WEST CLOVERDALE NORTH

NEIGHBOURHOOD CONCEPT PLAN

FINAL REPORT

PLEASE NOTE:

The City of Surrey does not warrant the accuracy or completeness of the information contained in this document or any use of this document by the user. The information contained in this document is relevant only to the date of first printing and may not incorporate subsequent amendments. It is the responsibility of the user of this document to contact the Planning & Development Department regarding any amendments pertaining to this document.

- All developments must comply with all City By-laws, Standards, Specifications and Policies.

RES.R97- Carried

Item No. C377 West Cloverdale North Neighbourhood Concept Plan (NCP)
Stage 2 - Final Report
(Also See Item No. C379)

It was Moved by
Seconded by
That Council:

1. Approve the final and complete Neighbourhood Concept Plan (NCP) for West Cloverdale North Neighbourhood (Appendix I);

2. Approve the arrangements, terms and conditions specified in the West Cloverdale North Neighbourhood Concept Plan as a means of managing the development and general provision of services, amenities and facilities for this new neighbourhood;

3. Amend the West Cloverdale Local Area Plan (Appendix VII) to reflect the recommendations contained in the West Cloverdale North Neighbourhood Concept Plan;

4. Authorize staff to draft the following by-laws to implement the provisions of the Neighbourhood Concept Plan:

   a. an amendment to Surrey Zoning By-law, 1993, No. 12000, as amended, to enact the approved bonus density provision for the West Cloverdale North Neighbourhood Concept Plan area; and

   b. an amendment to the City of Surrey Land Use and Development Application Fees Imposition By-law, 1993, No. 11631, as amended, to authorize the payment of additional application fees to recover the costs of preparing the West Cloverdale North Neighbourhood Concept Plan.

RES.R97- Carried

SURREY
CITY OF PARKS

Corporate Report

NO: C377

COUNCIL DATE: DEC 2/97

COUNCIL-IN-COMMITTEE

TO:	**Mayor & Council**	DATE:	**November 26, 1997**
FROM:	**General Manager, Planning & Development**	FILE:	**2350-005/1**
SUBJECT:	**West Cloverdale North Neighbourhood Concept Plan (NCP) Stage 2 - Final Report**		

RECOMMENDATION

It is recommended that Council:

1. Approve the final and complete Neighbourhood Concept Plan (NCP) for West Cloverdale North Neighbourhood (Appendix I);

2. Approve the arrangements, terms and conditions specified in the West Cloverdale North Neighbourhood Concept Plan as a means of managing the development and general provision of services, amenities and facilities for this new neighbourhood;

3. Amend the West Cloverdale Local Area Plan (Appendix VII) to reflect the recommendations contained in the West Cloverdale North Neighbourhood Concept Plan;

4. Authorize staff to draft the following by-laws to implement the provisions of the Neighbourhood Concept Plan:

   a. an amendment to Surrey Zoning By-law, 1993, No. 12000, as amended, to enact the approved bonus density provision for the West Cloverdale North Neighbourhood Concept Plan area;

   b. an amendment to the City of Surrey Land Use and Development Application Fees Imposition By-law, 1993, No. 11631, as amended, to authorize the payment of additional application fees to recover the costs of preparing the West Cloverdale North Neighbourhood Concept Plan; and

   c. a by-law to adopt the West Cloverdale North Neighbourhood Concept Plan as an Official Community Plan by-law.

INTENT

The intent of this report is:

1. To provide an overview of the complete and final West Cloverdale North Neighbourhood Concept Plan;

2. To review minor adjustments to the Stage 1 Neighbourhood Concept Plan brought about during the preparation of Stage 2;

3. To summarize the funding mechanisms for amenities proposed for the West Cloverdale North Neighbourhood Concept Plan area;

4. To describe the by-laws needed to implement the West Cloverdale North Neighbourhood Concept Plan; and,

5. To highlight concerns expressed by certain property owners throughout the planning process.

BACKGROUND

Council approved the physical plan component of the West Cloverdale North Neighbourhood Concept Plan (Stage 1) on December 11, 1995 and authorized the Neighbourhood Concept Plan participants to commence the Stage 2 process. The Stage 2 Neighbourhood Concept Plan is based on the type, size, location, and densities of the specific land uses, road hierarchy and alignments, subdivision concepts and general servicing concepts contained in the Stage 1 report (see Appendix II for the approved Stage 1 land use concept).

The Neighbourhood Concept Plan proponents were also required to address all conditions and requirements identified at the time of Stage 1 approval. Further, City Council stipulated that the Neighbourhood Concept Plan proponents were to prepare, as a first priority, a comprehensive financial plan that demonstrates adequate funding provisions for infrastructure and other facilities.

Finding solutions to address the major funding constraints for sanitary and storm sewer services has resulted in some unusual delays in finalizing the Neighbourhood Concept Plan.

A report on servicing and funding from the General Manager of Engineering is to be considered in conjunction with this report.

DISCUSSION

Overview of the Land Use/Development Concept

The West Cloverdale North Neighbourhood consists of approximately 100 hectares (250 acres) owned by approximately 70 owners. The Neighbourhood Concept Plan contemplates about 1,630 new dwelling units in the neighbourhood for a build out population of approximately 4,575. Highlights of the plan include the following:

(a) as directed by the Local Area Plan, the neighbourhood is predominately single family residential, however street-oriented townhouses are proposed along the "village" street (60 Avenue) and at the eastern edge along 168 Street;

(b) a 12-acre combined school/park site is to be located in the centre of the neighbourhood;

(c) residential cluster development along the western edge will enable: 1) a major woodland and many other significant trees to be preserved; 2) a trail system to be developed; 3) protection of the Agricultural Land Reserve; and 4) enhancement of the rural and distinct nature of the neighbourhood;

(d) adult-oriented townhouse and cluster development is proposed for lands north of 64 Avenue adjacent to the Northview Golf Course;

(e) a small neighbourhood commercial site will be located at the corner of 60 Avenue and 168 Street; development at this corner will reflect the historical significance associated with Surrey's Five Corners and the historic city centre;

(f) to enhance the village street notion envisaged for this area, the Neighbourhood Concept Plan is proposing very limited specialty neighbourhood commercial uses which will be integrated with residential development at the intersection of 60 Avenue and 166 Street;

(g) the geographical high point of the neighbourhood (near 60 Avenue and 164 Street) is proposed for an institutional and/or townhouse development which will incorporate a landscaped plaza and public view point; the Neighbourhood Concept Plan proposes some flexibility in the development of this site to take advantage of its topography while also making it the western "anchor" for the urban village street (60 Avenue); and,

(h) an extensive multi-use corridor network for pedestrians and bikes is proposed including a portion of Surrey's City-wide "Greenway" along the north side of 64 Avenue, and two wide corridors linking the south neighbourhood to the school/park site in the north neighbourhood.

Overview of the Engineering, Funding and Amenity Provisions

The Stage 2 Neighbourhood Concept Plan consists of a specific engineering servicing strategy, an infrastructure funding proposal, the proposed development phasing, and the amenity contribution proposal. These components, with the exception of the amenity contributions are dealt with in a separate report from the General Manager, Engineering Department to be considered by City Council concurrently with this report.

The Neighbourhood Concept Plan process has resulted in the identification of capital requirements for specific amenities and facilities that are required to support the projected development of this neighbourhood. Based on the cost of these amenities, a corresponding funding proposal has been developed. It is based on a thorough review of the general amenity requirements which involved participation of relevant City departments and the public.

Overall, this neighbourhood will require approximately $1,244,433 in capital funds to accommodate the costs of fire and police protection, library books and materials, and to develop the identified neighbourhood and linear parks facilities. The total amenity contribution per unit will be approximately $763.00. An additional amount toward fire and police protection will be contributed by the developers of the commercial and institutional uses.

The amenity funding arrangements for residential development are as follows:

(a) A neighbourhood park adjacent to the school, a system of linear walkways and viewpoints, and the partial rehabilitation of the Orange Hall will cost about $627,100 to develop as estimated by the Parks & Recreation Department. Based on this figure, approximately $384.50 will be contributed by the owners/developers on a per dwelling unit basis.

(b) A study of library requirements in new neighbourhoods has determined that a contribution of $112.50 per dwelling unit would be appropriate to cover the capital costs for library materials and services. Consequently, a total of $183,487 will be contributed from this neighbourhood towards materials such as books.

(c) Future development in this neighbourhood will require upgrading of existing fire and police protection facilities. Both services require a total of $433,846 which will result in a per unit contribution of $266.00.

Public Consultation

Both City staff and the Consultants undertook extensive consultation with property owners and the public at large throughout the planning process. In addition to regular Steering Committee meetings, five public meetings were held to enable the owners and the public to view and provide written comments on the Neighbourhood Concept Plan. A majority of the land owners in the neighbourhood have indicated written support for the final Neighbourhood Concept Plan, including the funding and phasing proposals, which were reviewed at the most recent open house held on October 15, 1997.

Concerns Expressed by Property Owners

Subsequent to the approval of the Stage 1 Neighbourhood Concept Plan, a number of property owners brought forth concerns with respect to the land use designation and/or development concept for their properties. The approximate location of the properties (A-F) as depicted in the Stage 1 and the Stage 2 Neighbourhood Concept Plans is shown in Appendix III and IV respectively. These concerns and the manner by which the Stage 2 Neighbourhood Concept Plan responds to these concerns are discussed below:

A. Mundi/Abrams Property - 60 Avenue Near 164 Street

At the time of the Stage 1 approval, Council requested staff to review the proposal by these owners to "square off" the institutional/townhouse designation in order to allow for a more efficient project. This revision has been reviewed by City staff and the public, found to be acceptable and therefore accommodated as a minor adjustment to the Stage 1 land use plan.

B. Bergen/Katronis Property - 64 Avenue Near 168 Street

These owners appeared as a delegation before City Council on November 3, 1997 requesting that the Stage 2 Neighbourhood Concept Plan accommodate a cluster development on their entire property rather than just on the east side as depicted in the Stage 1 plan. Staff have since worked with the owners, and an acceptable concept for the property has been prepared (see Appendix V). This concept does not represent a deviation from the original approved Neighbourhood Concept Plan, and meets the approval of both the owners and the City. It is noted that this concept is subject to further refinement at the rezoning application stage, especially with respect to the easterly portion of the property where the cluster development must conform to Surrey's Zoning, Subdivision By-laws, and other applicable policies.

C. Bose Property - 64 Avenue & 164 Street

These properties are designated for cluster development at a density of 2 dwelling units per acre in the Neighbourhood Concept Plan. This is consistent with the SUBURBAN designation in the Official Community Plan (permitting a maximum of 2 units per acre) and the suburban cluster designation in the West Cloverdale Local Area Plan.

Near the conclusion of the Stage 2 Neighbourhood Concept Plan, concern was expressed by these owners that a) a higher density would be preferable, and b) provision should be made in the servicing plan to allow the properties to be served by a gravity sewer rather than future pump stations.

The possibility of utilizing gravity sewers has been accommodated in the Stage 2 Neighbourhood Concept Plan. However, at this time, City staff cannot support a re-designation of the properties to URBAN, as it would involve a contravention to the City's policies regarding a) protection of the Agricultural Land Reserve (to the west), and b) protection of the slopes and treed areas on the slopes. The owners have been advised that it is not within the mandate of the Neighbourhood Concept Plan to contemplate an amendment to the Official Community Plan. The owners may wish to make such an application at a later date and have it receive due process.

D. Stewart Property - 61 Avenue & 164 Street

These properties are located adjacent to the Bose properties and have the same Suburban designation. The owners share the same concerns as indicated in C. above.

E. Johl Property - 60 Avenue Near 168 Street

This property is designated for future townhouse development, and the Stage 2 Neighbourhood Concept Plan shows that a 12-metre (6 metres on this property) multi use corridor is necessary along the eastern edge of the property to act as a major link to the south neighbourhood. This corridor serves as an important access to the school/park site and to the historic Five-Corners.

At the time of Stage 1 approval, the matter of all pedestrian/bicycle corridor locations and widths was outstanding and was required to be addressed in Stage 2. During the preparation of the General Design Guidelines for this neighbourhood, the width of this corridor was established at 12 metres. It is noted that this width is consistent with that approved in the south neighbourhood, and that it is integral to achieving the desired character and pedestrian orientation of the neighbourhood.

The owners have indicated resistance to accommodating a 6-metre (20 foot) dedication or right-of-way on their property, due to fears of security risks, inequities in the distribution of corridors throughout the neighbourhood and cost implications.

Toward alleviating the concerns of these owners and recognizing the importance of this corridor, City staff have included the costs of developing the corridor in the overall amenity contribution thereby relieving the owners of this cost burden. Staff have met with the owners on several occasions and will continue to work with them toward achieving the visual and functional objectives of the corridor while minimizing their concerns respecting security, building setbacks and fencing. The precise solution to this issue will be worked out through the rezoning application process.

F. Khera Property - 63 Avenue & 166 Street

During the review of the rezoning application, this owner requested a minor adjustment to the direction of the cul-de-sac, which enables an additional lot to be created and the sewer line to be located within the road right-of-way, rather than through a dedicated area on the side of two lots.

This requested change has been accommodated in the Stage 2 Neighbourhood Concept Plan. The modified lot layout (to be refined during the rezoning application) is presented conceptually in Appendix VI.

School Site Acquisition

While the City has initiated acquisition for park land in this Neighbourhood Concept Plan area, the School District has indicated that there are no funds available to acquire the identified school site. The School District's recently prepared Five Year Capital Plan indicates that site acquisition is to occur in 1998 with construction to commence in 2001. However, at this time, there is no commitment from the Ministry of Education to supply the necessary funds, especially in the absence of a mechanism to raise funds through some type of development charge or levy.

In response to the universal issue of school capacity and lack of school funding, City Council established a Task Force to examine ways to ensure construction of schools will meet the demands generated by growth and development in Surrey. The Task Force was comprised of 70 people representing a wide range of disciplines and interests. Following a series of meetings and discussions between May and October 1997, the Task Force identified seven recommendations to further facilitate the timely and economic construction of new school facilities. On November 18, 1997, Council received the Task Force report and forwarded it to the Ministry of Education, Skills and Training, and the Surrey School District for consideration and implementation. Discussions with these agencies are ongoing.

Resolution of Stage 1 Outstanding Issues

Apart from the funding problems associated with acquiring the school site, all other outstanding issues that were identified at Stage 1 have been resolved and included in the Stage 2 Neighbourhood Concept Plan.

The final Neighbourhood Concept Plan has been reviewed by the environmental agencies which indicated that subject to some specific development requirements that will be addressed at development stage, the Neighbourhood Concept Plan is acceptable.

West Cloverdale Local Area Plan and Surrey's Official Community Plan

Section 5 of Surrey's Official Community Plan contains policies and directives that relate to the status of Neighbourhood Concept Plans, the planning process and the content of the Neighbourhood Concept Plans. The approved West Cloverdale Local Area Plan (Appendix VII) provides general land use and development policy for this neighbourhood as part of the larger West Cloverdale community.

The Neighbourhood Concept Plan for the North Neighbourhood of West Cloverdale complies with the relevant policies of the Official Community Plan and the Local Area Plan. Minor adjustments to the land use plan map in the Local Area Plan were noted in the Stage 1 approval. The approval of the final Neighbourhood Concept Plan will supersede the Local Area Plan by serving as a refinement of the land use plan map.

Implementation

Following Council's approval of the Neighbourhood Concept Plan, a number of initiatives must be undertaken to successfully implement the West Cloverdale North Neighbourhood Concept Plan as follows:

a) General Urban Design Guidelines

Development proposals in the following areas will be designed in accordance with some General Urban Design Guidelines, which are intended to help create an identifiable, pedestrian-friendly residential neighbourhood. It is noted that the identity and character of West Cloverdale are largely defined by the appearance of the "Main Street" (60 Avenue), the pedestrian/bike routes and public spaces and parks used by the local residents. Consequently, guidelines have been prepared for the following key areas within this Neighbourhood Concept Plan:

- 60 Avenue - intended cross section, round-about design, recommended street treatments, lamp standards, fencing and trees.
- Five Corners - design elements of the intersection and development concept for the commercial area.
- Pedestrian/bikeway network widths and development guidelines.
- Street trees concept.

Once approved, these guidelines will ultimately be used by City staff and the developers to coordinate the design concepts among individual development applications. It is noted that the Heritage Advisory Committee has reviewed and indicated support for the design guidelines prepared for West Cloverdale.

b) Amendment to City of Surrey Zoning By-law, 1993, No. 12000

Pursuant to Sections 496 and 904 of the Municipal Act, RSBC 1996, Chapter 323, the current Zoning By-law No. 12000 has to be amended in order to accommodate bonus densities in exchange for contributions towards the specified amenities that have been identified in the final Neighbourhood Concept Plan. An amendment by-law will be prepared and forwarded for consideration by City Council upon approval of this Neighbourhood Concept Plan.

c) Amendment to Surrey Land Use and Development Application Fees Imposition By-law

The costs of preparing this Neighbourhood Concept Plan have to date been borne by two lead developers (Progressive Construction and Narland Homes). The lead developers also acted as overall managers and coordinators of the project. The developers have indicated that the total cost of this project is approximately $320,000. As per past practice in developer up-fronted Neighbourhood Concept Plans, the developers have up-fronted 100% of the cost and will be eligible to recoup 50% of the total cost. They will be repaid the 50% on an annual basis as the City collects a rezoning surcharge fee for applications in the Neighbourhood Concept Plan area. The details of this cost is still under review by the City. It is noted, however, that none of these costs will be borne by the City.

d) Preparation of the Neighbourhood Concept Plan By-law

Surrey's Official Community Plan requires that Neighbourhood Concept Plans be adopted by by-law, and therefore be the subject of a public hearing. It is noted that a report and recommendations regarding the procedural implications of this initiative will be forwarded to City Council in the near future.

e) Development Applications

There are a number of in-stream development applications in this Neighbourhood Concept Plan area which will be evaluated in the context of the approved Neighbourhood Concept Plan. If in conformance with the plan and complete, these applications will be eligible for consideration by City Council. It is noted that the

processing times for applications which conform to the Neighbourhood Concept Plan will be substantially reduced.

CONCLUSION

The West Cloverdale North Neighbourhood Concept Plan illustrates land uses, densities and a development pattern that are in general conformity with the approved Local Area Plan and are consistent with Surrey's Official Community Plan. In addition, it includes a reasonable amenity funding and phasing strategy that has received general support from the owners and the public.

Should Council approve the recommendations of the General Manager of the Engineering Department regarding the associated servicing and financing issues, it is recommended that City Council approve the attached West Cloverdale North Neighbourhood Concept Plan and the corresponding recommendations outlined in this Corporate Report.

Lehman O. Walker
General Manager
Planning & Development Department

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Appendices

Appendix I:	West Cloverdale North Neighbourhood Concept Plan (Stage 2)
Appendix II:	Approved Stage 1 Land Use Concept Plan
Appendix III:	Approximate Location of Owners Concerns - Stage 1
Appendix IV:	Approximate Location of Owners Concerns - Stage 2
Appendix V:	Accepted Concept for Bergen/Katronis Property
Appendix VI:	Conceptual Modified Lot Layout for Khera Property
Appendix VII:	West Cloverdale Local Area Plan - Land Use Plan Map

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WEST CLOVERDALE NORTH NEIGHBOURHOOD CONCEPT PLAN

SURREY
CITY OF CHARACTER

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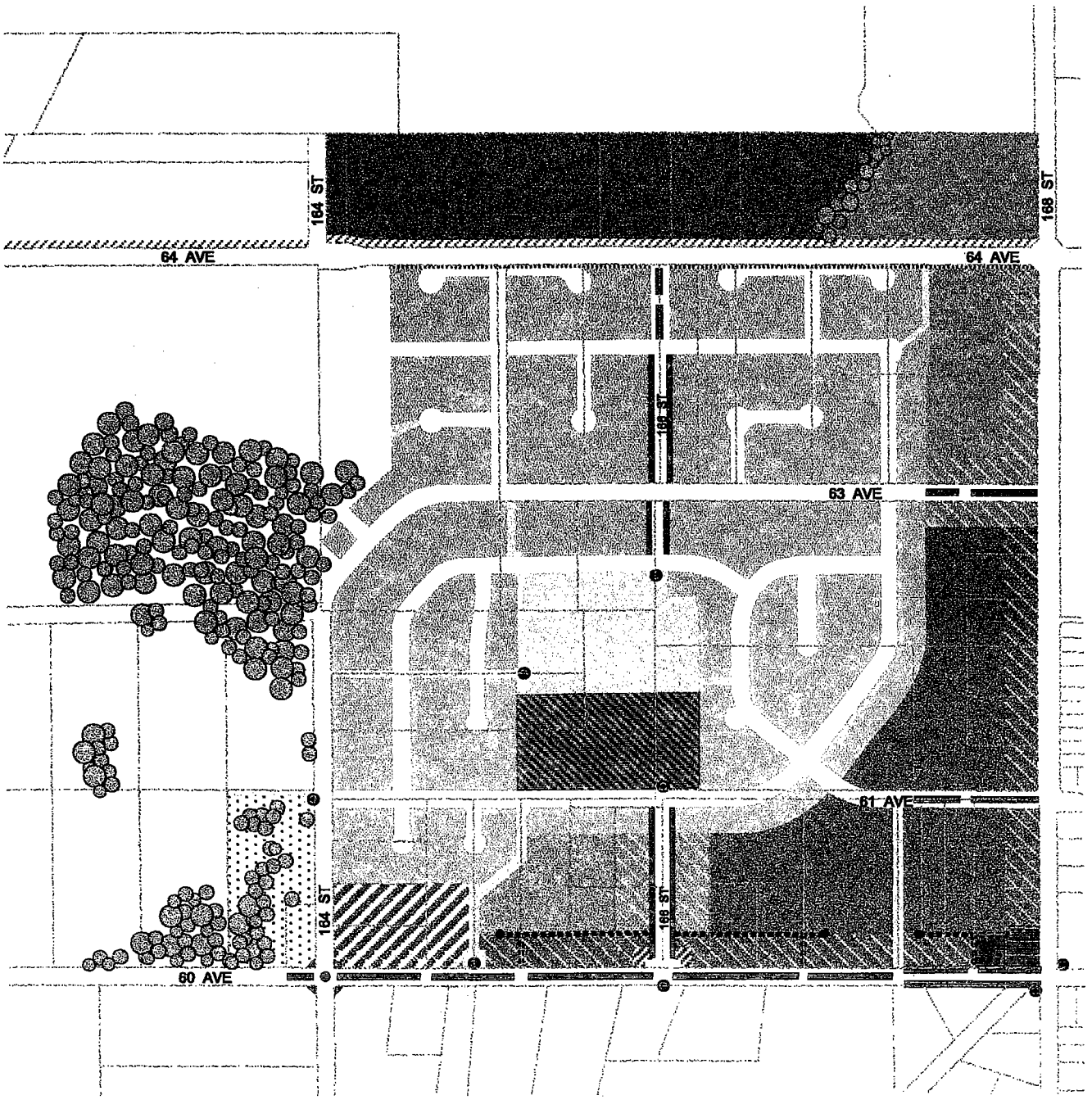


Land Use Designations

- Townhouses (up to 15 u.p.a.)
- Townhouses or Institutional Residential
- Clustered Development Urban Single Family and Duplex (10 u.p.a)
- Urban Single Family (6 u.p.a.)
- Clustered Development Suburban (2 u.p.a.)
- Clustered Development Urban (5 - 7.5 u.p.a.)
- Commercial
- School
- Park/Open Space

Other Notations

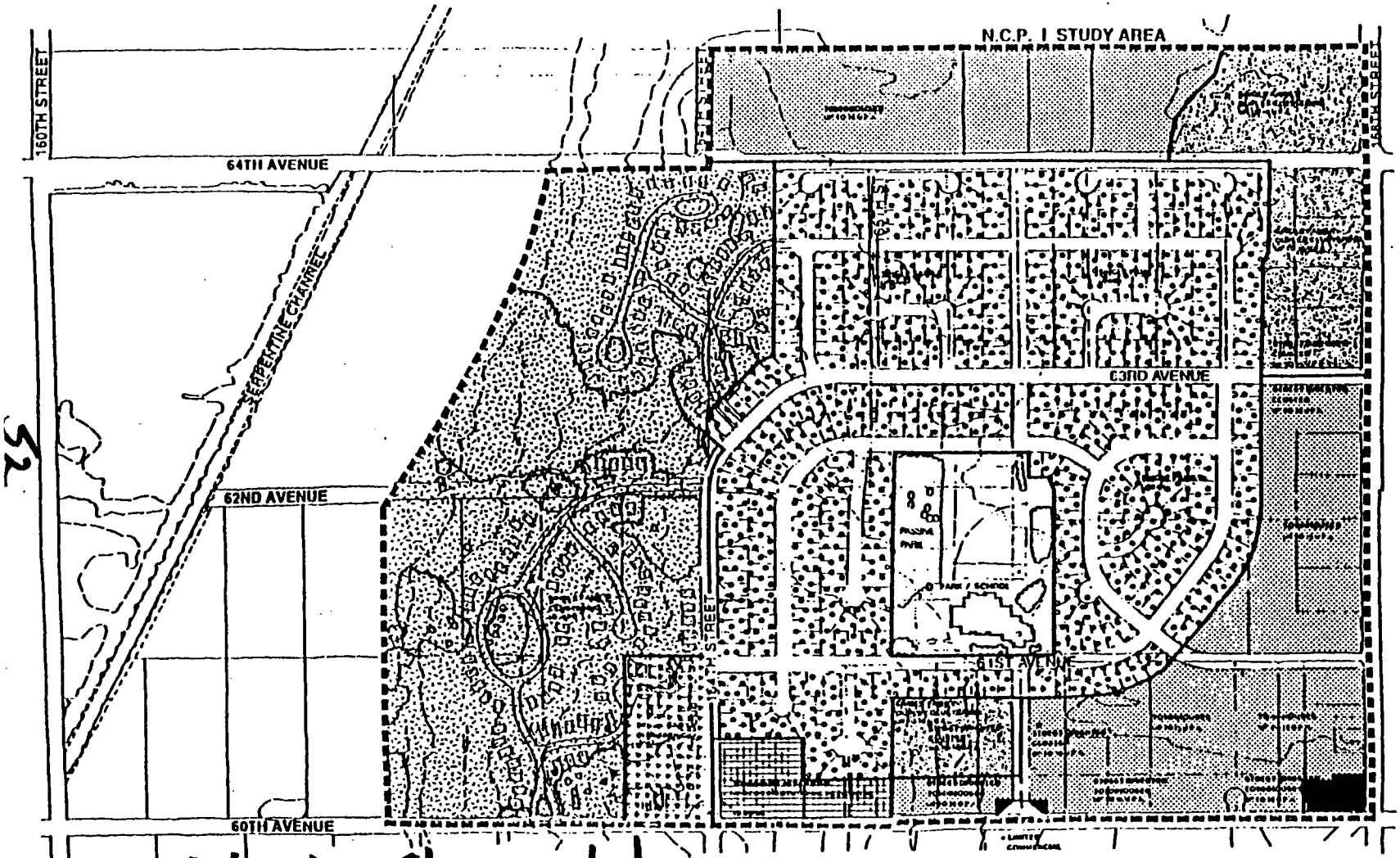
- Limited Commercial Plaza
- Street Oriented
- Landmark/Focal Point
- Buffer
- Greenway

0 50 100 150 200 250 300 Meters

APPROVED DEC.1997

APPROVED STAGE 1 NEIGHBOURHOOD CONCEPT PLAN

APPENDIX II



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West Cloverdale LAND USE PLAN & SUBDIVISION CONCEPT

NEIGHBOURHOOD CONCEPT PLAN

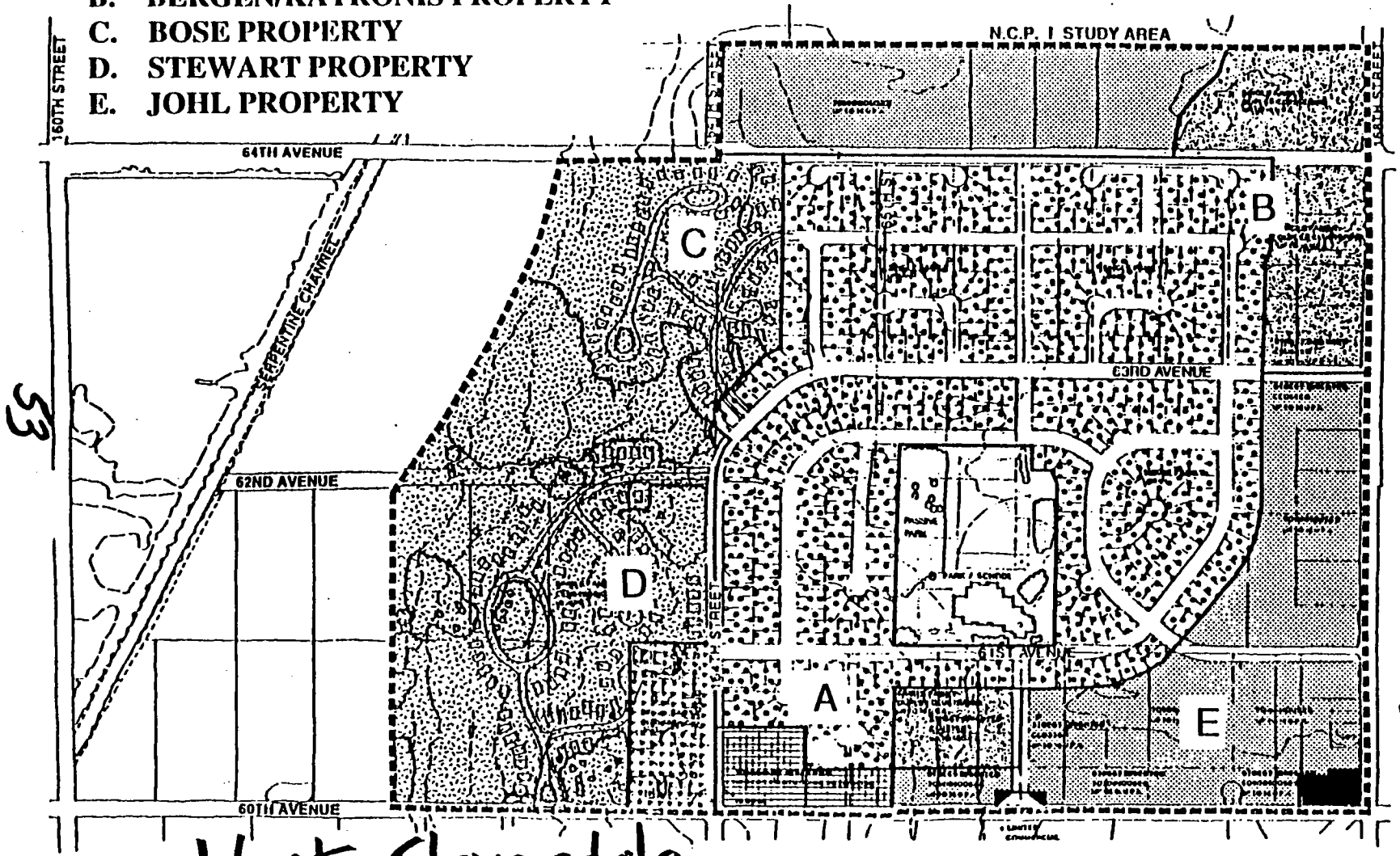
APPENDIX II

APPROXIMATE LOCATION OF OWNERS CONCERNS

APPENDIX III

STAGE 1 NEIGHBOURHOOD CONCEPT PLAN

A. MUNDI/ABRAMS PROPERTY
B. BERGEN/KATRONIS PROPERTY
C. BOSE PROPERTY
D. STEWART PROPERTY
E. JOHL PROPERTY



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West Cloverdale LAND USE PLAN & SUBDIVISION CONCEPT

