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NEIGHBORHOOD TRAFFIC MANAGEMENT AND COMMUNITY LIVABILITY: THREE VANCOUVER CASE STUDIES

By

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M.A., The University of British Columbia, 1986

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

in

THE FACULTY OF GRADUATE STUDIES

THE SCHOOL OF COMMUNITY AND REGIONAL PLANNING

We accept this thesis as conforming

to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

APRIL 1986

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ABSTRACT

The study investigates the effectiveness of neighborhood traffic management in achieving a balance between two competing objectives: accessibility and community livability. Its role in creating environmental areas, defining environmental capacities and providing an arterial network is studied, as is the relationship between traffic and land use. The importance of an efficient transportation system and livable residential areas, combined with the increasing use of neighborhood traffic management suggests that the effectiveness of neighborhood traffic management planning in addressing neighborhood livability issues and its effects on the transportation system are important urban concerns.

Three Vancouver neighborhoods with neighborhood traffic management plans implemented between 1979 - 1982, Shaughnessy, Vancouver Heights and the West End, serve as case studies. The effectiveness of the neighborhood traffic management planning process in addressing neighborhood concerns is measured by determining the perceptions of the group advocating the plan with respect to the process and the plan, and by determining how well this group represents the neighborhood. Indicators of representativeness used include: descriptive, substantive, geographic and process. Determining the effectiveness of the neighborhood traffic management plans in reducing traffic volumes within the neighborhoods is achieved by analysis of before and after traffic counts. With regard to the effects of the implemented plan on the transportation system, the study looks at traffic volumes at nearby arterial intersections and the presence of arterial improvements made in conjunction with the neighborhood traffic management plan.

The study findings indicate that the group advocating the neighborhood traffic management plan is representative of the area and that the planning process identifies and responds to the concerns of the area residents. However, the implementation of the neighborhood traffic plans falls short of meeting residents' needs, due to the design of the devices or the timing of the implementation. The study findings on the effects of the plan on the transportation system are not conclusive, but suggest no major impacts.

The study concludes that the neighborhood traffic management planning process should be improved by formalizing the role of neighborhood traffic planning, thereby giving legitimacy to both citizen participation and the plans produced. In addition, the adoption of an environmental area policy emphasizing the protection of residential neighborhoods will ensure that plans are implemented as intended. The study also concludes that an optimal balance between efficiency of the transportation system and environmental quality can only be achieved by the integration of neighborhood traffic management planning, transportation planning, and land use planning.

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ACKNOWLEDGEMENTS

I wish to express my sincere thanks to Dr. Peter Oberlander and Dr. Paul Tennant for their special contributions to this project. Many thanks to the representatives of the community groups studied, Richard Pedersen, Carole Walker, Graham Clay and Fred Cavanagh for sharing their experiences with me.

I also wish to thank Nancy Nowlan and Chris Zeiss, my office mates, and John Speakman and my husband Scott McBride for helping me maintain my perspective over the last 18 months.

THE RESEARCH PROBLEM

INTRODUCTION

Urban transportation planning aims to achieve an optimal balance between two competing objectives: the operational efficiency of the transportation system, and its responsiveness to traffic externalities -- optimal as defined by community values. Urban transportation planning has historically focussed on efficiency concerns, with traffic externalities being considered by engineers and planners rather than by citizens. Changing social values placed pressure on the system to become more responsive, and the advent of citizen participation in planning processes allowed for the expression and incorporation of community needs in urban transportation planning. The development of neighborhood traffic management plans through neighborhood planning processes is one way in which the responsiveness of the overall transportation plan can be increased.

As greater responsiveness generally results in less efficiency, community values suggest tradeoffs to be made. Difficulties arise because overall community values are too general to suggest which tradeoffs should be made: this is best done at the neighborhood level. Planning for operational efficiency, in contrast, is an activity best undertaken at the urban or regional level; efficiency concerns are not a priority in the development of neighborhood plans. Achievement of both objectives are important in their contributions to the livability of an urban area. The final tradeoffs between mobility and the residential environment are made at the political level.

Neighborhood traffic management (NTM) schemes are often implemented in areas where the level of mobility greatly surpasses that of livability as an attempt to redress the imbalance. The slow and gradual infiltration of commuter traffic in inner city residential neighborhoods has become a source of discontent among affected residents in recent years. The gradual nature of the increase allows for adaptation, but a point is reached where the externalities associated with this through traffic, such as noise, decreased safety and pollution are perceived to reduce the livability of the area. Inner city areas are most affected due to their location between the CBD and outlying areas, and the grid street layout common to these areas facilitates access for both local and non-local traffic. While demand for access to the CBD continues to grow, street capacities remain relatively fixed.

The protection of residential neighborhoods from auto related externalities is generally accomplished by the use of traffic management devices in the neighborhood to mitigate negative impacts. These devices are inexpensive and easy to install relative to other solutions, such as increasing arterial capacity or providing alternative modes of transportation. In addition, the high degree of development in urban areas coupled with high construction costs makes a capital solution economically unfeasible as well as politically unpopular. Hence, in response to intense citizen pressure, cities have investigated, developed, implemented, evaluated and modified traffic management schemes; devices commonly used have included traffic circles, diverters, road closures and signage.

Civic staff and elected representatives are hesitant to approve the implementation of neighborhood traffic management plans because the representativeness of the advocating group is not ensured, and because traffic is generally redistributed rather than reduced. Redistribution of traffic onto adjacent streets or back onto already congested arterials raises public controversy, and charges that neighborhood traffic management is incompatible with other urban transportation objectives.

The purpose of this thesis is to evaluate the effectiveness of neighborhood traffic management planning in achieving a balance between the operational efficiency of the transportation system, and its responsiveness to traffic externalities. It is recognized that numerous factors are involved in the operational efficiency of the urban transportation system and community livability. Traffic volumes on residential and arterial streets are used as an indicator of both operational efficiency and livability. Although they are a fair indicator of livability, they are a weak indicator of the operational efficiency of the transportation system. Unfortunately, traffic volumes were the only consistently available measure and are used to give a qualitative, if not quantitative indication.

This thesis will address the following questions: does neighborhood traffic management respond to the concerns of citizens regarding the impacts of automobile related externalities on their community? What is the effect of neighborhood traffic management schemes on the operational efficiency of the transportation system?

Analysis and research in urban transportation in general, and the tradeoffs between efficiency and responsiveness in particular are important because most transportation decisions are public sector decisions. As these decisions usually occur within the political jurisdiction of one municipality, with expenses and pervasive impacts borne by the same group of citizens -- the electorate, it is in the interests of the civic authorities to strike the 'best' balance.

Planning's concern with the issue is manifold. NTM deals with the allocation of resources: access and mobility, and a safe and pleasant environment. The work of planners is essential to ensure that both objectives are considered and to inform and encourage the community to respond to wider concerns. In addition, because planning for urban transportation must be comprehensive, incorporating social and economic factors, community values and urban and neighborhood development goals, planners must also determine the effectiveness of NTM as a method of protecting residential neighborhoods, AND its effects on operational efficiency. Achievement of a sensitive balance between the residential environment and the transportation system is essential and is only possible by a process which allows for the expression of conflicting interests and the negotiation of compromises.

The development and adoption of a policy on neighborhood traffic management will affect citizens, civic staff and elected representatives by:

- providing direction and a framework for NTM activities;
- decreasing ad hoc, short term problem solving;
- generating expertise in required areas;
- clarifying other city policies, such as the street classification system and zoning schedules;
- ensuring more efficient allocation of funds.

In addition, the establishment of formal procedures will legitimize citizen participation and decrease the controversy surrounding NTM plans.

STUDY APPROACH

This thesis will use a case study approach to evaluate the effectiveness of NTM planning in achieving a balance between efficiency and responsiveness. It will focus on NTM plans which are developed and implemented on a neighborhood basis, and intend to manage traffic in its place or redistribute it.

The experiences of three Vancouver neighborhoods and their NTM plans will be investigated. Vancouver has been chosen as the location of this study because of its substantial history of citizen involvement in urban transportation planning. NTM plans which were implemented several years ago are available for study; the case study approach will allow for the examination of the effects of these implemented plans. Investigating a number of cases within one city and within a short time period illustrates the different experiences possible within one planning structure.

Several criteria for selecting cases have been developed:

1) the NTM plan should cover an area with measurable traffic externalities;
2) citizen involvement must be present;
3) civic staff should be involved in plan development;
4) goals of citizens must include reduction of auto related externalities;
5) the area to be covered by the NTM plan must cover more than two intersections and use more than two devices.

Based on these criteria, Shaughnessy, Vancouver Heights and the West End have been selected as case studies. Although the affected areas vary in size, NTM treatment, and proximity to the CBD, they all include citizen and civic staff involvement related to the reduction of measurable traffic externalities. The cases selected had NTM plans implemented between 1979 and 1982.

DATA COLLECTION METHODS

Data collection methods included primary and secondary sources. Personal interviews were conducted with those neighborhood group representatives who were prominently involved with the NTM issue. Secondary sources included City Council minutes, Transportation Committee minutes, Reports to Council and other civic documents, as well as newspapers and publications.

Semi-structured, open-ended interviews were selected as the method of primary data collection. Although subject to problems related to interviewer bias or manipulation, this method was chosen because in depth, interpretive information relating to the NTM planning process, and the results of the implemented NTM plan were desired. Secondary sources were used to provide objective information of a statistical and historical nature.

ORGANIZATION OF THE THESIS

Chapter One has provided an introduction to the research problem, and study approach. Chapter Two provides a literature review, covering the history of transportation planning, citizen participation processes in transportation planning, neighborhood traffic management theory and the traffic management experiences of four cities.

Vancouver's history with citizen participation in transportation planning and its goals introduce Chapter Three; the remainder of the Chapter cover the land uses, plans, zoning and evolution of the NTM plans in each case study area. The citizen participation process is analyzed in Chapter Four and the effects of the NTM plan on local and arterial streets is discussed in Chapter Five. Chapter Six provides a conclusion.

Footnotes are provided by chapter at the end of the text.

CHAPTER TWO

THE LITERATURE REVIEW

INTRODUCTION

City streets have been traditionally viewed as thoroughfares with transportation planning enhancing the efficient movement of industrial, commercial and commuter traffic.[1] In addition to this mobility function,city streets provide access for emergency, water, sewer, gas, lighting, and refuse collection services and also spatially organize land uses within the city. [2] For these reasons, careful planning and management is essential to prevent congestion in the urban transportation system and inefficiency in the operation of civic services, and to ensure complementarity with other civic development goals.

Streets also perform an important social function. Jacobs and Appleyard document the importance of the street as the site of extensive daily interaction which contributes to the quality of neighborhood life.[3] As the majority of movement in urban areas is local,comprised of trips not exceeding two to three miles in length, and as the majority of the urban dwellers' time is spent in residential areas, street quality and local mobility are neighborhood concerns.[4]

Traffic in many cities has increased to the point where both operating efficiency and quality of urban life are public concerns.[5] NTM schemes can improve both, if technical solutions are strengthened with public action and policy. Incorporation of citizen participation into government practices and policies increases the number of interests involved and contributes to the balancing of social and economic objectives.[6]

Traffic related externalities include noise, air pollution, vibration, dirt and soot, visual intrusion and loss of privacy, physical and social neighborhood division and concerns regarding the safety of both vehicles and pedestrians.[7] As traffic volumes increase in a gradual manner, adaptation to the externalities is possible and the changes go unnoticed.[8] However, when volumes reach levels where externalities are perceived, citizen involvement begins. Inner city residential neighborhoods are the prime location for intensive citizen involvement in transportation planning because:

1) the value of physical resources and social structures of existing neighborhoods is recognized;[9]
2) the neighborhood is viewed as a political unit;[10]
3) the increase in incomes which led to an increase in car ownership has also led to demands for the control of automobile related externalities;[11]
4) older areas have a grid street pattern which provides ease of access for through traffic;[12]
5) traffic volumes continue to increase and few transportation facilities are constructed in highly developed areas.[13]

Development of local traffic plans does not reduce the need for transportation planning at the urban level.[14] Rather, local plans must contribute to the overall health of the city.[15] Traffic management devices should ideally be introduced as one part of a transportation program that established short and long term goals, provides positive features as well as traffic restraints, and promotes alternatives to automobile use.[16]

HISTORICAL OVERVIEW

Schemes to protect residential areas from the effects of traffic date back to the 1800s when in some European towns, trade vehicles were forbidden entry into certain residential or park areas.[17] The first contemporary scheme occurred in 1928 in a suburban development in Radburn, New Jersey where design elements were used to ensure that quality of life considerations were met: all housing was situated on cul-de-sacs, and the interaction between pedestrians and traffic was reduced by the separation of pedestrian ways from the street.[18]

By the 1950s, urban transportation planning consisted mainly of straight line projections of traffic counts and comparisons of forecasts with existing street capacities -- this technical emphasis was reinforced by the advent of the computer. Citizen involvement was minor and the thrust was the construction of highway systems.[19] Traffic controls were used mainly to increase street capacity and smooth the flow of traffic at intersections.[20] In the 1960s, highway location became recognized as a major transportation planning problem, because the link between land use and transportation was established revealing an unequal geographic distribution of costs and benefits associated with transportation investments.[21] Citizen involvement was confined largely to evaluating complete plans; NTM principles were applied to older city centres.[22] The 1963 Buchanan Report, proposing "environmental areas" where non-local traffic is eliminated and environmental considerations predominate seemed to be the precursor to NTM schemes in Great Britain.[23] However, in both the United States and the United Kingdom, urban renewal cleared many old inner city residential neighborhoods before traffic management principles could be applied.[24] Social and environmental aspects of transportation planning were recognized in the 1970s. Citizen participation became widespread and was incorporated into most phases of the planning process; urban transportation planning was seen as a political as well as a technical process.[25] Soaring construction costs and limited funds led to a concern for better use of existing facilities; this concern continues into the 1980s. Citizen participation continues to be integrated into the planning process and is being legitimized in many cities by being a formal requirement in the development of transportation plans. Public concern is aimed at promoting greater economy, efficiency and equity in transportation investments.[26]

CITIZEN PARTICIPATION IN THE URBAN TRANSPORTATION PLANNING PROCESS

Transportation planning is a continuous process involving civic staff, elected representatives, and citizens: traditionally, the citizens work with civic staff to identify and analyse the problem, and develop and implement a course of action to resolve it.[27] Final approval is the domain of the elected representatives.[28] The view of transportation as a service reinforces the importance of citizen participation in defining community values with respect to that service.[29]

Planning is the process where community goals and values are clarified.[30] Citizen participation does not ensure that consensus will be reached at any stage in the process. A divergence of opinion is more common and is beneficial in that many community interests are identified.[31]

Citizen participation allows "new potential clienteles to make transportation planning more responsive to their interests and values".[32] These new sources will provide inputs to transportation planning other than traditional economic and efficiency concerns; incorporation of these concerns will result in better overall transportation decisions because a wider range of values will be reflected.

Citizen participation in transportation planning and decision making is important not only to plan better transportation systems but also to "strengthen the decisive nature of the planning process" and to create public support for public decisions.[33] Citizen participation should aim beyond localized, ad hoc problem resolution to longer term transportation planning.[34]

Representativeness of citizens groups is an often raised concern of civic staff and officials.[35] Studies have shown that the demographic characteristics of citizen participants are different from those of the community they are representing.[36]

The congruence of demographic characteristics between participants and the community is termed descriptive representation.[37] As sharing a set of social characteristics does not ensure sharing a set of values, Cole describes substantive representation: the congruence between the participants and the community with respect to the goals and objectives for the community. Pitkin and Peterson state that both descriptive and substantive measures should be considered when investigating representation.[38]

Geographical representation, ensuring that all areas of the community are represented is another measure of community coverage. Other measures include formal representation and process indicators.[39] Formal representation includes the process of selecting representatives; process indicators call for the investigation of effort undertaken in the planning process to influence representation, and the effects of these efforts. The process indicators contribute a sense of dynamism; the previous four measures are static.

NEIGHBORHOOD TRAFFIC MANAGEMENT

The development and implementation of neighborhood traffic management plans in many cities in North America and Europe in recent decades has contributed greatly to experience in NTM planning. In addition, theoretical work has provided a solid definition of the problem and its importance in urban areas, and has suggested measures and policies aimed at reconciling the competing objectives of accessibility and the environment.

The 1963 Buchanan Report outlines the direct relationship between traffic and activity, the latter being situated in buildings concentrated in central business areas of cities.[40] As cities have developed, the activities concentrated in the central areas have increased; the high degree of development has constrained accessibility within these areas and the environmental quality has decreased.

Accessibility and environment are described as two competing facets of the urban traffic problem. In order to meet both concerns, Buchanan suggests the creation of environmental areas, connected by an arterial network. Environmental areas are areas where environmental considerations predominate. They are not traffic free zones; however, the traffic volume and type is related to the character of the area. Any area, residential, industrial, mixed use, can form an environmental area; the environmental standards will be according to the area. Appleyard feels that only neighborhoods with vulnerable populations, or those vulnerable to intrusion should be protected, or made into environmental areas.[41] In addition, he suggests that levels of protection required will vary by area.

Buchanan states that all streets have an environmental capacity which is definable by an absolute traffic volume.[42] This capacity is based on street dimensions, land uses and pedestrian traffic. Appleyard supports the environmental capacity concept and suggests that there is an extremely wide variation possible, by similar types of neighborhoods, in what constitutes acceptable, absolute traffic volumes.[43] He attributes this to both physical characteristics of the area and population characteristics.

The size of each environmental area is determined by the type of land uses and their density.[44] Higher density areas generate greater volumes of traffic from local and non-local sources. A denser arterial network is required to ensure that the environmental capacity of the area is not exceeded. The increased difficulty of providing an arterial link in a densely developed area is noted: "the practical difficulties of contriving the network could and almost certainly will, limit the amount of traffic in urban areas."[45]

Buchanan states that the establishment of environmental standards will determine accessibility; accessibility can only be increased by large expenditures on physical improvements. In sum,

> "there are absolute limits to the amount of traffic that can be accepted in towns, depending on their size and density, but up to those limits, provided a civilised environment is to be retained or created, the level of vehicular accessibility a town can have depends on its readiness to accept and pay for the physical changes required." 46

In response to environmental concerns raised by citizens, certain traffic control devices are commonly installed to alleviate perceived problems. The devices used include both operational and physical measures. The operational measures are signs; they have limited success and are best used when enforcement is possible.

Physical measures include:

1) traffic circle: this device is used in the centre of an intersection, primarily for the purpose of decreasing vehicle speed. A decrease in speed will result in decreased noise and accidents. Traffic circles do not reduce traffic volumes.
2) traffic diverter: this device is used to reduce traffic volumes. It is a raised platform constructed at a 45 degree angle across an intersection and forces vehicles to turn. Diverters are often used to eliminate shortcutting.
3) traffic island: an island is a triangular or rectangular raised platform used to channelize traffic. This device restricts access and thereby reduces traffic volumes. Traffic islands may be free-standing or joined to the curb.
4) cul-de-sac: this is a dead-end street and is used to reduce traffic volumes.
5) mini-parks: streets are closed and made into parks, resulting in reduced traffic volumes.

The type of measures implemented depends on the problem to be solved, and generally neighborhood traffic management plans involve a combination of both physical and operational measures.

