (kph)	53	53	49	
- cost of congestion delays (\$m/yr)	\$110	\$162	\$295	
- total truck running costs (\$m/yr)	\$525	\$775	\$1100	
Percentage of roads badly congested*	9%	8%	8%	
Annual vehicle km travelled (billion)	11.1	13.4	16.6	

* i.e. percentage of road links with a level of service in rush hour classified as level "E" or worse

**The above targets for the year 2021 represent the latest estimates of system performance as of the date of publication of this medium-range plan report. They supersede those in the TRANSPORT 2021 Long range plan published in September 1993.

Appendix 1: Note on Commuter Rail

Purpose of this Appendix



Characteristics of Commuter Rail

Consideration of commuter rail in the TRANSPORT 2021 Long- range Plan

As this report was being prepared, the Government of British Columbia was actively investigating two potential commuter rail routes (see map) and was in discussion with two rail companies—CP Rail and Burlington Northern Railroad. Announcements were possible near the time of the conclusion of the TRANSPORT 2021 project, pending satisfactory feasibility studies and successful negotiations between the Province and railway companies.

However, since the outcome of these studies and discussions was uncertain at the time of this report, the TRANSPORT 2021 project could not properly treat commuter rail as a given, i.e. to be built into the existing base network for the TRANSPORT 2021 project's travel demand and supply projections.

This appendix outlines the characteristics of commuter rail as a mode of travel, describes its advantages and disadvantages as seen by the project, and places the expected decision to install or not install commuter rail in context of the medium-range plan.

Commuter rail is a mode of transport with the following features:

- typically used for longer distance commutes 15km to 50km, generally in the peak period only;
- operates on existing freight railroad tracks, with single- or bi-level cars pulled by diesel locomotives;
- stations are widely spaced, served by feeder buses and park and ride lots, which are a required part of the system;
- has seen a resurgence in U.S. cities and is being expanded in Montreal (with 7 new routes under consideration); and
- usually requires a contractual agreement between the railroad and government authorities, specifying among other things the responsibility for capital costs for fixed plant and rolling stock, charges for use of track capacity, and operating subsidy.

In developing its long-range recommendations, the TRANSPORT 2021 project considered commuter rail as an option, using technical information from available past studies done in the 1970s and 1980s.

Commuter rail links do not appear in the project's long-range recommended system; based on available information and a balance of advantages and disadvantages, commuter rail did not emerge as strategic element of the plan.

Considering the current interest in commuter rail, this conclusion warrants elaboration. The following are the disadvantages and advantages as seen by the project.

Advantages of Commuter Rail	Disadvantages of Commuter Rail
<ul style="list-style-type: none"> • The right of way for the service already exists (subject to capital upgrade in places). Disruption to the community either during construction or operation should be minor. • The service would give some congestion relief in the short term from the North East Sector. • The service can be mobilized in a small number of years, compared with much longer lead times for other rail-based transport. • Public opinion research indicates that popular support exists for commuter rail. • The service could be seen as a staging option (a) to build ridership for more intensive transit service or (b) for interregional rail service in the very long term connecting valley town centres for general purpose (non-commuting) passenger travel. 	<ul style="list-style-type: none"> • The potential services generally run counter to the regional land use/growth management objectives because they promote wider physical separation of homes and jobs, with suburbs being encouraged to become bedroom communities—rather than more complete communities with a better balance of work force and jobs. However, given the number of train departures being considered (morning and afternoon peak period only), any negative effect on land use patterns is expected to be relatively small. • If operated as a core-oriented, limited-stop service, commuter rail does not foster intensification of urban development along corridors; much of the lines pass through industrial areas not well located or suited for urban development. • Travel demand in the direction of the commuter rail lines is projected to grow, but the target is for low growth, i.e. below the regional average. Forecasts suggest a modest market for the services, which would be warranted only at peak periods. Riders would be drawn both from current automobile and bus commuters; transit has already won a high share of the travel market to downtown. • There is some market overlap; to some extent commuter rail competes with other facilities such as the Barnet Highway HOV lane being built or an intermediate capacity transit line in the Lougheed Highway corridor; the BN Rail route may compete with rapid transit in the Lougheed corridor and high occupancy vehicle lanes on the TransCanada Highway. • Based on previous estimates of cost to government (subject to negotiation) commuter rail appears relatively costly for the limited function it provides.

Status at Time of Writing

Additional information on the technical and economic feasibility of commuter rail is expected to become available from the outcome of Provincial studies and Province-railway discussions. This information would have considerably greater depth and detail on costs and financial feasibility compared with that available to the TRANSPORT 2021 project in coming to its conclusions.

Cost effectiveness is key

The cost effectiveness of providing service via commuter rail compared with alternatives (such as "SuperBus" on the Barnet-Lougheed Corridor) is a key consideration, bearing in mind that the

*Place of commuter rail in
medium-range plan*

HOV lane on the Barnet corridor is under construction and capital has already been spent.