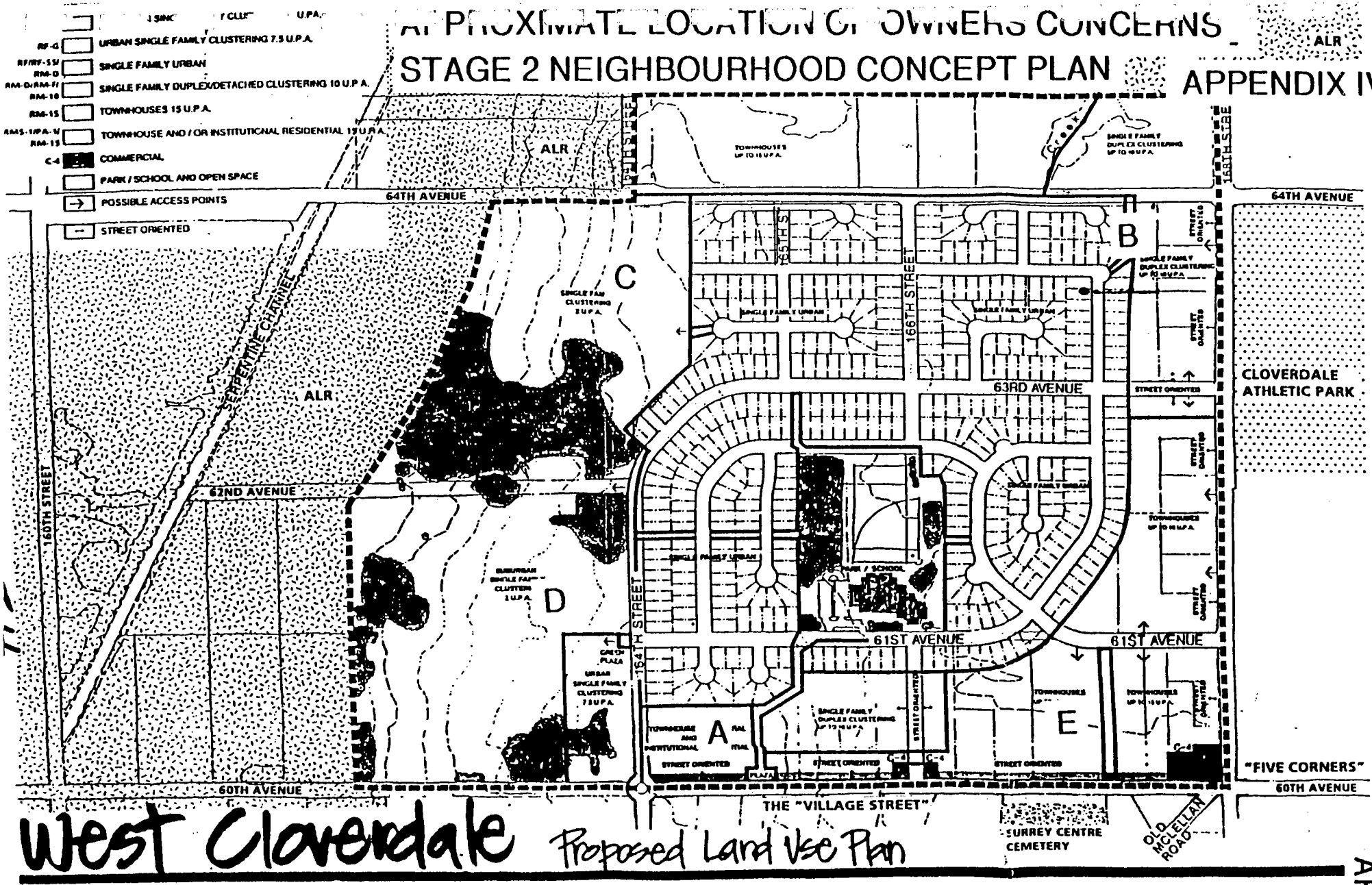
NEIGHBOURHOOD CONCEPT PLAN

APPENDIX III

APPROXIMATE LOCATION OF OWNERS CONCERNS

STAGE 2 NEIGHBOURHOOD CONCEPT PLAN

APPENDIX IV

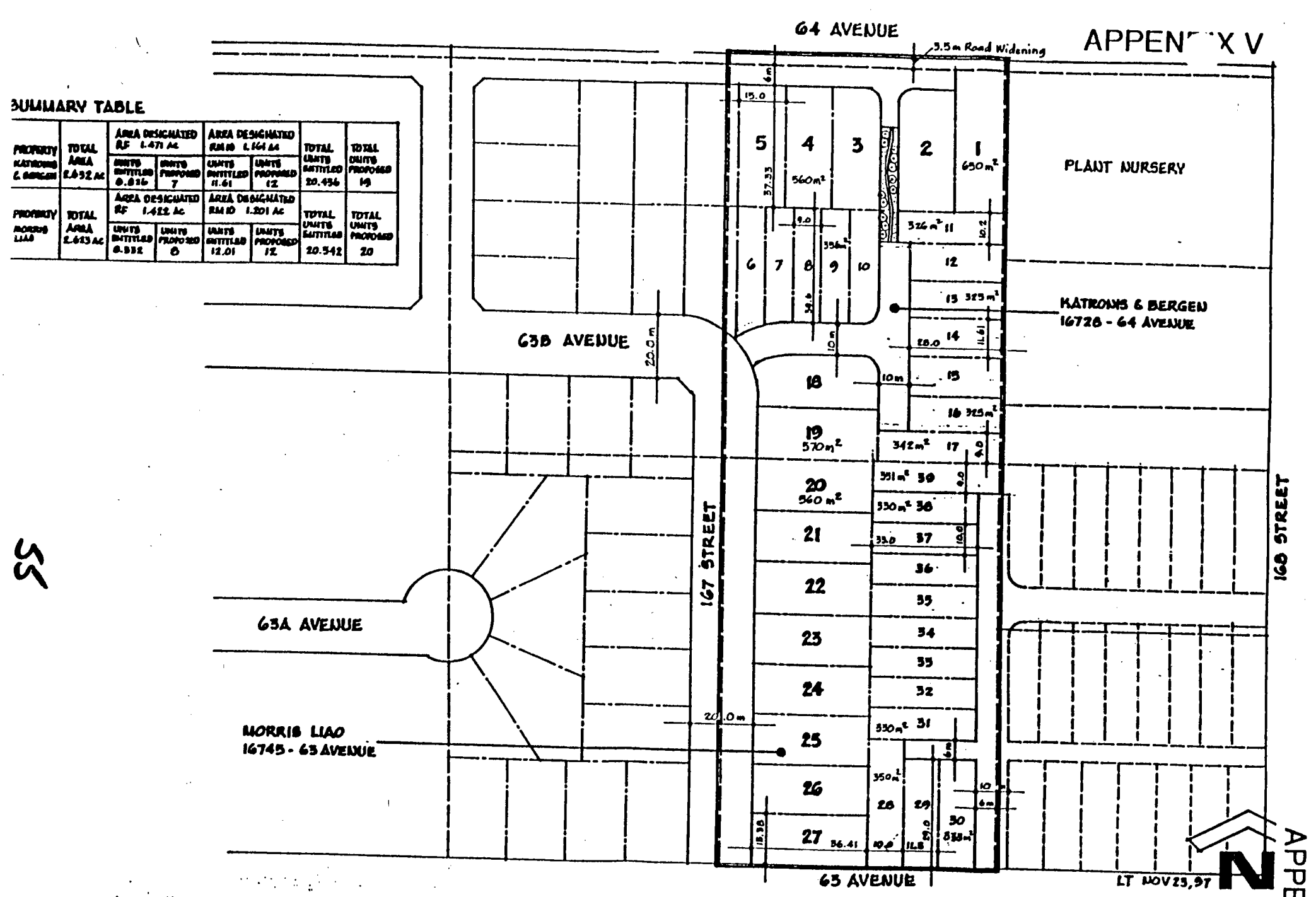


West Cloverdale Proposed Land Use Plan

A. MUNDI/ABRAMS PROPERTY
B. BERGEN/KATRONIS PROPERTY
C. BOSE PROPERTY
D. STEWART PROPERTY
E. JOH[illegible]PROPERTY

APPENDIX IV

APPENDIX V



SUMMARY TABLE

PROPERTY	TOTAL AREA	AREA DESIGNATED RF 1.471 Ac		AREA DESIGNATED RM10 1.164 Ac		TOTAL UNITS ENTITLED	TOTAL UNITS PROPOSED
		UNITS ENTITLED	UNITS PROPOSED	UNITS ENTITLED	UNITS PROPOSED		
KATRONIS & BERGEN	2.632 Ac	8.826	7	11.61	12	20.436	19
		AREA DESIGNATED RF 1.422 Ac		AREA DESIGNATED RM10 1.201 Ac			
PROPERTY MORRIS LIAO	TOTAL AREA 2.623 Ac	UNITS ENTITLED	UNITS PROPOSED	UNITS ENTITLED	UNITS PROPOSED	TOTAL UNITS ENTITLED	TOTAL UNITS PROPOSED
		8.332	8	12.01	12	20.342	20

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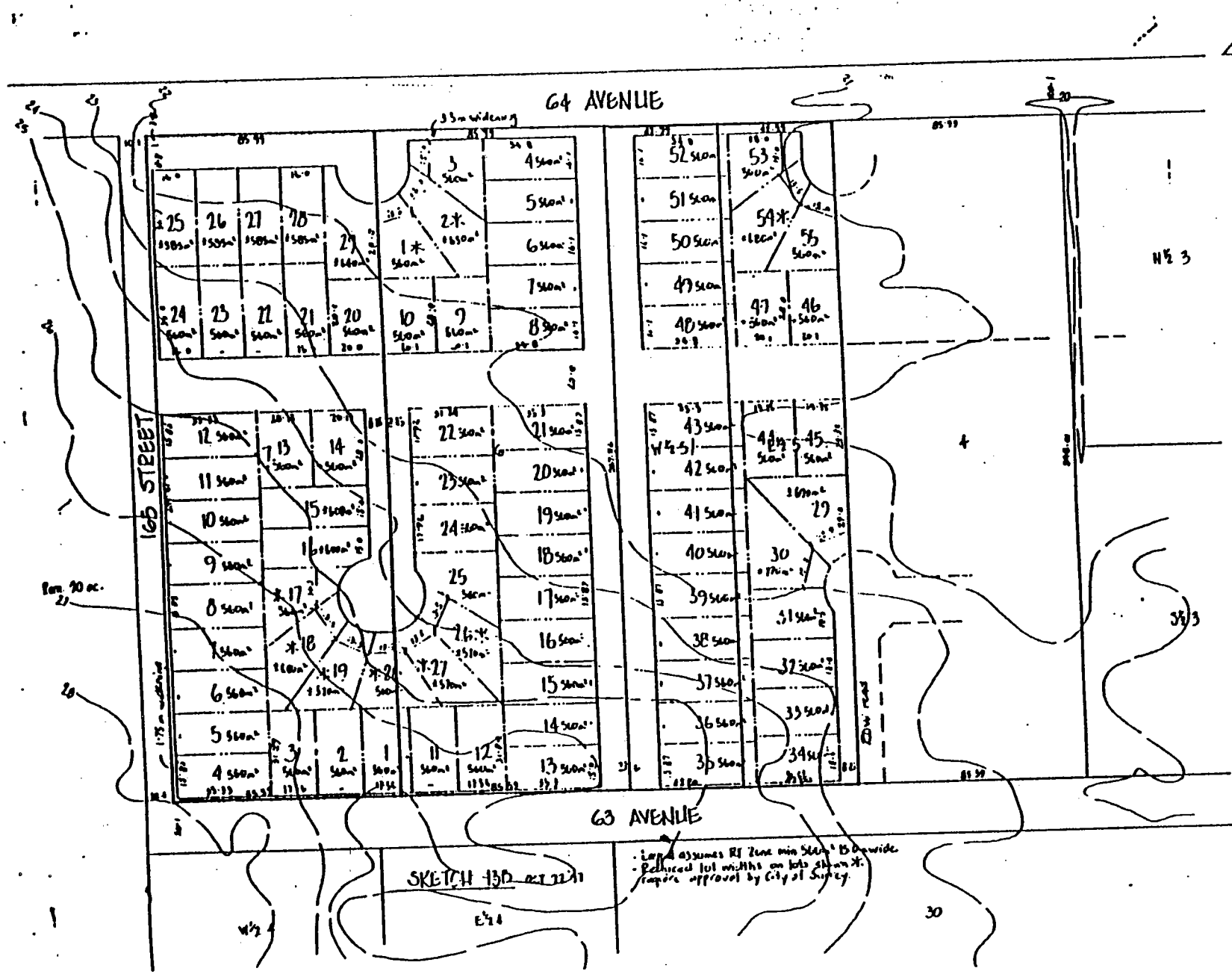
ACCEPTED CONCEPT FOR BERGEN/KATRONIS PROPERTY

(subject to a suitable internal road & unit configuration

APPENDIX 1

CONCEPTUAL MODIFIED LOT LAYOUT FOR KHERA PROPERTY

APPENDIX VI



Note:

- Preliminary layout only, subject to approval.
- Areas and dimensions are subject to detailed survey and [illegible]pilon, and may vary.
- Not to be [illegible] legal transactions.

Scale: [illegible]

Date: MAY 1996

Dwg: P. [illegible]

McElhanney Engineering Services Ltd.

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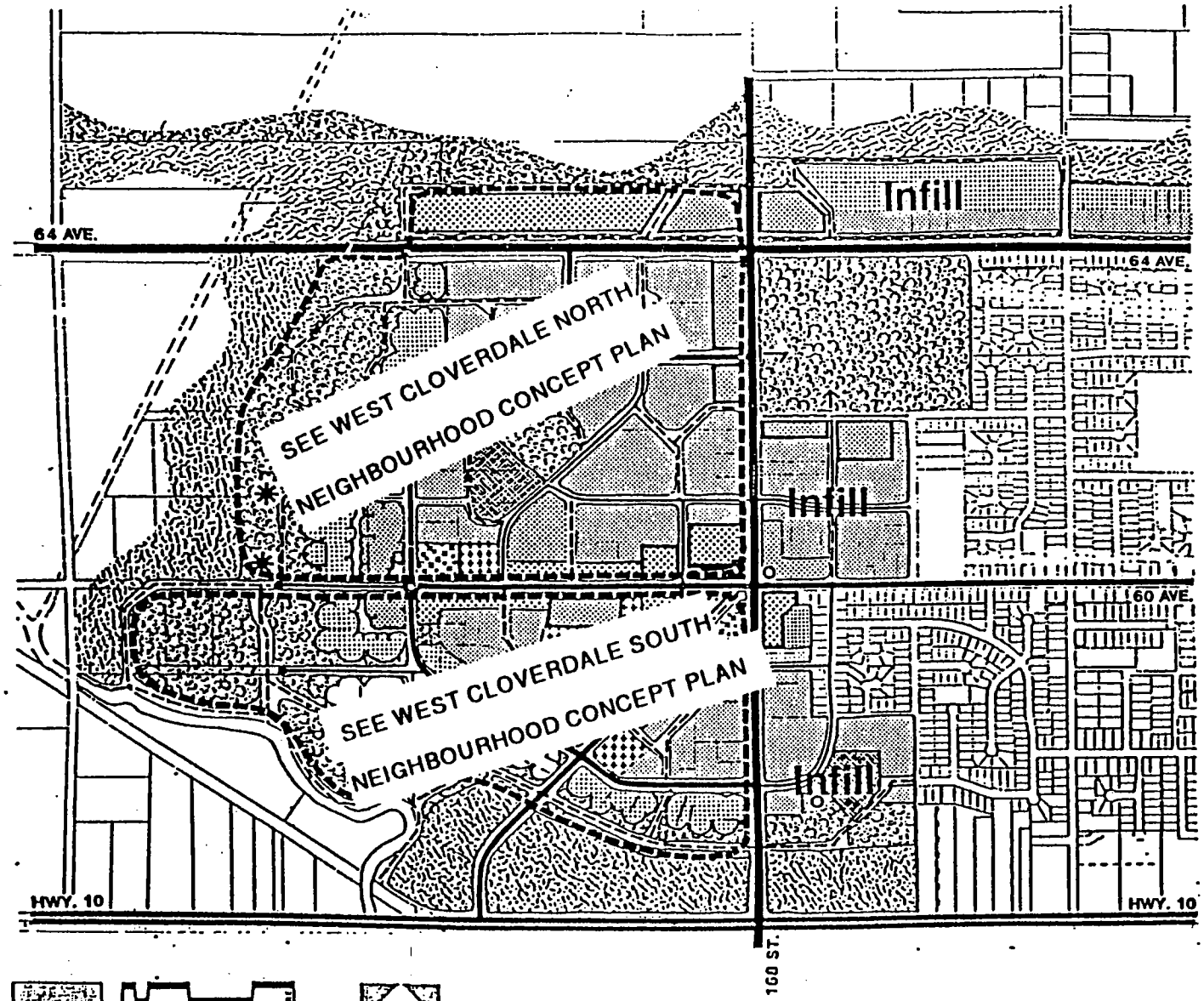
APPENDIX VI



LEGEND

- Clustering at 1 Acre Density
- 1/2 Ac. Suburban Single Family Residential
- Clustering at 1/2 Ac. Density
- Urban Single Family Residential
- Clustering at Urban Single Family Density
- Cluster Housing (Single Family/Duplex)
- Compact Housing (Single Family)
- Multi Family Residential Medium Density (Town Housing)
- Multi Family Residential Medium Density (Street oriented Townhouses)
- Local Commercial
- Commercial / Residential Mixed Use
- Industrial
- Institutional (Religious and Public Assemblies, Cemetery, etc.)
- School
- Institutional / Residential
- Park & Open Space
- Golf Course
- Agricultural
- Provincial Hwy.
- Arterial Road
- Pedestrian/Bike Path
- Collector Road
- Local Collector
- Study Area
- Heritage Site
- Community Services
- Plaza
- View Point

LAND USE PLAN MAP

WEST CLOVERDALE

APPENDIX VII

Item No. C379 West Cloverdale North Neighbourhood Concept Plan
North of 60 Avenue - Stage 2 Report
File: 2350-005

It was

Moved by
Seconded by
That the Stage 2 Report for the West Cloverdale North NCP be adopted subject to the following:

- A group of developers front ending the construction of an estimated $3.1 million of services, being all the DCC funded sanitary and storm sewer services required to open up the NCP.

- That full payment of Drainage and Sanitary Sewer DCC's be made at the time of servicing agreement.

- That development follow the Phasing as proposed in the Stage 2 Report or the developer prepare a revised phasing plan to the City's approval.

- That developments follow the servicing and road layouts as proposed in the Stage 2 Report or as revised by the applicant to meet with the City's approval.

- That it is understood that the report is based upon the best information currently available and costs estimated based upon this information. As such, solutions and costs may change as more details become available leading to revisions to Stage 2 report.

- That financing of the NCP infrastructure will be provided by the developers with no funds being provided by the City other than Development Cost Charges collected from developers of benefiting properties.

- Council modify the 10 Year Servicing Plan by the proposed additions to the Arterial Road program and the adjustments to the drainage program.

- All developments must comply with all City By-laws, Standards, Specifications and Policies.

RES.R97-

Carried

SURREY
CITY OF PARKS

Corporate Report

NO: C 379

COUNCIL DATE: DEC 2/97

COUNCIL-IN-COMMITTEE

TO:	**Mayor & Council**	DATE:	**25 November, 1997**
FROM:	**General Manager, Engineering**	FILE:	**2350-005**
SUBJECT:	**West Cloverdale North Neighbourhood Concept Plan North of 60 Avenue - Stage 2 Report**		

RECOMMENDATION

The Stage 2 Report for the West Cloverdale North NCP is now substantially complete from an Engineering and Infrastructure Financing perspective. The Development Cost Charges from this NCP are adequate to meet the overall financial requirements for engineering utilities required to open up the NCP. However, due to the need for the sanitary and storm sewers trunks to be constructed before development can proceed, there is cashflow shortfall. This NCP can be adopted subject to the following:

- A group of developers front ending the construction of an estimated $3.1 million of services, being all the DCC funded sanitary and storm sewer services required to open up the NCP.
- That full payment of Drainage and Sanitary Sewer DCC's be made at the time of servicing agreement.
- That development follow the Phasing as proposed in the Stage 2 Report or the developer prepare a revised phasing plan to the City's approval.
- That developments follow the servicing and road layouts as proposed in the Stage 2 Report or as revised by the applicant to meet with the City's approval.
- That it is understood that the report is based upon the best information currently available and costs estimated based upon this information. As such, solutions and costs may change as more details become available leading to revisions to Stage 2 report.

- That financing of the NCP infrastructure will be provided by the developers with no funds being provided by the City other than Development Cost Charges collected from developers of benefiting properties.

- Council modify the 10 Year Servicing Plan by the proposed additions to the Arterial Road program and the adjustments to the drainage program.

- All developments must comply with all City Bylaws, Standards, Specifications and Policies.

DISCUSSION

This Neighbourhood Concept Plan has not been serviced by infrastructure adequate to provide for the development of the area. Therefore the report identifies the need for a sanitary sewer trunk from 168 Street to about 176 Street, a storm sewer trunk north along 168 Street to the Serpentine River and significant water system upgrading to the east along 60 Avenue to 176 Street.

In order to provide the sanitary and storm sewer services required before development can proceed it will be necessary for a developer or group of developers to front end the construction of these facilities. A draft agreement for this specific purpose was presented to Council and was approved by Council. Should it not be possible for a group of developers to front end the $3.1 million to provide the needed storm and sanitary sewers, then the NCP should not be approved. This NCP is being advanced for approval based upon a commitment by a group of developers to front end these services.

The Stage 2 report indicates that this NCP can be self financing. It is however important to note that as part of the NCP process, the consultants consider the specific servicing needs of the NCP. The primary focus is on direct infrastructure needs within or immediately adjacent to the NCP boundaries. In order to support these new works, there are also overall infrastructure requirements external to the NCP such as:

- supply mains, reservoir and pump capacities for waterworks,
- new or upgraded pump stations, trunk mains for sanitary
- new or upgraded pump stations, dykes and trunk mains for drainage, and
- road improvements to provide additional capacity for the new growth.

These works are specifically included in the 10 Year Servicing Plan and are funded in part by the surplus DCCs generated by some of the NCPs. When this report refers to surplus DDC funds, they are in fact not surplus to the City but only surplus to the direct needs of the NCP.

The engineering and financing issues have been reviewed and recommendations have been prepared as outlined below.

TRANSPORTATION

The West Cloverdale North Neighbourhood is currently served by two arterial roads, 168 Street to the east and 64 Avenue running through the northern part of the NCP. To the south is a limited collector, 60 Avenue, that becomes a through collector to the east of 168 Street.

The NCP proposes one access to 64 Avenue at 166 Street and two access points to 168 Street at 61 and 63 Avenues. The main collector through the NCP will be 63 Avenue connecting to 164 Street.

It is proposed that 60 Avenue be reclassified as a through collector to allow it to function as a local "main street" with paving stones at crosswalks and narrowing of pavement at intersections and four way stops.

No direct access will be permitted for single family homes on 64 Avenue. Homes fronting 64 Avenue will be provided access by frontage roads or rear lanes.

Temporary access will be allowed from the multi-family sites to 168 Street until the access to these sites can be provided from the internal road systems and 60 Avenue. Multi-family sites on the north side of 64 Avenue will be allowed access to 64 Avenue but may be limited to right-in / right-out turning movements. The street oriented townhouses proposed on 60 Avenue will not be allowed direct access to 60 Avenue but will have to provide access by way of a private rear lane.

Consideration has been given to pedestrian and bicycle circulation using a pathway system, sidewalks, bicycle paths along arterials and along some collector roads.

The existing 10 Year Servicing Program does not include any items of major collector works for growth related non-arterial roadworks. The 10 Year Servicing Program does include $530,500 for arterial roadworks on 64 Avenue and on 168 Street needed for the NCP area. The Stage 2 Report identifies additional arterial road projects valued at $1,326,400. These new works are proposed to be added to the 10 Year Servicing Program. The additional demand that the NCP places upon areas outside of the NCP area are not included in the Stage 2 Report.

At build-out, the NCP will have paid $1,993,000 in Major Collector Development Cost Charges beyond that which is required to provide the NCP with road services within the NCP area. The NCP will have contributed $5,986,000 in Arterial Road DCCs beyond that required to serve the needs of the NCP within or immediately adjacent to the NCP.

TRANSIT

Transit can be provided by 60 Avenue and 168 Street with details being worked out with BC Transit as the neighbourhood develops.

SANITARY SEWER

There are no gravity sanitary sewers currently available within the West Cloverdale North NCP. A sanitary sewer exists at the intersection of 168 Street and 60 Avenue and it extends north on 168 Street and west on 60 Avenue. Another sewer exists on 168 Street at 61 Avenue

and flows to the east. These two systems flow to the GVS & DD trunk along Highway #10 and have the ability to service a portion of the south eastern section of the NCP.

The remainder of the NCP is outside of the catchment area of the sanitary sewers on 168 Street and must be serviced by a proposed trunk that will start at about 64 Avenue and 168 Street. It will flow to the interim North Cloverdale sanitary pump station at 176 Street and 68A Avenue. This pump station will be eliminated when the Clayton trunk sanitary sewer trunk is constructed in the future.

The proposed sanitary sewer trunk will be constructed on rights-of-way through the agricultural lands. Initially the sewer runs along the Agricultural Land Reserve boundary and then it will head generally north east overland to 176 Street. The City and the developers have worked together to obtain these rights-of-way. This trunk is estimated to cost $1.2 million and will have to be constructed in order for any of the lands in the north catchment area to develop. This presents a significant cashflow problem for the NCP. The Stage 2 report proposes that a group of developers front end the construction of this trunk and that the City enter into an agreement with a group to reimburse them to the maximum of the value of the trunk sewer. Council have already approved such an agreement. If a group of developers do not get together to front end the sanitary sewer trunk then the development within the NCP cannot proceed.

The Stage 2 report also proposes that each application be required to pay their full DCC upon development rather than in 3 installments.

The proposed half-acre cluster residential area west of 164 Street can be serviced in either of two ways. Provision has been made in the South NCP to take the cluster housing area that is within the catchment area of the future toe-of-slope sanitary sewer into that trunk if required. Since the toe-of-slope sewer requires numerous rights of way, provision has also been made to allow this area to pump by way of a private pump station into the proposed future trunk to the North Cloverdale pump station.

The City's 10 Year Servicing Plan includes $1,221,000 for the proposed 168 to 176 Street trunk sanitary sewer. There are no other sanitary sewers within the NCP that qualify for Development Cost Charge financing.

Based upon current servicing plans and estimates, the NCP will ultimately pay $1,400,000 in Sanitary Development Cost Charges. These funds will be used primarily to finance the sanitary sewer trunk. Therefore this NCP will have paid $179,000 beyond that which is required to provide Municipal sanitary sewer services within the NCP at build-out.

WATER SUPPLY

This Neighbourhood Concept Plan will require significant improvements to the water supply system to support the proposed development. The area is currently serviced by a high pressure main on 176 Street that is supplied by the GVRD's Whalley Clayton main on the Fraser Highway. In order to provide for development, the water supply system along 60 Avenue from 176 Street to 168 Street is proposed to be upgraded to meet the needs of the neighbourhood. A supply main will also be required along 168 Street from 57A Avenue to 64 Avenue.

The initial phases of development will be able to obtain their water supply from 168 Street but once the threshold number of units has been reached, the watermain along 60 Avenue

must begin to be upgraded. Based upon the estimated rate of development of the NCP, the Stage 2 Report provides a tentative schedule for the construction of the different sections of the new supply watermain along 60 Avenue from 164 to 176 Streets starting in 1998 and completion in 2003.

The City's 10 Year Servicing Plan includes an amount of $1,648,000 for watermains required for this NCP. The Stage 2 Report identifies that of the watermains included in the Servicing Plan, an estimated $851,000 will qualify as being Development Cost Charge rebatable.

Based upon current servicing plans and estimates, this NCP will have contributed $797,000 in Water Development Cost Charges in excess of that required to service this NCP. When the West Cloverdale South NCP was approved by Council it was pointed out that the water supply required to allow for the full development of the South NCP could not be funded by that NCP. The combined NCPs do provide adequate DCCs to fund the required waterworks to service both NCPs. The North and South NCPs together will generate about $2,166,000 in water development cost charges.

STORM DRAINAGE

The NCP is divided into 3 catchment areas that all drain to the Serpentine River. The majority of the NCP drains to a creek located at 167 Street that flows through the Northview Golf Course and Country Club to the 168 Street ditch and then discharges to the Serpentine River. The North west section of the NCP drains into another creek located west of the alignment of 166 Street that discharges directly into the Serpentine Channel. The west section of the NCP flows overland to ditches that discharge to the Serpentine Channel and River.

The Stage 2 report proposes to enclose the two creeks south of 64 Avenue while the sections downstream of the NCP will continue to convey base flows and the major flows. The major flood paths for the area will be routed primarily along roadways and will also use existing drainage ditches and swales in the lowlands.

In order to mitigate the small increase in runoff to the lowlands, the report proposes a pressure storm system along the section of 168 Street next to the Serpentine River. This pipe system will provide the required increase in the rate of discharge to the River.

According to the Stage 2 Report, all the DCC drainage works are required to be constructed for phase 1 of their development staging. This results in a cashflow shortfall of about $846,000 that cannot be funded by available drainage DCCs. The report proposes that developers get together to front end the construction of all the DCC drainage works and that the City enter into an agreement to pay these developers back as other Drainage DCCs are collected from properties within this NCP. A draft of this agreement has already been approved by Council. If developers cannot front end these drainage works then the development of the NCP cannot proceed.

Approvals for the proposed drainage system have be received verbally from the Ministry of the Environment and the Department of Fisheries and Oceans.

The City's existing 10 Year Servicing Plan includes storm sewer trunk works on 168 Street from about 61 Avenue to the Serpentine River as well as on 63 Avenue and 167 Street.

The current 10 Year Servicing Program includes $ 3,030,000 for drainage works. The Stage 2 Report proposes a number of revisions to the work adding $253,000 to the program and reducing the Program in other areas by $1,383,000. The revised 10 year Servicing Program cost is $1,900,000.

Based upon current servicing plans and estimates, the NCP will have paid $586,000 in Drainage Development Cost Charges beyond that which is required to provide the NCP with Municipal drainage services within the NCP boundaries at build-out.

INFRASTRUCTURE FINANCING

SUMMARY

The Stage 2 Report deals with the servicing requirements for the NCP that are to be provided within or immediately adjacent to the NCP. The Report does not address the demands that the NCP may place on the Municipal systems outside of the NCP area. These overall demands are included in the 10 Year Program and are funded by Development Cost Charges collected from development and not expended upon works within the NCP itself.

The total Development Cost Charges that will be paid by this Neighbourhood Community will be approximately $7,527,000 for Sanitary Sewer, Storm Sewer, Water and Major Collectors. The estimated related expenses within the Neighbourhood is $3,972,000

Upon complete build-out, this NCP will have paid approximately $3,555,000 more in DCCs than the costs of works required, within the NCP area, to service the NCP with Municipal services. This surplus will be needed to provide for growth related works beyond the boundaries of the NCP that are identified in the 10 Year Servicing Program. A net position of the DCC account for each item of infrastructure is listed in the following table:

	Projected DCC Revenues	Current 10 Year Servicing Plan	Addition to Current 10 Year Servicing Plan	Projected DCC Expenditures	Net Surplus or Deficit
Sanitary	$1,400,000	1,221,000	0	1,221,000	179,000
Drainage	$2,486,000	3,030,000	(1,130,000)	1,900,000	586,000
Water	$1,648,000	851,000	0	851,000	797,000
Major Collector	$1,993,000	0	0	0	1,993,000
Total	$7,527,000	$5,102,000	(1,130,000)	$3,972,000	$3,555,000

The above table does not include the $ 5.99 million in Arterial Roads DCCs surplus to be contributed by the NCP since the majority of Arterial Road DCCs will be spent in areas external to the Neighbourhood to respond to overall traffic demands put upon the City's Arterial Road network.

To the Readers of this report:

The Engineering servicing plans included within this document are conceptual in nature reflecting Coastland Engineering & Surveying Ltd. best judgement based upon the information available at the time of preparation of the plans. Changes to these plans may become necessary from time to time as more detailed information becomes available and, as such, the City may make changes to the conceptual servicing plans within this report without notice.

Each development application affected by this plan will have to comply with the requirements of all City Bylaws, policies, design criteria, construction standards and other relevant regulations current at the time of development. Where it is specifically mentioned within this report that the recommended proposal will differ from the City Bylaw or policy, a Development Variance Permit will be required to be approved by Council at the time of the application processing.

ACKNOWLEDGEMENTS

This Neighbourhood Concept Plan was prepared jointly by Davidson Yuen Simpson Architects and Coastland Engineering & Surveying Ltd. for the West Cloverdale North Neighbourhood.

The following people have contributed to the preparation of this study and are acknowledged for their contributions:

Steve Kurrein	- Project Management
John Turner	- Project Management
Mike Jorden	- Planning
Greg Sewell, P.Eng.	- Engineering
Ian McGregor	- Engineering
Ron Yorston, P.Eng.	- Engineering
Trevor Ward, P.Eng.	- Traffic
Ian Whyte	- Environmental
Hugh Fraser, P.Eng.	- Drainage
Ray Fung, P.Eng.	- Drainage

DEVELOPMENT PHASING

As mentioned earlier, this NCP has a financial problem with the sanitary sewer and drainage works required to open up the area. No development can take place until a developer or group of developers are prepared to front end the DCC funded sanitary sewers and the storm sewers estimated to cost $3.1 million. In this case a group of developers have indicated a willingness to fund all of the DCC funded sanitary and storm sewer up front. It would not normally be our approach to bring forward an NCP unless a clear method of financing were available and confirmed. In this case the NCP is brought forward subject to the developers agreeing to front end these needed services.

The phasing of development is anticipated to start at 168 Street and 64 Avenue since this is where the storm and sanitary sewers will first be available. The services will then be extended south and west by the individual developers and development is expected to follow logically. If developers want to develop out of sequence then they may do so if they can provide municipal services to City standards and are prepared to pay the additional costs.

The proposed phasing plan presented in the report attempts to minimize in a broad manner, the infrastructure costs to each development. If landowners choose to proceed outside of the phasing proposed then they will have to construct infrastructure that would otherwise be built and paid for by other landowners.

Umendra Mital, P.Eng.,
General Manager, Engineering

JJ

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WEST CLOVERDALE

NEIGHBOURHOOD CONCEPT PLAN

NORTH NEIGHBOURHOOD

SECTION I

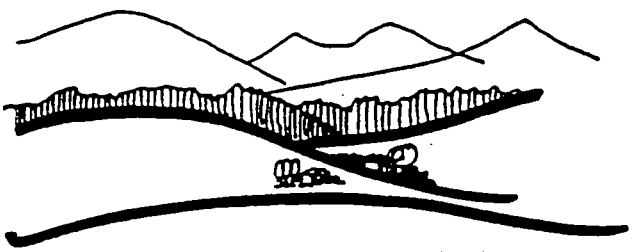
LAND USE PLAN
AND SUBDIVISION CONCEPT

NOVEMBER 26, 1997

COASTLAND ENGINEERING & SURVEYING LTD.

WEST CLOVERDALE
Neighbourhood Concept Plan 1

STAGE II
REPORT



Prepared by
Davidson Yuen Simpson
Architects
and
Coastland Engineering Ltd.

for
West Cloverdale Area 1
Steering Committee

WEST CLOVERDALE
Neighbourhood Concept Plan 1
STAGE II

EXECUTIVE SUMMARY

The following report presents a Neighbourhood Concept Plan (NCP) proposal for West Cloverdale's sub-area 1, in Surrey.

This report provides:

a) An overview of the physical site, context and issues affecting the preparation of a Neighbourhood Concept Plan .
b) A summary of the process and results of the community involvement work.
c) A Land Use Plan for the site.
d) An empirical comparison of the Local Area Plan (NCP 1 area) and the proposed NCP 1.
e) A general evaluation of the servicing and costing implications of the NCP 1 area.

The West Cloverdale NCP 1 area is approximately 250 acres. The NCP 1 Land Use Plan proposes a total of approximately 1634 dwelling units.

Land owners in the NCP 1 area have been involved in the design and planning process, and the plan presented here has the support of seventy-two percent of the land owners, representing eighty percent of the land area.

PREAMBLE

In September 1993 Surrey Council identified the West Cloverdale neighbourhood as one of several areas that would benefit from the preparation of a Local Area Plan (LAP) to guide the future growth and development of the neighbourhood.

With this awareness, Surrey planning staff held a series of public information meetings and workshops to involve the area residents in the preparation of a Local Area Plan. The LAP which resulted from that process describes a general direction for further neighbourhood planning work, and establishes the overall goals for schools, parks, area population and land uses. NCP proposals for the three sub-areas were the next stage in the planning process that began with the LAP.