The NTM plan can be a series of diverters and signs only, or a part of an overall neighborhood improvement program, including planting, streetscaping and parks.[47] Traffic control devices can be applied to one or to several streets, a neighborhood, or an entire city. The devices can be applied at the periphery of an area to totally eliminate traffic, or within an area to slow it down. Generally, the type of device and the priority of implementation should be determined by the severity of the problem and the vulnerability of the area residents.[48]

Since traffic flow is like an ecological system, shifting to most convenient patterns, difficulties often arise when traffic control devices are installed on only one or two streets.[49] The traffic is shifted onto other local streets or onto already congested arterials. On the local streets, the change in traffic volumes may not be large, but will be visible and likely controversial. Polarization of residents within the neighborhood may occur, accompanied by charges that a more comprehensive approach to the problem is needed, or that a larger area should be covered.[50] A comprehensive approach is more effective in that it provides alternatives in modes of transportation and route chosen.[51] With respect to the size of the area covered, small plans are more likely to have manageable citizen participation programs, which allow for debate, negotiation and compromise.[52]

NEIGHBORHOOD TRAFFIC MANAGEMENT EXPERIENCES OF OTHER CITIES

The following cases have been chosen for their different approaches to NTM programs and different lessons learned.

SEATTLE

Seattle is known for its Neighborhood Traffic Control Program, which has evolved over the last 25 years.[53] In the early 1960s, neighborhood traffic concerns were addressed on an ad hoc basis. The process became more structured in conjunction with an extensive street improvement program and in 1968 a committee composed of representatives of several civic departments was formed to investigate the feasibility of environmental, operational and traffic safety improvements in the context of a neighborhood street plan. This committee worked with the citizens of a Seattle neighborhood in 1971 and successfully developed a plan which reduced both traffic volumes and accidents and had a minor impact on travel times, arterial traffic flow or delivery of public services.

In 1978, the Neighborhood Traffic Control Program was formally established and allotted an annual budget. A formal citizen participation process was developed and incorporated into the program. Due to strong community interest, each request for a neighborhood traffic control device was ranked according to traffic volumes, speed, and number of accidents at the intersection. Although this system ensured that the most serious areas were being addressed, it was revised to ensure that program funds were being spent in an optimal way. In the current program, the city ranks all residential intersections by the number of accidents and thereby identifies those neighborhoods with the most serious safety concerns. The city then contacts the residents living near the identified areas, and neighborhood meetings are held to determine support for a device. Where support exists, a permanent device is installed and monitored for six months; follow-up meetings or a survey are conducted only when complaints are received.

Since 1981, the Program has been largely confined to the use of traffic circles. Circles have proven to be effective in reducing speed, which is consistent with Seattle's policy of managing traffic in its place rather than shifting it. In recent years, traffic volumes have remained relatively constant on streets receiving treatment, but the perception of externalities is decreased due to less noise. Citizen participation is still a strong element in the program and without neighborhood support, no action is undertaken.

THE CENTRAL LONDON AREA

The influence of the Buchanan Report is evident in the NTM schemes in the following two areas:

BARNSBURY

In 1964, a scheme to redevelop one street in this central London neighborhood was opposed by a group of residents who wanted an overall plan for the neighborhood and were interested in an 'environmental area' treatment.[54] In response, the Borough developed and exhibited a report which divided the area into environmental zones, stressed the diversion of commuter traffic through the use of one way streets and cul-de-sacs, and made recommendations with respect to housing problems in the area. Traffic management was the public priority and the Greater London Council approved a scheme limited to the suggested traffic improvements.

In conjunction with the implementation of the traffic management scheme, the Borough independently carried out a tree planting and townscaping program. Shortly thereafter, some area residents protested that the 'tarting up' of the neighborhood would contribute to existing pressure on low income tenants to relocate. This group was also dissatisfied with the way in which the scheme redistributed traffic, and decreased their own accessibility and mobility.

A major problem in Barnsbury was that the arterials were at capacity, and the high degree of existing residential development prevented improvements from being made on both arterial streets and intersections in the area. Given these constraints, the existing street system had to be managed in a way to achieve the best balance between mobility and environmental concerns. Unfortunately the Borough failed to involve the residents of the area in debating tradeoffs and determining neighborhood priorities. Despite further reviews and minor modifications, attitudes towards the scheme in the mid 1970s remained negative.

PIMLICO

Pimlico adopted an environmental area designation in 1965 and in 1968 implemented a NTM plan that allowed free internal circulation but severely restricted entry to the neighborhood.[55] One way out streets and a one way internal maze were implemented to eliminate traffic cutting through local streets to avoid intersection delays. The plan was initiated by the City and although initial reaction was negative, attitudes changed quickly. An evaluation of the plan showed that internal traffic volumes and accidents decreased substantially and that little traffic had shifted to peripheral streets, although these arterials had sufficient capacity to absorb any traffic increases resulting from the NTM plan.

DELFT, HOLLAND -- THE WOONERF

Delft is known for its innovation in traffic control devices -- legislation and design guidelines for the woonerf were introduced in 1976. A woonerf is a residential area where the street is geared to pedestrian use but also allows vehicles.[56] It is not suitable for arterials, nor for areas with heavy parking requirements. The woonerf treatment complements the major street system by making a clear distinction between the arterial street system and the local streets, without restricting access.

In a woonerf, curbs are removed to eliminate the distinction between the pedestrian area and the vehicle area. Traffic speed is low, and changes in route direction or pavement surfaces are used to create a residential impression which is reinforced by planting and street furniture. Citizen participation is important to ensure that areas with such treatment meet the needs of the residents and will be maintained. This concept manages traffic in place, rather than redistributing it -- the devices work to reduce the impact of automobiles, rather than the volume.

The woonerf concept has been applied extensively in Europe and is being applied experimentally in North America.

BERKELEY

In the early 1970s the anti-car movement became a popular cause in Berkeley and in 1974, citizens became actively involved in the Berkeley Neighborhood Traffic study.[57] Although the study was to develop a comprehensive traffic strategy, including transit, bicycle and pedestrian alternatives, public interest seemed to focus on traffic control devices and the redistribution of traffic rather than general transportation policy and traffic reduction.

In 1975, citizens developed traffic plans for their individual areas which were distributed throughout Berkeley and discussed at public meetings. The plans proposed a total of 46 diverters, 10 signals, over 300 stop signs, 17 traffic circles and various other modifications and regulations. Negative reaction to the proposals led to minor modifications and the plan was implemented in the fall.

By early 1976, two citizens groups had been formed. The Citizens Against the Barricades, advocating free use of all streets and use of traffic control devices only to improve traffic flow, had collected sufficient signatures to ensure that the traffic management plan would be put to the vote in the June election. The Berkeleyans for Fair Traffic Management advocated the use of barriers for improved quality of urban life, and wanted the adoption of the NTM scheme to be based on the outcome of the trial period evaluation. They also wanted the program to continue as it was a prerequisite for federal funding for public transit systems.

The evaluation of the scheme took place, showing positive neighborhood effects with slight increases in traffic volumes on arterial streets, travel times, and traffic congestion. The vote on the Traffic Plan was 56% in favor of retaining the diverters.

Thereafter, the City conducted a post evaluation and a citizens advisory committee was created to consult with citizens in the development of a formal citizen participation process for future modifications to the plan.

DISCUSSION OF CASES

All of the cases discussed are residential areas experiencing through traffic as a result of their geographic location between central areas and outer city/suburb areas.

Seattle's program is a city-wide program implemented at the street level. Barnsbury and Pimlico are examples of neighborhood controls; Berkeley is the only case of city wide controls, although the plan was developed incrementally, with each neighborhood designing their plan.

Each city provides unique lessons. Seattle's lengthy experience with NTM programs has resulted in the establishment of a formal program and citizen participation process. However, the degree of citizen participation was higher in the program of the early 1970s when the citizens were initiating the process and making tradeoffs, than in the current program which is city initiated and involves citizens only in the approval phase. It is unclear whether a city initiated plan, based on the number of accidents per intersection responds to the concerns of the residents in those neighborhoods receiving treatment. Efficiency in the allocation of program funds seems to have been achieved, and the management of traffic in place should have fewer negative operational ramifications. The formalization of the process may also reduce the controversy often surrounding these schemes, because the issue is moved from the political arena to the bureaucratic level.

Barnsbury provides a good example of the type of difficulties commonly experienced in NTM programs. The insufficient, yet fixed, arterial capacity meant that any changes would have to be managed on the existing street network. This constraint was exacerbated by the failure of the Borough to introduce a citizen participation process which allowed for the expression of concerns and debate among various interests. The lack of time and structure for negotiation may have contributed to the negative impression held by some residents of the scheme.

In contrast, the lack of controversy surrounding the Pimlico traffic management scheme may have been due to the fact that no tradeoffs were required. Local needs for accessibility were met and the environmental quality of the area was improved. Sufficient arterial capacity was available for non-local traffic squeezed off local streets, although the traffic counts indicated that most of it avoided the area entirely.

The woonerf is another example of managing the effects of traffic in place rather than relocating it. The use of landscaping and street furniture offset any reduction in access.

Berkeley is the best example available of a comprehensive traffic management scheme, developed through a citizen participation process. It is not a typical NTM scheme because it applies to a whole city, but the development of plans for individual areas, and the lack of transportation alternatives to reduce traffic volumes make it very similar to other traffic management schemes. The slight reduction in operation efficiency was offset by perceived community benefits.

CHAPTER THREE

VANCOUVER'S RECENT TRANSPORTATION HISTORY

Vancouver and surrounding suburbs form the largest metropolitan area in western Canada. Vancouver's central business district is the major focus of commercial activity in the region and hence, the destination of ever increasing volumes of commuter traffic. The location of Vancouver and its central business district in relation to other centres in the region is depicted below.

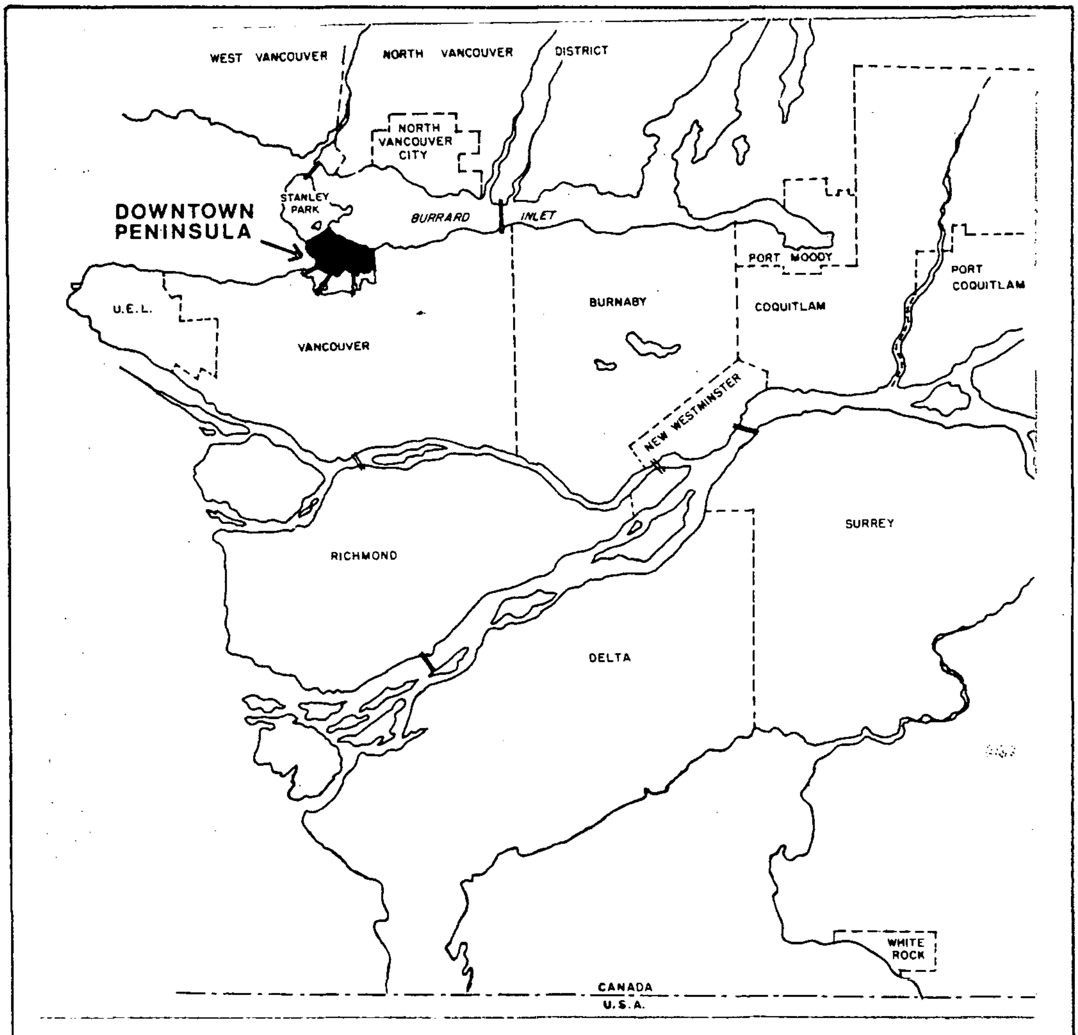

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FIGURE #1 VANCOUVER AND SURROUNDING AREA
SOURCE: City of Vancouver
SCALE 10 KM

Efficient traffic movement into the downtown area is hampered by three factors. Firstly, the Vancouver central business district is not located in the geographic centre of the region. Secondly, it is located on a peninsula, and the bridges to it tend to concentrate traffic to a few major arterials. Lastly, the difficult access is reinforced by the lack of freeways in Vancouver.

Since the 1960s, Vancouver's citizens have been actively involved in transportation decision making, particularly with respect to freeways. Numerous studies, public meetings and hearings became clearly focussed in 1967 and 1968 when citizens protested the Third Crossing of Burrard Inlet, the downtown freeway alignment through Gastown, and the Georgia viaduct alignment through Chinatown.[1]

Vancouver's first neighborhood traffic management plan was implemented in the West End in 1974-75, although some traffic management devices were installed as a part of neighborhood improvement programs earlier. The three neighborhoods serving as case studies complete those plans implemented. Other plans are currently being developed in Grandview-Woodland, Mount Pleasant and Strathcona, all inner city neighborhoods.

GOALS FOR VANCOUVER

Between 1978 and 1980 the Vancouver City Planning Commission collected the opinions of the residents of Vancouver resulting in the Goals for Vancouver document which was given City support. Of interest are the following goals:

1) "to support efforts to generally reduce, buffer or mask the unwanted noises of the city;
2) to support the development of individual character and identification for neighborhoods of Vancouver:

3) to improve automobile circulation in the city by the management of existing facilities, rather than the development of new roads, widening of existing roads,etc;

4) to improve the pedestrian environment in all parts of the city and plan for its enhancement.....

5) to promote the opportunity for resident involvement in the future of Vancouver and its neighborhoods....

6) to manage growth and change so as to ensure a high quality of life for all citizens of Vancouver ...." 2

A current document dealing with growth and its consequences for housing, employment, environment and transportation is the Vancouver Plan. This Plan views transportation as one of Vancouver's most important and costly public services, and discusses the City's goals to accommodate increasing travel demand, reduce congestion, and protect residential neighborhoods.

The Vancouver Plan projects increased peak period travel which will be difficult to accommodate with existing levels of street and transit facilities. It proposes the development of a capital investment plan for transportation facilities and the establishment of a downtown parking policy as interim measures to accommodate increased travel demand. Other interim measures to derive additional capacity from the existing transportation system are the construction of left-turn bays at critical intersections and the computerization of traffic signals.

The Plan recognizes the neighborhood livability - commuter access problem as an area of civic dispute requiring further study and the development of alternatives.

CIVIC STRUCTURES

At the time of the earliest neighborhood traffic management plan discussed in this study (1979), the City of Vancouver had been actively involved in local area planning programs for approximately six years. Planners and politicians had experience in citizen participation and a structure and method for local area planning had been developed. The type and extent of citizen participation, the role of the local area planning committee and its relationship to the civic bureaucracy was defined. This recognized the importance of citizen participation, clarified and legitimized the process, and gave support to the plan.

None of these characteristics applied to the neighborhood traffic management planning processes investigated. There was no recognized structure or method to follow to ensure representation and an open and public process, no civic staff support or expertise, no channels of communication between neighborhood and civic representatives and no accepted means to build civic support. Although benefitting from experience gained from local area planning processes, the neighborhood traffic management committees developed and promoted the traffic plans relatively independently of City Hall.

CASE STUDY FORMAT

The profiles of the three neighborhoods selected discuss the land uses in the area, existing plans and zoning, and briefly describe the evolution of the NTM plan. The background information forms a context for the discussion of the people and process and the traffic characteristics which follow.

The map on the following page depicts the location of the three case study NTM plans in Vancouver.

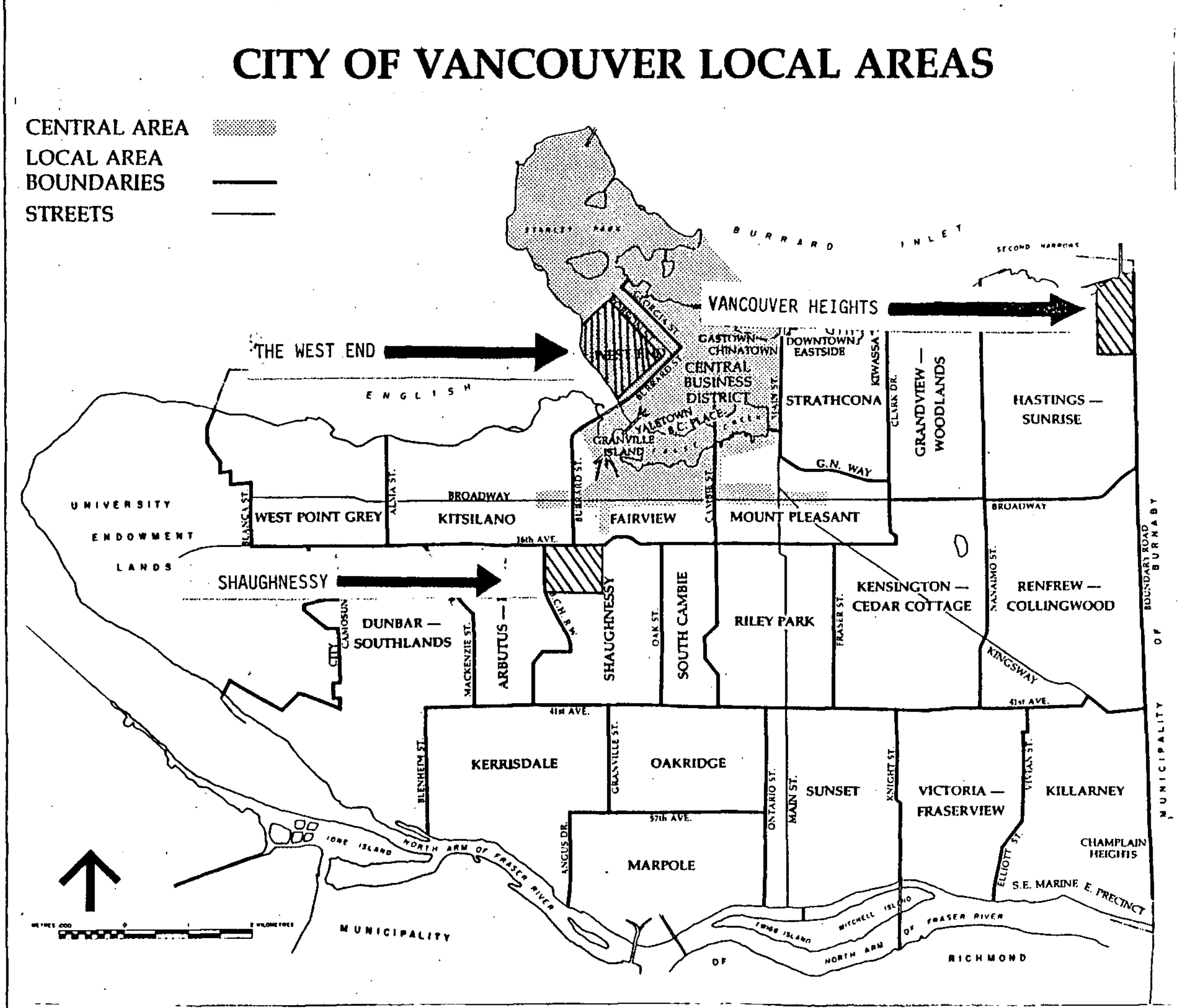

FIGURE #2 LOCATION OF NTM CASE STUDIES IN THE CITY OF VANCOUVER

SOURCE: City of Vancouver

SCALE 1 2 3 km

N

SHAUGHNESSY

INTRODUCTION

Shaughnessy is a prestigious residential area located close to Vancouver's central business district. Its exclusive nature was established in the early 1900s when large homes were constructed on large, irregular shaped lots, and maintained over the decades by citizen action intent on preserving the single family nature of the area and the exclusive type of development.[3]

LAND USES

Shaughnessy remains a very low density, single family residential neighborhood. The average lot size exceeds $1500m^2$.[4] However, approximately ten per cent of all dwellings are multi-family dwellings and two per cent are institutional dwellings for the elderly, physically and mentally handicapped.[5]

Shaughnessy streets are wide, ranging in width from twenty to thirty metres and are lined with mature trees. The widest streets are divided by tree lined boulevards. On street parking is minimized through the provision of generous on-site parking for each dwelling unit.[6]

EXISTING PLANS

Through the efforts of the Shaughnessy Heights Property Owners Association, the First Shaughnessy Planning Study Working Committee was established and recognized by City Council in July 1979.[7] The committee was structured to ensure representation of a cross section of Shaughnessy interests, and with the support of city staff, produced the First Shaughnessy Official Development Plan, Background Report, and

First Shaughnessy Design Guidelines. These documents were adopted by City Council in May 1982. The Official Development Plan provides goals and direction with respect to heritage considerations, housing, traffic circulation, community services and community involvement. It includes as one of its goal statements "to discourage commuter and through traffic in First Shaughnessy".[8]

The Background Report identifies the specific locations of the through traffic problem, discusses traffic volumes, and outlines resident dissatisfaction with measures implemented to date. It also recognizes that commuter through traffic occurs as arterials become congested, and that in the long term, arterial improvements, as well as rapid transit will be required to preserve quiet and safe streets.