Should the Provincial review find that commuter rail is the most cost effective alternative, then this medium-range plan would view it as the mode of choice in the Coquitlam-Vancouver corridor. Commuter rail would provide a relatively rapid response to alleviating peak period congestion in the corridor.

If the outcome of the Provincial review is otherwise, then this medium-range plan would view a SuperBus service as the mode of choice in the corridor, using the Barnet Highway HOV lanes now being built.

When an intermediate capacity transit capacity system is in place to link the North East sector with downtown Vancouver, (targetted by 2006—see description in Chapter 3), it is likely that it would be economic to phase out the commuter rail/SuperBus. The passenger loads could then be carried on the intermediate capacity transit system with greater cost effectiveness.

Appendix 2: Note on Lions Gate Bridge

Purpose of this Appendix

The Lions Gate Bridge is nearing the end of its economic life and will require a major rehabilitation or replacement within a few years.

In mid-1993, the Minister of Transportation and Highways initiated a public consultation process on the future of the bridge. The TRANSPORT 2021 project was approached by various parties to spell out its findings as they apply to the bridge. The purpose of this appendix is to offer guidance to those who will participate in decisions on the future of the bridge, based on the perspective of the TRANSPORT 2021 project.

Growth and the North Shore

The North Shore is growing but only slowly: population growth is projected at one third the rate of Greater Vancouver as a whole, the slowest rate of growth out of the nine areas into which the project has divided the region.

Under the GVRD's "Livable Region Strategy: Proposals", in the 30 years to 2021 the North Shore population is targetted to rise from 156,000 people to 205,000, or 31% growth.

The number of households would rise from 62,000 to 89,000, or 44%, a higher percentage growth resulting from the shrinkage in the average size of the family.

Employment would rise from 47,000 to 68,000 (a 45% increase, also faster than the population) so that the North Shore would have a better balance of work force and jobs. North Shore residents will have more opportunity to work on the North Shore without travelling outside their sector of the region.

Growth trends are close to targets

These GVRD target figures happen to be close to the "business-as-usual" scenario expected to evolve under the existing Official Community Plans of the North Shore municipalities.

The increase in jobs in the City of Vancouver, a major attractor of travel from the North Shore, would be 47% over the 30 years.

Transport Policy Context

An "automobile restraint" approach to urban transport is part of the TRANSPORT 2021 plan. Among its goals are to have an efficient, effective transport system while reducing dependence on the automobile. While the car will remain the predominant form of

Tolls on First and Second Narrows Bridges

people-transport, the goal is to have better managed and more efficient use of the automobile.

Under such policies, tolls would be charged on both Lions Gate and Second Narrows bridges—not simply to generate revenues for re-investment in the system, but to cause behaviour changes—so that some people will shift away from solo-driver commuting into transit and carpools.

Proposed higher downtown parking charges, higher fuel prices and other ways of providing travellers with more accurate signals of the full cost of travel would also tend to move people into higher occupancy vehicles.

Offering much better transit service, including bus priorities and high-occupancy vehicle lanes where operationally feasible, would provide the necessary alternatives to the solo-driver and help to attract people to use other modes more extensively. Some increased congestion for the single-occupant vehicle is acceptable as part of the re-balancing of the competition among the modes.

Travel Demand Projections

Under such policies, analysis points to limited growth in automobile demand. Therefore, very little additional transport capacity is needed for autos moving onto the Burrard Peninsula (from all directions, not only from the North Shore) within the study horizon.

Indeed, the analysis suggests that more capacity for solo-drivers could be counterproductive for the growth management goals of the Livable Region Strategy, such as reducing urban sprawl and creating a more compact region.

The demand analysis for the North Shore specifically includes allowance for inter-regional journeys to and from the Sea to Sky Highway 99 and the Horseshoe Bay Ferry Terminal.

A strong jump in transit ridership is forecast (up over 200% across Burrard Inlet, including Lions Gate, SeaBus and Second Narrows).

Findings

Rapid transit (or "intermediate capacity rapid transit systems" of which SkyTrain is an example) is not warranted for the North Shore in the next 30 years.

There is not a need to increase the capacity for single occupant vehicles over the Lions Gate and Second Narrows Bridges.

Carpool lanes across the bridges will not be particularly effective because trips to and from the North Shore are relatively short and do not offer much opportunity for the significant time saving required to induce carpooling.

SeaBus service frequency and capacity would be increased (e.g. by adding a third vessel).

Current technologies suggest a bus solution. The bus approach, following, is illustrative—there may be several solutions to meeting demand involving other technologies in the future.

Assuming that bus terminal operations and staging areas on the North Shore and downtown trips ends could be successfully managed, rush hour ridership across Lions Gate would require 70 conventional 50-passenger buses per hour, or a headway of 50 seconds. Separate bus lanes would not be warranted at this level of demand, but there is a need for bus "queue jumpers" at both ends of the bridges (some are in place today).

If the bus volume were to increase beyond 100 buses per hour, then a separate bus lane should be considered in the peak direction.