West Cloverdale's Sub-area 1

The neighbourhood's vision for this area of West Cloverdale is a low density urban village that captures some of the traditional heritage character that is Cloverdale. The elements of the traditional village that distinguish it from the contemporary suburban landscape are the following:

- a defined boundary or visible edge
- strong neighbourhood "Focal Points"
- streets that emphasize the walking/cycling experience rather than the movement of vehicles
- a "Village Street" which is defined by buildings in a similar fashion to Cloverdale's downtown
- a definable building "character" (see 'Traditional Design Elements')

■ WEST CLOVERDALE ■
Neighbourhood Concept Plan 1
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The proposed NCP 1 Land Use Plan, suggests some higher densities compared to the LAP including street oriented townhouses which are believed to be appropriate and so are proposed along 64th Avenue, 168th Street and 60th Avenue. But the majority of the area is single family lots. These densities are planned to complement the local commercial node at the "Five Corners" intersection, of 168th Street and 60th Avenue.It is also hoped that some small mixed use commercial could be accomodated in perhaps two or three units on 60th Avenue at the 166th Street intersection; emphasizing the "Village Street" concept. No commercial use is proposed which would compete with downtown Cloverdale.

Located in the centre of the NCP 1 area is a neighbourhood school in association with a neighbourhood park. A significant pedestrian / bicycle circulation system will provide convenient and safe access to these facilities as well as to the prominent perimeter areas which define the visible edge of the NCP 1 area - the Northview Golf Course to the north, the Cloverdale Athletic Park to the east, the proposed "Village Street" to the south, and the Serpentine Channel and agricultural lands to the west.

The NCP 1 proposal is generally consistent with the Local Area Plan in intent and quantity. Although the proportion of housing types differs from the LAP the projected number of dwelling units and accompanying population is in close conformity, and has been substantiated by the engineering analysis.

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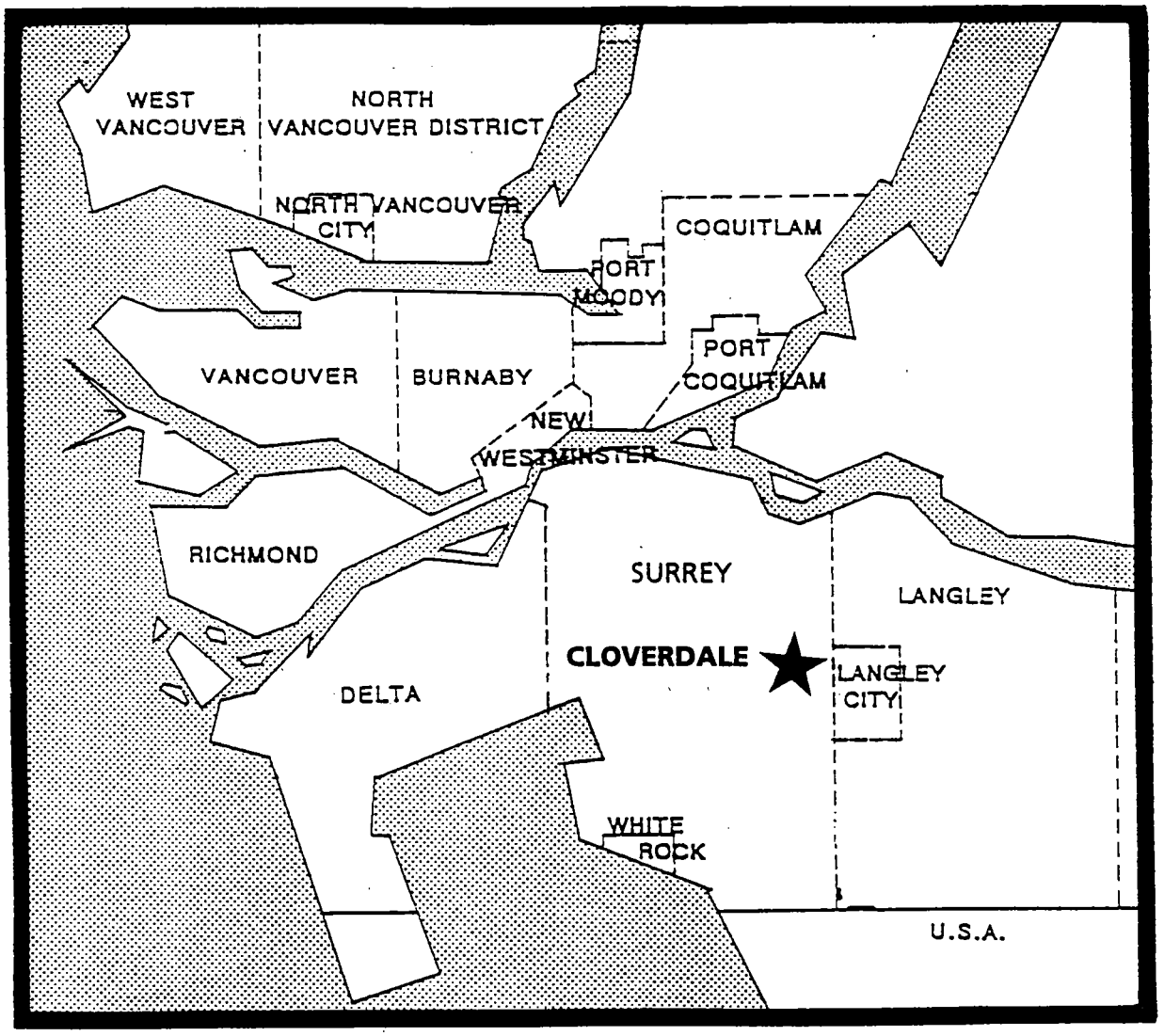
REGIONAL CONTEXT MAP



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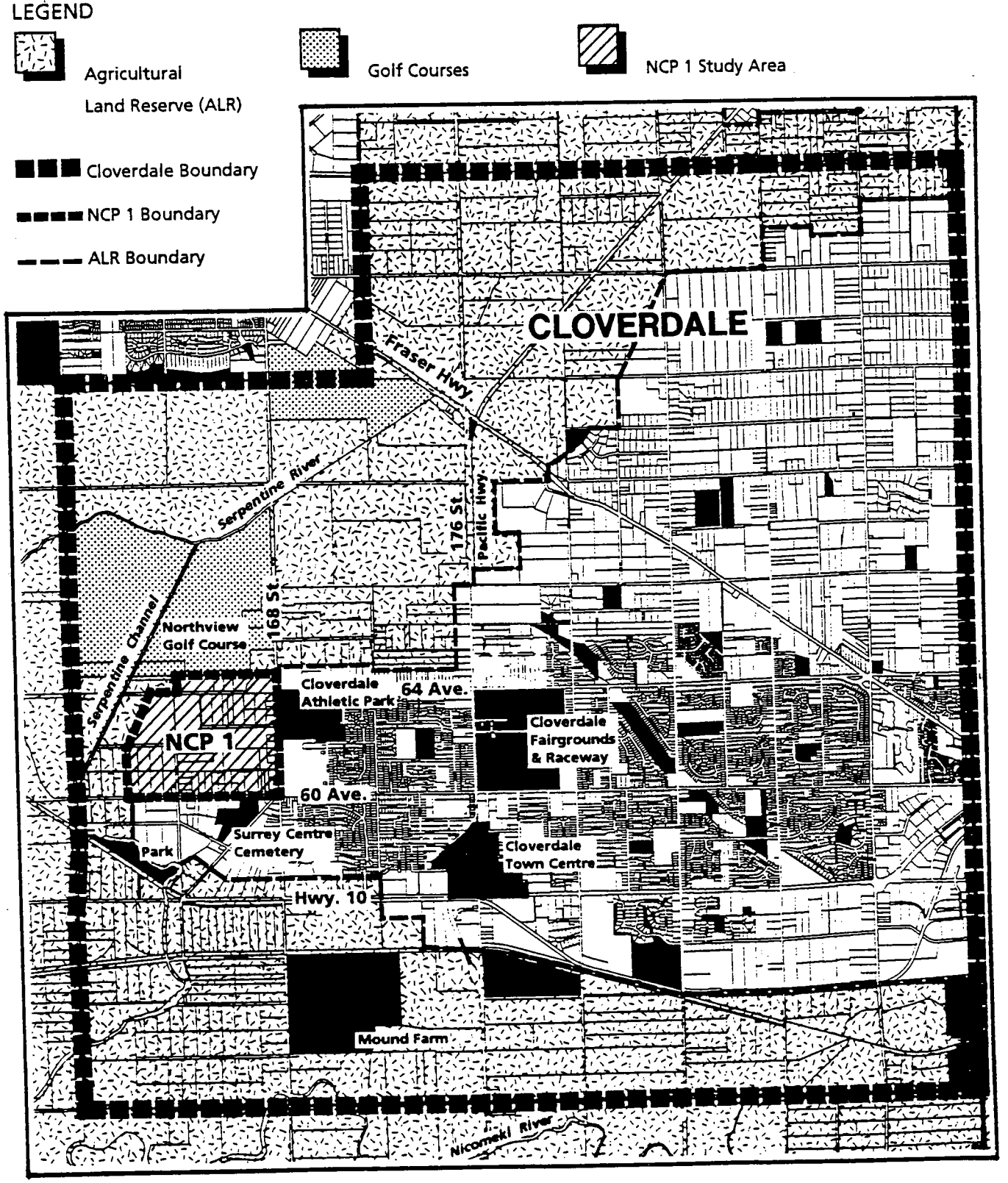
LOCAL CONTEXT MAP



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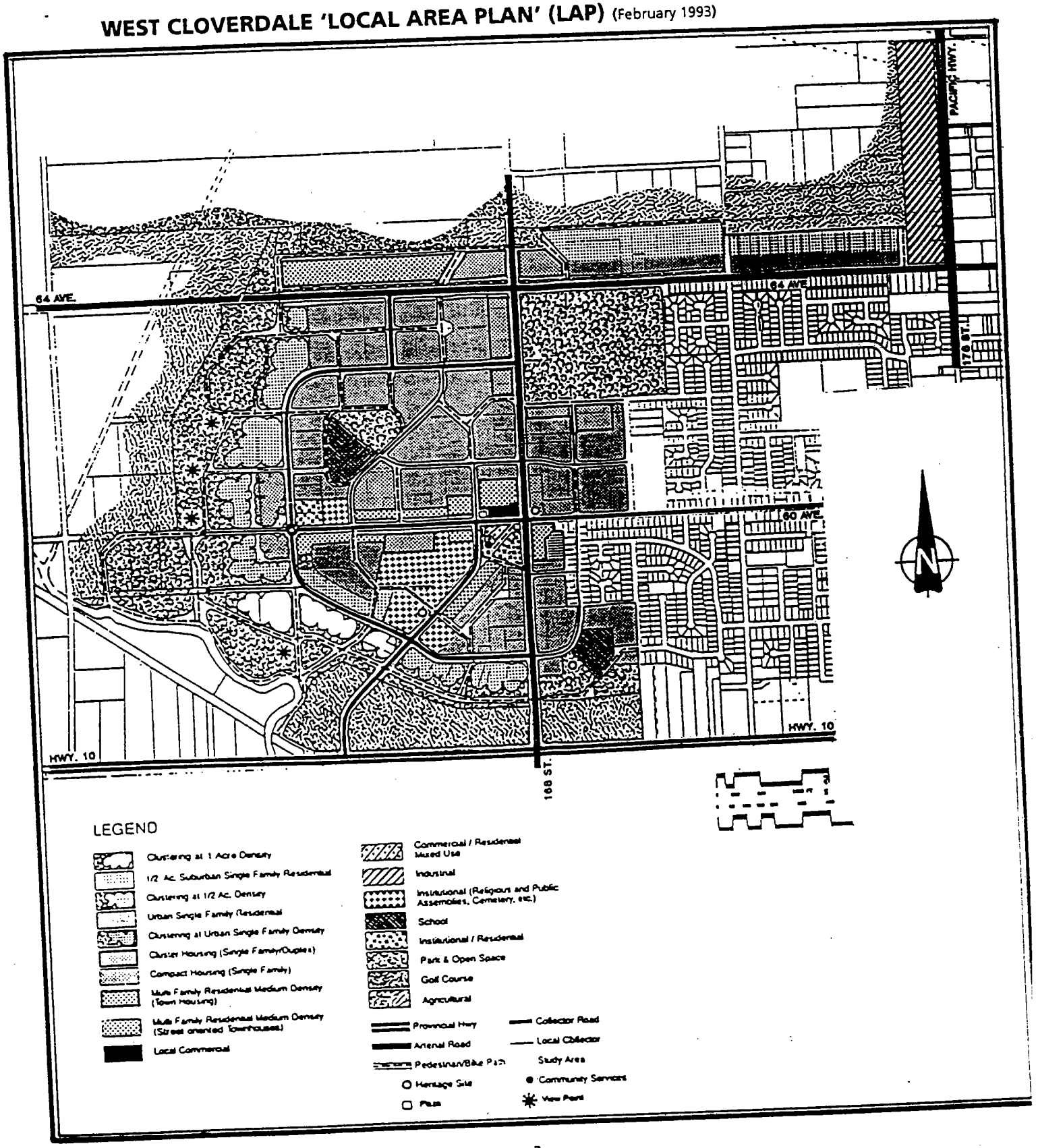
WEST CLOVERDALE 'LOCAL AREA PLAN' (LAP) (February 1993)



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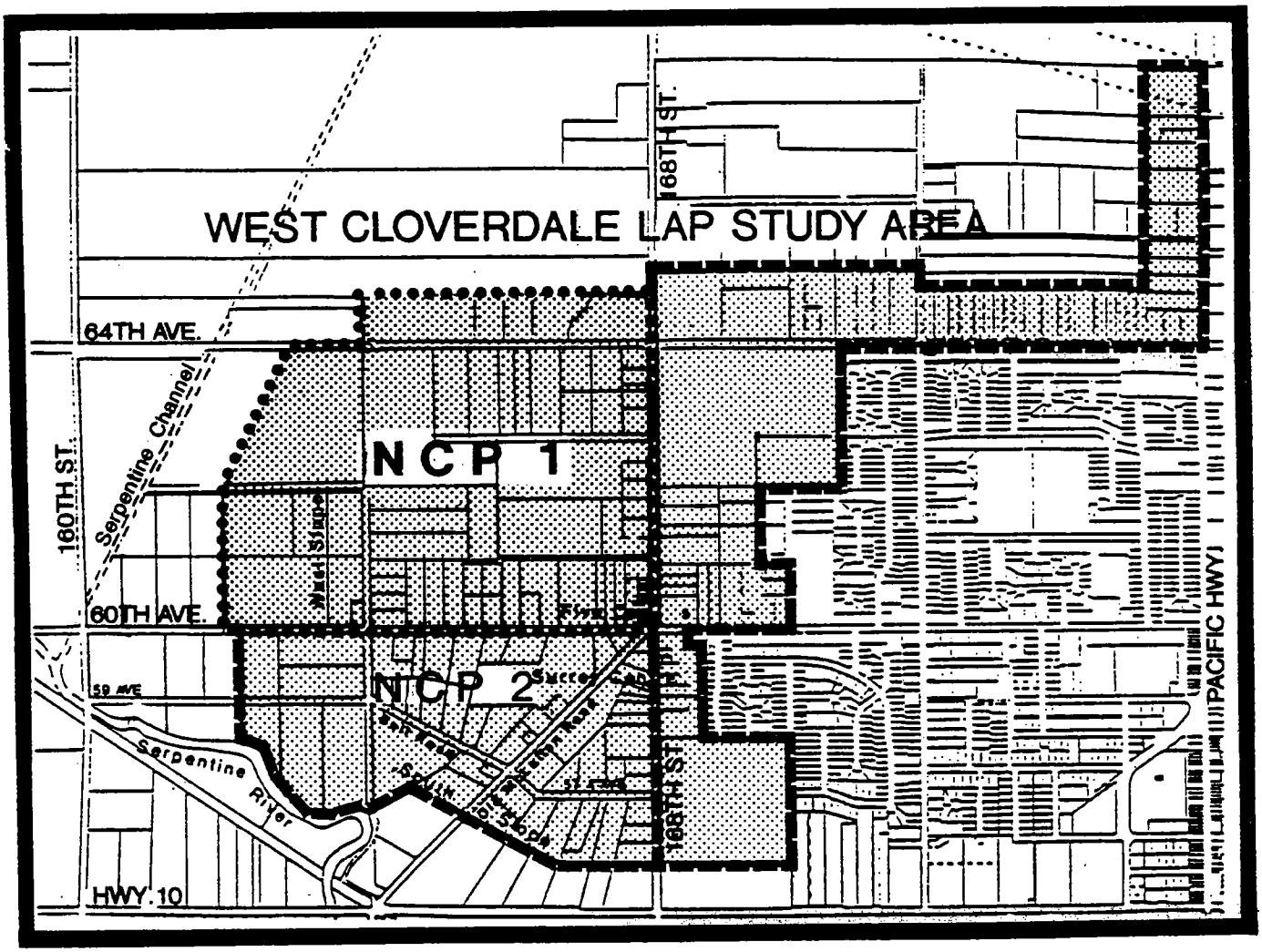
WEST CLOVERDALE LAP STUDY AREA AND NCP 1 SUBJECT SITE



■ WEST CLOVERDALE ■
Neighbourhood Concept Plan 1
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1.0 INTRODUCTION

1.1 Location and Description

The West Cloverdale neighbourhood is located approximately three kilometres to the west of the Cloverdale Town Centre.

The Local Area Plan (LAP) separates West Cloverdale into three Neighbourhood Concept Plan (NCP) sub-areas. NCP 1 area is north of 60th Avenue and is the area under consideration here. NCP II area is south of 60th Avenue and bounded as indicated in the Local Area Plan. The other NCP area is east of 168th Street.

The West Cloverdale Area 1 neighbourhood is bounded on the north by 64th Avenue and the properties fronting on the north side (of 64th Avenue), on the east by 168th Street, on the south by 60th Avenue and generally on the west by the Serpentine Channel.

The area is predominantly large acreages with scattered homesites. Limited agricultural use, including a mushroom farm, can be found in the area. No lands in the West Cloverdale neighbourhood are within the Agricultural Land Reserve.

1.2 Purpose and Process Overview

The preparation of a Neighbourhood Concept Plan is the second part of a three part planning and approval process.

The first part is the preparation of a Local Area Plan for a specific area or neighbourhood. These areas are studied by City staff, who subsequently prepare a LAP, which describes goals for land uses and housing types, ultimate population, and provision for schools, parks, fire protection and police services.

The Neighbourhood Concept Plan Stage I document is the second part in that process. The general design and program elements of the Local Area Plan are used as the basis for further refinement of land uses, road layout and design. This work, performed by planning consultants, engineers and land owners, is presented in the Neighbourhood Concept Plan proposal Stage I.

The NCP Stage II document, based on the framework established in Stage I, is the third part. It includes servicing details, phasing, development guidelines, contributions, owner's agreements and cost sharing arrangements for services, social amenities and neighbourhood facilities. This stage demonstrates how neighbourhood facilities and services are provided without undue financial burden on the community at large.

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Neighbourhood Concept Plan 1
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There are three central objectives to be satisfied by the preparation of the Neighbourhood Concept Plan.

- *The first objective is to provide a detailed Land Use Plan for the neighbourhood area and a framework with which to evaluate future rezoning and subdivision applications for lands covered by this NCP.*

- *The second objective of the NCP is to provide a reasonable level of confidence in predictions of ultimate population, density and land uses. In this sense it is a refinement of the LAP.*

- *The third objective is to provide a process to allow for the participation of local land owners, respond honestly to their concerns and work to accommodate their vision for their community. This is a significant part of the planning process and the verifiable support of fifty percent of the land owners in the NCP area is required to demonstrate their support for both the NCP process and the final Land Use Plan.*

The NCP for the sub-area 1 has been prepared by a process of informal information and idea meetings with area land owners, formal town hall-style presentations, numerous Steering Committee meetings and discussions and reviews with City staff.

The NCP 1 Land Use Plan has been developed to work towards the spirit and empirical goals of the Local Area Plan for West Cloverdale as well as the Official Community Plan (OCP). In addition, the standards and concerns of appropriate government agencies have been incorporated in the overall design.

Subsequent sections within this report describe the physical and political aspects of the subject area, the public participation process, the proposed size and location of specific land uses, circulation, and the proposed neighbourhood facilities.

Lists of comments and questions recorded at public meetings for West Cloverdale were included in appendices to the NCP 1 (Stage I).

Section 4.0 describes the public participation process on which the Land Use Plan was based.

■ WEST CLOVERDALE ■
Neighbourhood Concept Plan 1
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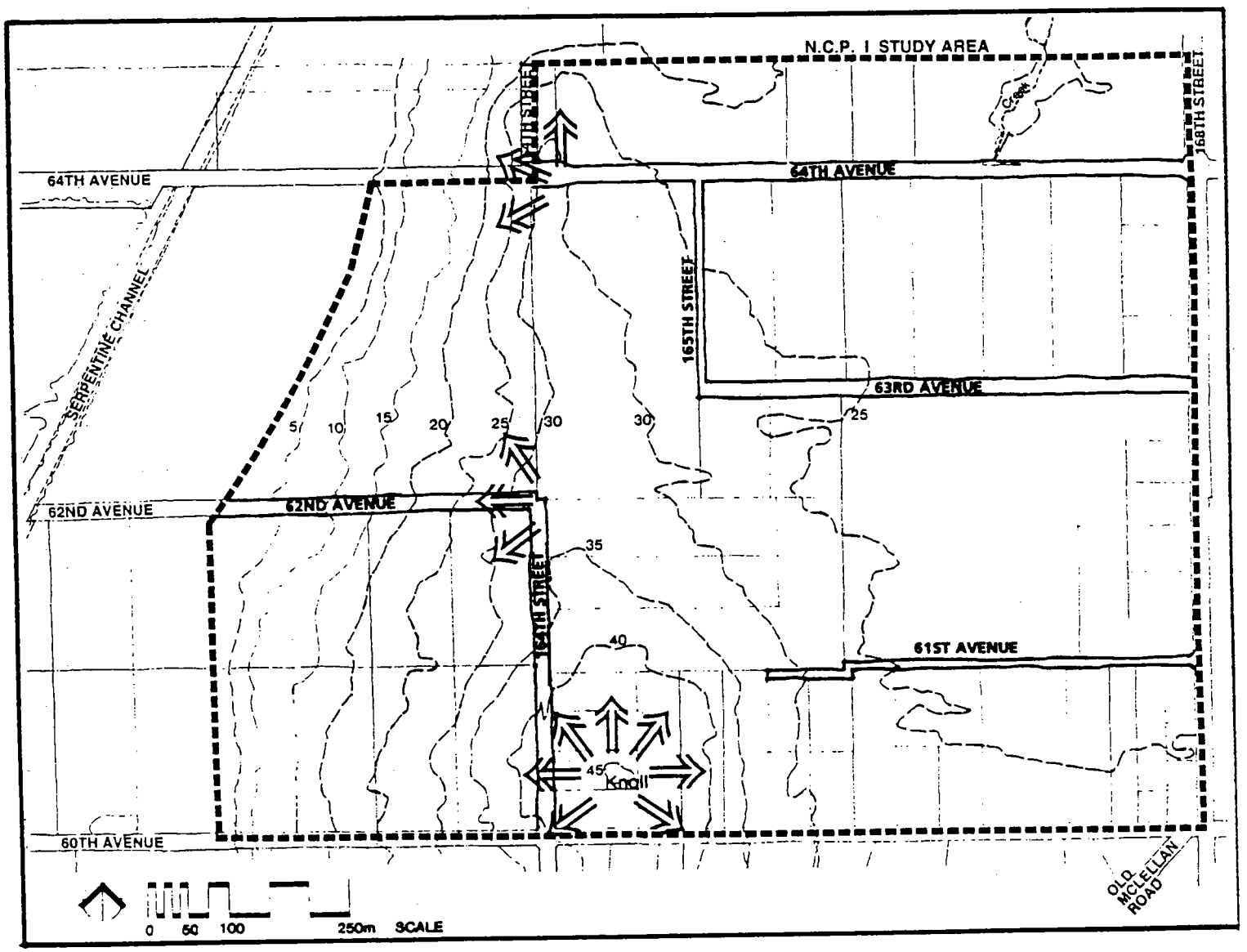
TOPOGRAPHY & VIEW POTENTIALS (March 1995)

LEGEND

- NCP 1 Study Area
- Contour Lines (metres)
- 'View' Potential



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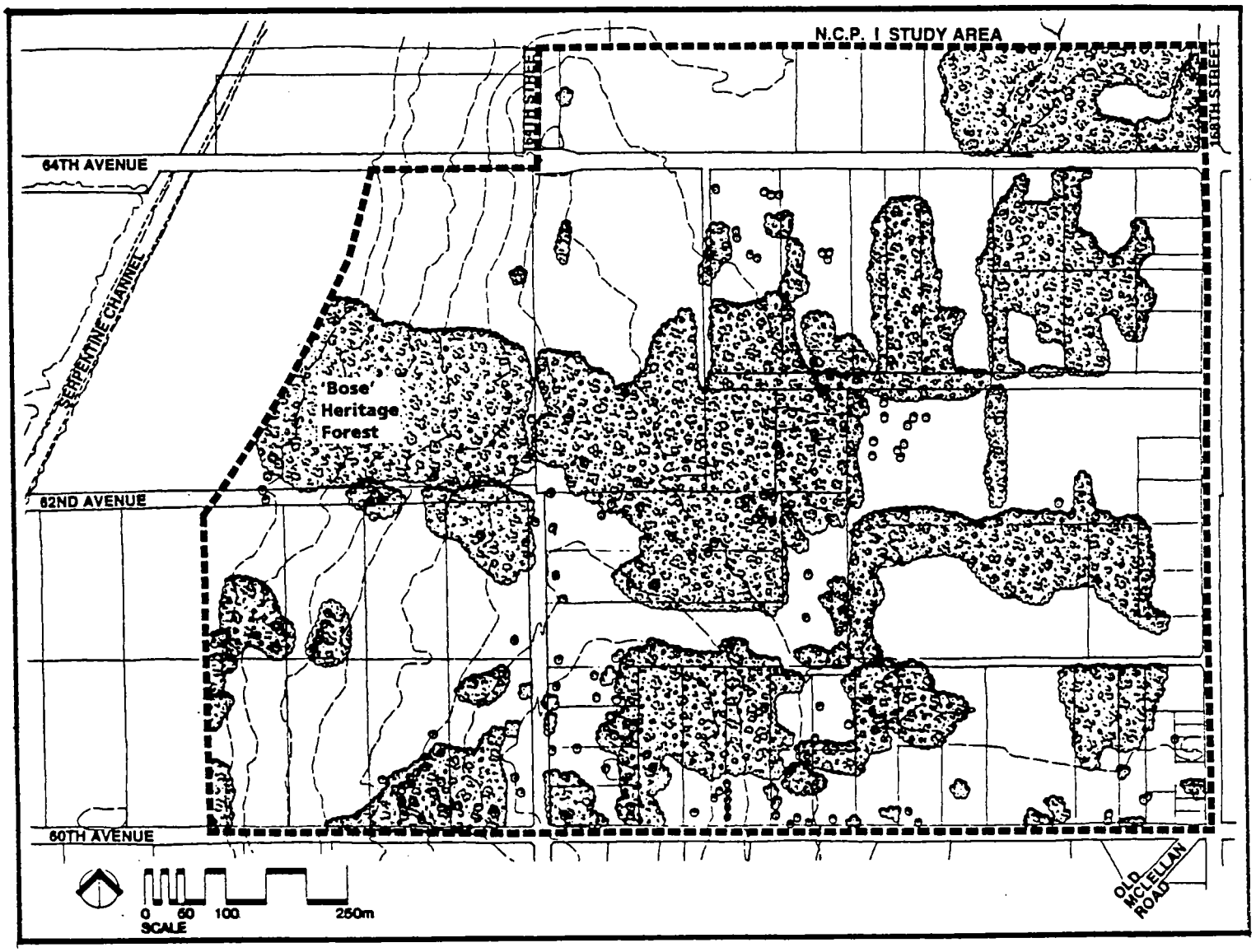
TREE STANDS (October 1994)

LEGEND

▬▬ NCP 1 Study Area

Tree Stands



2.0 PHYSICAL DESCRIPTION OF SITE

2.1 Topography

The site has a distinct high point at the south west corner, north of 60th Avenue and east of 164th Street. From this knoll, the property slopes gradually down to the north and east and more steeply down to the west towards the Serpentine Channel. Overall gradients are modest - usually under five percent. The west edge is steeper, with an elevation drop of approximately twenty five metres at varying slopes, averaging approximately 10 percent.

2.2 Soils

Soils in the West Cloverdale neighbourhood are uniformly glacio-marine in origin. The portion of the site between 164th Street and 168th Street is glacial till composed of sandy and gravelly material stratified with lenses of stony silt.

West of 164th Street as the land slopes towards the Serpentine River, the soil strata is glaciofluvial sandy gravel. Ice contact deposits create some sand and silt pockets. This area is consequently better drained than the remainder of the area.

2.3 Vegetation

The site is currently a mixture of cleared pasture land, tree stands and some rural residential lots. Vegetation consists of both ornamental trees and shrubs as well as some areas of native vegetation. Native vegetation generally consists of scattered Alder, Vine Maple and Broadleaf Maple with occasional Douglas Fir, Western Hemlock and Red Cedar. The most interesting area is the property currently owned by 452323 B.C. Ltd. (Freda Bose) situated west of 164th Street immediately south of 64th Avenue. Many large trees remain on this property and have been underplanted with grass. The residents have expressed interest in preserving this area and have noted this in writing.

■ WEST CLOVERDALE ■
Neighbourhood Concept Plan 1
STAGE II

MARCH 28, 1994
ZONING MAP

LEGEND

■■■■■ NCP 1 Study Area

Zoning Boundary (within the NCP 1 area)

A-1 General Agriculture Zone

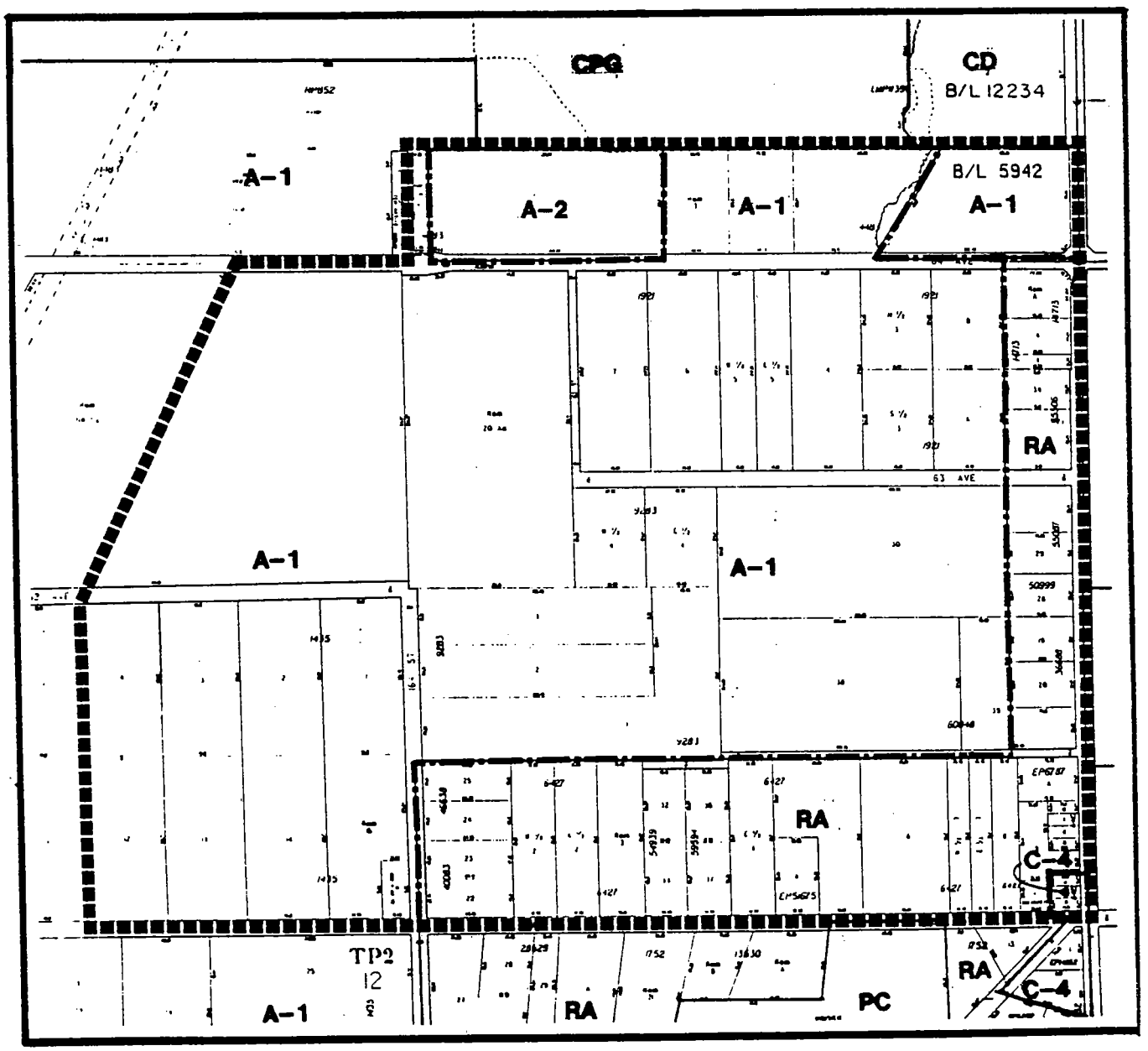
A-2 Intensive Agriculture Zone

RA One - Acre Residential Zone

PC Cemetery Zone

C-4 Local Commercial Zone

CPG Golf Course Zone



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Neighbourhood Concept Plan 1
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SEPT. 30, 1996
OFFICIAL COMMUNITY PLAN (OCP)
LAND USE DESIGNATION MAP

LEGEND

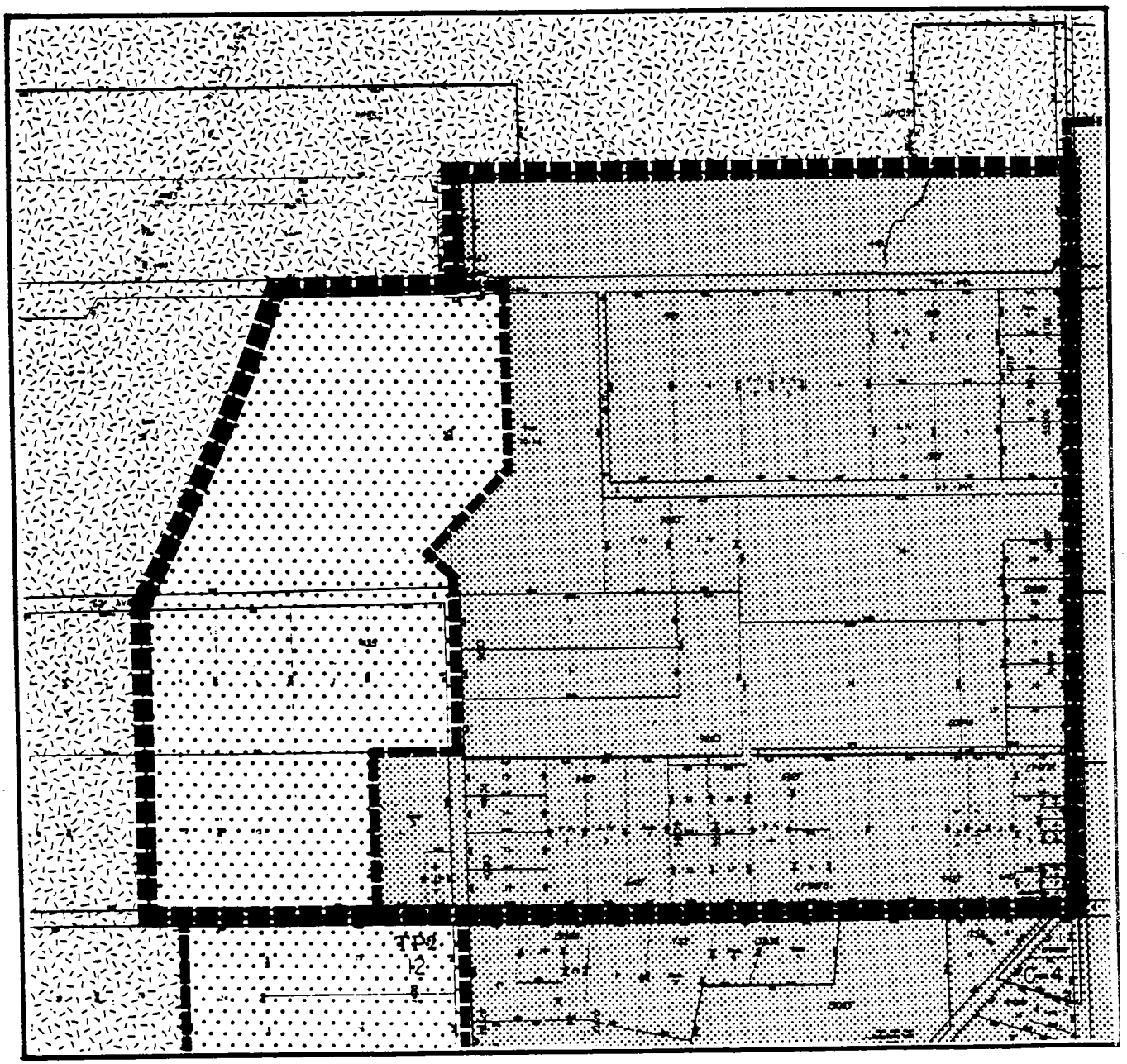
■■■ NCP 1 Study Area

Agriculture

Urban

Land Use Designation Boundary

Suburban



3.0 LAND STATUS

3.1 March 28, 1994 Zoning

The majority of the West Cloverdale NCP I area was zoned as General Agriculture (A-1) with the of One Acre Residential Zoning (RA) along the north side of 60th Avenue between 164th and 168th Street, and along the west side of 168th Street. The northwest corner of the "Five Corners" intersection was designated Commercial (C-4) zone.