ZONING

The RS-4 district schedule applies to the entire case study area; its intent is to maintain existing area characteristics such as single family residences on large lots, as well as to permit new single family development compatible in density, scale and lot size.

EVOLUTION OF THE NEIGHBORHOOD TRAFFIC MANAGEMENT SCHEME

The portion of Shaughnessy in which the neighborhood traffic management plan was implemented is surrounded by the heavily trafficked arterials of Granville, Arbutus, 16th and King Edward Avenues. It lies at the southern terminus of a major bridge crossing and arterial street. Earlier street plans included a proposal for a major connector linking the Burrard Street Bridge and another major arterial, but the construction of this connector was formally abandoned in 1975. Lacking an arterial connection to other north-south arterials, motorists began shortcutting through residential streets to avoid both congestion and left turn delays. In response to numerous complaints from Shaughnessy residents, the City of Vancouver Engineering Department undertook a study of traffic conditions in the area in August 1980.

At the same time, a group of residents becoming increasingly aware of the effects of through traffic on their neighborhood formed the Pro-Traffic Controls Committee. The goal of the Committee was basically to reduce through traffic and preserve a safe and quiet neighborhood. The Committee's primary area of concern was the case study area; the larger area considered extended south to 41st Avenue.

A neighborhood traffic plan was approved by City Council in September 1980, based on input from the Shaughnessy residents and the Engineering Department study. The plan included a number of diverters to restrain through traffic -- their installation being subject to a favorable response of area residents.

Numerous measures were also recommended for the arterials surrounding Shaughnessy to accommodate the increased traffic volumes resulting from the diverted traffic.

The survey included all residents living in close proximity to the proposed measures; the result was 72% in favor of the plan.[9]

In July 1981, Council unanimously approved the implementation of the neighborhood traffic plan for a trial period of six months, as well as the implementation of three arterial improvements. The temporary diverters were installed in December 1981 and were perceived to reduce the amount of non-local traffic using the local streets by forcing drivers to remain on Granville and Arbutus when travelling between 16th and King Edward Avenues.

An opposition group was formed in January 1982; its goal was to ensure equal access to city streets to all city residents. In February 1982 the Mayor and the City Engineer met with representatives of the two groups and agreed to reduce the trial period to four months. A report was requested from the City Engineer on alternatives to diverters; he reported that:

> "any neighborhood traffic plan can only succeed if there is an adequate arterial network for through traffic to be diverted to. In the case of northwest Shaughnessy, the adjoining arterials are congested and the barriers appear to have worsened this condition." 10

The engineering study was directed at three specific areas, to be implemented in a comprehensive and co-ordinated manner:

1) short-term arterial improvements;

2) long-term arterial improvements;

3) a local street plan -- based on a plan submitted by the area residents, called the 'compromise plan'.

The compromise plan replaced the diverters with less restrictive measures: traffic circles, traffic islands, partial diverters and signage. It was adopted by Council on March 23, 1982.

Despite a highly organized and vocal opposition, the permanent measures, as depicted on the following page, were installed in June 1982. The Pro-Traffic Controls Committee distributed a brochure to all Shaughnessy residents discussing the traffic problem and chosen solution. The brochure stated "City Council has acted to preserve the residential quality of life -- isn't this something you support?"

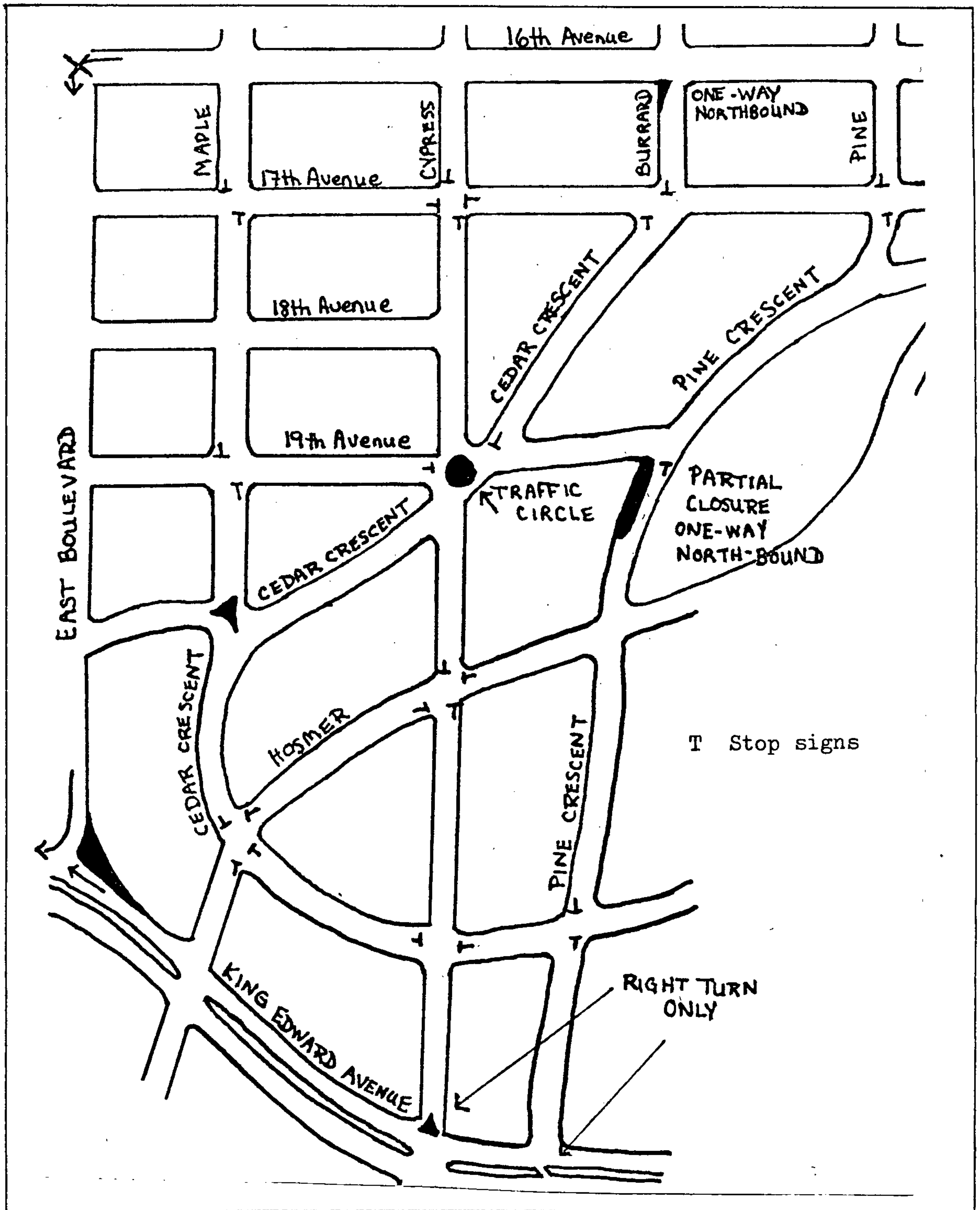

FIGURE #3 SHAUGHNESSY NEIGHBORHOOD TRAFFIC MANAGEMENT PLAN

SOURCE: City of Vancouver
SCALE 1" ÷ 400' 400 800

VANCOUVER HEIGHTS

INTRODUCTION

Vancouver Heights is located in the northeast corner of the Hastings-Sunrise community, as well as in the northeast corner of Vancouver. The case study area is bounded by Cassiar Street, Hastings Street, Boundary Road and Burrard Inlet.

LAND USES

Vancouver Heights is a well established single family residential neighborhood offering excellent views of the harbour and the north shore mountains. The area has a traditional grid street pattern and slopes steeply to the west. Its location adjacent to the Pacific National Exhibition site also contribute to seasonal traffic and parking problems.

Both Cassiar and Hastings Streets are arterials. Hastings Street has assorted retail uses. The area has no park space.

EXISTING PLANS

The Hastings-Sunrise Local Area Plan was adopted by Vancouver City Council in May 1985 after a five year long local area planning process. The intent of the plan is to maintain and improve the livability of the Hastings-Sunrise community. It identifies the following objectives:

1) to protect local residential streets from through traffic through street modifications;[11]
2) to improve the livability of the area adjacent to Cassiar Street by developing a freeway connection which will mitigate local impacts;[12]
3) to improve arterial traffic flow by street and intersection

improvements;[13]

4) to improve pedestrian crossing facilities.[14]

ZONING

The majority of land in the Vancouver Heights area is zoned RS-1, indicating single-family dwellings, and the preservation of the single family character of the area. The commercial development along Hastings Street is zoned C2, providing for a wide range of retail and service operations.

EVOLUTION OF THE NEIGHBORHOOD TRAFFIC MANAGEMENT SCHEME

Traffic has been a problem in the Vancouver Heights neighborhood since the early 1960s when the Second Narrows Bridge and the Trans-Canada Highway were completed without a freeway connector. Cassiar Street acts as the missing link in the Trans-Canada Highway and is the most heavily trafficked arterial in Vancouver, carrying approximately 60,000 vehicles per day (vpd).[15]

The major constraint to the efficient movement of traffic in this corridor is the Cassiar and Hastings intersection. The congestion and traffic delays resulted in the diversion of traffic onto local streets, in an effort to bypass the intersection entirely. Congestion also resulted in a greater than average number of accidents -- this was also observed on those local streets used by through traffic.

Approximately 60% of Cassiar Street traffic moves directly from the Second Narrows Bridge to the Trans-Canada Highway and vice versa.[16] Traffic on Cassiar Street continues to increase by 5 - 6% annually, much higher than the norm of 2% per annum.[17]

Cassiar is also a major truck route and leads to the only bridge crossing available in Vancouver; it carries approximately 1000 heavy trucks (three axles or more) in a ten hour day.

The long term nature of this problem led to safety and arterial improvements in the 1970s, however, the continual increase in traffic rendered the improvements inadequate.

The Cambridge loop -- a circular ramp to carry southbound bridge traffic directly onto the Cambridge overpass was also proposed as an interim measure to increase traffic efficiency and reduce neighborhood impacts. The City Engineering department conducted a study and prepared a report which was presented to Council in June 1979.

In the month prior to this presentation, the Vancouver Heights Citizens Committee (VHCC) was formed, and a public meeting to discuss the Cambridge loop was held. The general goal of the VHCC was to preserve the quality of life in the area by protecting the neighborhood from a perceived traffic problem comprised of excessive traffic volumes on residential streets, speeding and through-traffic. The group's short term goal was the implementation of traffic control measures to eliminate traffic and associated problems within the Vancouver Heights neighborhood. The longer term goal was to seek a resolution of both the neighborhoods' concerns and those of the commuter. The group's major area of concern was in the area forming the case study; their secondary focus extended east into Burnaby.

The VHCC also met with the City Manager to discuss their concerns and were advised to send a delegation to Council. The Committee studied the report prepared by the Engineering department, and was successful in defeating the loop proposal by arguing that the decision to construct the loop was made without neighborhood input and did not consider neighborhood impacts: locating a freeway off-ramp in a residential neighborhood was unacceptable. The group also urged the negotiation of a long-term solution with the province.

The high cost of the long term solutions developed by the province, as well as the need for provincial co-operation resulted in the VHCC continuing to meet over the summer of 1979 to develop a set of interim measures which would more effectively reduce through traffic while a long term solution was developed. The Committee proposal involved two basic sets of measures:

1) the installation of barricades on all local streets abutting onto Cassiar, as well as on the Cambridge overpass and on Skeena Street;
2) modifications to the Hastings-Cassiar intersection involving the addition of a second left turn lane north and southbound Cassiar onto Hastings, and increased left turn signal time.

The City Engineering department felt that the modifications to the Hastings-Cassiar intersection suggested by the VHCC did not adequately increase intersection capacity to provide sufficient capacity for the traffic diverted from the closure of all six streets. The City Engineer also indicated that the closure of Cambridge Street and overpass and Skeena Street was inappropriate, the former being recognized as a through street and bus route, the latter as a provincial access road.

The disadvantages associated with the installation of barriers across each local street at Cassiar were also noted: steep slopes and narrow streets create difficulty in executing turns, and delays could arise in emergency access situations. The City Engineer promoted a traffic management plan comprised of selective diverters, turn restrictions and other signage combined with increased enforcement.

The analysis and concerns of various civic departments, and delegations were heard at a Council meeting on September 25, 1979. Council unanimously approved the installation of diverters for the Cambridge overpass and Skeena Street, and for all the local streets abutting onto Cassiar; improvements for the Cassiar-Hastings intersection were also approved.

Temporary closures were implemented in advance of the suggested improvements at the Hastings and Cassiar intersections and both residents and commuters complained about the resulting congestion. In addition, the provincial government promptly ordered the removal of the barriers on Cambridge and Skeena Streets, as those facilities were constructed by the Province and were registered as public highways under the Highways Act. This incident angered the VHCC for several reasons. They had recommended that the closure of Cambridge and Skeena be negotiated with the Provincial Ministry of Highways, and also that the barriers be installed in conjunction with the construction of capacity improvements, neither or which were done. The VHCC was also angered at the lack of preparation and adequate notice: signage was non-existent, not visible, or confusing. In addition, the barricades were installed without flashing lights to advise night-time motorists of their existence.

Discussions continued at the neighborhood level through the VHCC, the Burnaby Heights Citizens' Committee and the Hastings-Sunrise Citizens' Planning Committee. In July 1981, City Council approved in principle, the use of gates to restrict access to the Cambridge overpass and Skeena Street, during non-peak hours, subject to support from the majority of area residents.

The opinion poll was conducted in the fall of 1981 and the majority of respondents opposed the barricades citing reduced access, emergency access difficulties and the enforced use of already congested Cassiar and Hastings Streets as reasons.

Based on the survey results Council agreed not to proceed with the barriers and gates in the Vancouver Heights area, but to continue discussions with area residents regarding traffic disruptions in the neighborhood.

The traffic plan in Vancouver Heights is depicted on the following page.

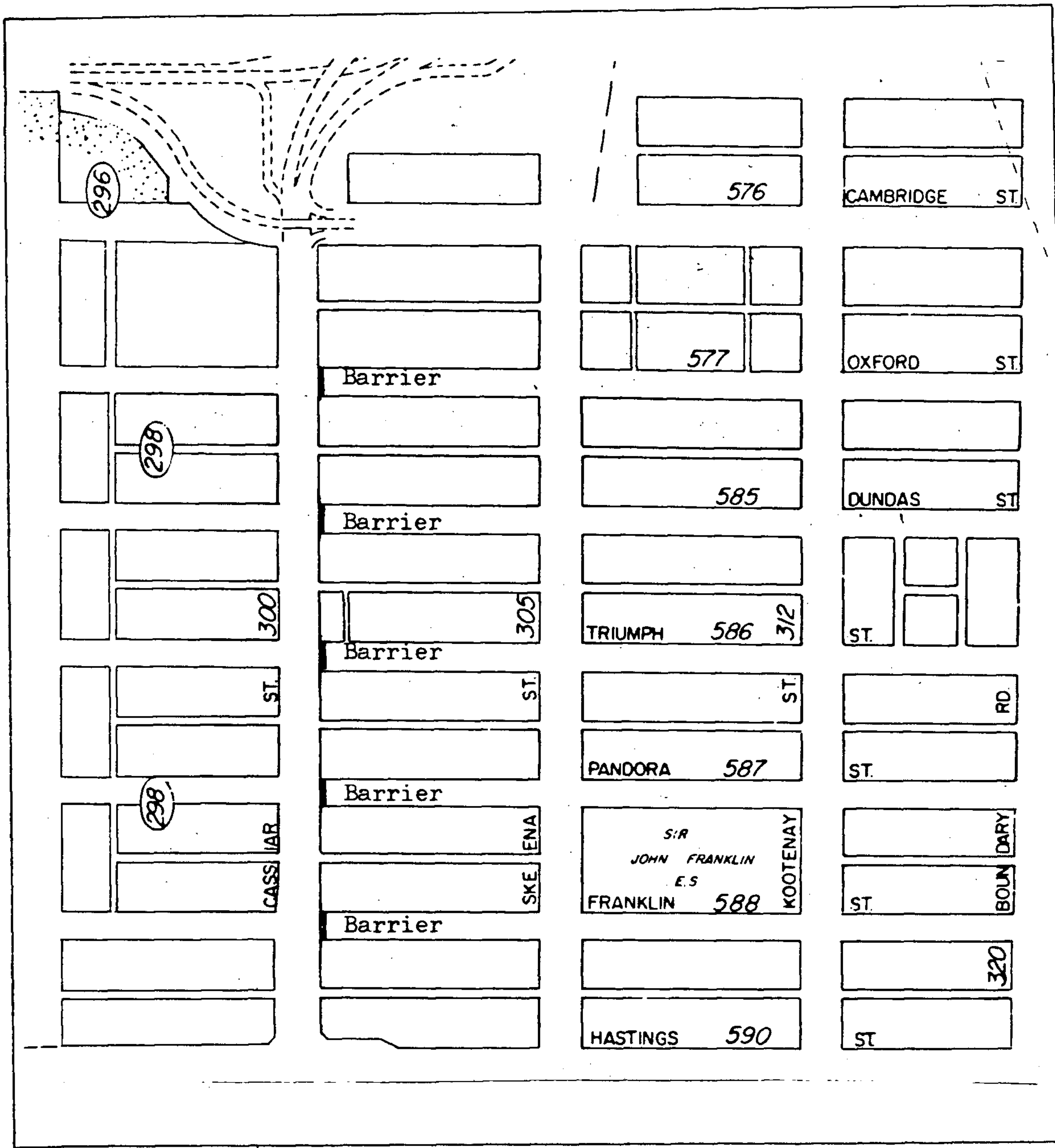

FIGURE #4 VANCOUVER HEIGHTS NEIGHBORHOOD TRAFFIC MANAGEMENT PLAN

SOURCE: City of Vancouver
SCALE 1"=400' 400 800

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THE WEST END

INTRODUCTION

The West End is located between Vancouver's central business district, the one thousand acre Stanley Park, and two inlets. Its location makes it both a high amenity neighborhood, and an area disrupted by diverse, often conflicting activities. The case study area boundaries are Robson Street, Thurlow Street, Beach Avenue and Denman Street.