There is some merit in permitting carpools into the separate bus lane, providing that the passenger requirement is set high enough (e.g. driver-plus-three passengers) so that carpools do not interfere with the flow of buses; the existence of the lanes could have demonstration value to help change public attitudes towards ridesharing.

Indications on Bridge Lanes

For the Lions Gate Bridge this suggests either a four lane bridge (2 lanes each way, with buses sharing with general purpose traffic) or a five lane bridge (2 lanes each way of general purpose traffic with buses having a separate reversible lane in the peak direction).

The final configuration of lanes on the Lions Gate bridge would depend partly on the operational concerns for marshalling and circulating buses effectively—including the problem of dealing with the "dead-head" back in the off-peak direction.

In addition, there are other operational concerns including safety and reliability in case of accidents, and the provision of pedestrian and cycling capacity.

Earthquake security, availability of land on the Stanley Park causeway and northern approaches, and environmental considerations are further factors which will have to be weighed in a final decision.

The following pages reproduce the text of the GVRD Board resolution passed on July 30, 1993.

The resolution is referred to in Chapter 1 of this report.

Appendix 3: GVRD Board Resolution on Implementation of Regional Strategic Plan

*Publications can be obtained from
GVRD Communications and
Education Department
4330 Kingsway
Burnaby, B.C., V5H 4G8
Tel: (604) 432-6339
Fax: (604) 432-6399*

Appendix 4: List of Publications

Proceedings of Public Conferences *(held jointly with the GVRD's Strategic Planning Department)*

First Conference:

Shaping Our Communities: The Challenges of Regional
Growth and Transportation
(held May 23, 1992 in Surrey, B.C.) July 1992

Second Conference:

Shaping Our Communities: The Critical Choices
*(held November 28, 1992 in Richmond, B.C.)
February 1993*

Third Conference:

Creating Our Future: Critical Choices
*(held May 15, 1993
simultaneously in six locations in the region)
June 1993*

Council of Councils Meeting:

(held March 27, 1993 in Delta, B.C.) May 1993

Council of Councils Meeting:

Creating Our Future: Critical Choices
*(held June 12, 1993 in New Westminster, B.C.)
June 1993*

"Choices" Bulletins

*(eight-page bulletins published jointly with the
GVRD's Strategic Planning Department)*

1. "Preparing for the 21st Century" *May 1992*
2. "Conference Rejects Business As Usual Planning" *September 1992*
3. "Critical Choices" *November 1992*
4. "Building A Livable Region" *March 1993*

Newspaper Inserts

*(distributed in community and/or region-wide
newspapers)*

- "Critical Choices"
A sixteen-page newspaper insert *May 1993*
- "Greater Vancouver into the 21st Century"
A four-page newspaper insert *September 1993*

Working Papers and Final Reports

- | | | |
|------------------------------------|------|---|
| <i>Objectives</i> | [1] | Goals, Objectives and Criteria for Developing a Long-range Transportation Plan for Greater Vancouver
May 1993 |
| <i>Demand for Transportation</i> | [2] | Transportation Demand Management Measures and Their Potential for Application in Greater Vancouver
January 1993 |
| | [3] | Transportation Demand Management: A Forecast Modelling Approach
February 1993 |
| | [4] | A Qualitative Research Study on Transportation Demand Management Measures
March 1993 |
| | [5] | Public Opinion Surveys on Transportation Demand Management
July 1993 |
| | [6] | Parking, Mobility and Accessibility in Greater Vancouver
May 1993 |
| | [7] | Trucking in Greater Vancouver: Demand Forecast and Policy Implications
August 1993 |
| | [8] | Urban Access to Gateways - Seaports, Airports, and Major Routes into and out of the British Columbia Lower Mainland
March 1993 |
| <i>Supply of Transportation</i> | [9] | Evaluation of Three Transportation Supply Scenarios for Greater Vancouver
July 1993 |
| | [10] | Derivation of a Long-range Transportation Supply Strategy for Greater Vancouver
August 1993 |
| <i>Transportation Costs</i> | [11] | The Cost of Transporting People in the British Columbia Lower Mainland
March 1993 |
| | [12] | Historical Public Transportation Expenditures in the BC Lower Mainland
August 1993 |
| <i>Land Use and Transportation</i> | [13] | Transportation Implications of Regional Growth Options in Greater Vancouver
March 1993 |
| | [14] | Transportation Implications of a Compact Metropolitan Growth Option
May 1993 |
| | [15] | Regional Transportation Implications of Neighbourhood-Level Planning Initiatives
August 1993 |
| <i>Other Topics</i> | [16] | Economic Development Perspectives on Transportation Planning
October 1992 |
| | [17] | New Transportation Technologies and Their Implications for Greater Vancouver
February 1993 |
| <i>Final Reports</i> | [18] | A Medium-range Transportation Plan for Greater Vancouver
October 1993 |
| | [19] | Medium-range Transportation Plan for Greater Vancouver—Technical Appendix
October 1993 |
| | [20] | A Long-range Transportation Plan for Greater Vancouver
September 1993 |
| | [21] | Interim Highway Improvements
September 1993 |