3.2 September 30, 1996 Land Use Designation

The majority of the NCP I area is now designated as Urban. The exception is a strip area west of 164th Street between 64th Avenue and 60th Avenue which is now Suburban in land use. The gradual density change from high (on the east side) to low (on the west side) still remains, complementing the Agricultural Land Reserve bounded on the west of the NCP I site.

3.3 Present State of Lands in the NCP I Area

The NCP I lands are generally rural residential with varying lot sizes. Stands of coniferous and deciduous trees separate open fields on many of the properties, and casual agriculture and pasture uses are present.

An abandoned mushroom farm is located on 61st Avenue, west of 168th Street. Some agricultural buildings remain and are in varying states of use and repair.

A small corner grocery store is located on the northwest corner of the "Five Corners" intersection. This land use is to be retained in the Proposed NCP 1.

4.0 PLANNING AND DESIGN PROCESS: ISSUES AND GOALS

4.1 Steering Committee

One of the original intents of the NCP process was to involve the area owners and to ensure that the plan developed reflects the desires of the owners and area residents. A Steering Committee was formed as part of the owner consultation process. This Steering Committee was comprised of the following land owners and representatives of the land owners who wanted to play an active role in the implementation of the NCP process.

Don Dhanoa
Harj Cheema
Pep Khera
Grace Jeklin
Sue Spivey
Avtar Johl
John Turner
Steve Kurrein
Roger Bose
David Vaishnev

4.2 Public Participation Process

As required by the City of Surrey, the client and consultant group has worked to inform the owners of land in the NCP 1 area of the process, and to obtain the support and participation of as many of these land owners as possible. To this end, all of the registered owners were contacted and invited to participate in the process.

Meetings were held with the land owners and the client group on the following dates:

Feb 16, 1994	Preliminary information meeting.
June 09, 1994	Preliminary Land Use Plan presentation and review.
Jan. 25, 1996	Final Stage I Land Use Plan presented for ratification.

The first meeting, held on February 16 achieved the required support of 50% of the registered land owners in the NCP 1 area in favour of proceeding with the NCP process.

At the second meeting, held June 09, preliminary Land Use Plans were presented to the group of owners. During the meeting the questions and comments of the owners and the replies of the consultant team were recorded and were attached in the Stage 1 appendix.

The revised Land Use Plan was presented to the owners for review on January 25, 1995.

4.3 Planning Objectives

The Neighbourhood Concept Plan has been prepared in response to the goals and objectives identified in the LAP, and to incorporate the views and concerns of the property owners who participated in the process. Accordingly, we believe the NCP 1 is a fair and balanced accommodation of the major program elements for the West Cloverdale area.

Four general areas were considered as criteria for the preparation of the NCP 1.

i) Physical Site Response Goals

- Identify and protect environmentally important and sensitive areas, and significant existing vegetation.
- Respond to potential impacts and conflicts with traffic along 168th Street and 64th Avenue.
- Identify physical features unique to the subject area, and work to emphasize these features during the neighbourhood design process.

ii) Housing and Community Structure Goals

- Create strong community "Focal Points"
- Plan for a variety of housing types and styles to accommodate and integrate a variety of income and housing needs.
- Provide a realistic arrangement of housing types to promote interaction between age and income groups, while maintaining an identifiable neighbourhood character.
- Plan for adequate family oriented housing to support a community park and school.
- Locate family oriented housing in close proximity to central community facilities, such as the school and park.
- Create a sense of community identity by means of Design Guidelines and a strong "Village Street" theme.

iii) Movement and Circulation Goals

- Provide a logical road system which will allow for easy circulation through the neighbourhood without encouraging through-traffic.
- Lay out roads and housing areas to work with the variations in topography, thus reinforcing the goal of respect for the natural character of the area.
- Develop a series of pedestrian connections to encourage walking and bicycling as a reasonable alternative to vehicles for movement within the neighbourhood. This should include a focus on the school and park facility.

iv) Servicing Objectives

- Provide centrally located and accessible school facilities, and plan for a population to sustain the operation of a school.
- Provide a realistic cost estimate and service schedule for hard service costs: roads, sidewalks, street lighting, water, storm and sanitary sewers, and hydro.
- Provide an engineering based assessment of options for servicing special needs areas. The west portion of the NCP 1 area may require extra consideration in this respect.

4.4 Summary of Site Opportunities and Constraints

A review of the area suggests that its physical characteristics do not impose significant constraints on the possibilities for development, but rather that they may provide opportunities that could contribute to the identity of the neighbourhood.

Although this area has relatively homogeneous terrain, the southwest portion of the neighbourhood area has more topographic relief, with a high point at the intersection of 60th Avenue and 164th Street. From this knoll, view possibilities exist in many directions; to the west the Serpentine Channel and agricultural lands and to the east Mount Baker and the Cascades. (see 'Topography & View Potentials')

A significant constraint is seen to be the cost of servicing the land to the west of the high knoll. Properties in this area are below the gravity sanitary sewer. Because of this constraint, development of the neighbourhood requires consolidation of land so that the parcel has sewer frontage. A strata development with a pump station is proposed.

5.0 NEIGHBOURHOOD CONCEPT DESIGN PROPOSAL

5.1 Planning Principles

The Neighbourhood Concept Plan was the result of an interactive design and consultation process. Each complete phase of the work was reviewed with neighbourhood property owners, ensuring that their interests and opinions have been considered.

In response to the physical characteristics of the site, the Land Use Plan proposes the highest and best use of the appropriate areas for development, consistent with the need to respect sensitive areas of environmental interest, and land owners who have not participated in the NCP process.

As the NCP work progressed, a series of specific design ideas became apparent, suited to the program and goals developed earlier. The following ideas were used to guide the planning of the Land Use Plan for the NCP area.

- Locate some parcels of land designated as family-oriented multi-family or cluster housing in close proximity to school and park facilities.
- Create a system of roads to allow logical vehicular access and circulation to all areas of the neighbourhood, with a generally concentric, ordered pattern.
- Develop a formal, overall plan of roads and pedestrian paths to create opportunities for "Focal Points" and views to destinations. Include both the existing store at "Five Corners" as well as the proposed mixed use service area.
- Maintain the idea of formality and focused views in designing the street front townhouse areas along 60th Avenue. Propose green focal points to be included in the renovation of 60th Avenue at important neighbourhood intersections.
- Develop and promote the concept of a higher density "Village Street" along 60th Avenue. Maintain a vision of a rural village street with a character appropriate to Cloverdale.
- Investigate opportunities to reduce the speed of vehicular traffic along 60th Avenue.

■ WEST CLOVERDALE ■
Neighbourhood Concept Plan 1
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TABLE 1 West Cloverdale - **LOCAL AREA PLAN (LAP)** February 1993 - Total Area

Plan Designation / Proposed Land Use	**Summary of Proposed Land Statistics** Approx. Land Area (Acre)	UPA Units / Ac.	Approx. No. of Dwelling Units	Persons / Unit PPU	Projected Pop.
CD Clustering @ 1Ac	**12.0**	**1.0**	**12**	**3.5**	**42**
RH / RH-G 1/2 Ac. & 1/2 Ac. Gross Sub. Res.	**40.0**	**1.9**	**76**	**3.2**	**242**
RC Clustering @ 1/2 Ac	**61.0**	**2.0**	**122**	**3.2**	**390**
RF / RF-SS / RM-D Urb. SF Res. (Sec. Suite & Duplex)	**170.0**	**5.9**	**1,012**	**3.2**	**3,235**
RF-G Clustering @ Urb. SF	**6.0**	**5.0**	**30**	**3.2**	**95**
RM-D / RM-F / RM-10 Cluster Housing (Duplex & Multi Res.)	**26.0**	**9.5**	**248**	**3.2**	**790**
RF-G Compact Housing	**11.0**	**7.9**	**87**	**3.2**	**275**
RM-15 Townhousing	**25.0**	**11.5**	**289**	**2.0**	**570**
RM-15 Rowhousing	**10.0**	**8.8**	**88**	**2.0**	**176**
CCR / CD / RM-15 / C-4 Commercial / Res. / Mixed Use	**1.0**	**20.0**	**20**	**2.0**	**40**
RMS-1 / PA-1 / RM-15 Institutional / Res.	**4.0**	**10.0**	**40**	**2.0**	**80**
C-4 Local Commercial	**1.0**	-	-	-	-
IB / IL Industrial	**25.0**	-	-	-	-
CCR / PC / PA-1 Institutional (Religious, Public Ass., Cemetery etc.)	**20.0**	-	-	-	-
SCHOOL	**11.0**	-	-	-	-
PARK / OPEN SPACE (excludes linear walkway systems)	**19.0**	-	-	-	-
TOTAL	**442**	N / A	**2,024**	N / A	**5,935**

Note: Land Areas, No. of Dwelling Units, & Projected Pop. from LAP 1993 Appendix I

Note: Road Area & Cloverdale Athletic Park excluded

■ WEST CLOVERDALE ■
Neighbourhood Concept Plan 1
STAGE II

TABLE 2 West Cloverdale - **LOCAL AREA PLAN (LAP)** Feb.1993 - NCP 1 Area

Plan Designation / Proposed Land Use	**Summary of Proposed Land Statistics** Approx. Land Area (Acre) (% of 250 Ac)	UPA Units / Ac	Approx. No. of Dwelling Units	Persons / Unit PPU	Projected Pop.
CD Clustering @ 1Ac	-	-	-	-	-
RH / RH-G 1/2 Ac. Sub. Res.	-	-	-	-	-
RC Clustering @ 1/2 Ac	**67.0** (26.8%)	**2.0**	**134**	**3.2**	**429**
RF / RF-SS / RM-D Urb. SF Res.	**113.6** (45.4%)	**6.0**	**681**	**3.2**	**2,179**
RF-G Clustering @ Urb. SF	**4.9** (2.0%)	**5.0**	**24**	**3.2**	**77**
RM-D / RM-F / RM-10 Cluster Housing	**12.9** (5.2%)	**9.5**	**122**	**3.2**	**390**
RF-G Compact Housing	**6.4** (2.6%)	**8.0**	**51**	**3.2**	**163**
RM-15 Townhousing / Rowhousing	**28.3** (11.3%)	**11.5**	**326**	**2.0**	**652**
CCR / CD / RM-15 / C-4 Commercial / Res. / Mixed Use	-	-	-	-	-
RMS-1 / PA-1 / RM-15 Institutional / Res.	**2.4** (1.0%)	**10.0**	**25**	**2.0**	**50**
C-4 Local Commercial	**1.7*** (0.7%)	-	-	-	-
IB / IL Industrial	-	-	-	-	-
CCR / PC / PA-1 Institutional (Religious, Public Ass., Cemetery etc.)	**2.5** (1.0%)	-	-	-	-
SCHOOL / PARK / OPEN SPACE (excludes linear walkway systems)	**10.0** (4.0%)	-	-	-	-
TOTAL	**250.0**	N / A	**1,363**	N /A	**3,940**

* Note: 1.7 Acres is based on our area take-off calculation from the Feb. 1993 LAP

■ WEST CLOVERDALE ■
Neighbourhood Concept Plan 1
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TABLE 3 West Cloverdale - **PROPOSED NCP 1 Land Use Plan** May 15, 1997

Plan Designation / Proposed Land Use	Summary of Proposed Land Statistics Approx. Land Area (Acre) (% of 250 Ac)	UPA Units / Ac	Approx. No. of Dwelling Units	Persons / Unit PPU	Projected Pop.
CD Clustering @ 1Ac	-	-	-	-	-
RH / RH-G 1/2 Ac. Sub. Res.	-	-	-	-	-
RC Clustering @ 1/2 Ac	**63.95** (25.6%)	**2.0**	**128**	**3.2**	**409**
RF / RF-SS / RM-D Urb. SF Res.	**78.51** (31.45%)	**6.0**	**471**	**3.2**	**1,507**
RF-G Clustering @ Urb. SF	**5.34** (2.15%)	**7.5**	**40**	**3.2**	**128**
RM-D / RM-F / RM-10 Cluster Housing	**20.8** (8.3%)	**10.0**	**208**	**3.2**	**666**
RF-G Compact Housing	-	-	-	-	-
RM-15 Townhousing / Rowhousing	**48.6** (19.4%)	**15.0**	**729**	**2.0**	**1,458**
CCR / CD / RM-15 / C-4 Commercial / Res. / Mixed Use	-	-	-	-	-
RMS-1 / PA-1 / RM-15 Institutional / Res.	**3.7** (1.5%)	**15.0**	**55**	**2.0**	**110**
C-4 Local Commercial	**1.1** (0.4%)	-	-	-	-
IB / IL Industrial	-	-	-	-	-
CCR / PC / PA-1 Institutional (Religious, Public Ass., Cemetery etc.)	-	-	-	-	-
SCHOOL / PARK / OPEN SPACE	**14.6** (5.8%)	-	-	-	-
EXISTING ROADS (refer to Figure 'Topography & View Potentials')	**13.4** (5.4%)	-	-	-	-
TOTAL	**250.0**	N / A	**1,631**	N /A	**4,278**

5.2 Land Use Statistics

The Local Area Plan (LAP) has an approximate total land area of 442 acres. The LAP is composed of the three sub-areas:

- NCP 1 - area north of 60th Avenue and west of 168th Street
- NCP 2 - area south of 60th Avenue and west of 168th Street
- the area east of 168th Street

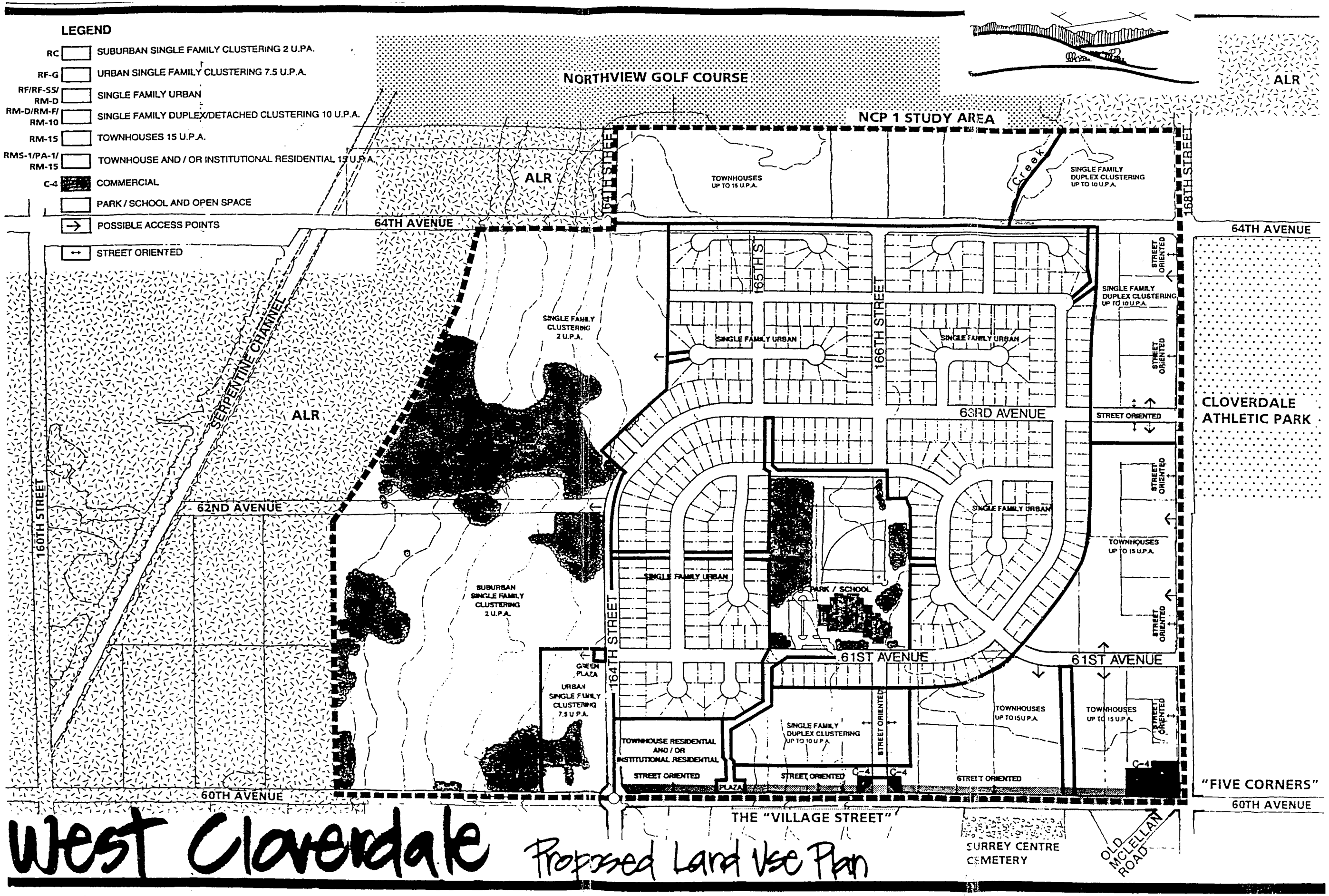
Table 1 is a statistical summary of the yield estimates for the total area of the LAP.

Table 2 is the statistical summary of the yield estimates for the NCP I area of the LAP.

Since the statistics for the LAP were an aggregate of the three sub-areas, the NCP I (an approximate 250 acre area), represented only a portion of the total LAP. To calculate the LAP yield statistics for just the NCP I portion, area take-offs were done and the density calculations from the LAP applied. It was found that some proposed densities could not be achieved.

Table 3 is the statistical summary of the yield estimates for the Proposed NCP I Land Use Plan area.

The Proposed Land Use Plan is the result of an interactive design and consultation process. Adjustments to the LAP - NCP I land uses were made while respecting the plan's overall principles and projected population estimates. As stated, in practice not all land use densities proposed in the LAP could be achieved. Therfore, the Proposed Land Use Plan accomodates increased densities and is still close to the projected population outlined in the LAP - NCP I estimates.



West Cloverdale Proposed Land Use Plan

Neighbourhood Concept Plan 1

Scale 0 10 25 50 100 250m

May 15, 1997

5.3 NCP 1 Land Uses

i) Suburban Single Family Clustering at 1/2 Acre Density

The area between 64th Avenue and 60th Avenue west of 164th Street is designated in the Local Area Plan as Clustering at 1/2 acre density (2 units per acre gross). The density of 2 units per acre is to be calculated on the gross area of land located outside of the Agricultural Land Reserve (ALR). A substantial amount of open space can be left through clustering to buffer the ALR from the residential area. Clustering can preserve the 'Bose' Heritage Forest an important woodland of approximately 12 acres in area, preserve view points, accommodate a trail system and retain the rural nature of this area (the western edge adjacent to ALR lands). This can be achieved through the application of the new Cluster Residential Zone (RC). The extent of land saved for open space is greater in the RC zone than in other gross density zones, 50% or more of the site area. RC cluster residential is also appropriate in this area because of engineering limitations. The slope area west of 164 Street will require private on-site pumping systems to connect to the westerly limit of the proposed gravity system approximately at 164th Street.

In some extenuating circumstances, the application of the RH-G - 1/2 Acre Residential Gross Density or a Comprehensive Development (CD) Zone may be considered where the above stated intent of preserving slopes and trees as an aesthetic and recreational resource, as wildlife habitat, and as a buffer for adjacent agricultural lands and to maintain the "pristine rural character" of the community are achieved. All " clustering" development proposals shall address the following principles:

a) There must be a substantial buffer adjacent to the Agricultural Land Reserve.

b) The buffer shall be at least 65 feet (19.8 m) in width.

c) All undevelopable land and the buffer must be retained as open space.

d) Buildable area(s) and public passage will be identified and protected through the use of rights-of-way (for other than public lands) and restrictive covenants.

e) All subdivision designs will incorporate the priority of maximum preservation of trees.

f) Geotechnical reports may be required for proposals which are located on or near slopes.

g) All applications will demonstrate how development on adjacent properties is not precluded and how the proposal can achieve the stated intent. All proposals must be compatible with adjacent development in terms of frontage and density.

h) No proposal can compromise the approved servicing and road plan contained in this NCP.

I) In no case shall the density exceed that prescribed in the Official Community Plan; for the SUBURBAN designation, which is a maximum of 2 units per acre.

ii) Single Family Residential

Urban single family lots are proposed over the largest part of the neighbourhood. The layout of these areas is designed with several specific strategies. Where appropriate the plan will:

- Locate urban single family lots to front onto roads, in accordance with Surrey policy, thus retaining the typical street-front character popular in Surrey. (Frontage roads have been used in preference to lanes adjacent to 64th Avenue.)
- 'Surround' parcels of other land uses with urban single family lots and locate transitions at rear property lines. This allows the transition between housing types to occur within the new neighbourhood, rather than in existing areas.
- Permit a variety of housing styles, sizes and affordability.

iii) Single Family Duplex Clustering and Multi-Family Townhouse

A number of different forms of multi-family housing are suggested. In some instances, the multi-family designations vary in density or location from those proposed in the LAP however the principles set out in the LAP and the overall population projections are maintained. Single family character should be represented in the multi-family housing forms by incorporating architectural elements and a building scale compatible with the single family context. (see 'Traditional Design Elements' and the attached 'General Urban Design Guidelines' appendix)

North of 64th Avenue

The land use designations in the LAP are maintained. This area is felt to benefit from its proximity to the Northview Golf Course (to the north) for adult housing. The development is to be adult oriented in order to minimize the number of school children having to cross the arterial, 64th Avenue, to attend school in the neighbourhood. West of the creek is designated 15 units per acre with a suggested housing form of multi-family townhousing. East of the creek is designated 10 units per acre with a suggested housing form of single family duplex / detached clustering.

Fronting 168th Street

The lands just north of 64th Avenue to 63rd Avenue adjacent to 168th Street are designated single family duplex clustering at 10 units per acre. The lands so designated are wider in an east / west direction than indicated in the LAP. This is a minor change that will encourage greater flexibility and visual interest than would otherwise be possible and will also allow greater landscape buffering adjacent to 168th Street. All the single family units fronting 168th Street will be street oriented. There may be access points from 168th Street to this area but access to individual units will be from internal streets.

The area from 63rd Avenue to 60th Avenue adjacent to 168th Street is proposed at a density of 15 units per acre with a suggested housing form of townhousing. The exception is a strip approximately 30m (100 ft) in depth along 63rd Avenue which will have a density

of 10 units per acre to complement the housing form across the street. The multi-family area identified in the LAP along 168th Street was extended from 63rd Avenue to the south of 61st Avenue to merge with the LAP designated multi-family townhousing on 60th Avenue. Again, there may be access points from 168th Street to this area but access to individual units will be from internal streets. 168th Street will not have any limited commercial nor will it function as a main street. So, this additional townhousing density will help support the local commercial node at the "Five Corners".

Fronting 60th Avenue - the "Village Street" (from 168th St. to 164th St.)

The main focus of the "Village Street" is the local commercial node at the "Five Corners" intersection at 168th Street and some limited mixed use commercial introduced at the corner of 166th Street. But the main land use designation is a form of multi-family townhousing.

The area between 61st Avenue and 60th Avenue from 168th Street to 164th Street is recommended for a mixture of land uses that reinforce the concept of a complete community with a "Village Street" as its "Focal Point". Mulitiple family townhousing will be street oriented adjacent to 60th Avenue at a density no greater than 15 units per acre. The area west of 166th Street is recommended as single family / duplex clustering at 10 units per acre or less, reflecting a gradual transition downward in density to the single family area to the north and west. Along the east side of 166th Street a strip approximately 30m (100ft) in depth will be street oriented cluster at 10 units per acre to complement the housing form across the street. The remainder of the area east of 166th Street is designated townhousing up to 15 units per acre. Design of the access lanes / corridors within this area will emphasize; the separation of private from public space, safety, convenience, an attractive landscape, screening and separation (vertically and horizontally). Linkages with pedestrian / bicycle connections to the south neighbourhood (NCP 2) are also provided.

Affordable Housing

There are at least three sites suitable for affordable housing within this neighbourhood. The sites are located in the three townhouse areas (up to 15 u.p.a.) north and south of 61st Avenue. These sites meet the following criteria:

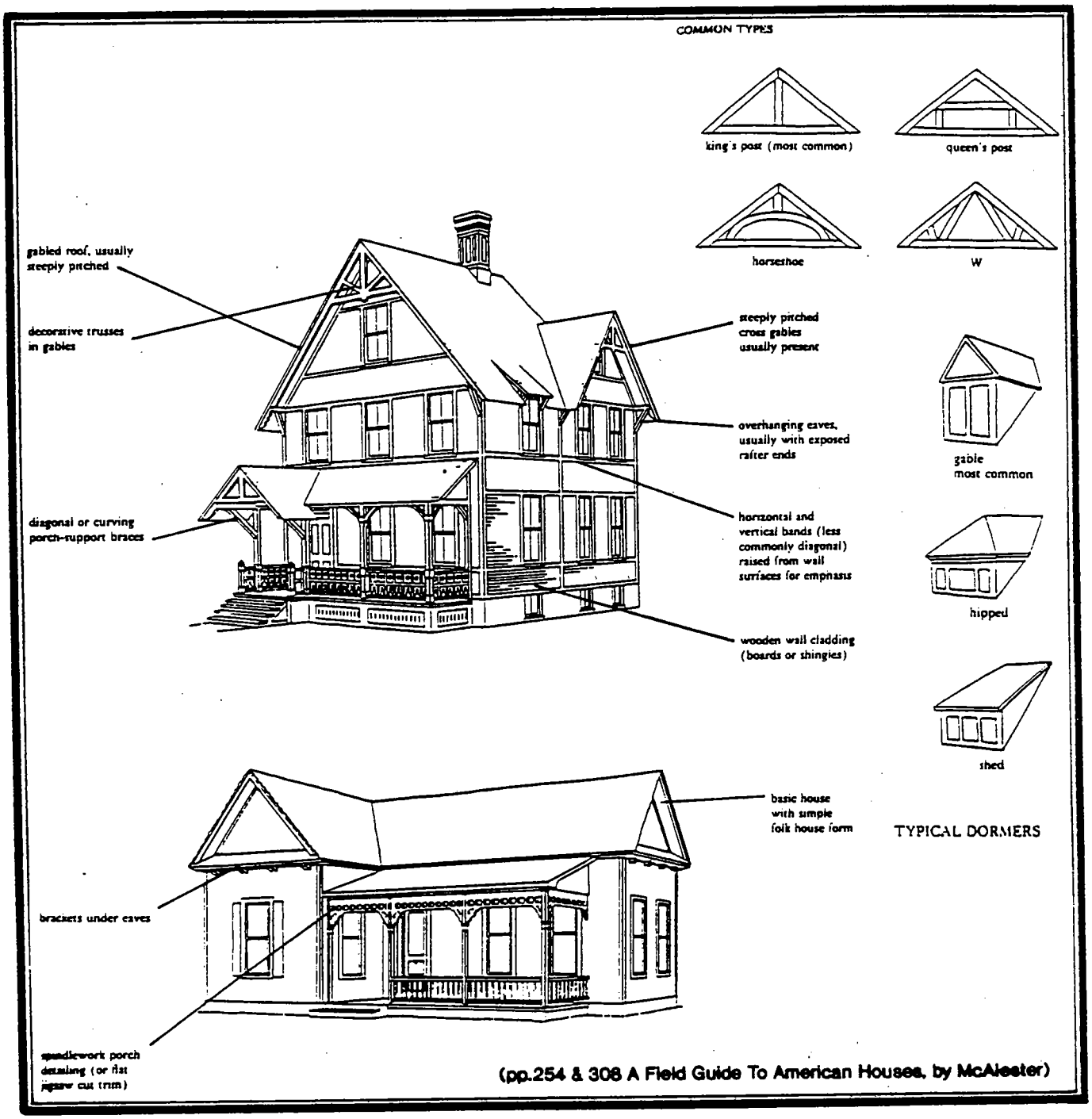
- They are each approximately 3.5 acres for a 30 - 40 unit family oriented project.
- They are located within walking distance (1/2 - 3/4 km) to the elementary school / park site.
- They are located within walking distance to the "Village Street" commercial areas.
- The number of adjoining single family residential lots are minimal.

In addition, the sites are located within 1/2 km. of a potential transit stop.

iv) Urban Single Family Clustering Density

The area along the west side of 164th Street between 61st Avenue and 60th Avenue is designated in the LAP as Urban Single Family Cluster (7.5 units per acre). Single Family Residential Gross Density Zone (RF-G) is proposed for this area. This zone, through the use of small urban lots, provides 15% open space to preserve the existing mature trees. This area does not have servicing limitations since it is adjacent to 164th Street.

TRADITIONAL DESIGN ELEMENTS



v) Local Commercial Nodes

Strong sentiment was expressed at public information meetings about the inadvisability of creating commercial uses which compete with downtown Cloverdale. In general it was felt that the amount of commercial area proposed in the LAP is appropriate for neighbourhood uses only and that much of the use will be community service oriented. The local commercial node at 168th Street has however been reduced to about 0.8 acres. The area was reduced to reduce the likelihood of creating a strip commercial development.

It was felt, however that the "Village Street" notion would be enhanced if some flexibility were allowed in the location of commercial use. In particular bakeries, ice cream parlours, coffee houses, some specialty retailing (but not pubs) and convenience grocery or other late-night uses might be allowed as mixed use enterprises at the 166th Street intersection at 60th Avenue (approximately 0.3 acres). (see the 'Village Perspective')

vi) Townhouse Residential and / or Institutional / Residential

Considerable discussion took place within the community about the desirability and practicality of the two land use categories on the north east corner of 164th Street and 60th Avenue - Institutional and Institutional / Residential. While members of the steering committee acknowledge the importance of this site from a community perspective, it is believed that the LAP proposed land uses may be impractical. This high knoll elevation and steeply sloping easterly portion of the site (which offers spectacular views of Mt. Baker and the Cascades) would be difficult to regrade for major institutional uses and their associated parking. Residential use would seem to take better advantage of the site's natural attributes.

The committee was unanimous in supporting a minor change in the land use designation which might be considered for this key area while acknowledging the desirability of creating a neighbourhood "Focal Point" for the westerly end of the "Village Street" (along 60th Avenue). The proposed use of this site corresponds with the OCP 1996 and provides a scale of residential project that would be economically viable according to the steering committee. The square lot also allows the built form to turn the corner and spatially reinforce the importance of this intersection.