LAND USES

The major land use in the West End is residential and various types of housing are available: single family, multi-family, walk-ups and high rises. The area also has several convenience sotres, commercial office space and public and institutional uses.

Generally low rise, small scale retail stores line Robson, Denman and Davie Streets, encircling the majority of the residential area included in this case study.

The West End is deficient in open space and park areas compared to other areas in Vancouver. Its higher land values have constrained the City's ability to meet this need. The area has a traditional grid street system.

EXISTING PLANS AND ZONING

A Local Area Planning program was conducted in the West End between 1973 - 1975 resulting in the West End Official Development Plan establishing the West End District zoning, and the West End Planning Policies.

The Official Development Plan applies to an area similar to that of the case study. Its intent is two fold: to ensure that

1) "high standards of design and development are maintained throughout the West End, and

2) the general environment of the West End is maintained as an attractive place in which to live or visit." 18

The Plan confirms the high density residential nature of the West End and allows for all types of residential uses in the area, as well as social, recreational and cultural uses of a non-commercial nature. It aims to recognize existing social and physical differences and to encourage a social mix and diversity of dwelling types.

Preservation and improvement of the West End as a desirable residential location, and the provision of opportunities for residents to participate in the planning and development of their local area are two of the overall policies identified as West End Planning Policies. With respect to transportation concerns, the following policy is important: to reduce through traffic and minimize its detrimental effect.

Other policies include preserving the existing diversity of West End residents, and retaining the character of existing West End neighborhoods. Commercial policies include promoting uses of interest to pedestrians and securing neighborhood input with respect to the establishment of convenience stores.

EVOLUTION OF THE NEIGHBORHOOD TRAFFIC MANAGEMENT PLAN

The West End has a lengthy history in neighborhood traffic management. A NTM plan known as Traffic Scheme 1 (TS1) was installed in the West End west of Denman Street in late 1974 and early 1975. At the same time, the City installed two diverters in the area east of Denman -- the case study area. TS1 was seen to enhance the livability of the area west of Denman and provided a positive example of the benefits of neighborhood traffic management controls.

In 1974, City Council also approved in principle Traffic Scheme 2 for the case study area, which aimed to reduce through traffic and minimize negative traffic-related impacts. The measures proposed were restrictive in nature and received only mediocre support of the area residents; the implementation of the scheme was delayed.

In June 1977, the West End Traffic Committee (WETC) was formed largely in response to a City initiated local improvement to repave and recurb one high traffic volume local street: Nelson Street. Area residents were opposed to the upgrading because it would result in both increased traffic volume and speed. Citizen action defeated the project and raised community awareness of the traffic conditions in the area.

The WETC has three major areas of concern: volume of traffic, speed of traffic and through traffic. Their goals were basically to work towards a livable, stable community in the West End, with safe, quiet streets, and to establish a well defined community identity and boundaries. They believed that traffic diversion was the key to achieving their goals. Their geographic area of concern extended from Chilco to Burrard Streets, Alberni to False Creek.

The WETC began to work towards traffic controls east of Denman Street and in April 1978, TS2 was reconsidered. The community was resurveyed to determine residents' opinions regarding the traffic plan. After a lengthy delay, in May 1980, at a Committee to Council meeting, the City Engineering department reported a low response rate of 8.2%, but responses generally in favor of the proposals:

- 56% in favor of traffic diverters east of Denman

- 61% in favor of mini-parks involving street closures

- 65% in favor of pedestrian paths

- 80% in favor of basic street improvements [19]

In June 1980, after hearing numerous delegations, Council agreed to approve, in principle, pedestrian pathways, traffic control devices and mini-parks for the area east of Denman Street. In July, in order to deal with the approved improvements on an individual basis, the West End Citizens Subcommittee was formed and seventeen West End groups were invited to participate. The West End Traffic Committee was the major force on this Subcommittee, which worked with staff from the City Engineering, Planning and Fire departments, and the Parks Board. An intensive citizen consultation process between July and September 1980 included a community walk to identify traffic problems, numerous sub-committee meetings and a general meeting with other West End interest groups to discuss location options for mini-parks and pedestrian pathways. Through these efforts, agreement was reached on the location of pedestrian pathways, and three options for mini-park locations were developed. Mini-park location was based on the following objectives:

- to reduce neighborhood open space deficiencies

- to discourage through traffic

- to maintain emergency and local access

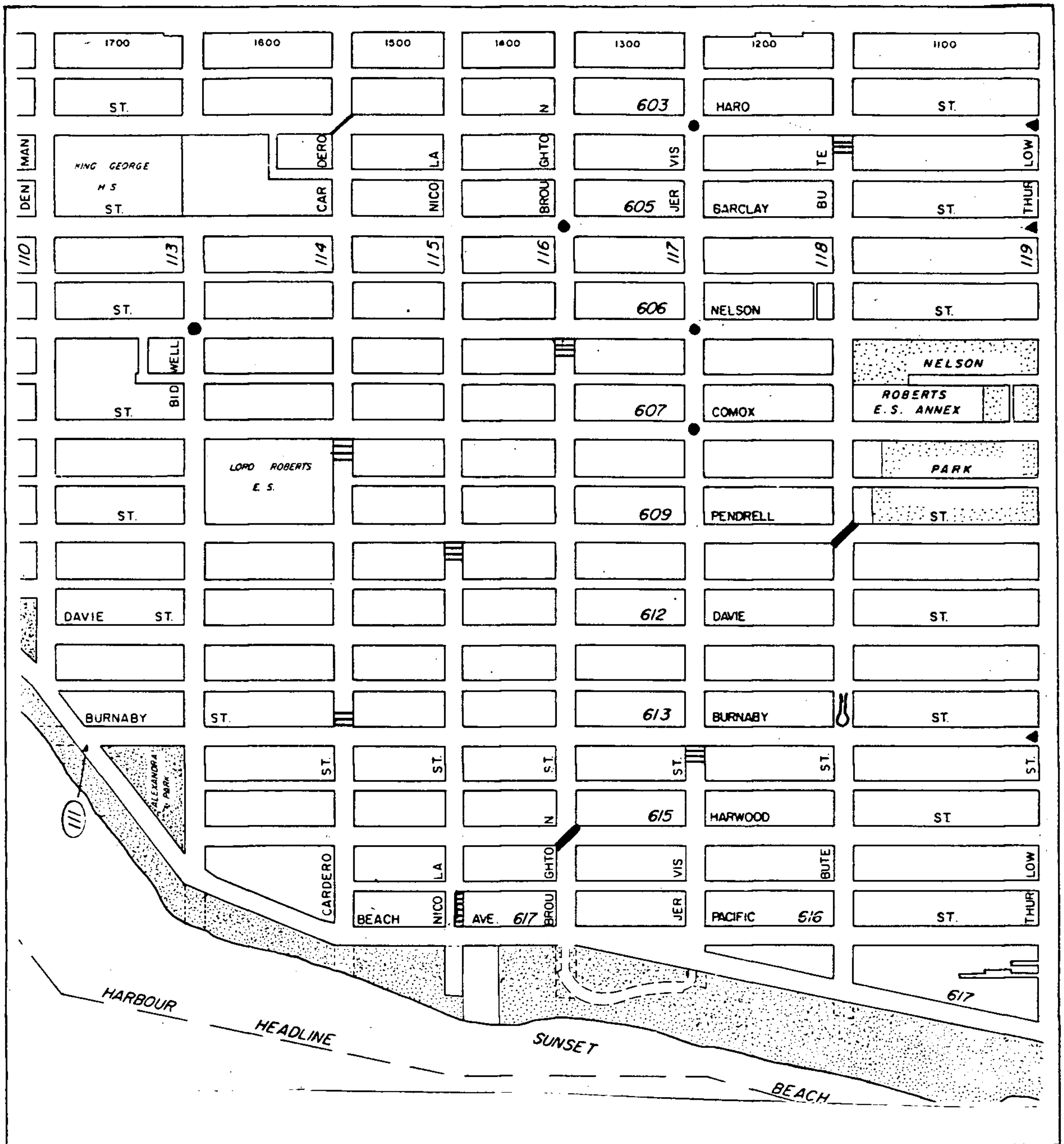
- to provide an equitable distribution throughout the area

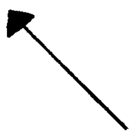
- to preserve mature trees

Each option included six mini-parks in areas identified as being deficient in park space and varied with respect to restriction of through traffic, local access and redistribution of traffic. Arterial improvements were not addressed as part of Traffic Scheme 2.

A public meeting was held in October 1980 and was attended by approximately 250 people. Over 60% of the delegations spoke in favor of the most restrictive option.[20] It was favored primarily because it offered protection from traffic to the entire community. At a November 1980 Council meeting, this option was approved.

In November 1981, temporary barriers were installed on the sites of five proposed mini-parks and two traffic diverters. Despite some resident objections, the permanent traffic plan was completed in late 1982. It is depicted on the following page.



 N	FIGURE #5 WEST END NEIGHBORHOOD TRAFFIC MANAGEMENT PLAN
	SOURCE: City of Vancouver SCALE 1'=600' 600 1200 SYMBOLS / Existing diverter / New diverter ≡ Mini-park ● Traffic circle ▲ Traffic island Cul-de-sac

CHAPTER FOUR

THE PEOPLE AND THE PROCESS

METHODS

In order to determine whether NTM planning addresses the concerns of citizens regarding automobile related externalities, an answer to the following question was sought: how well are citizens' concerns represented? More specifically, do NTM plans address the needs of the entire neighborhood, or those of the plan advocates?

The characteristics, activities and opinions of those advocating the NTM plan were examined to provide an indication of neighborhood opinions with regard to neighborhood traffic management. The implementation of the plans confirms that they passed the scrutiny of both the local residents and the civic officials, also indicating some degree of representativeness.

The following indicators were used to investigate the representativeness of the NTM planning process:

1) social characteristics of the committee members
2) goals, values of the plan, as developed by the committee members
3) residential location of the members
4) efforts made to ensure representation.

These indicators of representativeness will be used as a basis for analysis:

1) descriptive representation: the degree of congruence between the committee and the community on social characteristics;
2) substantive representation: the degree of congruence between the committee and the community with respect to goals and

and objectives for the development of the area;

3) geographical representation: all parts of the area represented by one or more committee members who reside in the area.

Comparison of the social characteristics of the community and the committee, and comparison of committee goals and objectives with those of other relevant community groups, as well as the identification of geographical representation will provide responses to the extent, location and nature of representation in the NTM planning process.

In addition, analysis of:

1) process indicators, including efforts undertaken at the community level to

   i) determine the existence of socio-economic and cultural groups in the area to be included in the planning process;

   ii) increase representation by using various citizen participation techniques;

   iii) influence representativeness by the timing, location and publicization of meetings

will determine whether efforts to ensure representation of community interests are adequate.

All characteristics of the participants were obtained through interviews with group leaders; these are compared to community characteristics obtained from the City of Vancouver document Vancouver Local Areas 1971-1981. Although these statistics represent an entire local planning area, of which each case study forms only a portion, the statistics will be assumed to apply equally well to the portion of the local area being studied.

SOCIAL CHARACTERISTICS

In all three cases, the number of residents involved is too small to make a comparison statistically significant. A comparison will be made, however, to provide an indication of how similar the participants in NTM planning are to the other area residents.

The number of members in each group is presented below:

Shaughnessy	7 core group members, 23 in total
Vancouver Heights	6 core group members
West End	7 core group members

The graphs on the following pages indicate the distributions for age, education, and length of residence in the area, by case study.

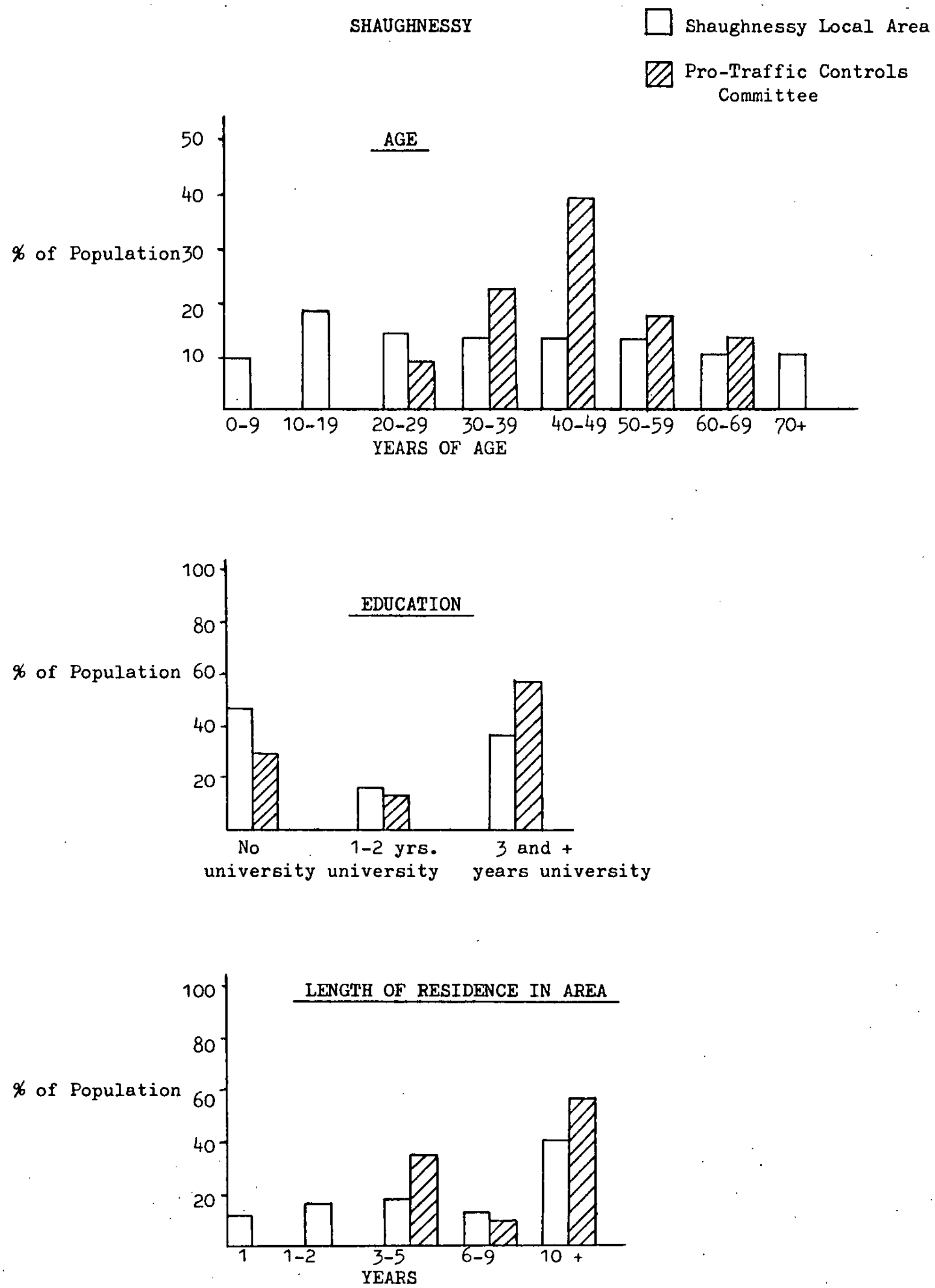


TABLE #1 SOCIAL CHARACTERISTICS OF SHAUGHNESSY LOCAL AREA AND PRO-TRAFFIC CONTROLS COMMITTEE MEMBERS

SOURCE: Vancouver Local Areas 1971-1981; personal interview with PTCC representative.

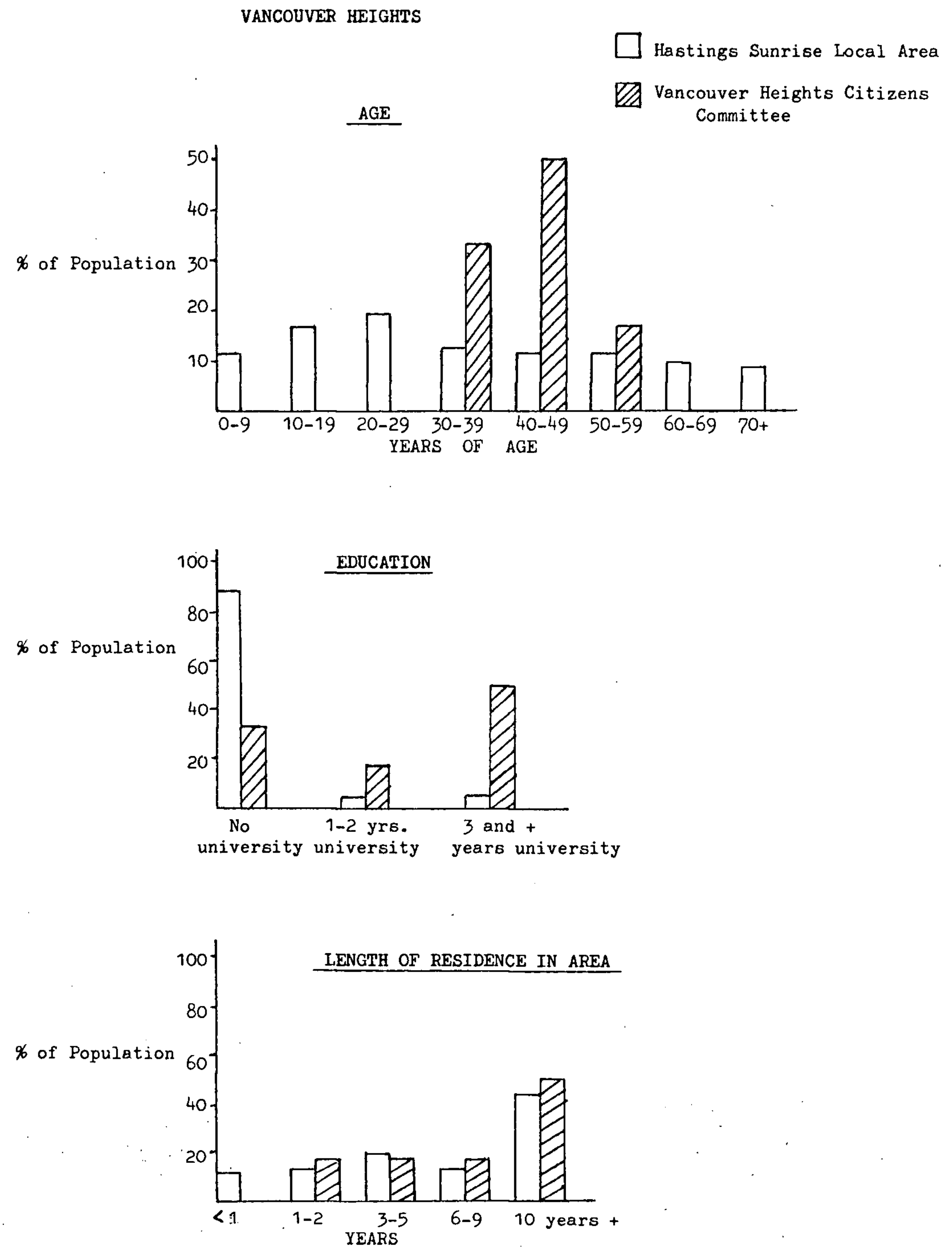


TABLE #2 SOCIAL CHARACTERISTICS OF VANCOUVER HEIGHTS LOCAL AREA AND VHCC MEMBERS

SOURCE: Vancouver Local Areas 1971-1981; personal interview with VHCC representative.

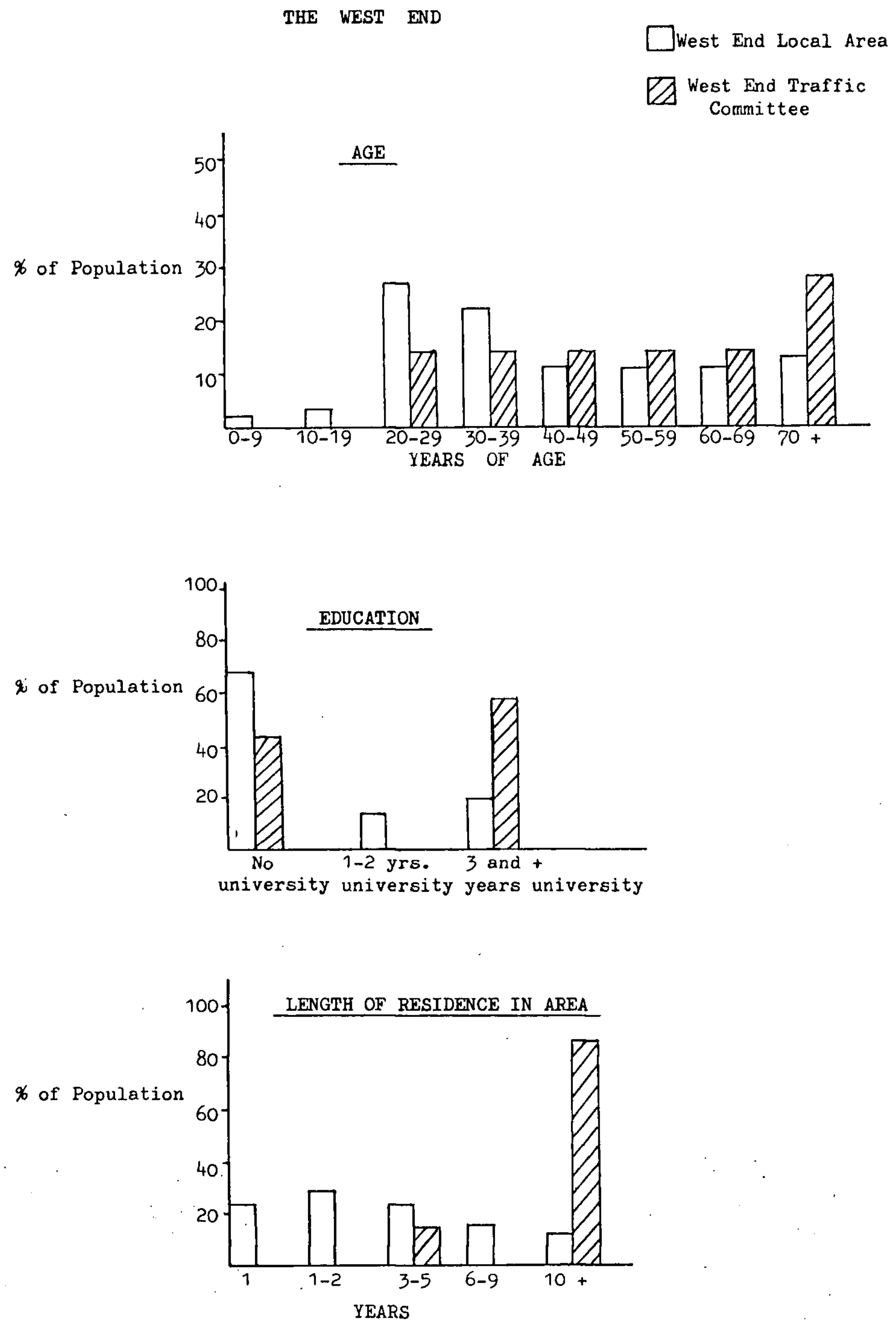


TABLE #3 SOCIAL CHARACTERISTICS OF WEST END LOCAL AREA AND WEST END TRAFFIC COMMITTEE MEMBERS

SOURCE: Vancouver Local Areas 1971-1981; personal interview with WETC representative

Both Shaughnessy and the West End have a wide range in the ages of participants; the West End has strong senior citizen representation. Vancouver Heights has a narrow age range. With respect to the remaining variables, in general, the participants in all three groups were better educated and resided in the area longer than other area residents. Shaughnessy's participants reflect the community most with regard to education and length of residence; the West End participants reflect their community least on these two variables.

The stronger participation of older residents in Vancouver Heights and Shaughnessy is not surprising. It is more expensive to live in these better quality, single family neighborhoods, and income is generally related to both age and education. These cases suggest that neighborhood traffic management planning participants have a 'stake' in their neighborhood, and may be participating to ensure that their quality of life is maintained.

RESIDENTIAL LOCATION

The maps on the following pages illustrate the residential location of the group members.

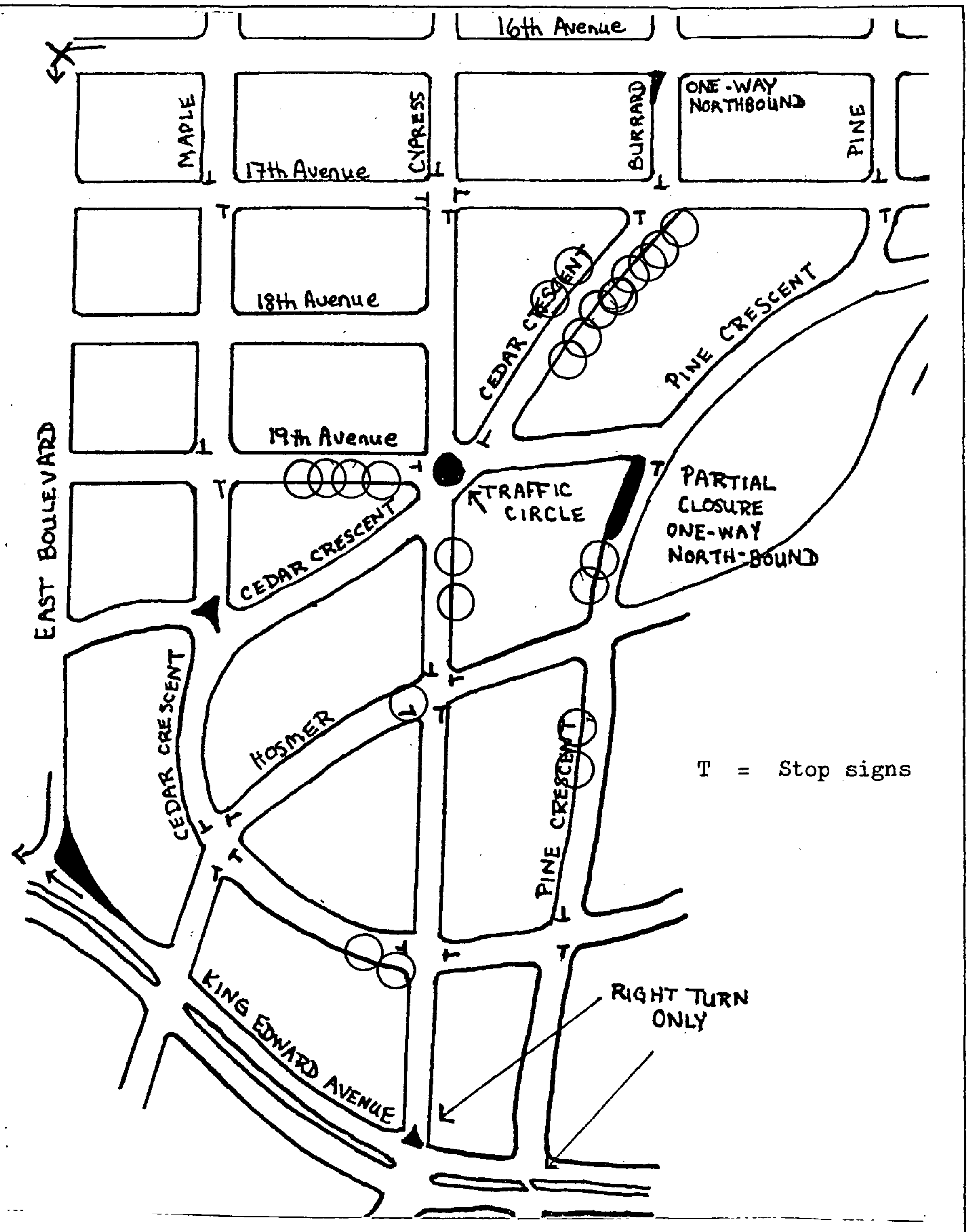


FIGURE #6 RESIDENTIAL LOCATION OF PRO-TRAFFIC CONTROLS COMMITTEE MEMBERS

SOURCE: City of Vancouver
SCALE 1" = 400' 400 800

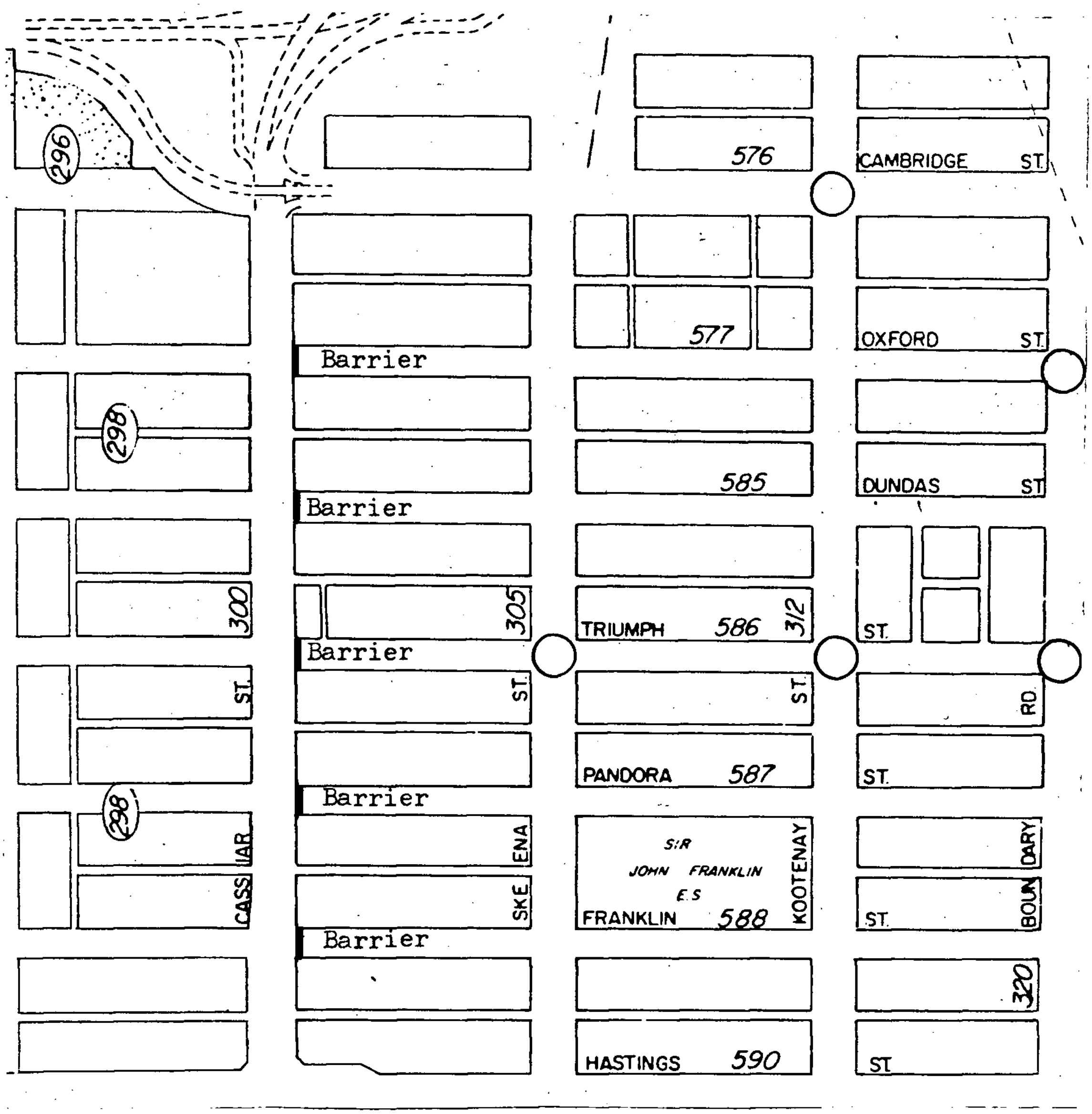


FIGURE #7 RESIDENTIAL LOCATION OF VANCOUVER
○ HEIGHTS CITIZENS COMMITTEE MEMBERS

SOURCE: City of Vancouver
SCALE 1"=400' 400 800

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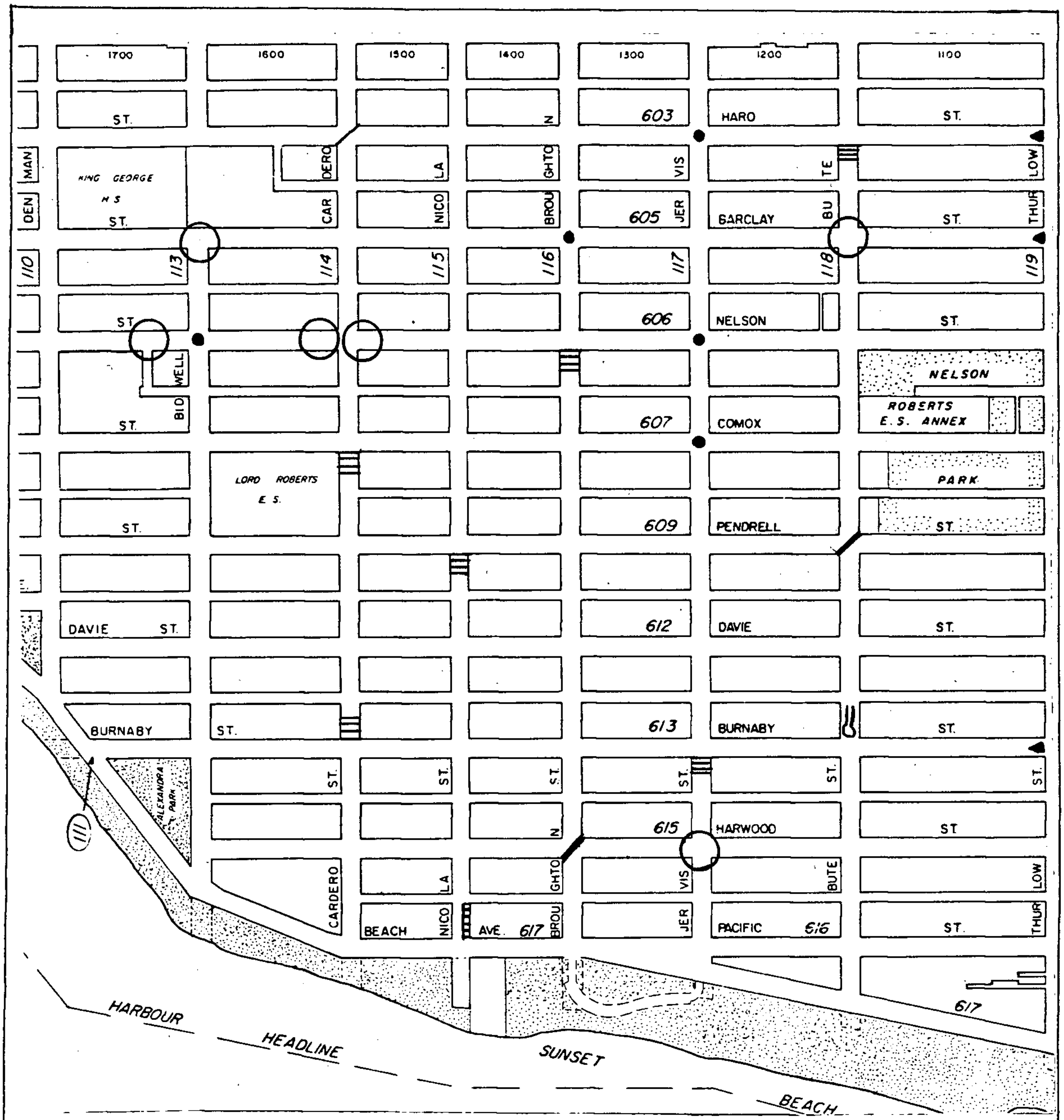

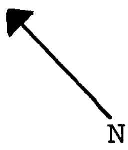

FIGURE #8 RESIDENTIAL LOCATION OF WEST END TRAFFIC COMMITTEE MEMBERS O

SOURCE: City of Vancouver
SCALE 1"=600' 600 1200
SYMBOLS
/ Existing diverter
/ New diverter
≡ Mini-park
● Traffic circle
▲ Traffic island
Cul-de-sac

Traffic control devices were installed within one block of the great majority of Shaughnessy participants, and all participants reside on streets which had high traffic volumes. With the exception of one Vancouver Heights Citizens' Committee member who resided in Burnaby (and liaised with the Burnaby Heights Citizens' Committee), the same holds for Vancouver Heights.

In the West End, many members resided on Nelson Street, which was and still is perceived as a street with excessive traffic flows. As in Vancouver Heights, one member resided outside the case study area. In contrast with the other two areas, the West End NTM plan appears to have more coverage, better distributed throughout the entire area.

THE PROCESS

In order to define the problem, develop a plan and obtain community support for it, the groups undertook numerous activities.

ACTIVITIES OF THE SHAUGHNESSY PTCC

This small neighborhood group met as required between mid 1980 and 1982. Group meetings were not formally publicized but arranged by telephone with members calling each other, as well as inviting other residents of the area when discussions specific to the area were to occur. Other activities included door to door petitioning, attending meetings with Council members, and sending delegations to Council and Committees of Council.

There was moderate interaction between the PTCC and representatives of the City Engineering department in the development of solutions to the traffic problems, but little interaction with City Planning department representatives. It was noted that extensive Planning department involvement was present in the development of the First Shaughnessy Official Development Plan, where the traffic problem was discussed and formally recognized by Council.

In terms of interaction with other neighborhood groups, the PTCC liaised with the SHPOA and kept this Association apprised of its activities. The SHPOA supported the goals and the activities of the Committee. The PTCC also promoted its viewpoint with known members of the opposition Ban the Barriers group residing in proximity to the proposed solutions.

Following the installation of the traffic control devices, the Committee circulated a brochure outlining the evolution of the plan and illustrating closures and alternate routes.