A green "Plaza" is proposed at the junction of 60th Avenue and the pedestrian / bicycle path which separates the different land uses. Being the highest elevation point on 60th Avenue (and the NCP 1 area) it is the logical place to have an amenity space to create a neighbourhood "Focal Point" which would take advantage of the spectacular views and add to the "Village Street" theme. The amenity space will be provided either as a dedication in conjuction with the future subdivision of the affected properties, or developed on private land (with public access) as part of the development of the affected properties. The design concept for the amenity space is presented in the attached 'General Urban Design Guidelines' appendix.

■ WEST CLOVERDALE ■
Neighbourhood Concept Plan 1
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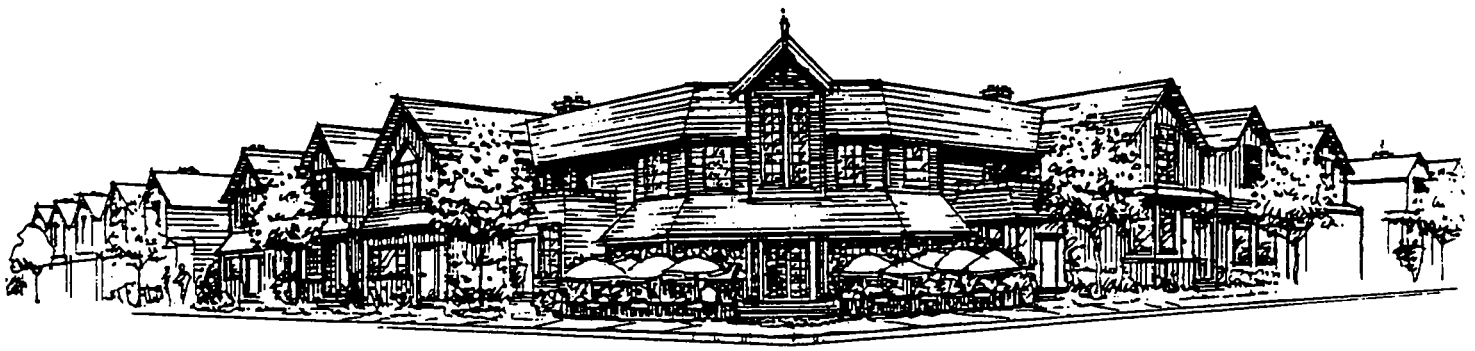
"VILLAGE STREET" PERSPECTIVE

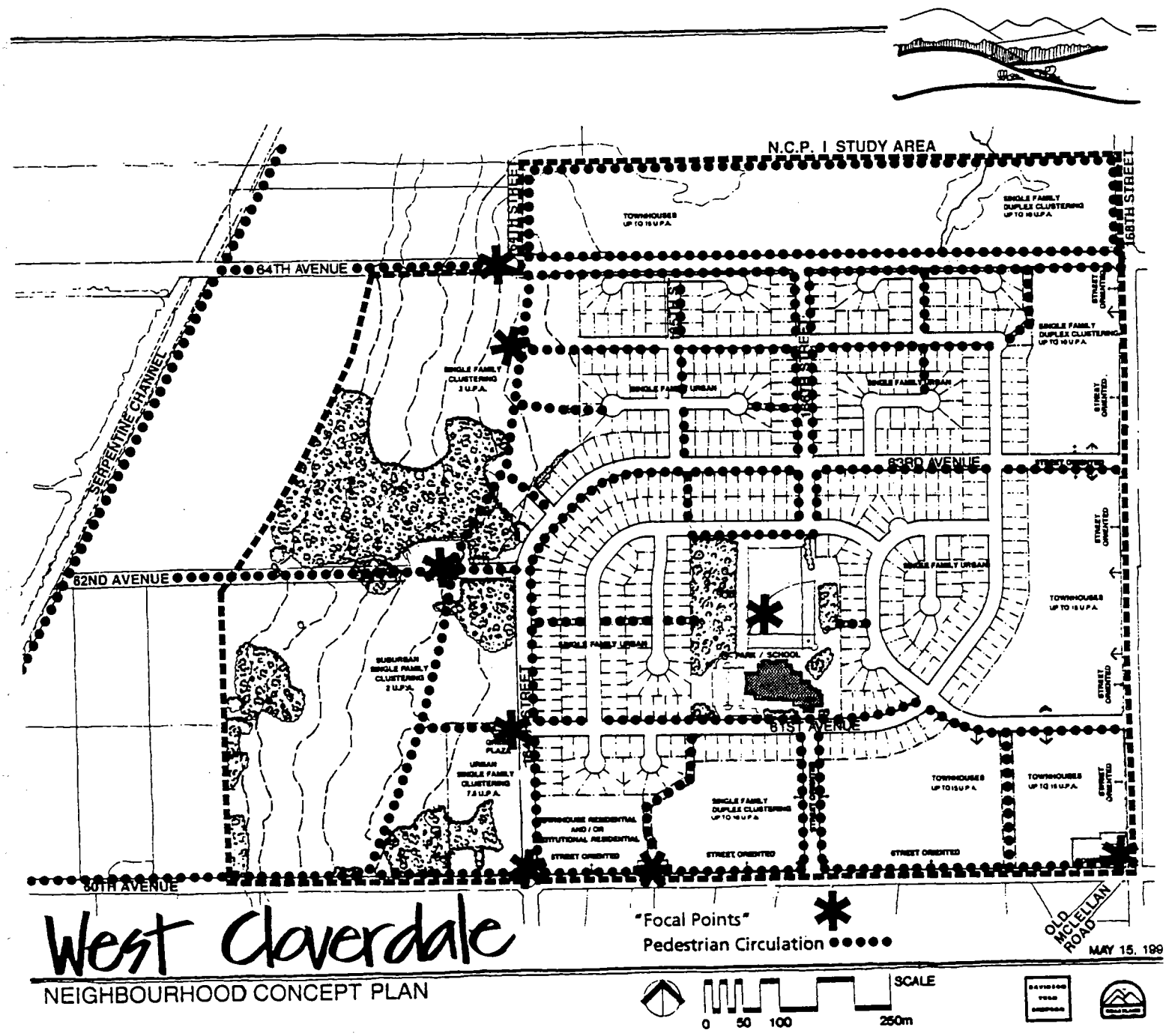


Residential Building with Potential commercial Use (on ground level at corner of 60th & 116th)

Village Perspective

■ WEST CLOVERDALE ■
Neighbourhood Concept Plan 1
STAGE II

PEDESTRIAN CIRCULATION AND "FOCAL POINTS"



5.4 Road System

Access to the neighbourhood is from five key entry points:

- 64th Avenue at 166th Street
- 168th Street at 63rd Avenue
- 168th Street at 61st Avenue
- 60th Avenue at 166th Street
- 60th Avenue at 164th Street

Roads within the neighbourhood are classified as limited collectors (60th Avenue between 168th Street and 164th Street) and through or limited local streets. Detailed road standards are given in Section 7.4.

The transportation system will incorporate sidewalks, walkways, and footpaths to complement the pedestrian and bicycle trail system. Tree planting / landscaping buffer will be incorporated in development proposals along 64th Avenue to lessen the impact of traffic on the residential community and to enhance the streetscape of this entry point corridor. Landscape buffers (comprised of a mix of deciduous, coniferous and shrub vegetation) will be introduced without disrupting important site lines for vehicular safety. (see 'General Urban Design Guidelines' - appendix)

5.5 Linear Open Space and Pedestrian / Bike Circulation System

Pedestrian circulation within the neighbourhood is encouraged through the development of generous pedestrian paths. A linear park / pedestrian / bicycle path network is proposed along the study area boundary north of 64th Avenue and along the west slopes to interconnect the neighbourhood with the rest of Cloverdale - for the purpose of providing a convenient pedestrian route to the Cloverdale Town Centre. Open space nodes or open spaces created through clustering of housing shall be connected to and augment the linear pedestrian / bicycle path system.

The proposed schematic design of both the road and pedestrian/bicycle paths have been coordinated to provide safe and convenient access from the residential areas to the "Village Street", commercial areas, bus stops and school and park site. The City Standard Road Cross Section will be used to accommodate the sidewalks / walkways in the ROW. The pathways should have a minimum surfaced width of 3 metres which will include 0.2 m edge of contrasting paving material (colour and texture differentiation). The width of circulation corridors will be 6m wide where they are a part of the main network. A pedestrian / bicycle corridor which is a linkage and / or connector will be 4m wide when the length is equivalent to the depth of one single family lot and 6 m wide when the length is equivalent to the depth of two or more single family lots. Major linear open spaces or pedestrian / bike connectors will be 10 to 15m wide (depending on their function).

Pedestrian pathways and / or roads are closely aligned with pedestrian paths and roads south of 60th Avenue to provide good north-south connections and easy access to the main street. A major linear open space and pedestrian / bike corridor directly connects 60th Avenue with 61st Avenue. This corridor is to be 15m wide with a 3m wide asphalt surface path. The first 30m is proposed as a dedicated ROW to provide access. This is to be accommodated by a lane which will be adjacent to the pathway area. The linear open

space will not be a dedicated R.O.W. but taken as part of a Development Permit. The other major linear open space and pedestrian / bike connector connects 61st Avenue and the "Plaza" on 60th Avenue at the high point between 164th Street and 166th Street. This corridor is to be 12m wide with a 3m wide asphalt surface path.

Pathways and road alignments also allow pedestrian movement from the western slope eastward to the school and commercial nodes. Pedestrian access from 64th Avenue and from 164 th Street to the 1/2 acre residential cluster to the west is provided. A pedestrian corridor is proposed at the western end of 61st Avenue for the purpose of providing a strong and direct access to the park / school site from the suburban residential areas. The corridor will widen at the eastern end adjacent to 164th Street to provide a wide landscaped node as a "Focal Point" at the end of 61st Avenue. This corridor is showen conceptually on the Figure entitled: 'Pedestrian Circulation and "Focal Points".

An additional pedestrian / bicycle linkage was added to improve protected accessibility from the northeast single family area toward the central park / school area. The width of this connector is to be 4m wide since it is not part of the main pedestrian / bike circulation system.

Principal pedestrian streets will link major neighbourhood elements. Design Guidelines have been developed for 60th Avenue, the "Five Corners", 166th Street gateway including a street tree concept. It is hoped that the combined product of pedestrian character streets and dedicated pedestrian paths will create a significant identifying feature of this neighbourhood. The pedestrian circulation responds to the need for convenient access to the transit route proposed for the neighbourhood.

5.6 Transit

Ward Consulting Group in their report on Traffic Impact of West Cloverdale Local Area Plan included a discussion of transit routes and the relationship to destinations served. In order to provide service to the West Cloverdale area, BC Transit may propose routes along 168 Street and 64 Avenue. The arterial roads can readily accommodate buses. Bus-bays, which will require additional road ROW dedication, will be located by transit. The higher density developments are primarily along the arterial roads and 60 Avenue and thus would be well served by transit. Ward Consulting Group suggests that the road network allows for a bus route to follow on-site collector roads with two alternative routings:

- 168th Street at 63rd Avenue via 164th Street/Bell Road back to 164th Street at 57th Avenue; or
- along 60th Avenue turning at the large turning circle proposed at 164th Street (LAP Feb. 1993).

5.7 Park and Open Space

The West Cloverdale Local Area Plan indicated that a new community park should be established in the north west area of the neighbourhood south of 64th Avenue and west of 164th Street. The purpose of this open space / park is to preserve the existing stand of mature trees ('Bose' Heritage Forest). Section 5.3(i) describes how this park may be created through the use of clustering at 1/2 acre density. Open space preservation is proposed through the application of Surrey's Residential Cluster Zone (RC) or 1/2 Acre Res. Gross Density (RH-G) or Comprehensive Development (CD), zoning.

Open space at the boundary of the Agricultural Land Reserve (ALR) is proposed to ensure containment of non-farm uses and to reduce their impact on the ALR. Along the west slopes, an open space buffer of 90-150 metres created by clustering the housing away from the slope shall be used to separate the residential lands from the ALR. Lookouts are also proposed at strategic points along the top of the escarpment. It is also noted that Surrey's Official Community Plan (OCP) requires that a Development Permit be obtained for all proposed development near the ALR.

5.8 School and Neighbourhood Park

The NCP proposes a combined school and park site of 12.8 acres. The park and school will form the organizational focus of the neighbourhood. Major pedestrian oriented streets as well as pedestrian connectors to neighbourhoods will ensure logical, effective access to this area of the neighbourhood.

5.9 Environmental Considerations

As stated in the environmental report (part of the NCP 1 - Stage I Report), the western portion of the study area is located within an area classified by the City of Surrey as "Medium" in their Environmentally Sensitive Areas (ESA) study. The juxtaposition of mixed deciduous / coniferous forest with open fields and proximity to the Serpentine Channel and

associated riparian habitats make the west slope area highly suitable for some raptors. Nesting sites should be protected and vegetation retained as much as possible.

Proposed development within the west slope area is residential lots with clustering at two UPA. As outlined in Section 5.3(i), this designation will provide the flexibility in site planning to allow for a substantial portion of land in this area to be retained in its natural condition.

6.0 GENERAL DESIGN GUIDELINES

Maintenance of the character of the neighbourhood and encouragement of a heritage theme can best be done through a combination of Design Guidelines and maintaining character landscape. (see 'General Urban Design Guidelines' appendix)

It is recommended that Design Guidelines governing the form and character of buildings and landscape be prepared and implemented as part of the municipal approval process governing all multi-family and commercial development. Specific suggestions contained in this NCP report and others may be incorporated into such a policy.

The NCP proposal incorporates tree retention as one of its goals and possible retention areas (shown on the proposed Land Use Plan). Specific landscape elements - existing and proposed - must be evaluated in detail as a part of individual applications for development.

There are a number of vine maple, broad-leafed maple and mixed conifers which are capable of retention as part of a development scheme. In general it is recommended that trees which can be retained in large stands and which are neither over-mature nor too large to be in scale with adjacent housing are prime candidates for retention. Surrey's subdivision by-law requirement for positive lot grading may be counter-productive, particularly on level sites, to achieving the desired tree retention. On sites with existing trees, building footprints should be configured to provide sufficient space around existing trees to maintain existing grades and prevent an increase in water drainage within the dripline of the trees. Swales, outside the dripline, should be used to direct water to achieve positive lot grading.

Design Principles for townhousing along the "Village Street" - 60th Avenue:

- Buildings should be two storey to provide an appropriate height to street width relationship.
- Front doors must address the street preferably with a porch.
- Street trees that are large and columnar in form should be used. Typical examples include Acer rubrum 'Armstrongii' (Armstrong Maple), Acer platanoides 'Columnare' (Columnar Norway Maple), Carpinus betulus 'Fastigiata' (Pyramidal European Hornbeam), Quercus robur 'Fastigiata' (Columnar Red Oak), and Liquidambar worpleston (Worpleston American Sweet Gum).

APPENDIX

GENERAL URBAN DESIGN GUIDELINES

WEST CLOVERDALE NORTH NEIGHBOURHOOD CONCEPT PLAN

GENERAL URBAN DESIGN GUIDELINES & HERITAGE SITES WEST CLOVERDALE NORTH NEIGHBOURHOOD CONCEPT PLAN

OBJECTIVES

These guidelines are intended to assist in creating an identifiable, pedestrian friendly residential neighbourhood in West Cloverdale, where the human scale and a strong heritage character define the built environment. The guidelines provide direction to achieve the neighbourhood character, encourage pedestrian/bicycle access to community facilities, and to establish the minimum standards to achieve the neighbourhood design objectives defined in the Neighbourhood Concept Plan.

The identity and character of the neighbourhood will be largely defined by the appearance of the Main Street (60 Avenue), the bicycle/pedestrian routes, and the public spaces and parks used by the local residents. Therefore, the guidelines are focused on the design principles that are applicable to these public spaces and abutting sites. The guidelines provide for the development of individual sites in a manner that is consistent and co-ordinated with the overall neighbourhood heritage image. Significant heritage sites are identified in Appendix "A". These sites have the potential to be placed on Surrey's Heritage Register.

APPLICABILITY

These guidelines provide the design principles and minimum standards that will permit the co-ordinated design and development of individual sites in the north neighbourhood of West Cloverdale. They will serve as a reference in the preparation and evaluation of specific development proposals. The guidelines may be refined in conjunction with applicants at the time of rezoning and will be used as a reference in preparing Development Permit Area Guidelines for multi-family and commercial developments, and for Neighbourhood Character Studies for single family developments.

Please note that these guidelines are for general use only and are subject to change upon completion of the engineering road standards for this neighbourhood. The guidelines may be refined in consultation with Surrey's Engineering and Parks and Recreation Departments as standards and requirements are developed for this neighbourhood.

GENERAL URBAN DESIGN GUIDELINES
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CONTENTS

GENERAL URBAN DESIGN GUIDELINES
WEST CLOVERDALE NORTH
NEIGHBOURHOOD CONCEPT PLAN

DESIGN GUIDELINES FOR YARDS ABUTTING RESIDENTIAL STREETS

1. General Design Principles for Yards Abutting Streets

The following general guidelines are intended to improve the quality of the streetscape and reinforce the street oriented character of West Cloverdale (north and south neighbourhoods). Yards abutting the street have a strong impact in determining the character and liveability of the street. Front yards of single family lots, townhouses, compact and cluster housing sites should be treated in a similar way to unify the streetscape. The landscaping, definition of yard edges, and design of open areas along public streets should achieve continuity and be complementary.

2. Continuity of Front Yard Character

To maintain the continuity and the quality of the streetscape, the yards of any townhouse or cluster housing sites along a public street should be treated and landscaped as front yards of single family areas.

3. Gates/Entrances

3.1. Gates are not permitted in a townhouse or cluster housing site which provides only one access/exit route.

3.2. Two access/exit routes are required in any proposal where gates are proposed. In this case the following requirements apply:

- Each gate must have a clear width of at least 3.6 m. (12 ft.)
- Access/exit routes may be provided at one location if there are two gates of at least 3.6 m. (4 ft.) in width, each opening in a different direction, and there is a 1.20 m. (4 ft.) barrier between the gates.
- Gates must be set back sufficiently from the lot line to provide at least one visitor parking space outside and adjacent to the gates, to permit vehicle drivers to pull off the road to make enquires at the gate. The required front yard setback is considered adequate for this purpose.

3.3. Where no gates are provided, a combination of walls, pavement change, landscaped medians, treed boulevards, arbours, trellises, pedestrian gatehouses, feature lighting posts, etc. are recommended to identify the boundary between public and private property.

3.4. These minor structures should consider details which relate to Surrey's architectural/landscaping heritage vocabulary.

4. Fences

4.1. General

4.1.1. Use of hedges and shrubs is recommended as an alternative to fences in the front yard area along a public street (1.20 m. high . Zoning Bylaw).

4.1.2. To maintain the rural/semi-rural character of the area, any fencing within the front yard area should include landscaping on both sides of the fence. The use of gates, arbours, trellises is also recommended for this purpose.

4.1.3. It is desirable that the use of a specific type of fence along a street frontage (picket fences, wrought fences, three board fences, etc.), or the use of shrubs and hedges be maintained consistent along the length of local residential streets.

4.1.4. The use of chain link fences in front yards is not acceptable.

4.1.5. Any high fences fronting on a public street should be placed at the setback line from the street (See Sketch A). The upper portion should be lattice.

4.2. Fences on Corner Lots

4.2.1. To maintain adequate sight lines at the intersection, only low landscaping (less than 0.75 m. high) should be planted at the corner of the site on a corner lot.

4.3. Fences Along Main Street (60 Ave.) and Southern portion of 166 Street.

4.3.1. Residential sites along both sides of the Main Street (60 Avenue between 164 and 168 Streets) and 166 St. (on that portion from Main Street to the school/park site on 61 Ave.) require a uniform, stronger and formal definition of the street edge.

4.3.2. A combination of low stone or brick wall base, and wrought iron fence (in total no more than 1.0 m. high) is recommended as a fence toward the street. To achieve consistency of streetscape, landscaping should be provided on both sides of the fence

4.3.3. Fences should be located 1.00 m. from the property line to accommodate tree planting on the street side of the fence.

4.3.4. To reinforce the linkage from the Main Street to the school/park site, the same edge definition used in the Main Street is also recommended on both sides of 166 Street, between 60 Avenue and 61 Avenue.

4.4. Fences Along Multi-Use Corridors

4.4.1. Transparent fences (combined with landscaping) are recommended along site boundaries abutting pedestrian/bike corridors and park areas. The intent is to provide opportunities for casual surveillance over these public use spaces (CPTED. basic principles) and increase the perceived visual width of the corridors (between buildings rather than between fences).

4.4.2. Fences along the major pedestrian/bicycle corridors should be treated as fences along flanking streets.

5. Driveways.

To reinforce pedestrian dominance on the street, to achieve the integration/continuity of landscaping on front yards, and to allow for boulevards with regularly spaced trees, the following should be considered by all residential developments:

DESIGN GUIDELINES FOR TREES ON AND ADJACENT TO PUBLIC STREETS

6. General Design Principles for Trees On and Adjacent to Public Streets

The following guidelines are intended to ensure an identifiable and integrated public streetscape by establishing the different role and character of the streets through specific species of trees and their locations. This will be accomplished through conformance with the Street Tree Planting Scheme indicated in Map I, and through the general application of these guidelines.

7. Street Trees

7.1. Recommended trees along the major neighbourhood streets are shown in Map I. "Street Tree Planting Scheme".

7.2. Recommended trees along the same street include a combination of species in order to provide bio-diversity, and to promote tree health by lowering the impact of common pests and diseases. Recommended species have been chosen from the list of *Replacement Trees* recommended for boulevards as per "Schedule K" of the Tree Preservation Bylaw (No. 12880).

7.3. Continuity and spacing of street trees along streets should meet the spacing standards defined by the Parks and Recreation Department.

7.4. Only the trees along 60 Avenue (the Main Street) should be planted at 8.00 metres on centre.

7.5. A gradual increase in spacing should be considered to satisfy the required distances to utilities, instead of creating a gap.

7.6. Tree planting on boulevards should meet the "Boulevard Tree Planting Standards" developed by Surrey Park Maintenance.

7.7. It is mandatory that planting of trees on all boulevards is done at the completion of all construction and landscaping in the development where the City boulevard is contiguous with private property and/or where the grade at the root zone will be altered or damaged with further construction or landscaping.

7.8. Trees may be planted in the medians following all other landscape installations, including grass, and only upon completion of final grade of the median. Should the developer not wish to wait until completion of construction and landscaping, cash-in-lieu of street trees can be deposited and the Parks and Recreation Department shall undertake the tree planting once development in the area is complete. The developer may plant the entrance boulevards with trees as embellishments to indicate that trees will be planted in the future.

8. Trees Adjacent to Streets

8.1. General

8.1.1. To enhance the overall quality of the neighbourhood, new developments should retain and incorporate existing clusters of trees in the design of he site plan layout. The publication "Saving Native Trees in the Pacific Northwest" is recommended as a guideline on this matter.

8.1.2. Flowering trees in front yards (especially at the neighbourhood entrances) are recommended to add colour and texture to the streetscape.

8.2. Front Yard Trees

8.2.1. At least two trees should be provided in the front yard area of every residential unit fronting the street.

8.2.2. One of these trees should be a flowering tree; the other should follow the planting pattern and be of the same species as the boulevard trees identified along the street frontage. Trees should be planted at a distance of 0.60 m. from the property line and a minimum of 2.10 m. from the edge of the sidewalk. ,

8.2.3. Some of the flowering trees recommended for yards toward the street are: Stewartia (*Stewartia nonadelpha*), Ivory Silk Tree Lilac (*Syringa reticutata 'Ivory Silk'*), Stag's Horn Sunac (*Rhus typhina*), Magnolia (*Magnolia grandiflora*), Lavalle Hawthorn (*Crataegus lavallei*) and Smoke Tree (*Cotinus coggygria*).

8.2.4. Tree planting in front yards should be co-ordinated with the tree replacement plan required for every proposed new development.

9. Consultation with Parks & Recreation

9.1. The Parks and Recreation Department should be consulted for specific suggestions regarding pattern, spacing, frequency of species or possible changes to the species of trees recommended along any of the routes identified.

DESIGN GUIDELINES FOR PEDESTRIAN/BICYCLE CORRIDORS (MULTI-USE CORRIDORS)

10. General Design Principles for Corridors and Linkages

10.1. The following guidelines are intended to ensure that a continuous, direct, safe and attractive pedestrian/bicycle network is provided in West Cloverdale (north and south neighbourhoods). This network facilitates access to community facilities, to the protected treed and landscaped areas on the west slopes, and to the City's public transportation corridors and the on-street bicycle routes.

10.2. The components of the local multi-use network: corridors, linkages and buffers, have been classified according to their width and local function within the neighbourhood. The main components of the network are indicated on Map II.

10.3. The different widths of the various components of the system reflect their hierarchical function within the neighbourhood pedestrian/bicycle network. The widths indicated are intended to maintain a strong sense of safety for users (an appropriate relationship between length and width of the corridor. CPTED. Crime Prevention Through Environmental Design principle).

10.4. It is noted that *corridor* refers to the right-of-way of the bicycle/pedestrian network (multi-use corridors), and that *path* or *pathway* refers to the paved surface for walking/biking contained within the corridor.

11. Reference Standards

11.1. The design and construction of all multi-use pathways should consider the guidelines contained in the document entitled "Review of Standards for Multi-use Pathways" and the recommendations on gradients and physical design contained in Section B.1 of the "City of Surrey Bicycle Blue Print".

11.2. Lighting of bicycle paths should taken into consideration the recommendations contained in the "Bikeway Design Supplement to the Urban Geometric Design Guide for Canadian Roads".

12. Pedestrian /Bicycle Pathways.

12.1. The multi-use pathways are integral components of the neighbourhood's pedestrian/bicycle circulation network and the trails system along the western slopes.

12.2. The pathways should be not less than 4.00 metres wide to accommodate various potential users (walkers, joggers, bikers, wheelchairs) and meet the recommendations from Engineering on this subject..

12.3. In some cases, these pathways may meander within the total width of the corridor right-of-way. In these cases the design must conform to the TAC guidelines (Transportation Association of Canada).

13. On-Street Bicycle Routes. (168 Street - 64 Ave.)

13.1. These routes form part of the City's Bike Plan.

13.2. The bicycle routes along 168 Street and 64 Avenue consist of bike lanes (one in each direction) incorporated into the paved area of the roadway.

14. Primary Linear Open Space/Multi-Use Corridors.
(Neighbourhood Pedestrian/Bicycle Network).

14.1. These corridors are the neighbourhood's main linear open space and pedestrian/bicycle routes to the central school/park, the commercial portion of the Main Street, and to the plaza at Five Corners. They also connect the north and south neighbourhoods across the Main Street.

14.2. The minimum width of these corridors is 12.00 metres.

15. Secondary Linear Open Space/Multi-Use Corridors
(Neighbourhood Pedestrian/Bicycle Network)

15.1. These multi-use corridors are extensions of the primary system toward the park areas and to the trails along the west slopes (and to the river). They complete the network which provides access to the school, parks and to various destination points in the north and south neighbourhoods.

15.1.1. The minimum width of these corridors is 8.00 metres.

16. Local Pedestrian/Bicycle Linkages
(Neighbourhood Pedestrian/Bicycle Network)

16.1. These are multi-use corridors - typically wide walkways - that generally connect two single family residential areas or local streets. They help to expand and interconnect the pedestrian/bicycle circulation network through the streets of the neighbourhood.

To improve the perception of safety and avoid the tunnel, narrow passage effect, and provide good privacy to abutting sites, the recommended widths are as follows:

- 4.00 m. ROW (4.00 m. pathway width), if its length is 60.0 m. or less.
- 6.00 m. ROW (4.00 m. pathway width), if its length is over 60.0 m.

16.2. Landscaping within multi-use corridors that are 6.00 m. wide should consider low shrubs and grass only. Trees on private yards abutting the corridor should be planted at various set-backs from the path to avoid a tunnel effect.

17. 64 Ave. Landscaped Buffer and West Cloverdale Greenway (see Sketch N).

17.1. A pedestrian/bicycle pathway should be provided on the North side of 64 Ave.; separated from the roadway by a 3.0 m. wide treed boulevard. This pathway forms part of the West Cloverdale Greenway (a component element of the City-wide Greenway Plan)..

17.2. A landscaped area should be provided between the Greenway pedestrian/bike pathway and the townhouse areas along the North side of 64 Ave. to offer a minimum level of visual and noise protection from the 64 Ave traffic.

17.2.1. The area required for these purposes along the North side of 64 Ave. should therefore be wide enough to accommodate both, a portion of the 4.0 m. wide Greenway pathway and the landscaped mound/buffer strip (4.0 m. in width is recommended). With the provision of the multi-use pathway, construction of a sidewalk within the 64 Avenue right-of-way may not be necessary This area

should be provided as a R.O.W. for public use.

17.2.2. The landscaped buffer strip should consider a combination of shrubs, deciduous and evergreens, and a 0.60 to 0.80 metre high mound (see Sketch N).

18. Landmarks and Focal Points

18.1. Focal points/landmarks (e.g. amenity buildings, unique cluster of existing trees, resting and/or play structures, arbours, gateways, etc.) should be developed at strategic locations in the neighbourhood (at the intersections of view corridors, on principal streets, and at various points along the pedestrian/bicycle network). These focal points should be easily identifiable to act as a reference point in the neighbourhood and should incorporate features which reinforce the unique character of the neighbourhood.

18.2. The recommended location for focal points/landmarks is indicated on Map II. Details of the development concept for the focal points (nodes) along the Main Street are found on Sketches D, E, F, G and H.

19. Pathway Design Specifics.

19.1. Pathway Surface

19.1.1. Asphalt is the preferred surface for pathways within the Greenway and the Primary Linear Open Space/Multi-use Corridors.

19.1.2. Crushed limestone/gravel may be acceptable for portions of the neighbourhood pedestrian/bicycle network through parks.

19.1.3. Edges of these pathways should be well defined. Where applicable (in potentially environmentally sensitive areas), the pathway location and its surface material will require approval from the Ministry of Environment.

19.2. Bollards and baffles.

19.2.1. Bollards should be used in pedestrian/bicycle (multi-use) corridors which end at a cul-de-sac.

19.2.2. Hinged bicycle baffles should be used in pedestrian/bicycle (multi-use) corridors which end perpendicular to a street..
Bicycle baffles should consider a separation of 1.5 m. between the gates to allow for wheelchair access. These safety devices should be placed at the property line (see Sketch B).

19.3. Street Crossing Approaches.

19.3.1. Changes in texture and/or colour should be considered in the pathway starting at the front yard setback line (generally 7.5 m.) before reaching the bollards or bicycle baffles. Standard decorative post and chain should be used on both sides of that portion of the multi-use corridor contained within the front yard setback.

19.4. Connections to the Corridors

19.4.1. Direct connections from cluster housing/townhouse sites to the pedestrian/bicycle corridors are recommended. If no multiple or direct access from individual units is provided, then the access point to the corridor should be toward the middle of its length.

5.1. Streetscapes dominated by garages should be avoided in single family residential areas. Location of garages toward the back of the site, unit is desirable.

5.2. Adjacent, parallel driveways are strongly recommended. The objective is to minimise the number of sidewalk interruptions and curb let-downs, and to maintain continuity of boulevard tree planting. Visual separation between individual parallel driveways should be preferably achieved by way of landscaping (see Sketch B).

5.3. In corner sites, driveways entrances and garage driveways should be provided from the flanking street.

5.4. Sidewalk pavement should be continued across the driveway pavement.

5.5. Strong definition of the edges of garage driveways and treatment of driveways as part of the front yard landscaping are recommended.

Safety Aspects - CPTED Recommendations *(Crime Prevention Through Environmental Design)*

19.5. Pathway Alignment

19.5.1. Clear visual continuity of the path must be maintained by careful direct alignment of the various portions of the pedestrian/bicycle (multi-use) network; including local streets that complete the network.

19.5.2. Sudden changes in the alignment of the pathway or interruptions must be avoided.

19.5.3. The alignment and dimensions of corridors should provide wide views and avoid a service alley character/feeling.

19.6. Surveillance

19.6.1. It is desirable that dwelling units located along the multi-use corridors provide second floor windows and balconies to increase opportunities for casual surveillance.

19.6.2. To help develop a sense of ownership over these public spaces, the provision of arbours, low gates and sidewalks from individual units to the pedestrian/bicycle corridors is recommended.

19.7. Lighting

19.7.1. Lighting should increase the sense of security for both, users of the corridors and residents of the units fronting on to the corridors. Pedestrian scale, low level lighting that does not interfere with the privacy of adjacent residential units is favoured for all components of the network.

19.7.2. Wall mounted lighting in units abutting the corridor may help to add to the corridor's lighting level and increase the user's (and resident's) perception of safety.

DESIGN GUIDELINES FOR PUBLIC STREETS

20. General Design Principles for Public Streets.

20.1. The following general guidelines are focused on achieving a strong residential neighbourhood character; where pedestrians, not the vehicles. define the design and characteristics of the street.

20.2. The overall character of West Cloverdale will be mostly affected by the width of the streets (from building face to building face), pavement textures and the way that the buildings and uses relate to the street.

20.3. The guidelines provide specific directions to achieve a special and strong pedestrian oriented character for the neighbourhood's Main Street (see Map III and Sketches D, E, F, G, H and J). The guidelines intend to minimize the number of vehicular access points to residential and commercial sites on both sides of the Main Street (see Map IV).

20.4. The guidelines encourage slow vehicular movement and strong pedestrian activity on the Main Street. (see Sketch J and Map IV). To improve the Main Street quality of the streetscape , a private lane parallel to the street is required; this lane is intended to carry most of the required services and provide vehicular access to the units fronting the street. (see Sketch J).

20.5. The guidelines reinforce the role of 166 Street as the main spine toward the school/park site from the Main Street (see Sketch O), and recommend a special treatment of the neighbourhood entrances (see Sketch P).

20.6. The guidelines recognize the need to adjust and tailor the City's present road standard cross-sections to achieve these design objectives.

20.7. ***It is noted that the proposed cross-sections identified for the Main Street (60 Avenue) development concept and the specific treatment of the right-of-way may require adjustments and be further detailed to the satisfaction of the City's Engineering and Parks & Recreation Departments.***

21. Street Right's-of-Way.

21.1. It is recommended that wherever possible; in consultation with Surrey's Engineering Department and appropriate to the context, the distance between buildings across collectors and local streets, and the width of roadway pavement be reduced to reinforce the rural/semi rural character of the neighbourhood. A combination of narrower right-of-way and/or reduced front yard setbacks may be appropriate.