ACTIVITIES OF THE VANCOUVER HEIGHTS CITIZENS' COMMITTEE

The VHCC, a small neighborhood committee, held meetings in members' homes or at the community school in the evenings on an as required basis. Although the public meetings were publicized by flyers dropped to homes, the majority of meetings were arranged by telephone. One group member worked for a local newspaper and wrote an article on the barricades in the Vancouver Heights neighborhood. A blockade conducted received extensive media coverage.

The VHCC had considerable interaction with their liaison Alderperson, and noted that this was a positive way of keeping the politicians informed of their activities. The group also made a presentation to the B.C. Minister of Highways, the Mayors of Vancouver, West Vancouver, North Vancouver, the District of North Vancouver, Burnaby, and two Vancouver alderpersons.

With respect to liaison with other groups, the VHCC liaised with the Burnaby Heights Citizens' Committee and the Hastings Sunrise Citizens' Planning Committee. The Burnaby Heights Citizens' Committee was formed approximately the same time as the VHCC and for the same reason. These two groups worked closely together. The VHCC kept the Hastings-Sunrise Committee apprised of their activities and received their support, but these groups worked independently of each other.

There was no direct involvement with the City Planning department, apart from communication through the Hastings-Sunrise group; numerous meetings occurred between the VHCC and the City Engineering department.

As only the measures approved in September 1979 were implemented, the public profile of this group was limited to a short period of time, although it continued to meet into 1983.

ACTIVITIES OF THE WEST END TRAFFIC COMMITTEE

The WETC was initially comprised of eighteen people -- area residents and representatives of West End organizations. A core group of seven evolved and this number remained stable over the five years this Committee was active, despite annual notification of each of the former members. A list of approximately two hundred fifty names of supporters was developed through WETC activities, with fifty to one hundred of these participating when requested.

The WETC met the first and third Monday evenings of each month at a neighborhood house located at the corner of Nelson and Bidwell Streets. Many of the meetings were publicized in the West Ender, a local newspaper.

Other activities included:

- delivering informational flyers
- conducting protest marches
- writing and submitting briefs to City Council and Committees of Council
- placing advertisements in the local newspaper
- writing over forty letters and articles for the local newspaper
- conducting traffic and pedestrian counts
- conducting public meetings
- polling local mayoralty and aldermanic candidates for their position on NTM planning
- appearing on thirty to fifty hours of community television promoting TS 2
- liaison with City Planning and Engineering department staff

The Chairperson of the WETC noted that the extensive publicization and media activity was to ensure public awareness and to prevent allegations of secretive activities.

ANALYSIS

To enable comparison among groups, a table has been developed. The minus signs indicate that the activity was not undertaken;plus signs indicate that the activity was engaged in, with more than one plus sign indicating greater emphasis on the activity or the use of numerous approaches to accomplish this activity.

PROCESS INDICATORS	PTCC	VHCC	WETC
1) identification of groups	-	-	++
2) use of various citizen participation techniques	-	+	++
3) publicization of committee meetings	-	-	++
4) publicization of public meetings	-	+	++
5) timing/location of meetings	-	-	+
6) interaction with other community groups	+	+	++
7) interaction with civic staff/officials	+	++	+
8) use of media, public communication	+	++	+++

TABLE #4 ACTIVITIES IN GROUP PLANNING PROCESSES

SOURCE: Personal interviews with group representatives

The WETC did the most of the three groups to increase community awareness of and participation in the preparation of the NTM plan. The VHCC has a mixed record; the Shaughnessy PTCC did not make any attempts to increase participation, and prepared and distributed a brochure on the problem and the solution only after the NTM plan was implemented. However, the opposition group worked diligently to secure continued media coverage, ensuring that both the neighborhood and the city was aware of the problem.

COMMITTEE PERCEPTIONS ON THE PROCESS AND THE PLAN

Committee members interviewed were also questioned regarding their perceptions of the process, the role of the City, and the implemented NTM plan. These questions were included to provide subjective information on the individual NTM planning processes, the perceived effectiveness of the NTM plan in addressing neighborhood concerns, and the perceptions of the role of civic staff and officials. This subjective information is intended to complement the objective information: the process indicators, traffic counts and civic policies and guidelines, or lack thereof.

SHAUGHNESSY - PERCEPTIONS OF THE PTCC

1) Neighborhood Traffic Management Planning Process

The PTCC stated that the role of a local government should be to accept responsibility for livability concerns and address these concerns. The ad hoc approach to NTM was deemed inadequate in the long term, and unsuitable for neighborhoods adjacent to arterial streets. The Chair-person indicated that longer term transportation planning had not been adequate to ensure that sufficient arterial capacity existed to prevent traffic filtration through neighborhoods.

It was also suggested that the City be divided into neighborhood units (smaller than the current local area planning areas) and as problems arise or are anticipated, planning for neighborhood needs in conjunction with planning for arterial capacities, should occur.

2) Implemented Neighborhood Traffic Management Plan

The initial plan, comprised of diverters was not viewed as the optimal solution by the Committee, but was seen as a first attempt at solving a difficult problem. The Committee recognized that the diverters completely obstructed traffic and were antagonistic to many motorists. The installation of the diverters in advance of improvements to the arterial streets compounded this antagonism.

The reduction of the trial period to four months from six was supported by the Committee and the compromise plan was felt to be a more appropriate solution.

The residents in the case study area have adjusted to the plan, and the traffic control devices are perceived to have made an excellent improvement to the quality of life in the immediate area, despite some non-compliance. Improvements to signals at adjacent intersections are now in place and delay and congestion is perceived to be minor. Although some residents have been forced to alter their routes, this disruption is also perceived as minor, in contrast with major benefits to the overall community.

VANCOUVER HEIGHTS - PERCEPTIONS OF THE VHCC

1) Neighborhood Traffic Management Planning Process

This group indicated typical perceptions of the Planning and Engineering departments: the planners were seen to be responsive to the livability concerns of the neighborhood; the engineers focused on 'moving cars'. The Engineering department was also criticized for their emphasis on the quality of streets and sewers, rather than the quality of life. There was also general dissatisfaction with the City's inability to carry out its motions, as they were intended to be carried out.

The Chairperson noted the utility of the liaison alderperson and suggested that this be continued in all such neighborhood processes. It was also suggested that the lack of positive response from the City frustrated many citizens and that the City should undertake a survey to determine why those who participate stop participating. The Chairperson also stated that the needs of the taxpayer for a safe, livable environment should be a major concern for a local government and should not require citizen protest to force resolution of a long recognized problem.

2) Implemented Neighborhood Traffic Management Plan

The Chairperson stated that the barricades on Franklin, Pandora, Triumph, Oxford and Dundas had alleviated traffic conditions on these streets, yet was dissatisfied with the limited nature of these measures and their redistributive effects. The VHCC does not perceive a diminished traffic flow in the neighborhood -- the volume of through traffic remains unacceptably high and is now concentrated onto Cambridge and Skeena Streets. This group awaits a long term solution -- one of the Cassiar connector options, and hopes that the Vancouver Heights neighborhood can remain viable in the interim.

THE WEST END - PERCEPTIONS OF THE WETC

1) Neighborhood Traffic Management Planning Process

The WETC perceived a general lack of direction, commitment and understanding of neighborhood traffic management and traffic control devices on the part of the civic staff and elected representatives. The Chairperson noted that livability does not seem to be recognized by politicians as a legitimate neighborhood concern. A philosophy favoring greater neighborhood control of an area, based on qualitative as well as quantitative factors, was a suggested improvement to the process.

The Chairperson also indicated that the ad hoc nature of NTM planning detracts from both efficiency and effectiveness of transportation planning, but will not be replaced by longer term or overall transportation planning until greater leadership and action is displayed by elected officials. Reaction to neighborhood complaints was perceived as the current procedure.

A power division between the Planning and Engineering departments was described. The dominance of the Engineering department and their reliance on quantitative measures provides the elected representatives biased information. To balance this, very organized, vocal, citizens groups are required to put forth a qualitative, environmental position. It was suggested that citizens' involvement should be limited to providing neighborhood input, rather than developing and promoting plans.

2) Implemented Neighborhood Traffic Management Plan

Although the WETC perceives improvements with respect to traffic disruptions in the West End, it was indicated that the work was only partially complete. The efforts were halted in 1983, due both to group fatigue and the development of an anti-WETC group. However, this interlude was of a temporary nature. The group has identified the following areas requiring further work:

1) lane protection
2) protection of Burnaby, Comox, Nelson and Jervis Streets
3) downgrading of Denman, Robson, Davie and Beach Avenues, thereby reducing their traffic volumes.

The WETC met again in November 1985.

DISCUSSION OF CASES

The small sizes of the three groups studied provides only an indication of their representativeness of the community. With respect to social characteristics, the group members are generally better educated and has resided in the area longer than the community as a whole. When analyzing residential location, it appears that neighborhood traffic control devices were located in proximity to members homes in all cases. The purpose of citizen participation is to define problems in areas and develop solutions that are appropriate to both the problem and the area. As citizens residing close to a problem are both more likely to be aware of it and better able to develop solutions, many of the devices should naturally be located near participants.

Nevertheless, neighborhood traffic management plans generally require a combination of devices, and possibly strategies, and interaction with other neighborhood groups and civic staff help to identify these and incorporate them into an overall plan. All groups interacted with existing groups and civic staff and officials.

The amount of effort made to increase both awareness and representativeness varies. The Shaughnessy group perceived their problem as a neighborhood problem and did not see the need to involve others. Generally, this holds true for the Vancouver Heights group, although this group did use the media to raise awareness. The West End group defined their problem as one affecting the entire community and hence their emphasis on both a plan with complete community coverage, and the emphasis on community awareness and participation.

All groups perceived the ad hoc nature of NTM planning to be inadequate and all called for more civic action, direction and commitment. The groups all felt that neighborhood livability was a concern of a municipal government and called for long range transportation planning to be done in conjunction with NTM planning. Two of the groups indicated that greater emphasis should be given to neighborhood input.

CHAPTER FIVE

ANALYSIS OF TRAFFIC CONSIDERATIONS

INTRODUCTION

In order to provide objective information regarding the effectiveness of the implemented NTM plans and effects on adjacent arterials, this chapter will investigate the traffic plans implemented in the three case study areas.

In Vancouver, both physical and operational traffic control devices are used and applied at both the periphery of the neighborhood and within it. The City has developed a guideline for traffic volumes in residential neighborhoods. This guideline is 1000 vehicles per day (vpd) for single family areas and has been developed for Vancouver through years of experience with Vancouver neighborhoods. 1000 vpd appears to be the volume at which residents perceive traffic as being unsafe, noisy or disruptive. 3000 vpd is the guideline for multiple-unit dwelling areas. No similar guideline exists for lanes.

METHODS USED

Implementation of a neighborhood traffic management plan, if effective, should reduce traffic and related externalities in the neighborhood by forcing traffic back onto arterial streets. In order to investigate the occurrence of this, and any impacts it may have on the operational efficiency, traffic volumes within the neighborhood and at nearby arterial intersections were examined. Intersection counts were used rather than arterial counts because in urban areas, intersection capacity is the major factor limiting traffic flow on arterial streets. In an attempt to offset any difficulties at arterial intersections resulting from the redistribution of traffic, intersection improvements are often made in conjunction with the implementation of the NTM plan.

The City of Vancouver Engineering department conducts intersection counts during a.m. and p.m. peak periods. Due to the expense of manually collecting these counts, they are generally performed every two years for most arterial intersections. Traffic counts are conducted more frequently only if the intersection is under study, or the subject of complaint or controversy.

As each two hour peak period count represents only one sample of a possible 365, the counts are adjusted for day of week and time of year. This adjustment enables comparison between, for example, a Tuesday in February and a Friday in July. All counts are conducted on weekdays.

The counts are a compilation of movements at each leg of the intersection. The north leg figures represent traffic which is south bound when entering the intersection and will turn east or west, or continue southbound, as an example. Traffic counts by leg of intersection form the basis of this analysis.

As numerous factors influence both traffic volumes and routes used, the figures and analysis presented here can, at best, serve as an indication of the effects of the NTM plan. Unfortunately, no engineering studies have been undertaken by the City of Vancouver to determine the impact of NTM plans on the operational efficiency of nearby arterial intersections. The City has determined that the typical rate of increase of traffic volumes on arterial intersections in Vancouver is 2% per annum. This figure is important when examining the increases in intersection volumes over time.

For each intersection, the date of implementation of the NTM plan is given, as well as the dates of the before and after counts, to illustrate the amount of time both between counts and after implementation. As a six month period is considered the norm for traffic adjustment to routing changes, an ideal count period would be shortly before the implementation of the NTM plan, and approximately six months thereafter. Unfortunately, no such counts were available.

Arterial intersection counts, tabulated by intersection leg, were examined for:

1) change in traffic volume by leg
2) change in traffic volume by intersection
3) change in proportion of traffic volume carried by each leg

The latter tabulation was done to aid in depicting changes in traffic patterns. All supporting traffic count tables are in the Appendix.

SHAUGHNESSY

1) The Neighborhood Traffic Management Plan

Apart from the four arterials defining the case study area, the remainder of the streets are all local streets. The traffic controls implemented are:

- one traffic circle
- one traffic island (partial closure)
- five restricted entrances into the neighborhood
- numerous stop signs

The traffic circle is located at the intersection of six local streets and is intended to force drivers to reduce their speed. Stop signs placed on two of the local streets at the circle reinforce this effect. The traffic island located on Pine Crescent at 19th Avenue is designed to allow northbound traffic only, and also has a stop sign. These two measures combined with the generous use of Stop signs are designed to reduce traffic speed and increase safety in the neighborhood. The five restrictions to entry are located at the periphery of the neighborhood. These measures are intended to reduce the volume of traffic entering Shaughnessy -- a goal which the traffic counts indicate has been achieved.

The NTM plan implemented is depicted on the following page.

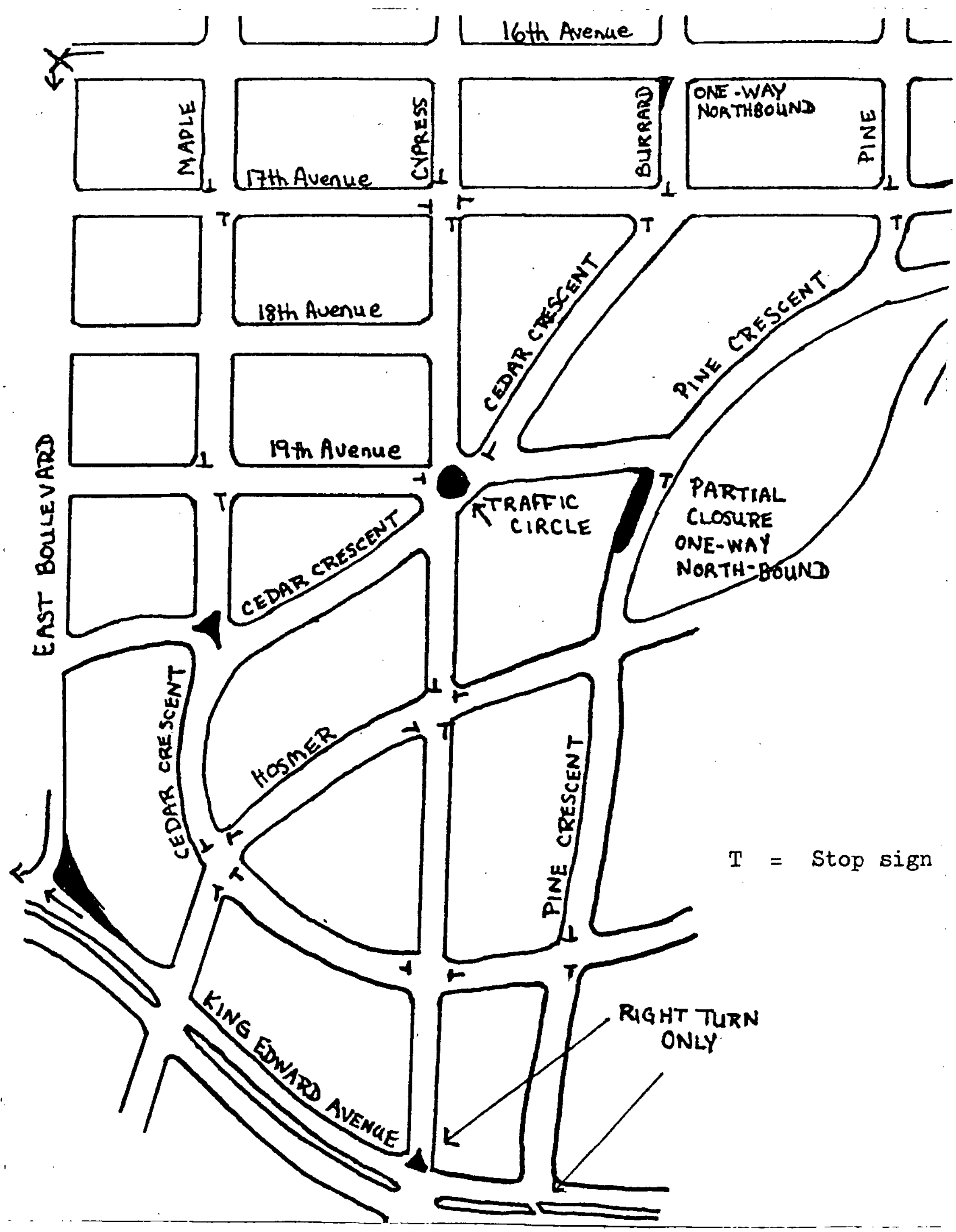

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FIGURE #9 SHAUGHNESSY NEIGHBORHOOD TRAFFIC MANAGEMENT PLAN

SOURCE: City of Vancouver
SCALE 1" = 400' 400' 800'

LOCATION	BEFORE Fall 1981	AFTER June 1982	% CHANGE
Maple N/of 18th	1034	834	-19
17th W/of Cypress	159	158	0
Cypress N/of Hosmer	4342*1	1334	-69
Cypress N/of 18th	135	817	+505
19th W/of Cypress	190	169	-11
Cypress N/of Matthews	4094	966	-76
Cedar Cres N/of 19th	4166	1007	-76
Pine N/of 17th	1764	1432 *2	-19
Pine Cres N/of Matthews	1239	504	-59
17th W/of Fir	428	308	-18
Pine Cres N/of Marpole	856	1075	+26
TOTAL	18407	8604	-53

*1 1980 figure
*2 incomplete count - 3 hours missing

TABLE #5 SHAUGHNESSY NEIGHBORHOOD TRAFFIC COUNTS
SOURCE: City of Vancouver Engineering Department

The counts indicate an overall reduction of traffic in the neighborhood by one-half. Before the implementation of the traffic control devices only four of the twelve streets had less traffic than the 1000 vpd guideline. After implementation seven local streets fell within this guideline, with two streets narrowly excluded. Only two streets gained traffic, one remaining within the 1000 vpd guideline, the other exceeding it slightly. Although the volumes on both of the streets which gained traffic are not large, they will be perceived, at least initially, due to the magnitude of the increase.

In sum, it appears that this NTM plan has been successful in reducing traffic volumes in the neighborhood, with minimal redistribution.

2) Arterial Intersections

Changes in some arterial intersection flow into the Shaughnessy area relate directly to the implementation of the NTM plan. They are easily visible for these reasons:

1) Shaughnessy's singular land use: residential -- there are no other uses in the area to attract motorists;
2) the NTM plan was designed to eliminate through traffic that was primarily northbound in the a.m. peak and southbound in the p.m. peak.

The following intersections were analyzed:

1) Burrard and 16th
2) Granville and 16th
3) Arbutus and 16th
4) Granville and King Edward
5) Arbutus and King Edward

Burrard and 16th, being closed completely to southbound traffic and restricted to northbound traffic was affected most directly, and warrants further discussion. With the introduction of a traffic island on the southside of Burrard Street at 16th, this intersection basically changed from a traditional four leg intersection to a T intersection. Southbound traffic was forced to turn east or west and continue the southbound journey on a nearby arterial.

Changes made on King Edward made access into Shaughnessy difficult, resulting in primarily local traffic entering Burrard Street at the Burrard and 16th Avenue intersection. This low level of northbound traffic facilitated the forced left turn movements of southbound traffic. In addition, a left turn advance signal was added at this intersection.

With the exception of the slight decreases in north and south bound vehicles, the proportions of traffic in each leg remained relatively constant.

Overall changes in a.m. and p.m. peak intersection volumes are indicated below:

	A.M.			P.M.			
INTERSECTION	BEFORE	AFTER	% CHANGE	BEFORE	AFTER	% CHANGE	YEAR OF COUNT
BURRARD & 16th	2287	2177	-5	2527	2481	-2	1981,1982
GRANVILLE & 16th	4207	4596	+9	4964	5022	+1	1980,1982
ARBUTUS & 16th	2676	2732	+2	3130	3113	0	1981,1982
GRANVILLE & KING EDWARD	5056	5021	0	4894	4949	+1	1981,1983
ARBUTUS & KING EDWARD	2796	2517	-10	3112	3496	+12	1978,1982

TABLE #6 SHAUGHNESSY ARTERIAL INTERSECTION COUNTS

SOURCE: City of Vancouver Engineering Department

As the standard rate of increase in traffic volumes for intersections in Vancouver is approximately 2% per annum, few of the above intersections are cause for concern.

The a.m. increase at Granville and 16th is attributable to traffic originating east of Granville and a possible shift of former Shaughnessy through traffic. The Arbutus and King Edward counts can be partially explained by the four year gap between counts, but also by probable rerouting of former through traffic. The a.m. decrease at Arbutus and King Edward, the little change at Granville and King Edward and the decrease at Burrard and 16th suggest that some of the traffic originating from the south or west of Shaughnessy chose alternate routes to

Vancouver's central business district.

The partial closure of the one street through Shaughnessy, and corresponding arterial improvements appear to have increased the operational efficiency of the intersection at Burrard and 16th. This appears to have been achieved without overloading other nearby intersections.

In sum, the plan in Shaughnessy appears to have achieved a good balance between meeting the quality of life and environmental standards desired by the area residents without causing serious disruptions to traffic flow on nearby arterials.

VANCOUVER HEIGHTS

1)Neighborhood Traffic Management Plan

Cassiar and Hastings Streets are classified as arterials; the remaining streets are local. The traffic devices implemented were diverters at the intersection of each local street and Cassiar, as depicted on the following page. The diverters eliminated all through traffic from these streets -- approximately 6000 vpd.

2) Arterial Intersections

Vancouver Heights, like Shaughnessy, is generally a residential area. Its land uses are somewhat more diverse, with two convenience stores and a community school in the neighborhood, and the Hastings Street commercial strip on its southern fringe. Its boundaries are clearly defined on all sides except east where the division is political rather than by an arterial street or change in land use.

Vancouver Heights' small size and simple NTM plan also makes for relatively visible changes in arterial intersection traffic volumes,

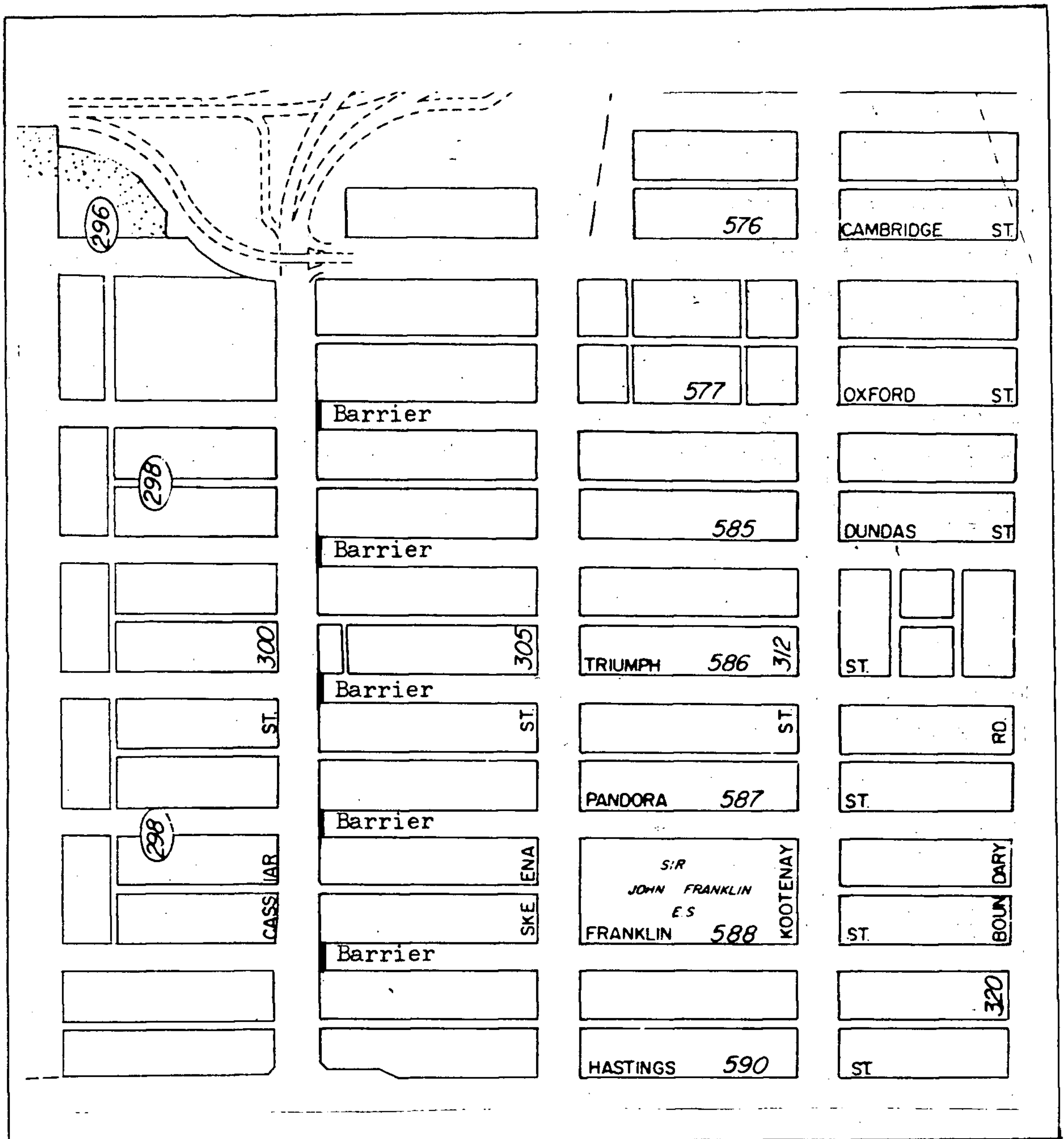

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FIGURE #10 VANCOUVER HEIGHTS NEIGHBORHOOD TRAFFIC MANAGEMENT PLAN

SOURCE: City of Vancouver
SCALE 1' = 400' 400 800

changes which relate directly to the introduction of the traffic control devices.

The following intersections were analyzed:

1) Cambridge and Skeena

2) Boundary and Cambridge

3) Boundary and Hastings

4) Cassiar and Hastings

Only the last intersection is truly an arterial intersection; however, the others function as arterials with high traffic volumes. As in Shaughnessy, one intersection more than others depicts the traffic flow changes, and in this case, the numbers reinforce the perceptions of the VHCC with regard to the effect of their NTM plan.

Theoretically, the traffic diverted from the local streets should be diverted primarily through the Cambridge and Skeena intersection, then to Cambridge and Boundary, Boundary and Hastings and lastly to Cassiar and Hastings. As the congestion at the intersection of Cassiar and Hastings resulted in traffic short-cutting through Vancouver Heights initially, it is unlikely that commuters will automatically return to it once local streets are barricaded. It is more likely that the alternate routes mentioned above will be used.

Overall changes in a.m. and p.m. peak period intersection volumes are indicated on the following page.

INTERSECTION	A.M. BEFORE	A.M. AFTER	% CHANGE	P.M. BEFORE	P.M. AFTER	% CHANGE	YEAR OF COUNT
CAMBRIDGE & SKEENA	629	1344	+114	1132	1486	+31	1973,1980
BOUNDARY & CAMBRIDGE	793	1281	+62	1093	1223	+12	July,Nov. 1979
BOUNDARY & HASTINGS	3286	3582	+9	3588	3937	+10	1978,1980
CASSIAR & HASTINGS	6031	6113	+1	6472	7780	+20	1978,1979

TABLE #7 VANCOUVER HEIGHTS ARTERIAL INTERSECTION COUNTS

SOURCE: City of Vancouver Engineering Department

Unfortunately, the large gap between counts taken at Cambridge and Skeena skew the percentages of increase somewhat. If the 2% per annum increase is applied, the increase over the seven year period should be in the order of 17%. As neither Cambridge nor Skeena are arterial streets, the 2% per annum rate may be high, but will be used here in the absence of a better adjustment factor.

The resulting 97% increase in a.m. traffic and 14% increase in p.m. traffic suggest that the after traffic volumes at this intersection are the result of more than normal increases in traffic volumes. The majority of traffic increase at this intersection is attributable to the north and east legs of the intersection in both the a.m. and p.m. peak periods. This suggests that the traffic diverted from the barricaded local streets concentrated at the Cambridge and Skeena intersection.

In sum, the intersection at Hastings and Cassiar is the only arterial intersection within this case study and its problems with regard to operational efficiency are well documented. However, the impact on this intersection of barricading all local streets abutting Cassiar cannot be estimated. The increases in traffic volumes at the other important intersections in the area are greater than normal (using the 2% rate), suggesting that these intersections are serving to alleviate congestion by distributing traffic.

Further to this point, the heavy use of these intersections within the neighborhood indicate that the NTM plan failed to achieve a balance between environmental considerations in the area, and operational efficiency. Certainly the five barricaded streets have benefitted from the elimination of through traffic, but its subsequent shift to other streets suggests that the overall community has not gained from the implementation of the plan.

THE WEST END

1) The Neighborhood Traffic Management Plan

Arterial streets form the boundary of the case study area; all other streets are local streets. Traffic control devices in the West End were implemented in a comprehensive manner -- each street in the case study area received one or more devices:

1) Diverters -- two diverters are located at Pendrell and Bute, and Broughton and Harwood. (Two previously installed diverters are located at Cardero and Haro, and at Pendrell and Bidwell).
2) Mini-parks -- six mini-parks are located at:
   - Bute and Haro
   - Jervis and Burnaby
   - Broughton and Nelson
   - Nicola and Pendrell
   - Cardero and Comox
   - Cardero and Burnaby

These mini-parks are one-half block in length, ending at the lane. There is an additional half mini-park located at Nicola and Harwood, serving to restrict northbound access into the neighborhood.

3) Traffic circles -- five traffic circles are locate at:

- Jervis and Haro
- Jervis and Nelson
- Jervis and Comox
- Broughton and Barclay
- Bidwell and Nelson.

4) Traffic islands -- three traffic islands are located at the eastern boundary of the case study area to restrict entry into the West End. They are located at:

- Thurlow and Bute
- Thurlow and Comox
- Thurlow and Burnaby

5) One cul-de-sac is located on Bute at Burnaby.

The NTM plan implemented in the West End is depicted on the following page.

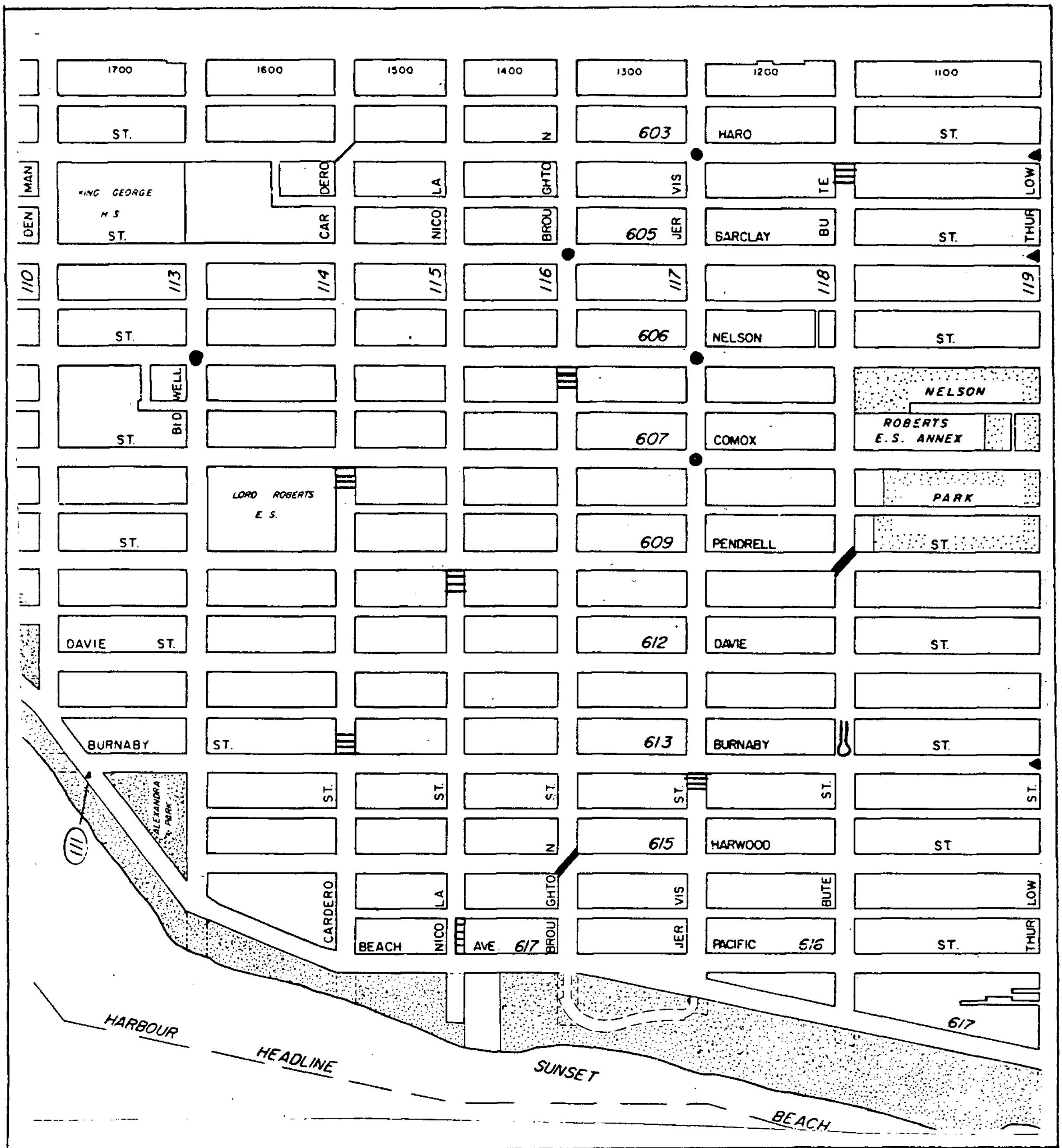

FIGURE #11 WEST END NEIGHBORHOOD TRAFFIC MANAGEMENT PLAN

SOURCE: City of Vancouver
SCALE 1" = 600' (scale bar: 600, 1200)
SYMBOLS
- / Existing diverter
- / New diverter
- ≡ Mini-park
- • Traffic circle
- ▲ Traffic island
- Cul-de-sac

The following traffic counts show that despite some redistribution of traffic into the lanes, the volume of traffic has been reduced by approximately 17%.

LOCATION	BEFORE	AFTER	% CHANGE
South of Davie			
Cardero S/of Davie	2319	973	-58
Burnaby W/of Jervis	1490	1689	+13
Harwood W/of Jervis	1798	818	-55
Broughton N/of Harwood	1217	565	-54
Jervis N/of Harwood	4143	851	-79
Nicola S/of Davie	2046	2315	+13
Broughton S/of Davie	2479	2458	0
Jervis S/of Davie	3856	3192	-17
Sub-total	19348	12861	-34
Lanes			
S/of Davie,W/of Cardero	863	601	-30
S/of Davie,E/of Cardero	411	575	+40
N/of Harwood, W/of Jervis	268	719	+168
N/of Harwood, E/of Jervis	458	551	+20
Sub-total	2000	2446	+22
North of Davie			
Broughton N/of Comox	2487	587	-76
Comox W/of Jervis	1935	2287	+18
Jervis S/of Comox	4328	6860	+59
Jervis N/of Davie	5630	6699	+19
Pendrell W/of Thurlow	1013	1378	+36
Bute S/of Pendrell	9003	4694	-48
Pendrell W/of Jervis	4972	2493	-50
Cardero N/of Pendrell	2564	790	-69
Sub-total	31932	25788	-19
Lanes			
N/of Comox, W/of Broughton	176	321	+82
N/of Comox, E/of Broughton	382	591	+55
N/of Davie, W/of Jervis	666	1011	+52
N/of Davie, E/of Jervis	1833	3134	+71
N/of Davie, W/of Nicola	765	601	-21
N/of Davie, E/of Nicola	589	971	+65
Sub-total	4411	6629	+50
TOTALS	57691	47724	-17

TABLE #8 WEST END NEIGHBORHOOD TRAFFIC COUNTS
SOURCE: City of Vancouver Engineering Department

In the sub-area south of Davie before the implementation of the NTM plan, all eight streets in this sub-area exceeded the 1000 vpd guideline. After implementation, only four exceeded it. Overall, only two streets gained traffic. The lanes in the sub-area experienced an overall increase of 22% with only one of the four lanes showing a decrease. When traffic counts in the lanes and the streets are combined, there is an overall decrease of 28%, representing 6041 vpd.

In the area north of Davie Street, four of the eight streets experienced traffic decreases. Before the introduction of the NTM plan, all streets exceeded the 1000 vpd guideline; afterwards, six of the eight remained in this category. Of the six lanes in this sub-area, there was an increase of traffic of 50%.

The total NTM plan decrease in traffic volume of 17% represents 9967 vehicles per day. This is a sizeable reduction but less than anticipated from a comprehensive, total neighborhood plan. The mini-parks add to the environmental quality of the area while also working to reduce traffic. However, the limited success of this NTM plan suggests that further study is required.

2) Arterial Intersections

The West End presents the most difficult problems with respect to the analysis of traffic flows through arterial intersections. Its location adjacent to the central business district, Stanley Park, its high density, and diversity of land uses all contribute to heavy traffic flow in the area, and to obscuring the effects of the traffic control devices on nearby arterial intersections. There are no intersections in the West End which clearly depict any shift of traffic as a result of the NTM plan. Examination of the proportions of traffic in each leg after the implementation of the plan do not help clarify the situation.