22. Access to Townhouse Units Along a Street.

22.1. Townhouse units along a street should be designed so that the main entrance is accessed from and fronts the street that is used for the building address. Main entrances to individual units should face the street.

22.2. In all townhouse or cluster housing sites, access to the garage of units fronting the street should be provided from the internal driveway.

23. Treatment of Intersections and Parking Areas.

23.1. All street intersections which involve a street having a parking lane should consider curb extensions (narrowing) to reduce the crossing distance for pedestrians and to lower vehicle's speed (see Sketch C).

23.2. Chokers and landscaping (with trees) should be considered every 8 on-street parking spaces on streets which include a parking lane.

23.3. Different texture, stamped concrete or other paving treatment that adds texture and colour differentiation, should be used at the major street intersections(see Sketch C), at the entrances to the neighbourhood, and at pedestrian crossings on the neighbourhood's Main Street (see sketches of various nodes on Main Street)

23.4. The Main Street should consider a unique pavement (colour, pattern, texture) for the sidewalks, and formal tree planting on grates in the commercial area (see Sketches G, H and J) .

23.5. A concrete band, separating travelling lanes from on-street parking lanes is recommended to further identify parking areas on the street (see Map IV).

24. Street Lighting

24.1. A type of lamp post and single luminaries with a strong heritage/rural village flavour should be used throughout West Cloverdale (north and south neighbourhoods).

24.2. The traditional goose-neck type of posts and luminaries, or similar, is recommended along the Main Street, 166 Street (South of the School/park site) and at the neighbourhood entrances. This type of lamps are primarily oriented to serve pedestrians (lower, with a gentler glow and placed at shorter intervals).

24.3. Double luminaries post should be used along the Main Street commercial area.

24.4. Wall mounted lighting fixtures are recommended on all commercial developments on the Main St. for the purpose of increasing and complementing the standard lighting level for public streets.

24.5. Implementation of the street lighting concept will be co-ordinated by Surrey Engineering through the servicing agreement process.

DESIGN GUIDELINES FOR BUILDINGS

25. General Design Principles for Buildings

25.1. The guidelines take advantage of this new growth area to create and set a special character for West Cloverdale. This set of guidelines focuses on achieving a harmonious architectural relationship and co-ordination among buildings, and between buildings and the street..

25.2. It is expected that the use of rural/semi rural heritage architectural details throughout the neighbourhood and the establishment of several landmarks with a unique local flavour will achieve a unity of character and a strong identity for West Cloverdale (north and south neighbourhoods).

25.3. The design of buildings should achieve architectural coordination and lend visual integration among the various projects in the area.

25.4. Individual proposals should convey a strong rural/semi rural heritage flavour for the neighborhood by incorporating the basic design principles and details found in many heritage residential buildings in Surrey (see Figures K, L and M for Surrey heritage character images).

26. Residential Architectural Character

26.1. To achieve rural/semi-rural heritage flavour for the neighbourhood, the design of any residential building fronting on the street should consider; as a dominant feature, one or several architectural elements found in many heritage residential buildings in Surrey (see Figures K, L, and M). The intent is not to make every house to look the same as these heritage buildings but rather to encourage co-ordination, and character integration by utilising dominant architectural features of the heritage vocabulary in the new housing designs.

26.2. Some of these heritage/rural character architectural elements are

- Gable roof components with a steep pitch (8/12 or higher); Pitched roofs; Gabled dormers; Attics, etc., Roof overhangs/eave projections.
- Louvered ventilation on gables; Shingled or scaled gable end walls;
- Shakes, cedar or asphalt shingles as roofing material,
- Horizontal siding and wide trim, etc.
- Porches; Verandas;
- Entry limited to one storey high;
- Bay windows; Windows with muntins and mullions; Rectangular shaped windows; French doors.

26.3. Garages

26.3.1. Garages should not be the dominant element on the streetscape or dominate the facade of any dwelling unit (also, see "5. Driveways" in "Design Guidelines for Yards Abutting Public Streets").

To achieve this objective, the following is recommended:

- Garage doors should not occupy more than 50% of the facade of a single family unit unless it is setback from the front building face (0.75 m. to 1.0 m. is suggested).

- Garages should preferably be located behind or on the side of single family units.
- Panel glazing, if used in the garage doors, must complement the top of the garage opening and shall not be the sunburst style.
- Carports or port-cocheres are not recommended.

26.3.2. Wherever possible, habitable rooms should be provided above garages.

26.3.3. Side wall of garages which are exposed to direct views from the street should include a window.

26.3.4. In corner sites, in single family residential areas it is desirable that garages have access from the flanking street.

26.4. Roofs

26.4.1. No flat roofs will be permitted anywhere in West Cloverdale (north and south neighbourhoods). Gable roofs, dormers and attics are encouraged. The minimum recommended roof slope is 6:12; higher roof pitches are preferred for gable roofs.

26.4.2. The use of metal roof tiles is not recommended in residential proposals in West Cloverdale (north and south neighbourhoods). Roof tiles and duroid are acceptable if they resemble cedar shakes in terms of texture, form and colour.

26.5. Corner Units

26.5.1. Corner units of a townhouse development, and any housing unit exposed to side views should provide sufficient architectural detailing to the side and street fronting elevations.

27. Multi-Family Building Form and Character.

27.1. Cluster housing along the local streets should provide a variety of forms, details and groupings that relate to a single family street character. The design of townhouse clusters along the street should not be repetitive and duplex clusters should avoid the mirror image effect.

27.2. Where townhouse clusters or cluster housing units front on single family residential areas, the quality of materials and overall design of these units should be compatible with the single family units across the street.

27.3. Simple forms and dominant gable roofs are recommended throughout West Cloverdale (north and south neighbourhoods). This is especially applicable to townhouse units along the Main Street.

27.4. To achieve visual diversity within projects, variations in building height, separations, roof lines and set-backs may be considered between clusters.

27.5. Site layout and designs should be based on the principles of defensible space (CPTED principles) and should provide ample opportunities for casual surveillance of public spaces. These principles attempt to strengthen two kinds of basic social behavior; territoriality and natural surveillance.

27.6. The design of townhouses and cluster housing proposals along a public street, excepting the housing units along the Main Street, should have a strong single family character. The layout of these units should focus on the street. Direct pedestrian access to the main entrance of the individual units from the street should be considered for all townhouse or cluster units along a public road.

28. Privacy from Public Views

28.1. In order to achieve privacy on porches, verandahs and patios/decks of units located toward a public street (especially along the Main Street), the finished grade of these dwelling units should be between 0.60 to 1.00 m. above the level of the sidewalk.

29. Retaining Walls

29.1. No retaining walls are allowed along the front property lines unless required as a result of strong natural site conditions.

29.2. Where retaining walls are absolutely necessary, they should not exceed 1.00 metre in height, and landscaping should be provided in front. It is recommended that the distance to a retaining wall from any property line should be at least equal to the height of the retaining wall (1.0 m. maximum) but not less than 0.60 m..

DESIGN GUIDELINES FOR COMMERCIAL AREAS
(Main Street and Five Corners)

30. Five Corners Commercial Node and Main Street Frontage (North-west corner of 60 Avenue and 168 Street)

30.1. The local neighbourhood character of the commercial node must be reinforced.. No car oriented commercial uses should be considered toward the Main Street.
30.2. Retail commercial activity should be focused on the Main Street frontage.
30.3. Commercial uses and building frontage continuity should be maintained along the Main Street between 168 Street and Old MacLellan Road (realignment).
30.4. Direct access from the street to the CRU's should be provided at relatively short intervals.
30.5. Pavement of the sidewalks should extend up to the building line.

31. Small Commercial Node at 166 Street and the Main Street (60 Avenue)

31.1. The line of the commercial frontage should be set back from the corners at the intersection to create an urban plaza (see Sketch F).
31.2. Access to the commercial uses should be provided directly from the plaza.
31.3. Provision of terraces or decks at the second level, around the plaza is encouraged.
31.4. The plaza should be developed as a gathering place for people and/or outdoor eating areas.
31.5. Double luminaries lamp posts and heritage elements should be used in the design of street furniture at this location. The inclusion of an identifiable landmark at this location should be considered.

32. Character of Retail Commercial Frontage

32.1. Continuous frontage and small front yard setbacks (e.g. 2.00 - 3.00 m.) should be considered for any commercial development along the Main Street.
32.2. It is recommended that second and third levels above the street level be set back from the ground floor level.
32.3. It is desirable that at least 75% of the commercial frontage at street level be dedicated to retail, eating establishments and/or personal service stores.
32.4. Residential/professional office uses are recommended above the street level retail uses.
32.5. Narrow, bay window and door type of storefronts are encouraged.
32.6. Several narrow frontage CRU bays are preferred to a single large commercial retail area fronting on the Main Street. Columns located at short intervals should be included in the commercial frontages to reinforce this concept.
32.7. Store fronts should consider the use of wood window and door frames. It is recommended that the doors to the CRUs fronting the street be made of wood with raised details, and consider inset glass panels.

33. Commercial Parking Areas

33.1. Parking lots and loading areas for commercial uses should be located behind the buildings; screened and away from direct views from the Main Street (60 Ave.). Access to parking areas is recommended from a service lane or driveway at the back of the commercial buildings and a lane from the Main Street (see Sketch J).

33.2. A combination of low planter/wrought iron fence (1.00 metre total height); with additional landscaping and tree planting, is recommended to enclose and screen parking areas from direct views from the street.

34. Canopies

34.1. Commercial developments along the Main Street (60 Avenue) and 168 Street frontage should provide canopies over the sidewalk (1.50 metre projection is recommended), in order to achieve weather protection continuity along the whole length of the building frontage.

34.2. Compatibility and co-ordination of canopy shapes is strongly encouraged. Round canopies are not recommended

34.3. It is recommended that canopies have an inclination between 30 and 45 degree slope and provide a 0.30 to 0.45 m. valance for identification signage purposes. Signs or lettering on the sloping part of the canopy are not recommended.

35. Signs

35.1. In addition to the canopy identification signs, other recommended types of sign include flood lighting over wooden routed signs, neon, lettering on windows of the retail/office space, projecting signs. Plexiglass backlit illuminated fascia bands which are not architecturally integrated to the building, or pylon signs are not appropriate for the Main Street commercial area.

35.2. Only one fascia sign per business is recommended; it should be installed in the area between first and second floors

35.3. Only window signs should be considered for business above the ground floor level.

36. Lighting

36.1. Facades of commercial buildings may be illuminated by spot lights placed at cornices, fascia or canopies.

36.2. The use of regularly spaced wall mounted fixtures on commercial developments on Main Street is strongly recommended. These lighting sources over the sidewalk will reinforce and complement the pedestrian scale lighting of the commercial areas.

APPENDIX A
SIGNIFICANT HERITAGE SITES
WEST CLOVERDALE NORTH
NEIGHBOURHOOD CONCEPT PLAN

The following heritage sites (denoted on the attached map) have been identified by the Planning & Development Department as having the potential to be listed on Surrey's Heritage Register.

16420/16430/16412-64 Avenue
Bose Farm
Henry Bose Farm House
Horse Barn, Calf Barn, Chicken Barn, Storage Shed, Hay Storage / tractor Garage, Shed, Hired Hand Residence, Residential Building

16390-64 Avenue
Meadow Ridge Farm
Henry John Bose House
Meadow Ridge Farm Barn, Farm Building

Other less significant sites include:
16520- 64 Avenue, 16709 - 60 Avenue & 6029 168 Street

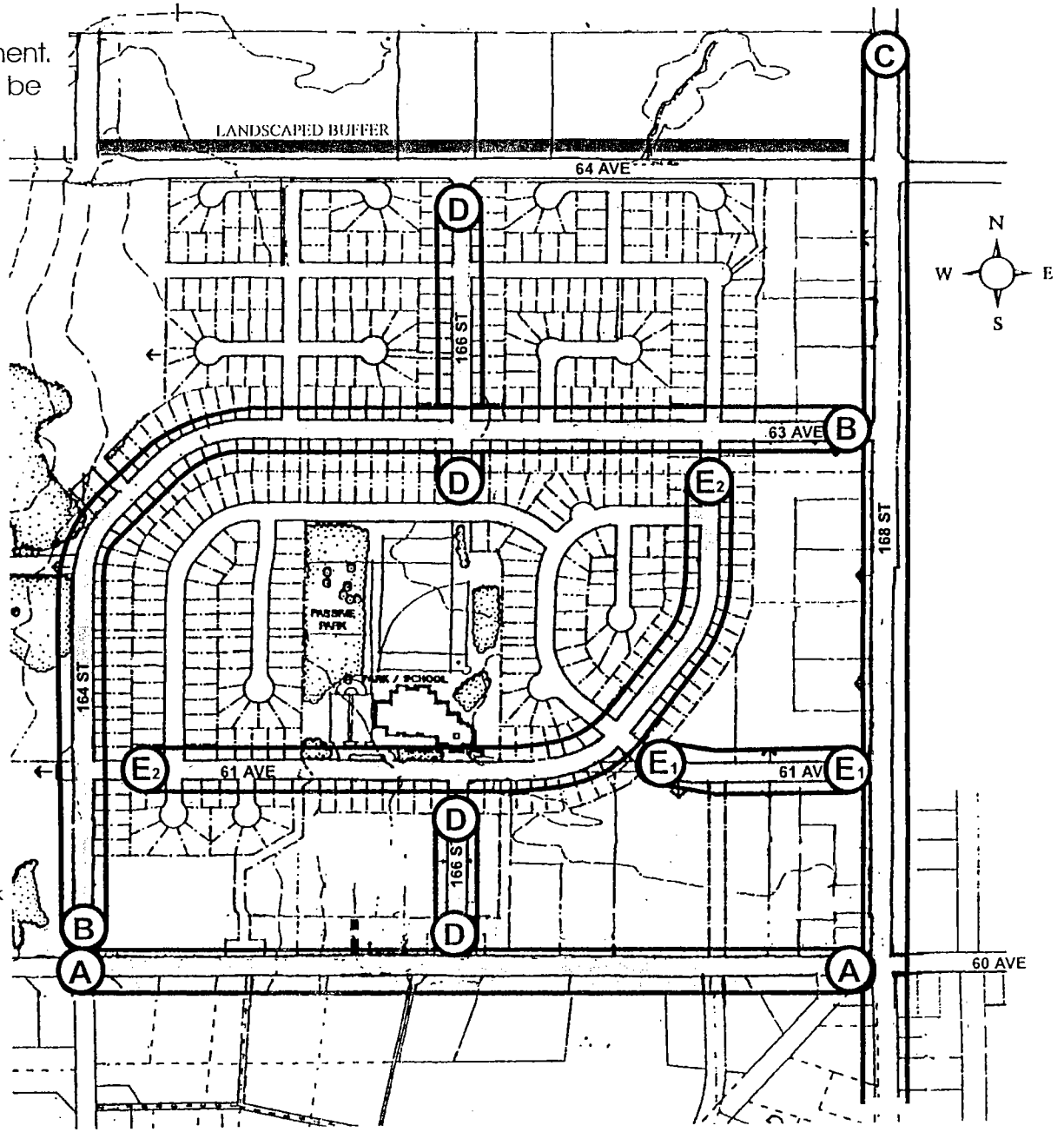
The Boothroyd House
Located at the north-east corner of 168 Street and 60 Avenue (outside of the NCP area). This house is a signficant component of Five Corners.

The following excerpt from Surrey's Official Community Plan provides direction for implementing measures to address the preservation of Surrey's Heritage resources:

G-2 Preserve Surrey's Heritage

a) Develop a heritage management plan for the City to provide guidelines and strategies on heritage issues.
b) Raise public awareness of historical preservation through the Heritage Advisory Committee.
c) Work with the Heritage Advisory Committee to develop and maintain a Heritage Register.
d) Evaluate buildings, sites and features on the Heritage Register on an ongoing basis, and work with owners of these properties to develop heritage revitalisation agreements, conservation covenants or heritage designation.
e) Work with the private sector and public interest groups to plan for and preserve heritage buildings, features or sites, and to designate Heritage Conservation Areas through the Neighbourhood Concept Plan process.

Pattern of the tree combination to be confirmed by Parks and Recreation Department. Consistancy of tree type, size and pattern to be maintained along the following streets:



(A) MAIN STREET

Median: Cercidiphylum japonicum
Liquidamber styraciflua "Worpelston"
Fraxinus oxycarpa "Raywood"

Boulevard: Acer platanoides "Crimson King" or "Royal Red"
Tillia cordata "Greenspire"
Gleditsia tricanthos "Sunburst"

(B) COLLECTOR RING ROAD
Cercidiphylum japonicum
Acer plat. "Drummondi"
Fraxinus ornus
Gleditsia tricanthos "Shademaster"
Liquidamber styraciflua "Worperlston"

(C) 168 STREET
Liriodendron Tulipifera
Quercus palustris "Crown.Right"
Liquidamber styraciflua "Worpelston"
Gleditsia tricanthos "Sunburst"

(D) 166 STREET.
Magnolia Galaxy
Sryrax japonica
Syringa reticulata "Ivory Silk

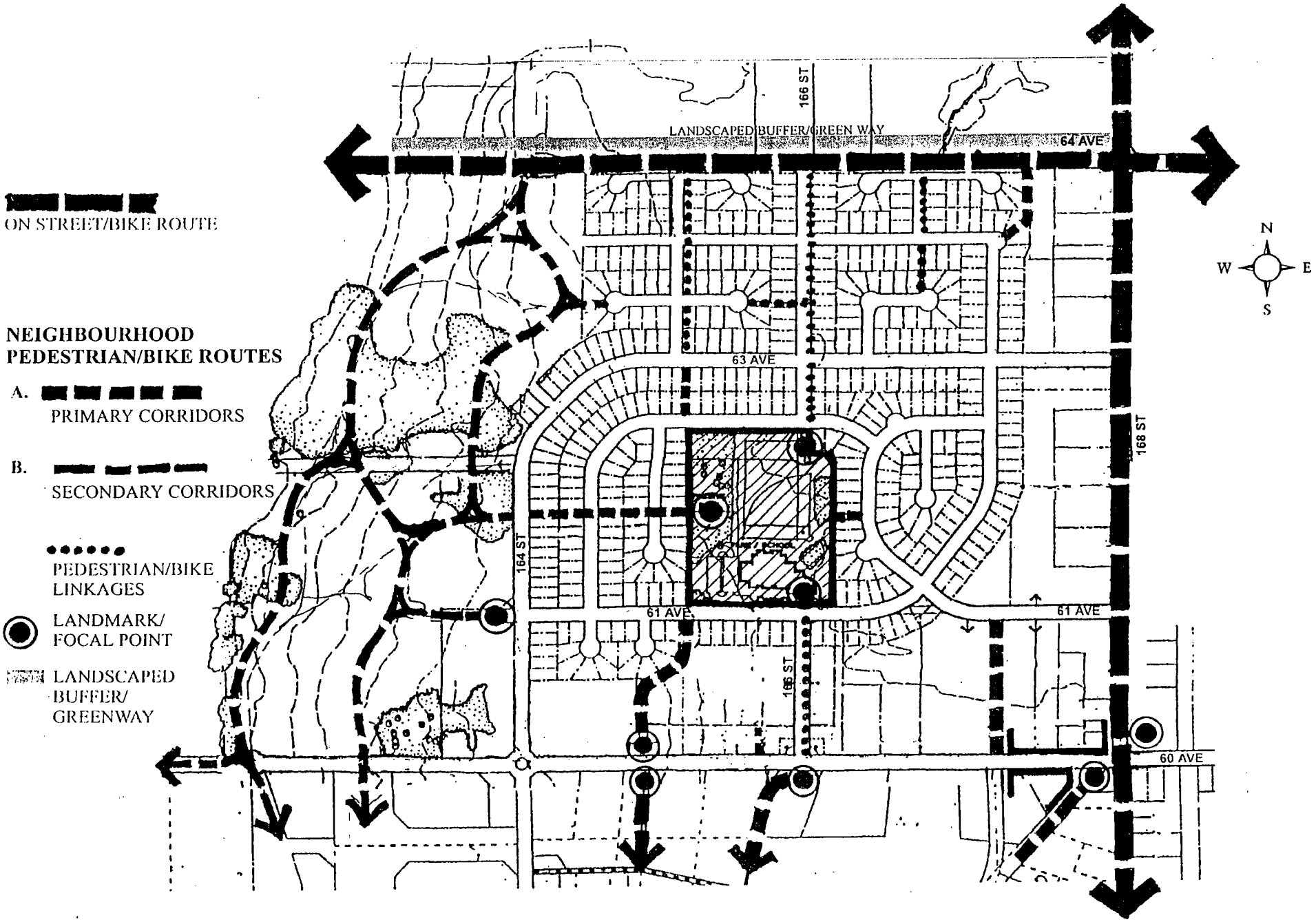
(E) 61 AVENUE **E.1.** 61 Ave from 16700 block to 16800 block
Malus x zumi "Calocarpa"
Magnolia Galaxy
Cratageous "Toba"

E.2. 61 ave from 16400 block to 16700 block (including 167th Street to 63rd Ave).
Acer plat: "Drummondi
Fraxinus oxycarpa "Raywood"
Cercidiphylum japonicum

WEST CLOVERDALE
North Neighbourhood

STREET TREE PLANTING SCHEME

MAP (I)