The intersections considered for analysis are as follows:

	A.M.			P.M.			
INTERSECTION	BEFORE	AFTER	% CHANGE	BEFORE	AFTER	% CHANGE	YEAR OF COUNT
THURLOW & ROBSON	3262	3455	+6	5404	5252	-3	1982,1984
THURLOW & DAVIE	1590	1393	-12	2365	2471	+4	1981,1983
DENMAN & BEACH	1395	2814	+101	1957	3186	+63	1982,1984
DENMAN & ROBSON	1658	1795	+8	1892	2042	+8	1981,1983
DENMAN & DAVIE	1476	2991	+103	1686	3275	+94	1982,1984

TABLE #9 WEST END ARTERIAL INTERSECTION COUNTS

SOURCE: City of Vancouver Engineering Department

Through examination of the above counts in conjunction with the NTM plan, the following could be suggested:

1) Thurlow and Robson: the small a.m. increase may be due to the closure of Bute at Haro (mini-park), forcing southbound traffic to use this intersection. As Thurlow is a one-way street (southbound), northbound traffic continues to use an alternate route.

2) Thurlow and Davie: the cul-de-sac at Burnaby and Bute eliminates this short-cut for southbound traffic, possibly contributing to the small p.m. increase. The a.m. decrease at this intersection could be the result of traffic remaining on Denman and Beach and using Pacific Avenue.

3) Denman and Beach: no traffic controls were implemented at the intersection adjacent to this one -- the large increase could be attributable to selection of new routes.

4) Denman and Robson: the increases in traffic at this intersection may be due to the lack of restrictions at the corner of Bidwell and Haro and a diverter at the corner of Cardero and Haro, in the opposite direction. By eliminate oncoming traffic, this diverter may actually facilitate westbound traffic using this route to avoid the intersection at Denman and Robson. It does work however, to prevent short-cutting of northeast bound traffic.

5) Denman and David: the diverter at Bidwell and Pendrell has eliminated this short-cut to the Denman-Davie intersection, thereby contributing to the increase. However, no counts at Bidwell and Pendrell are available to support this theory.

Furthermore, the slow and lengthy implementation of this plan and the selective use of temporary measures further complicate this analysis. Although some temporary barriers were installed in late 1981, the construction of the complete plan was not completed until December 1982. For this analysis, all after counts were post 1982; some of the before counts likely occurred during construction.

As there were no arterial improvements made in conjunction with the implementation of the NTM plan, the magnitude of increases at some of the intersections suggest that problems may exist. However, attributing these increases to the NTM plan is spurious. Undoubtedly, some redistribution of traffic occurred -- the magnitude and direction of change cannot be determined from the figures available.

In sum, the West End, despite its comprehensive NTM plan, appears to have been much more successful at improving the environmental quality of the area through the introduction of mini-parks than by the reduction of traffic. Unfortunately, effects on the arterial intersections can only be suggested. It is clear however, that the large volumes of traffic at these intersections will result in continued through traffic in the neighborhood unless more stringent measures are introduced, or arterial improvements are made. It is also clear that further study is required.

COMPARISON OF CASES

The NTM plan in Shaughnessy is clearly the most successful at achieving a balance between environmental areas and traffic operation considerations, with Vancouver Heights and the West End being less successful. From these cases it appears that difficulties in achieving a balance are related to:

1) density of development;
2) diversity of land uses;
3) location of arterials;
4) arterial improvements.

This closely relates to Buchanan's findings that the more diverse and intense the land uses are within an environmental area, the more arterial links are required, and are more difficult to provide. Based on this, the success of the Shaughnessy plan is due to its very low density, single use, lack of arterials separating the area, and effective arterial improvements. Vancouver Heights falls in the middle: the mixed success of this plan is due basically to inadequate arterial improvements. The West End plan, with the least traffic reduction, had the highest density, the greatest diversity of land uses, arterial separation of the area, and a lack of arterial improvements.

Furthermore, the 1000 vpd traffic volume guideline, and the 2% per annum rate of increase on arterial intersections may have limited application to the West End, due primarily to the large population residing in the area, and the diversity of uses which attract large numbers of residents from other areas of the city. As the neighborhood is comprised largely of multi-unit dwellings, the 3000 vpd guideline appears more applicable. Furthermore, it is possible that additional arterial links are required to carry the traffic generated by this neighborhood. The City of Vancouver Engineering department maintains that arterial improvements were not made in conjunction with the NTM plan, as they had no evidence that the traffic problem was caused by through traffic.

It is interesting to note that the Vancouver Heights group recognized that their plan could not be successful until sufficient arterial improvements were made to provide the heavy commuter traffic flow with a safe and convenient alternative to short-cutting through their neighborhood.

The West End Traffic Committee, on the other hand, have begun pursuing their goal of further reducing access to their neighborhood. Although lane protection involves small measures and has direct safety benefits, the downgrading of the arterial streets will likely result in worsening conditions within the neighborhood.

CHAPTER SIX

CONCLUSIONS

The thesis studied the effectiveness of neighborhood traffic management planning in achieving a balance between two competing objectives of urban transportation planning: accessibility and environmental quality. Three Vancouver neighborhoods with NTM plans served as case studies and conclusions are offered with respect to both the theory and the cases.

The NTM planning process appears to achieve a balance between accessibility and livability. Environmental areas are defined and plans are developed which aim to protect these areas and provide an arterial network sufficient to carry the existing volume of traffic. Those living in affected neighborhoods have become a major force in the process and contribute to the achievement of this balance in their roles as consumers of transportation services and as residents of areas affected by traffic.

The case studies corroborate the work done by Buchanan, emphasizing the existence of a definable, specific traffic volume, which, if the environment is to be considered, is the environmental capacity. It also supports Appleyard's assertion that perceptions of environmental capacity vary by city and by communities within a city. The environmental capacity considers the density of development and diversity of land uses and is directly related to the existing or desired character of the environmental area.

Buchanan's theory that the establishment of an environmental capacity determines the level of accessibility, with subsequent requirements for improvements in the arterial network, is also supported by this study. Greater density of development and intensity of land use was found to generate traffic volumes in excess of those stipulated by the environmental capacity. However, as Buchanan notes, the greater the level of development and activity, the more difficult the imposition of a needed arterial link becomes.

Due to the direct relationship between traffic and land use, Buchanan calls for the integration of transportation and land use planning. This is essential for the development of long range area plans. However, the increasing use of NTM planning, distinct from overall transportation planning, suggests that first the integration of these two types of transportation planning is required. Rather than conducting NTM planning as a reaction to neighborhood complaint, it should be undertaken as an integral part of planning for transportation facilities. The ecological nature of traffic, where a change in one part of the system affects other parts and where traffic shifts continuously to the most convenient routes, also calls for the coordinated planning of neighborhood and arterial traffic capacities, routes and improvements.

Once the link between NTM planning and overall urban transportation planning has been enabled, the primacy of the relationship between transportation and land use planning must be recognized, because transportation's role is to provide access to land uses and link activities. The integration of land use planning is central, as the type and density of development will influence both the need for accessibility and the perceptions of livability/environmental capacity. Integrated planning can achieve a better balance, and over time, make the balance easier to achieve due to the introduction of complementary land uses where possible.

Environmental quality and accessibility are basic civic responsibilities for several reasons. The need for livable residential areas and accessibility to other areas for work or leisure are common to daily life, and are generally local in nature. In addition, streets are a public good and transportation decisions are generally public decisions. The unequal distribution of costs and benefits associated with the installation of a traffic device calls for the making of rational decisions and tradeoffs. In order to make better decisions and to build public support for decisions, civic authorities recognize and utilize the local knowledge of area residents.

Citizen participation in the NTM portion of transportation planning is increasing. Citizen participation in the tradeoff process identifies community issues and values, and makes tradeoffs suited to the area and acceptable to those residing in the area. The wide variation in perceptions of environmental capacity/livability discussed by Appleyard reinforce the importance of local involvement in making local decisions.

As tradeoffs between environmental quality and accessibility are required, citizen participation in the development of overall plans which make the tradeoffs is required. The integration of NTM, overall transportation planning and land use planning will provide an opportunity for citizen participation in the development and advocacy of plans which go beyond their neighborhood. The adoption of a policy for the creation and preservation of environmental areas and environmental capacities tailored to the neighborhood is needed to encourage this participation and to generate public support for transportation plans. Such a policy is a first step to promote the acceptance of environmental areas and to give direction and legitimacy to the tradeoff process. Recognition of environmental and operational considerations in the context of existing, and possibly future land uses, will guide citizen involvement and the decision making process.

Several conclusions can be drawn specific to the cases studied. The establishment and promotion of environmental standards achieved by concerned area residents was separate from transportation and land use planning being performed by two different city departments. The plans, initiated and developed by concerned residents, expanded through interaction with other citizens groups and civic staff, and adopted by a political decision, addressed the concerns of the neighborhood. Citizen participation was deemed important and in need of strengthening by both a formal structure and civic recognition of the knowledge and familiarity of local residents with land uses, traffic patterns and the environmental capacity of the neighborhood.

With respect to operational efficiency, the plans did not appear to have negative effects on the overall transportation system, although the results of the analysis were only marginally conclusive. However, in two of the three cases, the implementation of the plans fell short of providing resolution to the problem identified, due mostly to the timing of the implementation.

The environmental capacity developed by the City served only as a guideline and was applied with great reluctance. The variation in neighborhoods studied suggests that further study is required to determine environmental capacities, and to confirm neighborhood boundaries suitable for transportation planning; the local area planning units in use were deemed too large.

The evolution of NTM advocacy groups provided a channel for the expression of community needs, but these needs were subordinated to both accessibility and civic budgets. The NTM plans were not implemented as intended, nor were the community needs incorporated into overall transportation planning.

NTM and transportation planning should be integrated with funding and budget procedures, to ensure that plans are not implemented in a piecemeal fashion. As the plans are generally conceived as total packages, to be effective they must be implemented as total packages. Redistributing traffic back onto arterials without making arterial improvements, or providing attractive alternatives to car users will make neighborhood traffic management appear as a culprit. Integration of the two types of traffic planning will ensure that they are dealt with together, and that plans will be implemented comprehensively.

This study also suggests the development and adoption of a transportation policy that is based on environmental capacities with an arterial network serving these environmental areas. Such a policy, combined with citizen involvement and integrated planning should enable and enhance the development of a long range transportation plan.

Buchanan notes that:

> "the great danger for the future would seem to lie in the temptation to seek a middle course by trying to cope with a steadily increasing volume of traffic by means of minor alterations, resulting in the end in the worst of both worlds -- poor traffic access and a grievously eroded environment" 1

The conflicting nature of the objectives of transportation planning, the magnitude of the expenditures involved and the essential public involvement in determining the tradeoffs all contribute to the complex and interdependent nature of the urban transportation problem. NTM planning, together with overall transportation planning must be integrated with land use planning to achieve an optimum livable city.

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APPENDIX

ARTERIAL INTERSECTION COUNTS

SHAUGHNESSY

Burrard & 16th Avenue 7 - 9 a.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	407	18	394	18	-3
East	472	21	605	28	+28
South	393	17	161	7	-59
West	1015	44	1017	47	-
Total	2287		2177		

Total Intersection Volume Change -5%

4 - 6 p.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	1044	41	1000	40	-4
East	762	30	804	32	+5
South	191	8	86	4	-55
West	530	21	591	24	+12
Total	2527		2481		

Total Intersection Volume Change -2%

Arbutus & 16th Avenue 7 - 9 a.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	466	17	467	17	-
East	347	13	381	14	+10
South	1186	44	1187	43	-
West	677	26	697	26	+3
Total	2676		2732		

Total Intersection Volume Change +2%

4 - 6 p.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	1034	33	998	32	-3
East	851	27	807	26	-5
South	795	25	762	24	-4
West	450	15	546	18	+21
Total	3130		3113		

Total Intersection Volume Change:less than 1%

Granville & King Edward 7 - 9 a.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	1147	23	1082	22	-6
East	788	16	807	16	+2
South	2121	42	2049	41	-3
West	1000	20	1083	22	+8
Total	5056		5021		

Total Intersection Volume Change: less than 1%

4 - 6 p.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	2213	45	2166	44	-2
East	785	16	835	17	+6
South	1045	21	1109	22	+6
West	851	17	839	17	-1
Total	4894		4949		

Total Intersection Volume Change +1%

Arbutus & King Edward 7 - 9 a.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	590	21	567	23	-4
East	519	19	511	20	-2
South	910	33	864	34	-5
West	777	28	575	23	-47
Total	2796		2517		

Total Intersection Volume Change: -10%

4 - 6 p.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	1135	36	1521	43	+34
East	758	24	670	19	-12
South	748	24	782	22	+5
West	471	15	523	15	+11
Total	3112		3496		

Total Intersection Volume Change: +12%

Granville & 16th 7 - 9 a.m.

Leg	Before	% of total	After	% of total	%change in traffic
North	806	19	767	17	-5
East	330	8	429	9	+30
South	2144	51	2440	53	+14
West	927	22	960	21	+4
Total	4207		4596		

Total Intersection Volume Change +9%

4 - 6 p.m.

North	1586	32	1759	35	+11
East	667	13	603	12	-10
South	1394	28	1158	23	-17
West	1317	27	1502	30	+14
Total	4694		5022		

Total Intersection Volume Change +1%

VANCOUVER HEIGHTS

Cambridge & Skeena 7 - 9 a.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	60	10	388	29	+547
East	400	63	686	51	+72
South	42	7	140	10	+233
West	127	20	130	10	+2
Total	629		1344		

Total Intersection Volume Change: +114%

4 - 6 p.m.

North	296	26	457	31	+54
East	176	16	305	21	+73
South	40	4	34	2	-15
West	620	55	690	46	+11
Total	1132		1486		

Total Intersection Volume Change +31%

Boundary & Cambridge 7 - 9 a.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	135	17	96	7	-29
East	46	6	65	5	+41
South	414	52	677	53	+64
West	198	25	443	35	+124
Total	793		1281		

Total Intersection Volume Change: +62%

4 - 6 p.m.

North	78	7	69	7	-12
East	20	2	41	3	+105
South	270	25	339	28	+26
West	725	66	774	63	+7
Total	1093		1223		

Total Intersection Volume Change: +12%

Boundary & Hastings 7 - 9 a.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	780	24	650	18	-17
East	1496	46	1777	50	+19
South	401	12	385	11	-4
West	609	18	716	20	+18
Total	3286		3582		

Total Intersection Volume Change: +9%

4 - 6 p.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	359	10	307	8	-14
East	836	23	1147	29	+37
South	1002	28	875	22	-13
West	1391	39	1608	41	+16
Total	3588		3937		

Total Intersection Volume Change:+10%

Cassiar & Hastings 7 - 9 a.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	2063	34	2150	35	+4
East	1612	27	1754	29	+9
South	1719	29	1517	25	-12
West	637	10	692	11	+9
Total	6031		6113		

Total Intersection Volume Change: +1%

4 - 6 p.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	1883	29	2283	29	+21
East	1093	17	1462	19	+34
South	1708	26	2215	28	+30
West	1788	28	1820	23	+2
Total	6472		7780		

Total Intersection Volume Change: +20%

WEST END

Thurlow & Robson 7 - 9 a.m. (Thurlow is one way southbound.)

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	1482	45	1507	44	+2
East	1068	33	1239	36	+16
South	-	-	-	-	-
West	712	22	709	21	-
Total	3262		3455		

Total Intersection Volume Change: +6%

4 - 6 p.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	2972	55	2551	49	-14
East	1313	24	1477	28	+12
South	-	-	-	-	-
West	1119	21	1224	23	+9
Total	5404		5252		

Total Intersection Volume Change: - 3%

Thurlow & Davie 7 - 9 a.m. (Thurlow is one way southbound).

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	405	25	498	36	+23
East	536	34	406	29	-24
South	-	-	-	-	-
West	649	41	489	35	-25
Total	1590		1393		

Total Intersection Volume Change: -12%

4 - 6 p.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	973	41	1075	44	+10
East	834	35	794	32	-5
South	-	-	-	-	-
West	558	24	602	24	+8
Total	2365		2471		

Total Intersection Volume Change: +4%

Denman & Beach 7 - 9 a.m. (No south leg).

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	586	42	1359	48	+131
East	597	43	1092	39	+83
South	-	-	-	-	-
West	212	15	363	13	+71
Total	1395		2814		

Total Intersection Volume Change: +101%

4 - 6 p.m.

North	542	28	943	30	+74
East	1002	51	1835	58	+83
South	-	-	-	-	-
West	413	21	408	13	+1
Total	1957		3186		

Total Intersection Volume Change: +63%

Denman & Robson 7 - 9 a.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	577	35	562	31	-3
East	166	10	229	13	+38
South	738	45	767	43	+4
West	177	11	237	13	+34
Total	1658		1795		

Total Intersection Volume Change: +8%

4 - 6 p.m.

North	586	31	536	26	-9
East	552	29	729	36	+32
South	592	31	625	31	+6
West	162	9	152	7	-6
Total	1892		2042		

Total Intersection Volume Change: +8%

Denman & Davie 7 - 9 a.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	711	48	1633	55	+130
East	237	16	377	13	+59
South	478	32	884	30	+85
West	50	3	97	3	+94
Total	1476		2991		

Total Intersection Volume Change: +103%

4 - 6 p.m.

Leg	Before	% of total intersection	After	% of total intersection	% change in traffic volume
North	699	41	1197	37	+71
East	350	21	672	21	+92
South	520	31	1233	38	+137
West	117	7	173	5	+48
Total	1686		3275		

Total Intersection Volume Change: +94%

INTERVIEW SCHEDULE

PART 1 - THE GROUP

1) What factors, events led to the formation of the group?

2) When did the group start to function?

3) What were the goals of the group?

4) What was the group's definition of the problem?

5) What was the group's geographic area of concern?

6) How was membership achieved?

7) Was the membership stable?

8) Can you provide me with the following information on each of the group members
   - -age
   - -education
   - -length of residence in the area
   - -residential location by cross streets

9) What types of activities did the group conduct? How often?

10) Did the group have any involvement with, or receive assistance from the City Engineering or Planning departments? What kind?

11) Did the group liaise with any other groups?

12) Tell me about your group meetings: when were they held? where were they held? did you publicize the meetings? how?

13) Did the group use any other techniques or activities to increase or maintain participation?

14) Did the group identify any groups in the area to be included?

PART 2 - THE PROCESS

1) How did the group perceive the City's direction and commitment to the problem identified?

2) How did the group perceive the City's direction and commitment to neighborhood traffic management?

3) What are your feelings about the process the group used? Please discuss your feelings with respect to the structure, the nature of the process (long vs. short term focus), the suitability of it.

4) How could the process be improved?

PART 3 - THE NEIGHBORHOOD TRAFFIC MANAGEMENT PLAN

1) Was the group concerned about possible redistribution of traffic to adjacent streets, or areas not covered by the plan? How did the group respond to the concern?

2) What is the group's perception of the solution that was implemented, in general? Has the solution been effective in solving the problem/s identified?

3) What effect has the NTM plan had on the areas surrounding the implemented neighborhood traffic control devices? on the case study area? on the adjacent arterials?

DEFINITIONS

ad hoc — unplanned adjustments to solve problems as they arise

arterial — a street whose main function is to carry large volumes of vehicles, and to connect local streets

local street — a street whose main function is to provide access to property

operational efficiency = efficiency of traffic operations
average operating speed is achieved and maintained;
lack of congestion, lengthy intersection delays, accidents;
- indicator used in this study is traffic flow through intersections

through traffic — traffic which passes through an area that has no origin nor destination in the area

traffic — actual volume (number) of vehicle trips

ABBREVIATIONS

SHPOA	Shaughnessy Heights Property Owners Association
PTCC	Pro-Traffic Controls Committee
VHCC	Vancouver Heights Citizens Committee
WETC	West End Traffic Committee
TS1	Traffic Scheme 1
TS2	Traffic Scheme 2
vpd	vehicles per day
NTM	neighborhood traffic management