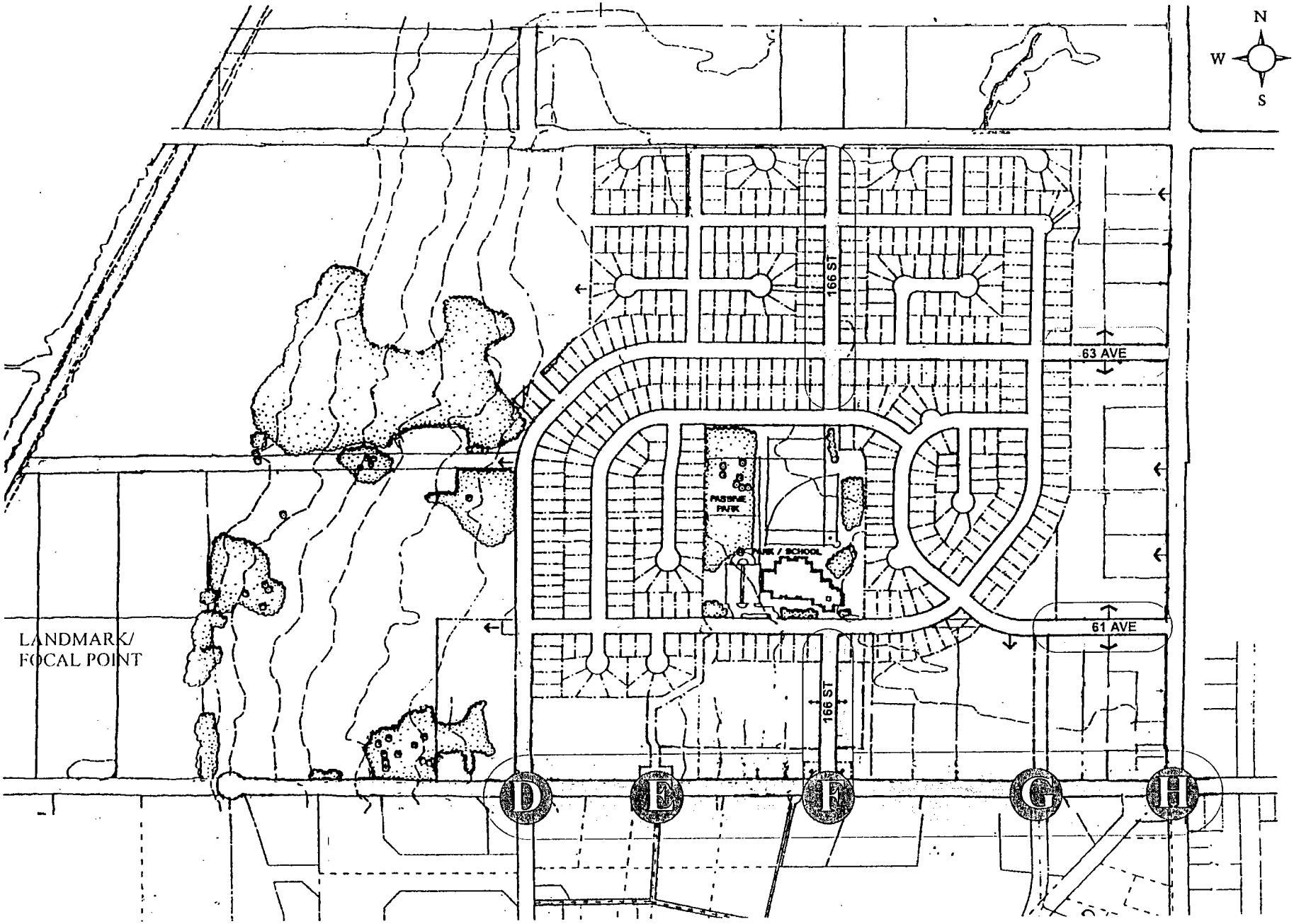


WEST CLOVERDALE

North Neighbourhood

PEDESTRIAN/BIKE (MULTI-USE) NETWORK

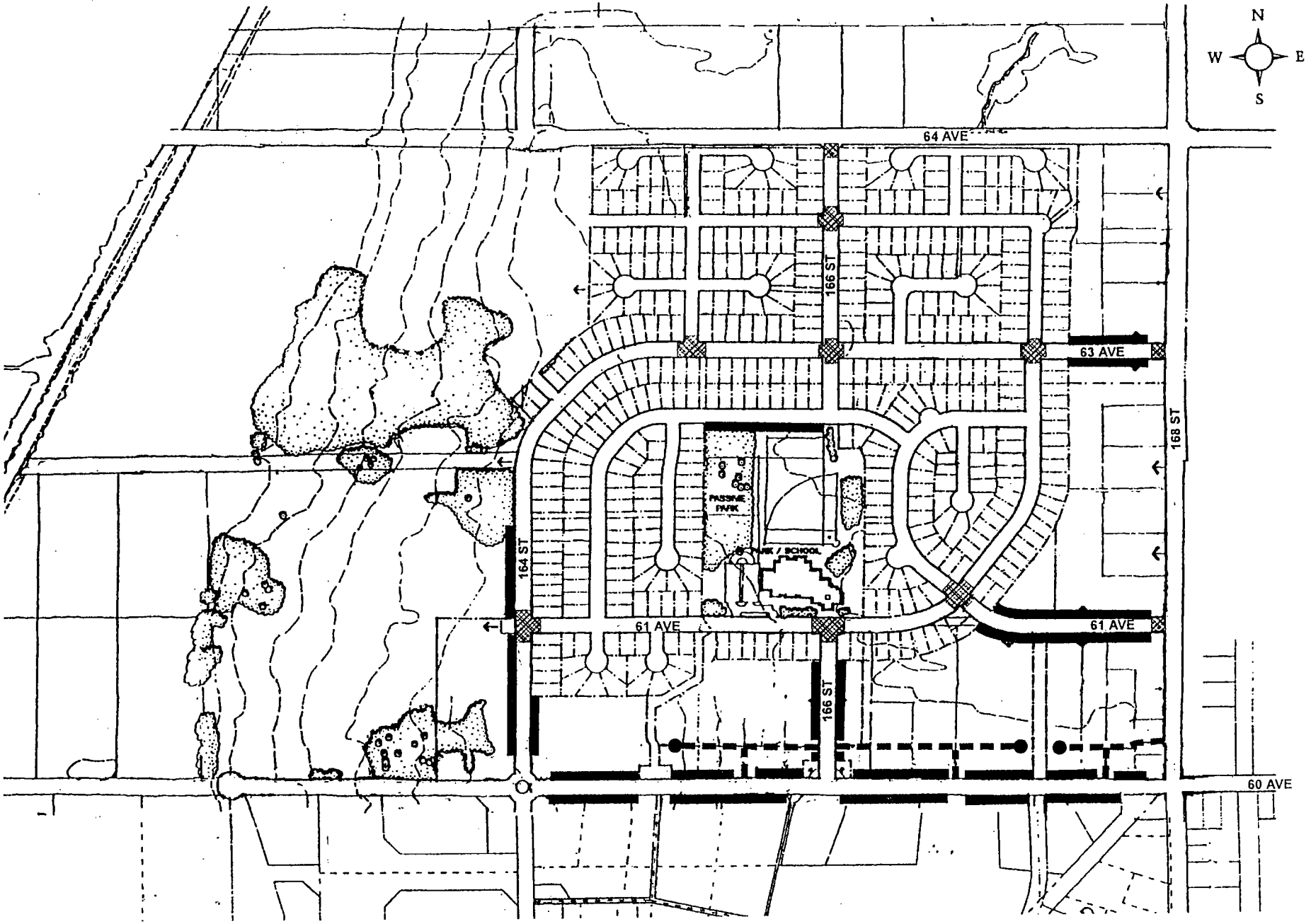
MAP II



WEST CLOVERDALE
North Neighbourhood

MAIN STREET - MAJOR NODES
NEIGHBOURHOOD ENTRANCES

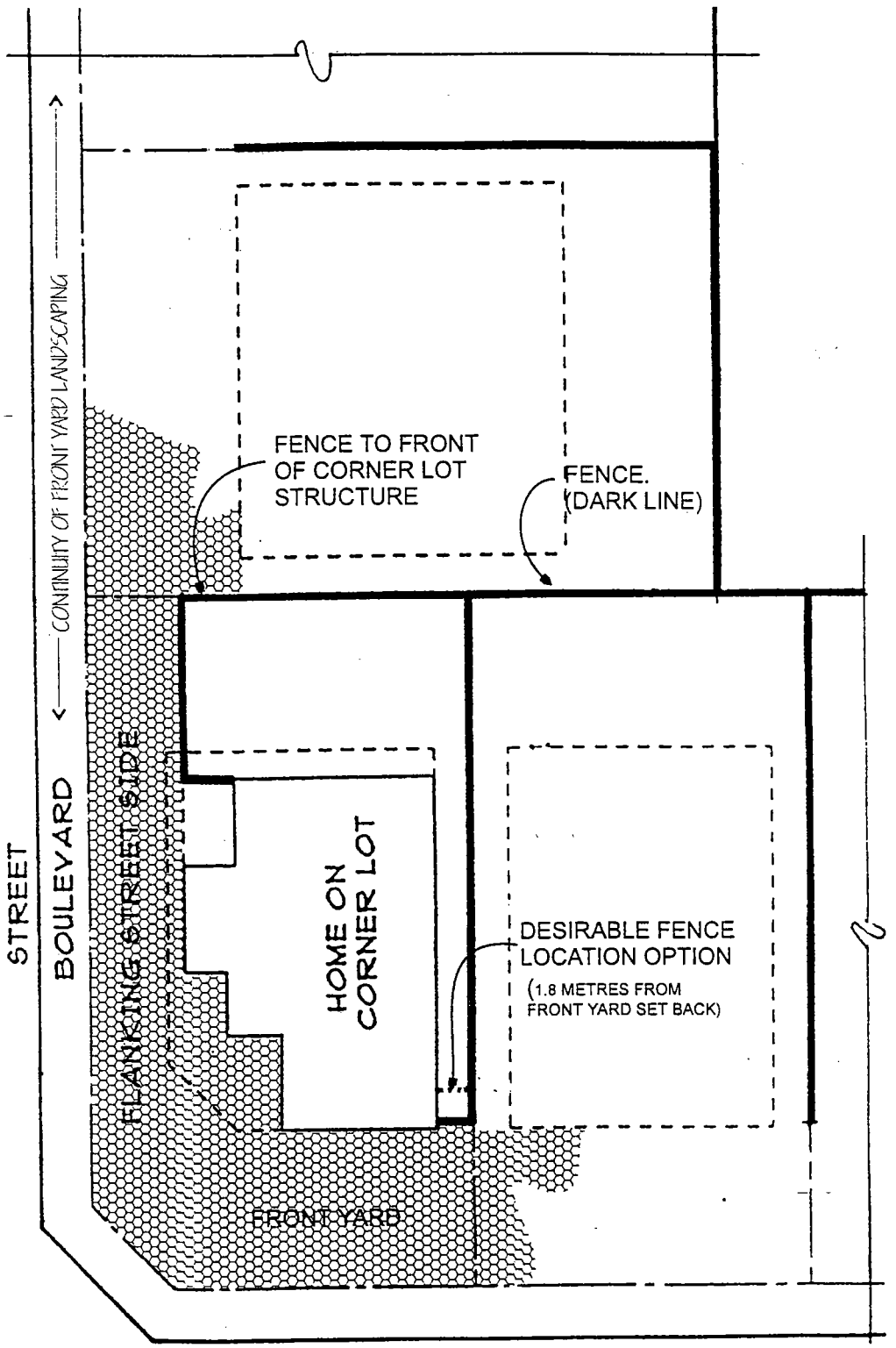
MAP III



WEST CLOVERDALE
North Neighbourhood

RECOMMENDED ON-STREET PARKING AREAS
ACCESS TO SITES ON MAIN STREET
INTERSECTIONS WITH SPECIAL PAVEMENT

MAP IV

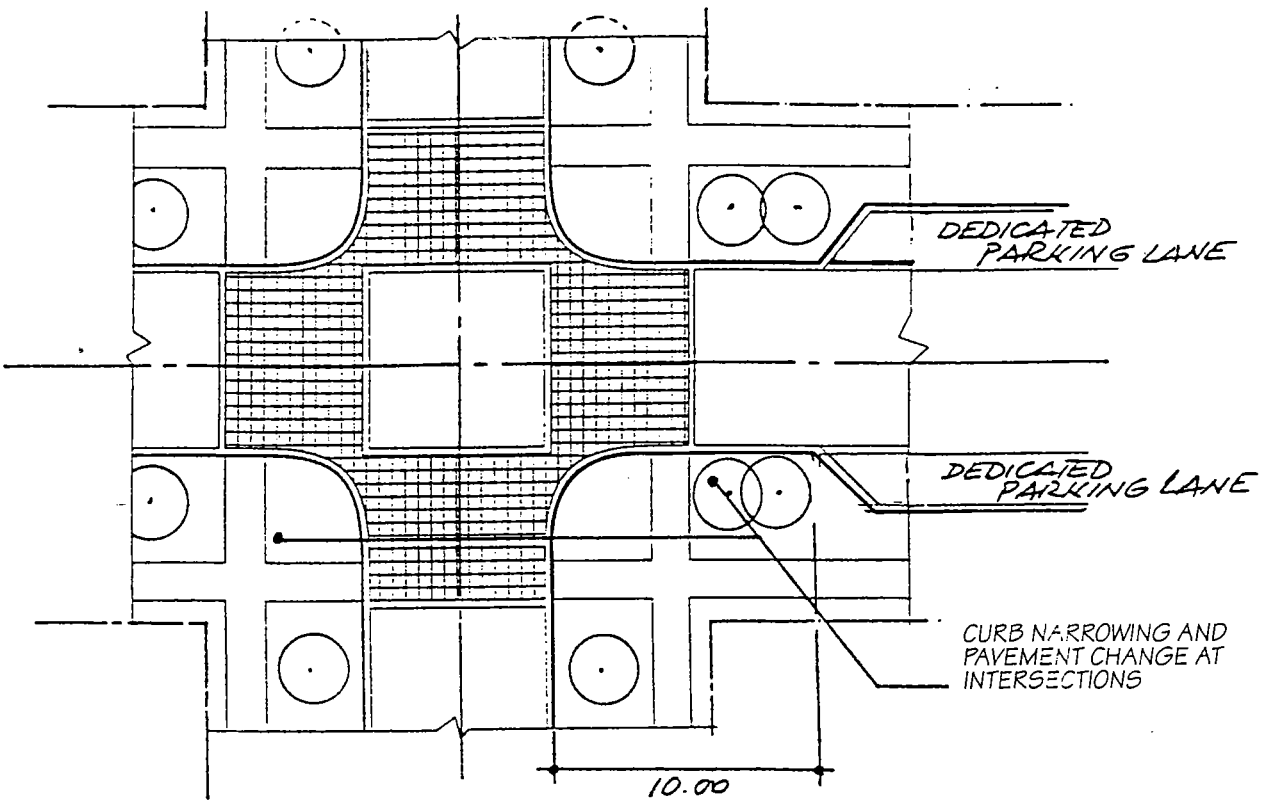


LOCATION OF FENCES AT THE CORNER LOT

WEST CLOVERDALE
North Neighbourhood

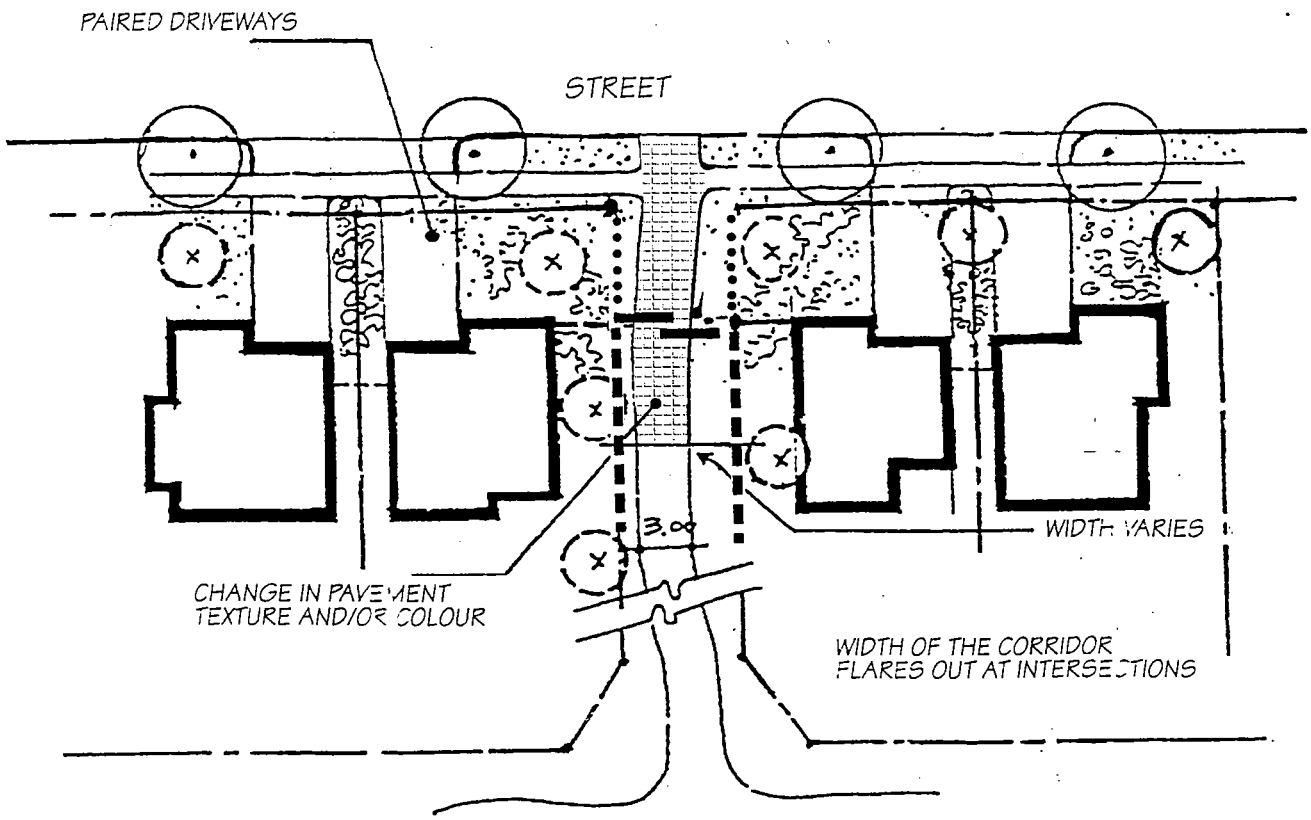
FENCES

A



INTERSECTIONS

C

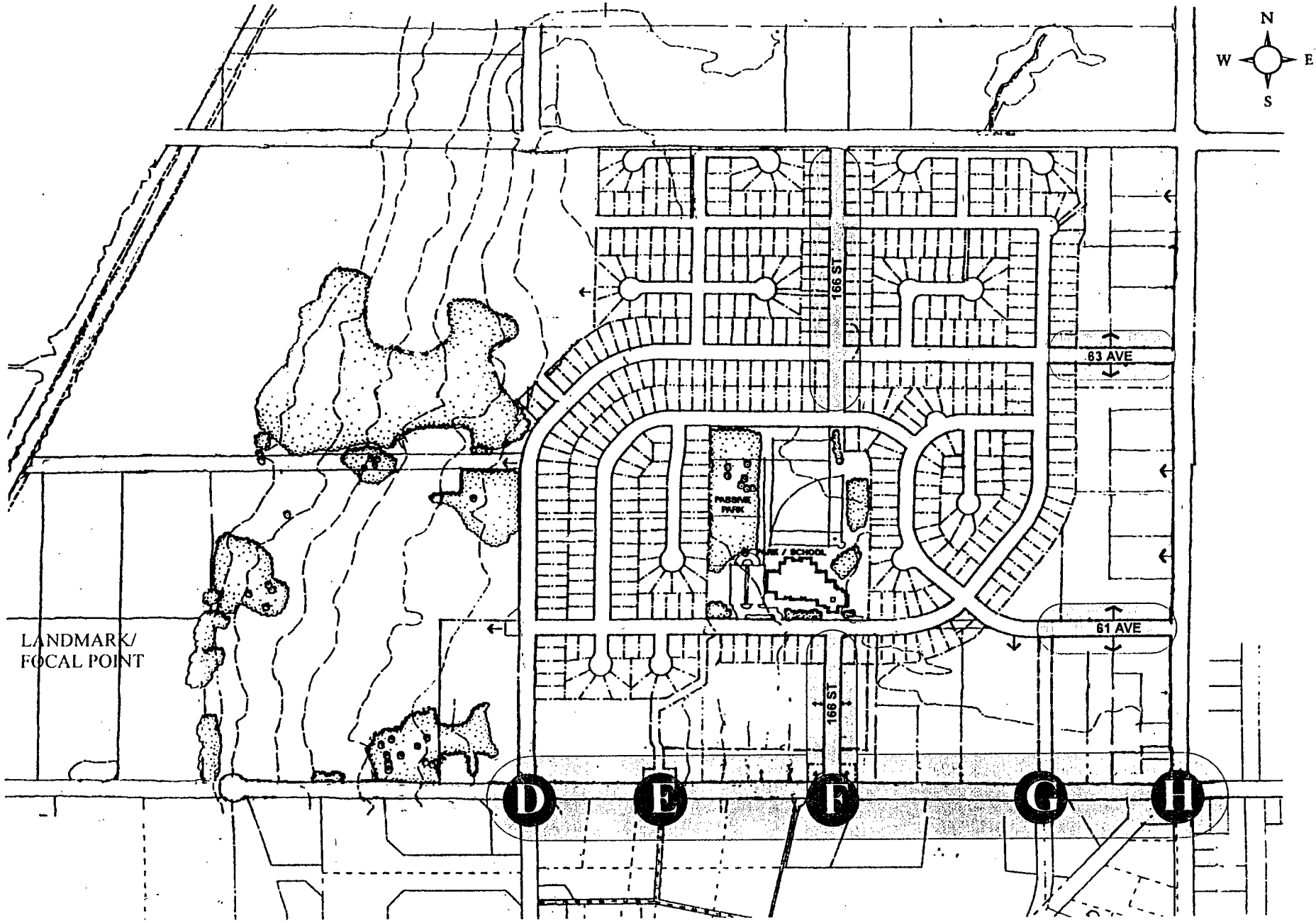


WEST CLOVERDALE

North Neighbourhood

DRIVEWAYS, MULTI-USE CORRIDORS PATHWAYS

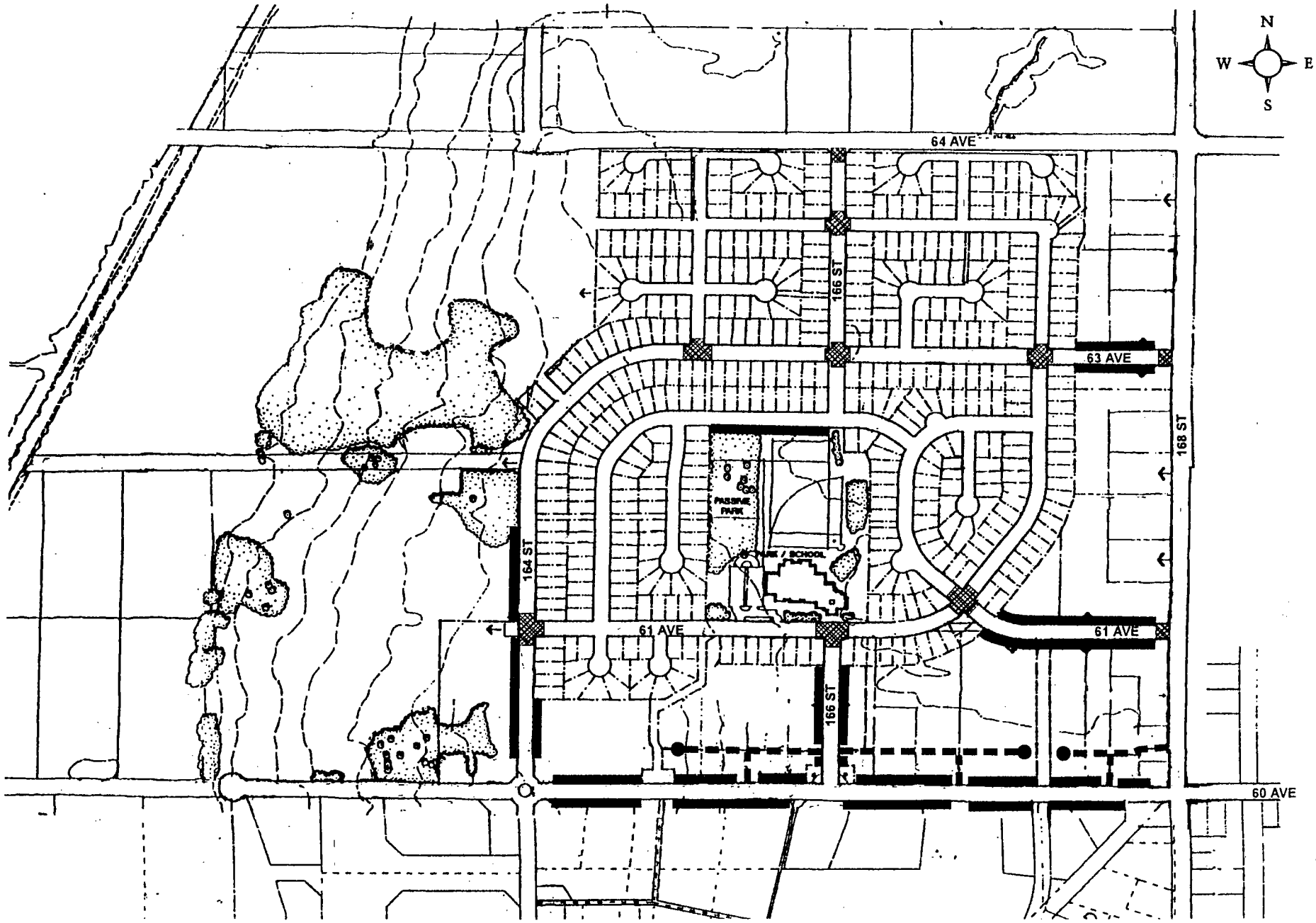
B



WEST CLOVERDALE
North Neighbourhood

MAIN STREET - MAJOR NODES
NEIGHBOURHOOD ENTRANCES

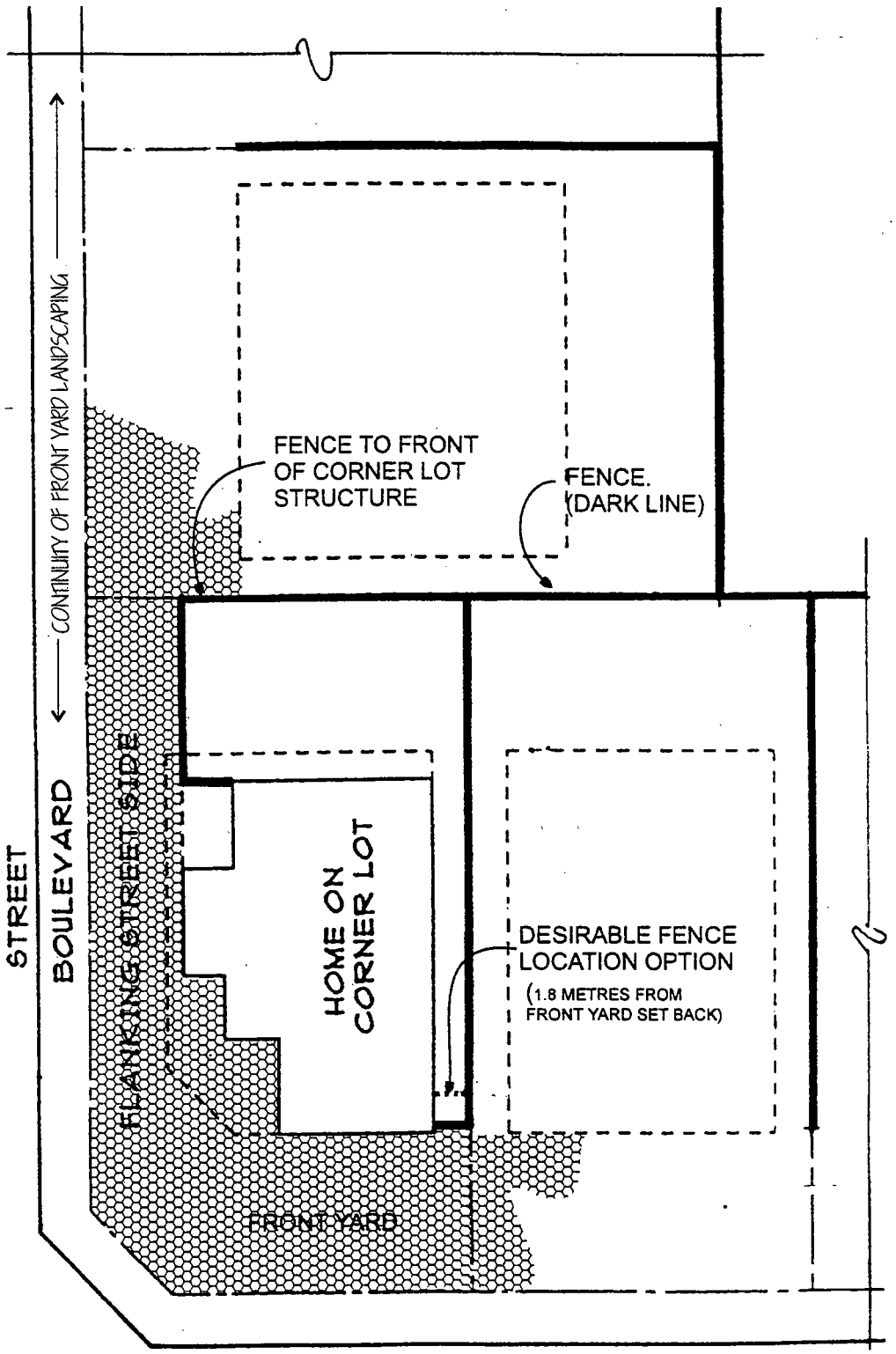
MAP III



WEST CLOVERDALE
North Neighbourhood

RECOMMENDED ON-STREET PARKING AREAS
ACCESS TO SITES ON MAIN STREET
INTERSECTIONS WITH SPECIAL PAVEMENT

MAP IV

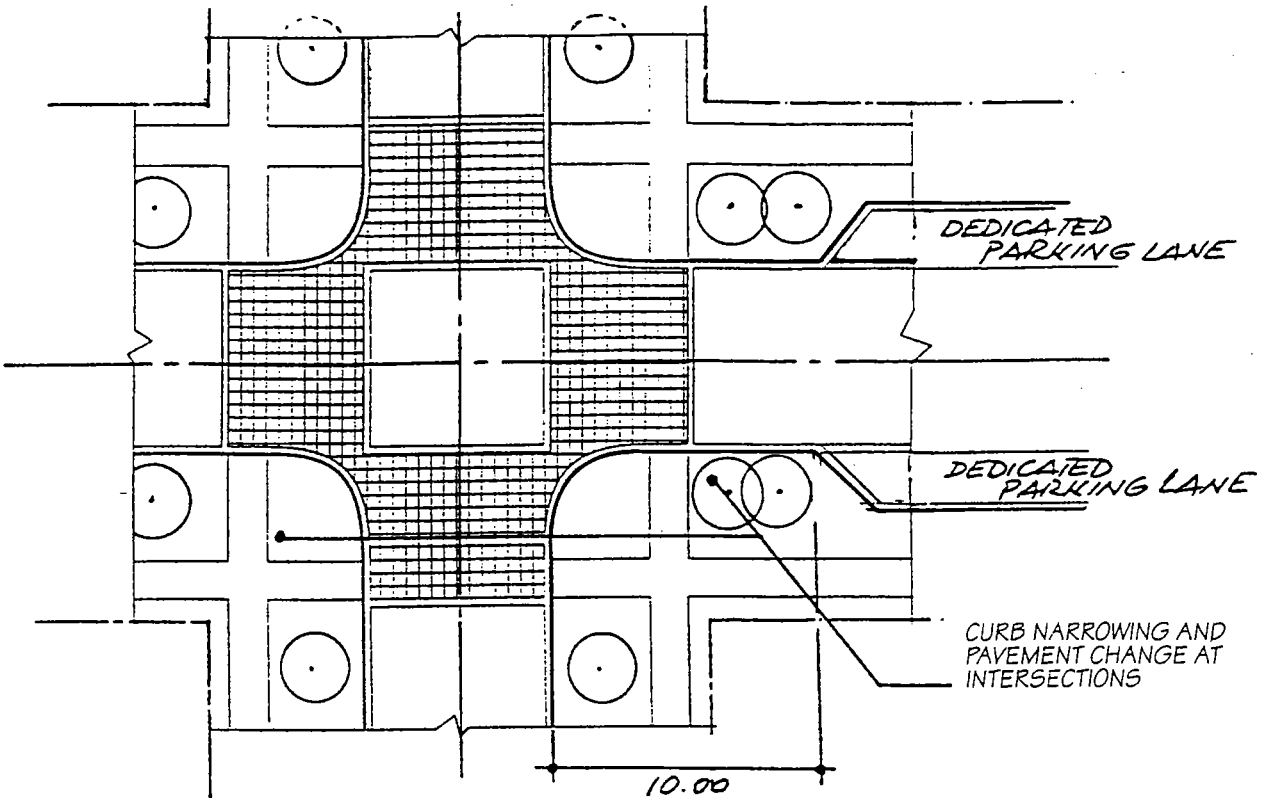


LOCATION OF FENCES AT THE CORNER LOT

WEST CLOVERDALE
North Neighbourhood

FENCES

A



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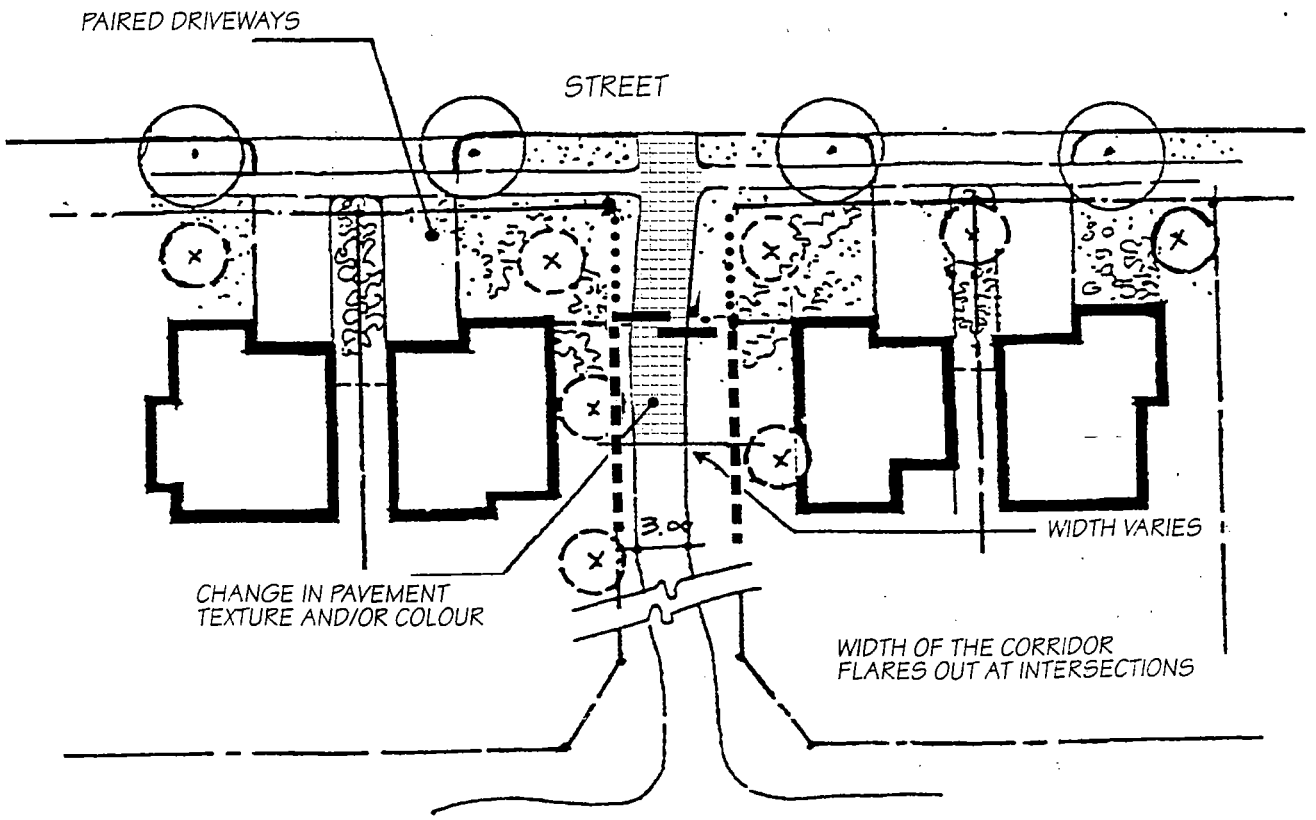
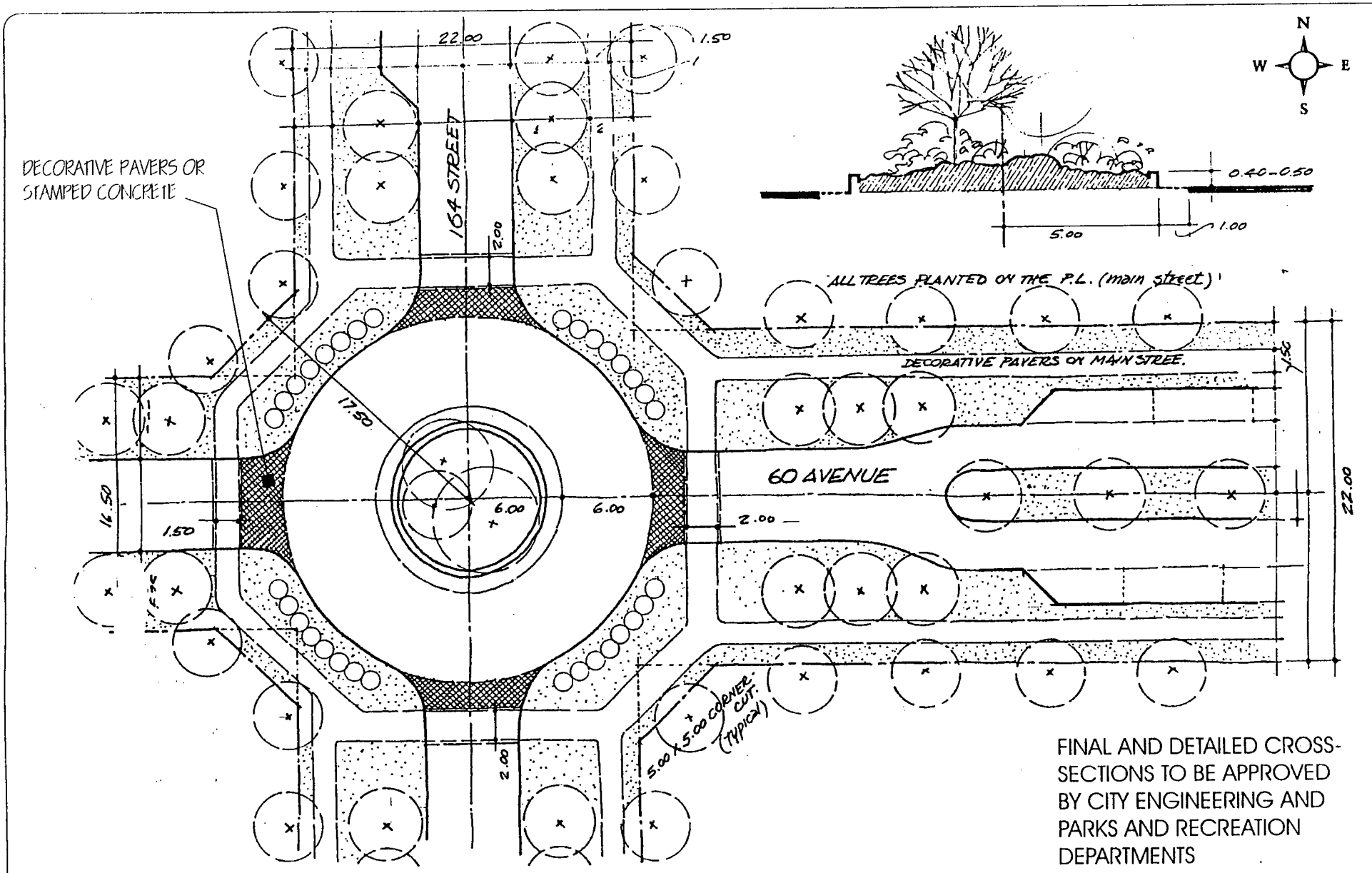


WEST CLOVERDALE
North Neighbourhood

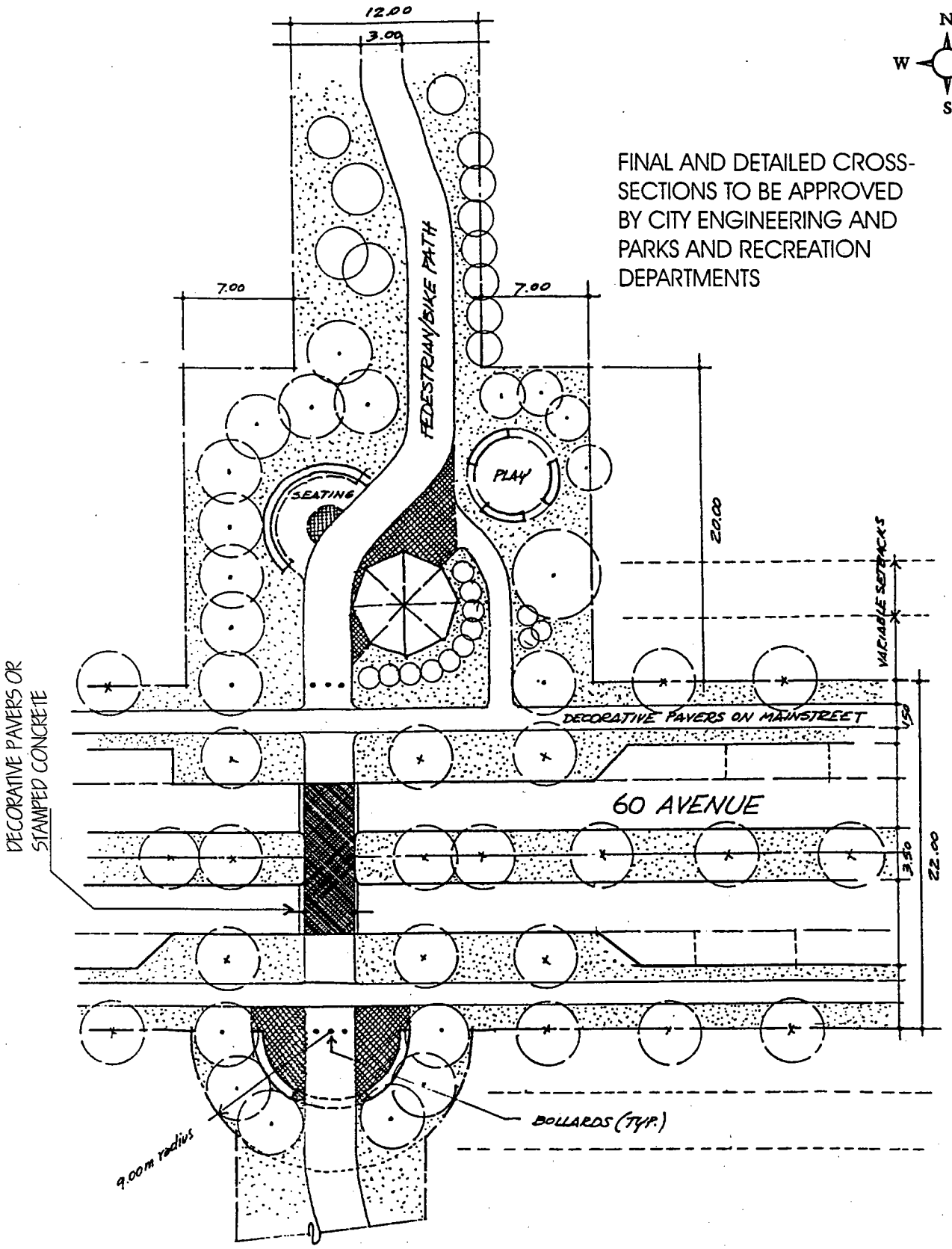
DRIVEWAYS, MULTI-USE CORRIDORS PATHWAYS B



FINAL AND DETAILED CROSS-SECTIONS TO BE APPROVED BY CITY ENGINEERING AND PARKS AND RECREATION DEPARTMENTS

WEST CLOVERDALE
North Neighbourhood

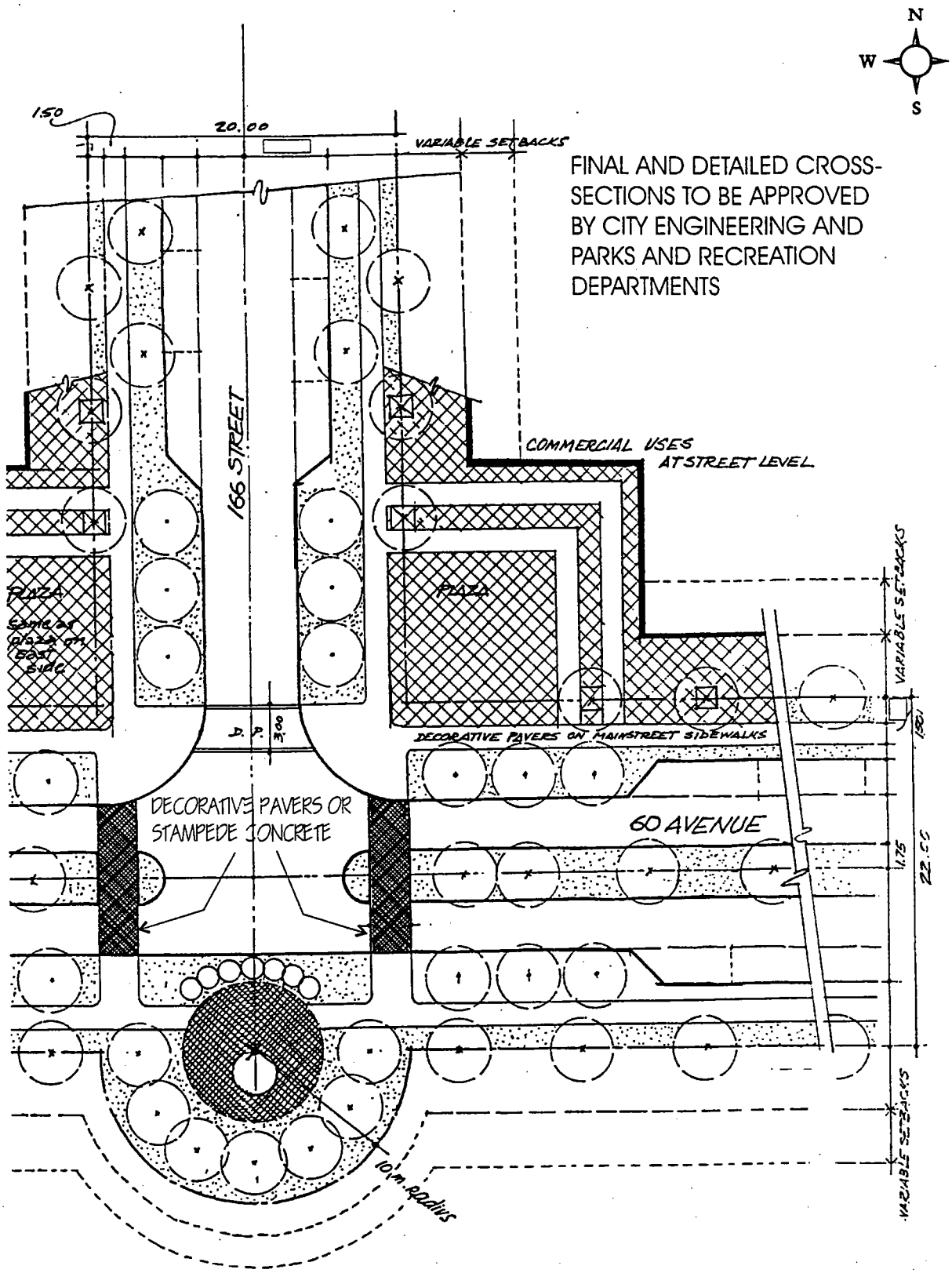
MAIN STREET DEVELOPMENT CONCEPT NODE (D)



FINAL AND DETAILED CROSS-SECTIONS TO BE APPROVED BY CITY ENGINEERING AND PARKS AND RECREATION DEPARTMENTS

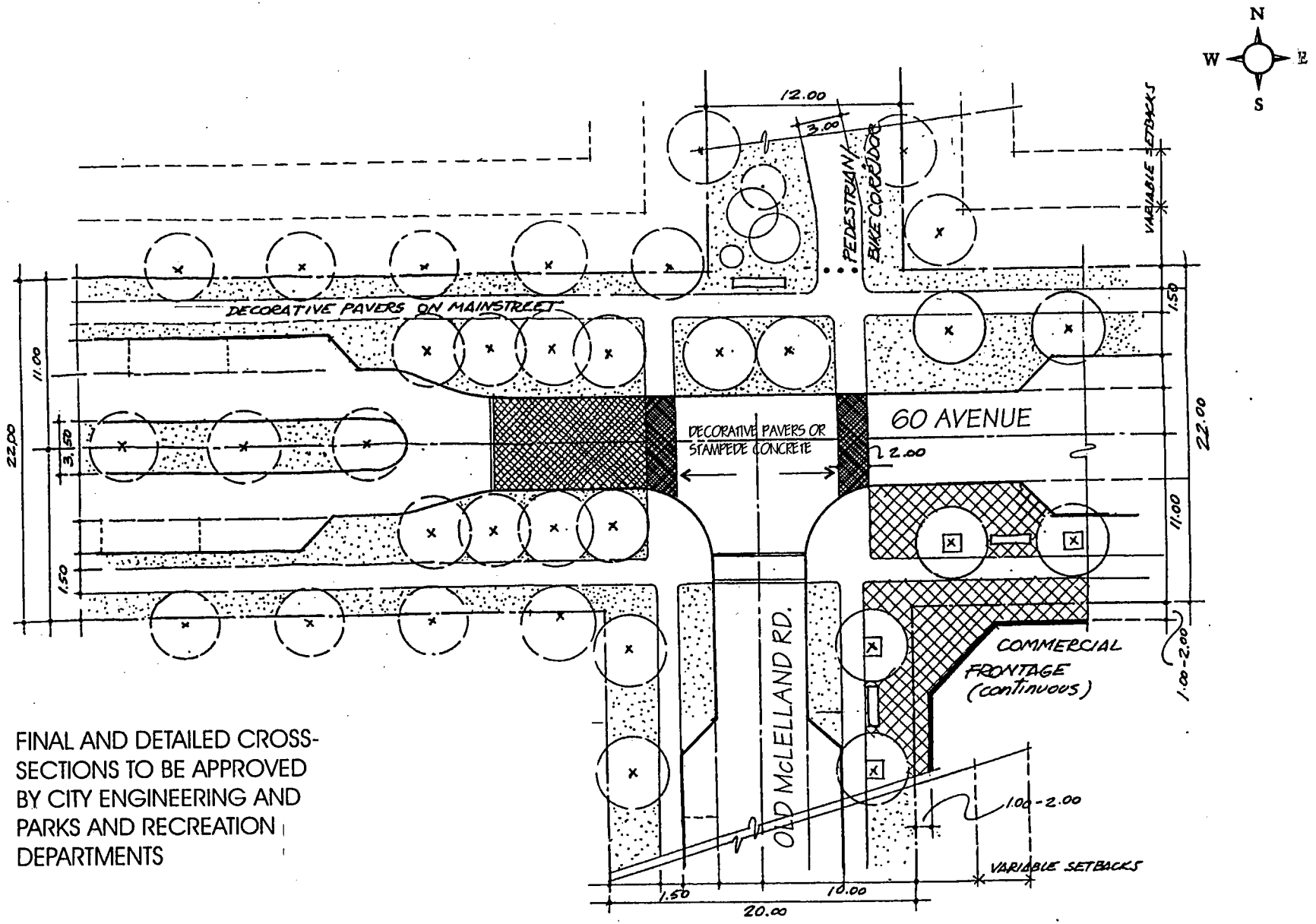
WEST CLOVERDALE
North Neighbourhood

MAIN STREET DEVELOPMENT CONCEPT NODE E



WEST CLOVERDALE
North Neighbourhood

MAIN STREET DEVELOPMENT CONCEPT NODE F

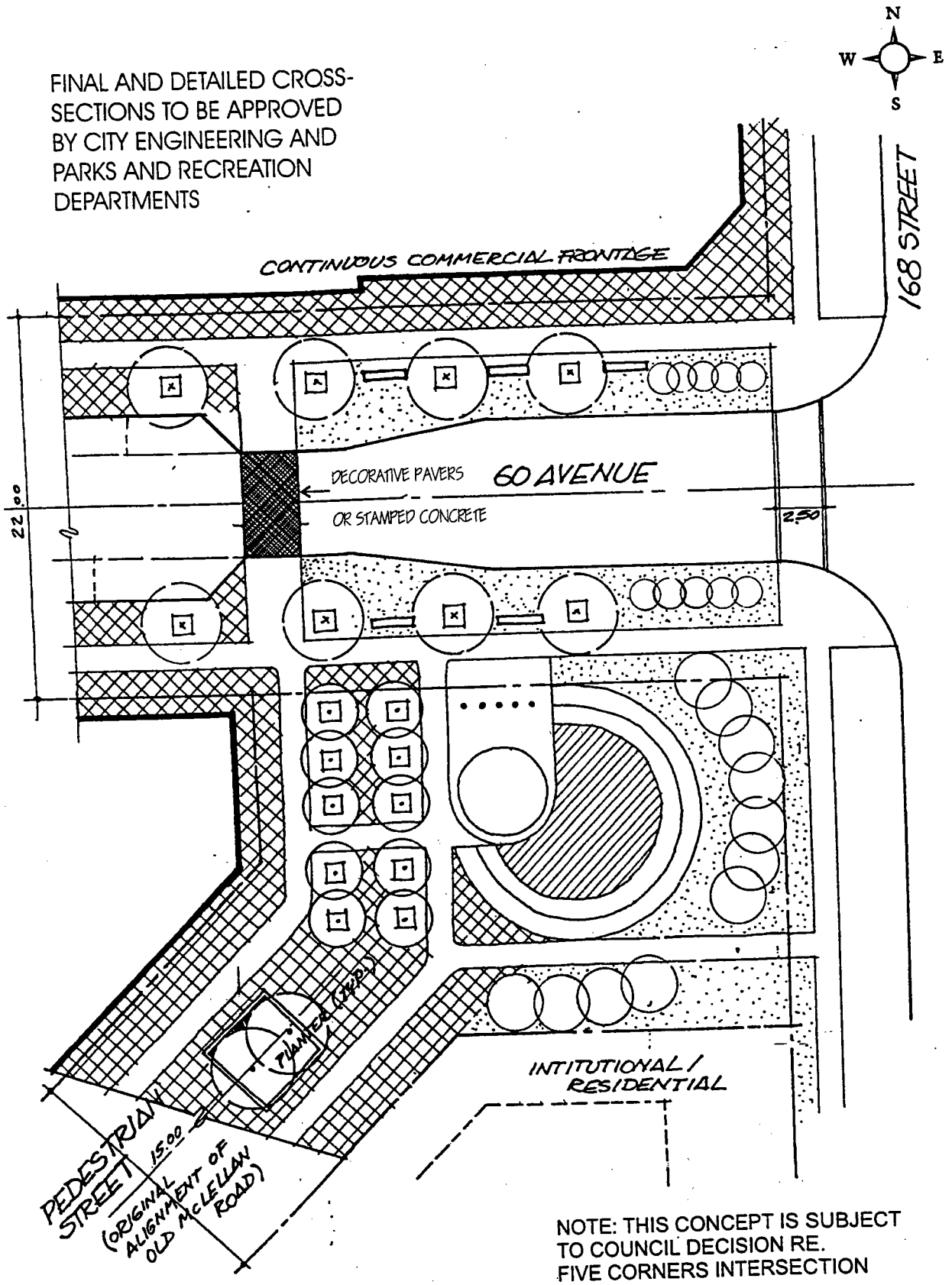


FINAL AND DETAILED CROSS-SECTIONS TO BE APPROVED BY CITY ENGINEERING AND PARKS AND RECREATION DEPARTMENTS

WEST CLOVERDALE
North Neighbourhood

MAIN STREET DEVELOPMENT CONCEPT NODE G

FINAL AND DETAILED CROSS-SECTIONS TO BE APPROVED BY CITY ENGINEERING AND PARKS AND RECREATION DEPARTMENTS

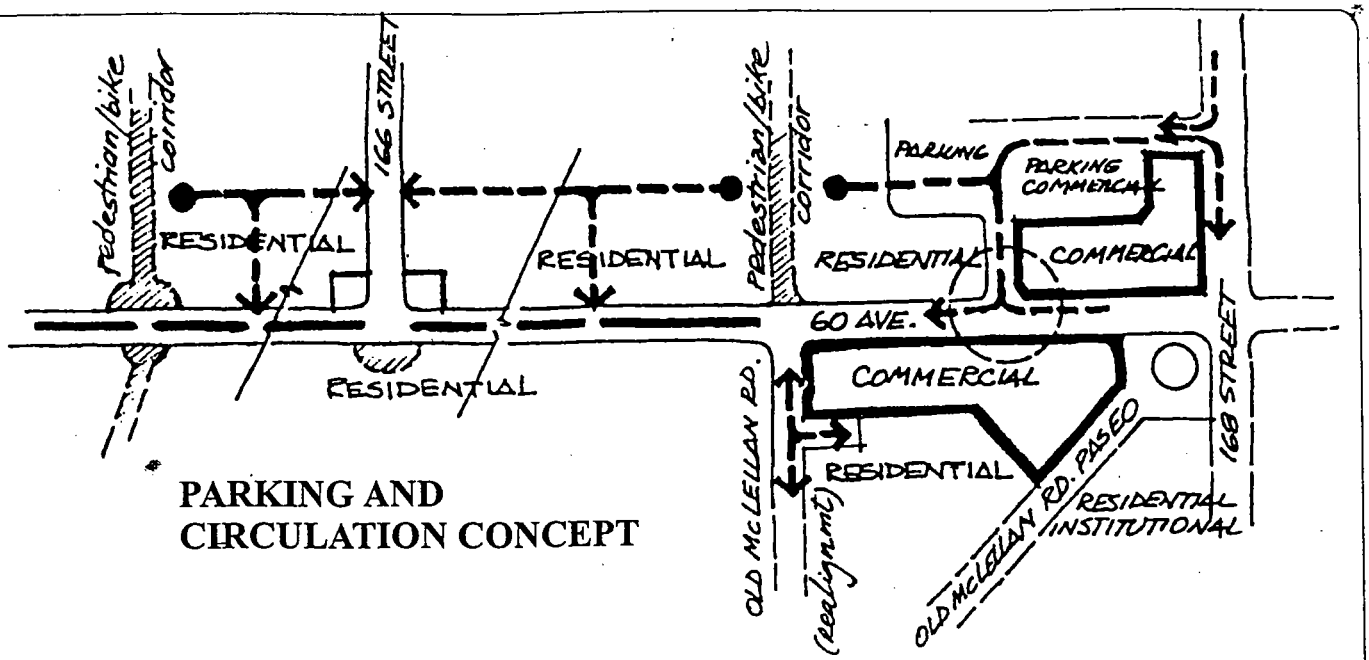


NOTE: THIS CONCEPT IS SUBJECT TO COUNCIL DECISION RE. FIVE CORNERS INTERSECTION DESIGN

WEST CLOVERDALE
North Neighbourhood

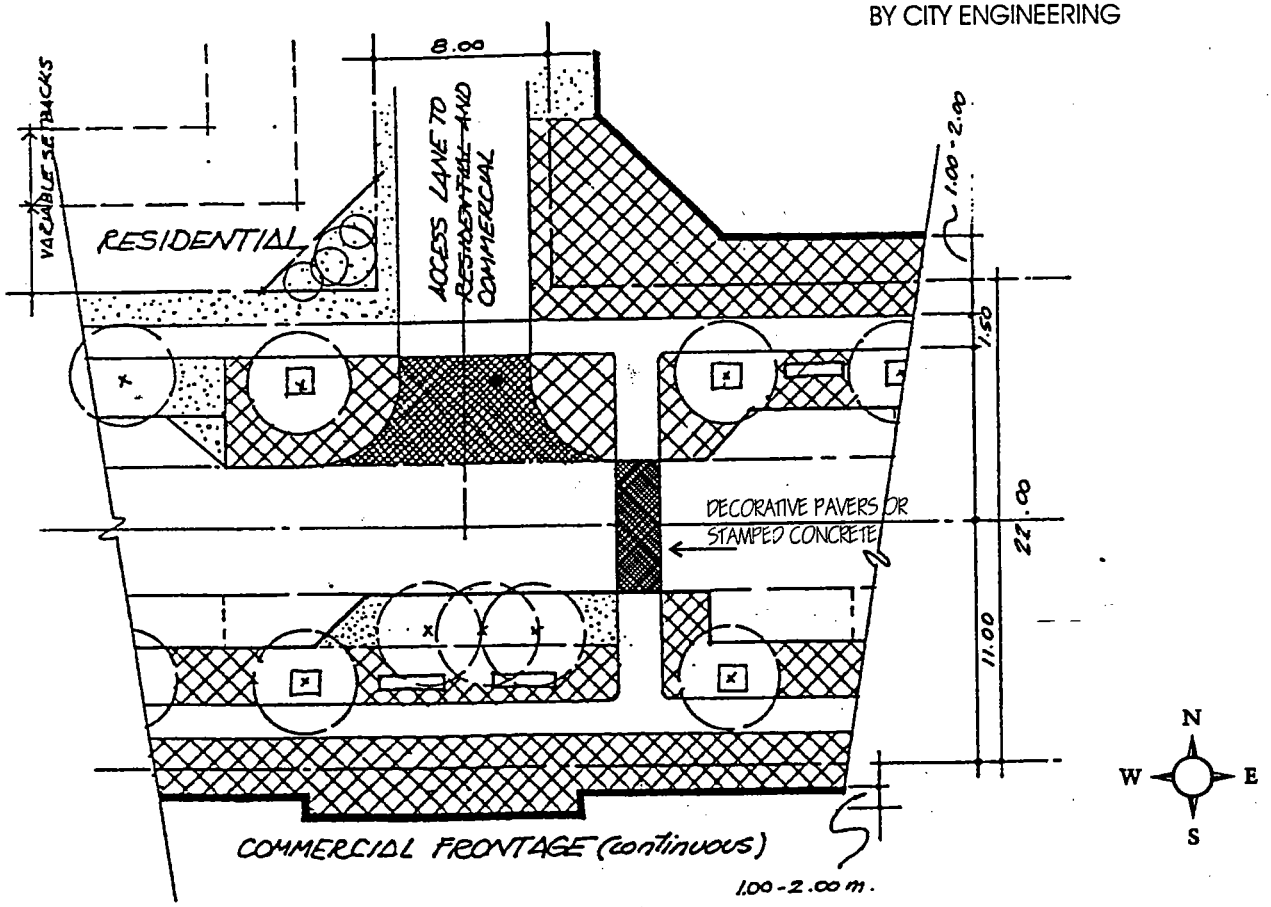
MAIN STREET DEVELOPMENT CONCEPT

NODE H



PARKING AND CIRCULATION CONCEPT

FINAL AND DETAILED CROSS-SECTIONS TO BE APPROVED BY CITY ENGINEERING

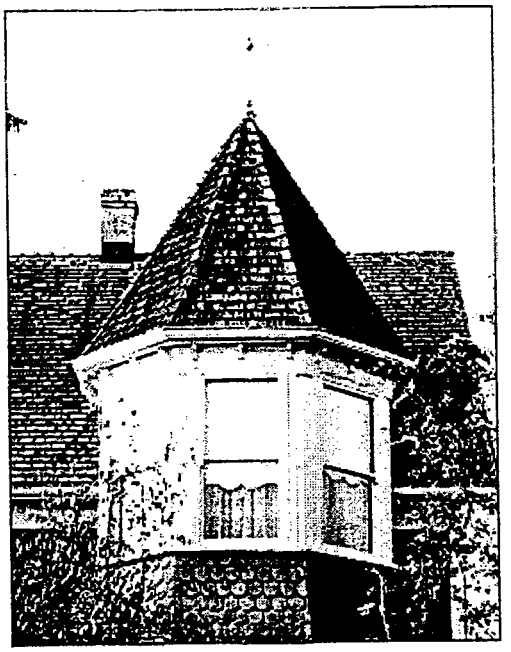


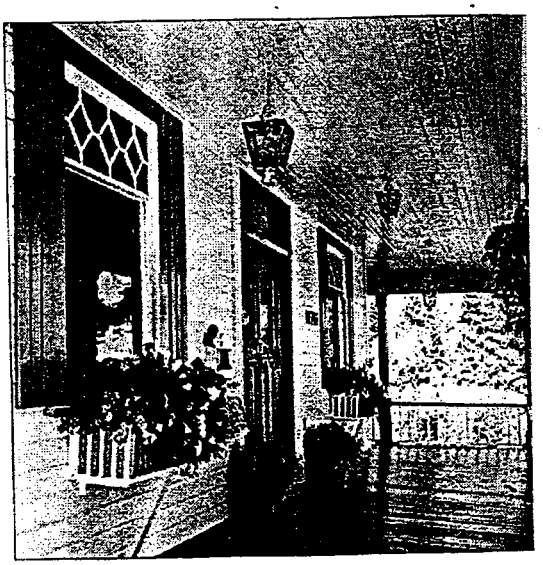
ACCESS LANE TO PARKING AREAS

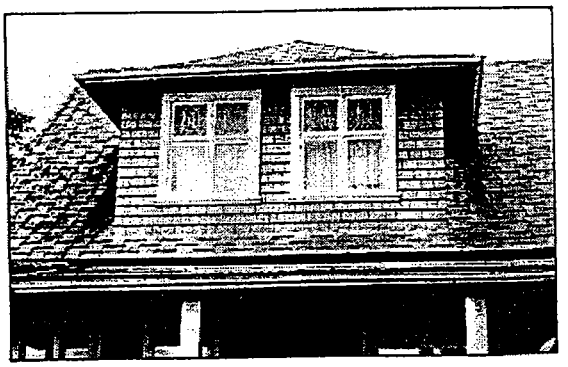
WEST CLOVERDALE
North Neighbourhood

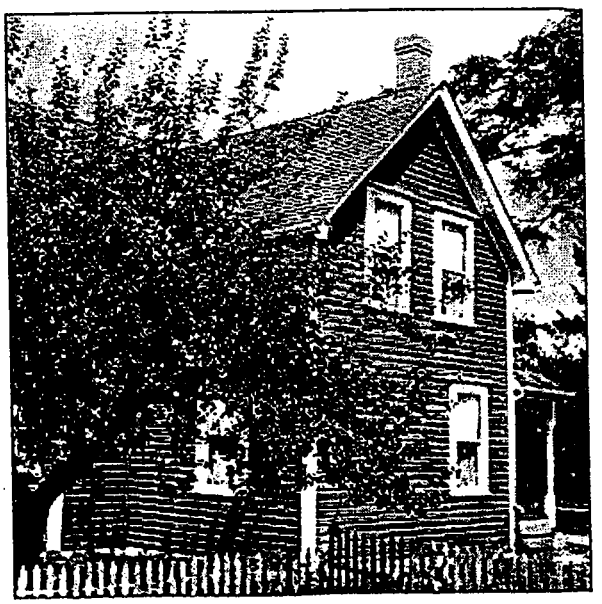
MAIN STREET DEVELOPMENT
CONCEPT. PARKING LOCATION

J





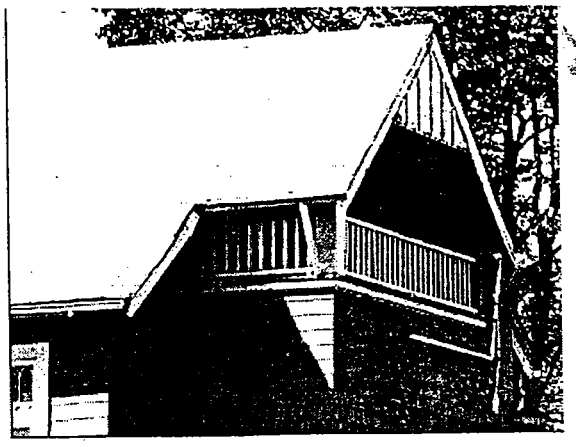


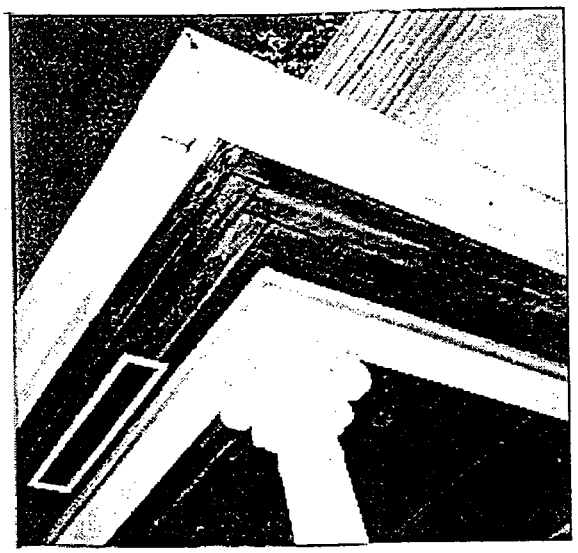


WEST CLOVERDALE
South Neighbourhood

HERITAGE
CHARACTER IMAGES

K

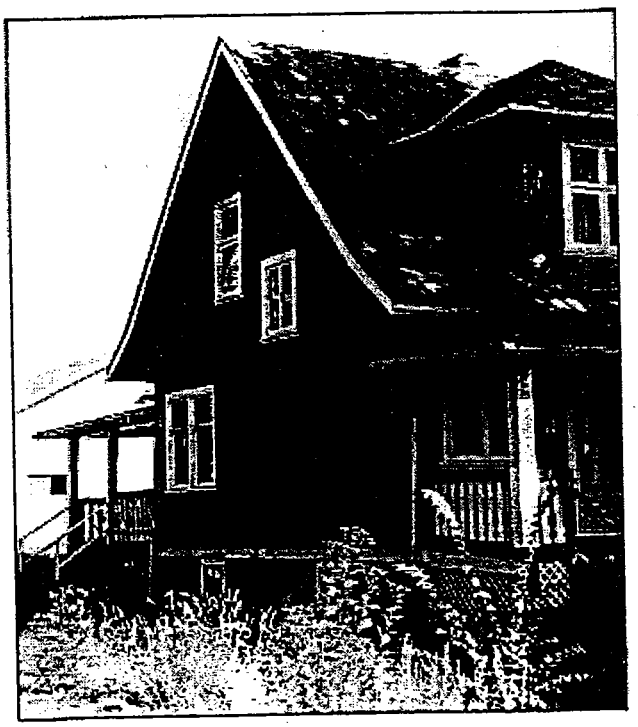




WEST CLOVERDALE
South Neighbourhood

HERITAGE
CHARACTER IMAGES

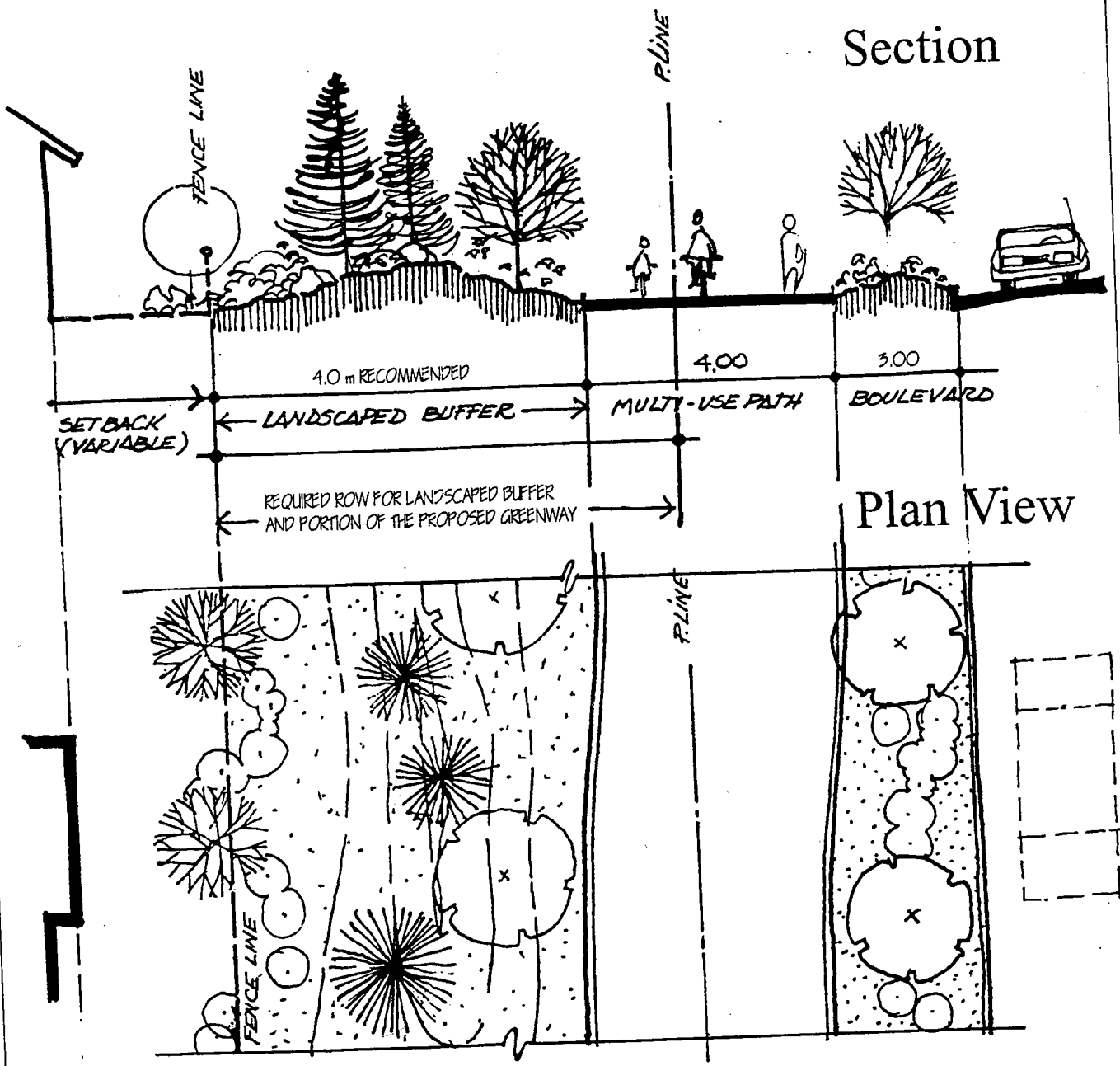
L



WEST CLOVERDALE
South Neighbourhood

HERITAGE
CHARACTER IMAGES

M



PLANTED INTERIOR MOUND

Coniferous:
Pinus Nigra (Austrian Pine)
Picea Pungens (Colorado Spruce)

To be combined with deciduous trees and'medim and large shrubs:Photinia, Portuguese Laurael, Barberis or similar.

PLANTED EXTERNAL MOUND

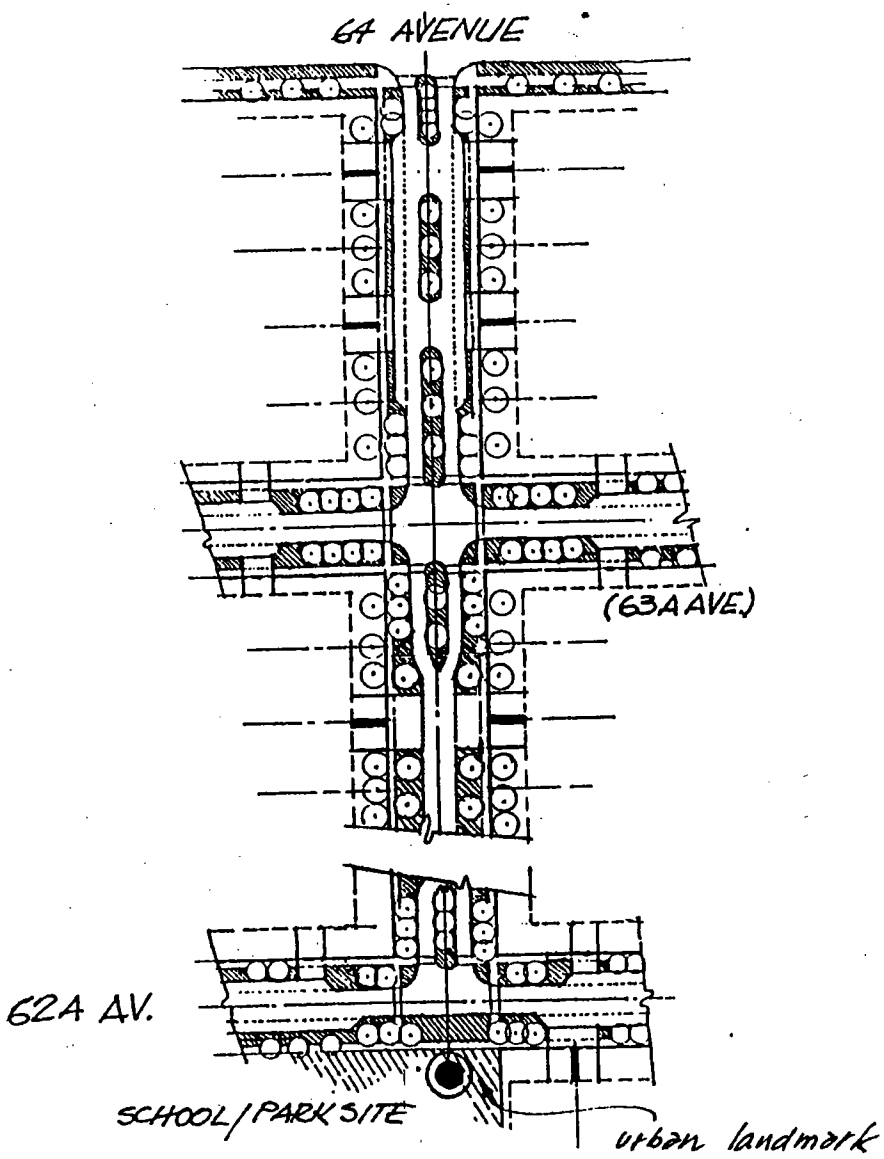
Deciduous:
Fraxinus Exelsior 'Wethoffs Glory'
(Westhoffs Glory Ash)
Acer Platanoides 'Deborah' (Deborah Maple)

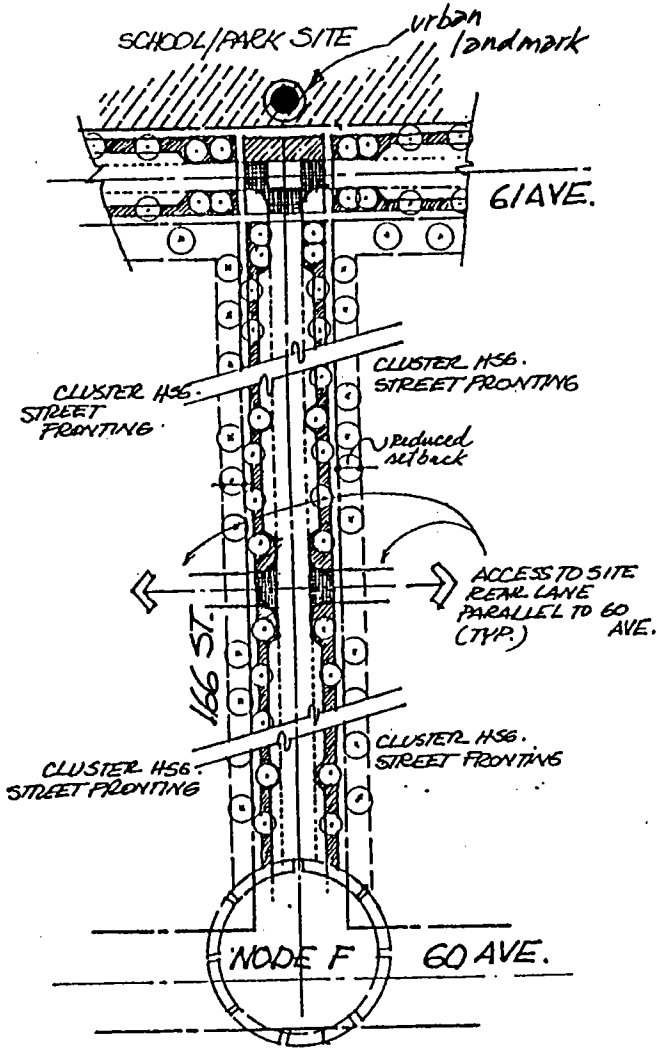
To be combined with low shrubs: Genista Lidia, Shrub Rose, Rosa Foetida or similar

WEST CLOVERDALE
North Neighbourhood

64 AVE. GREENWAY AND LANDSCAPED BUFFER

N

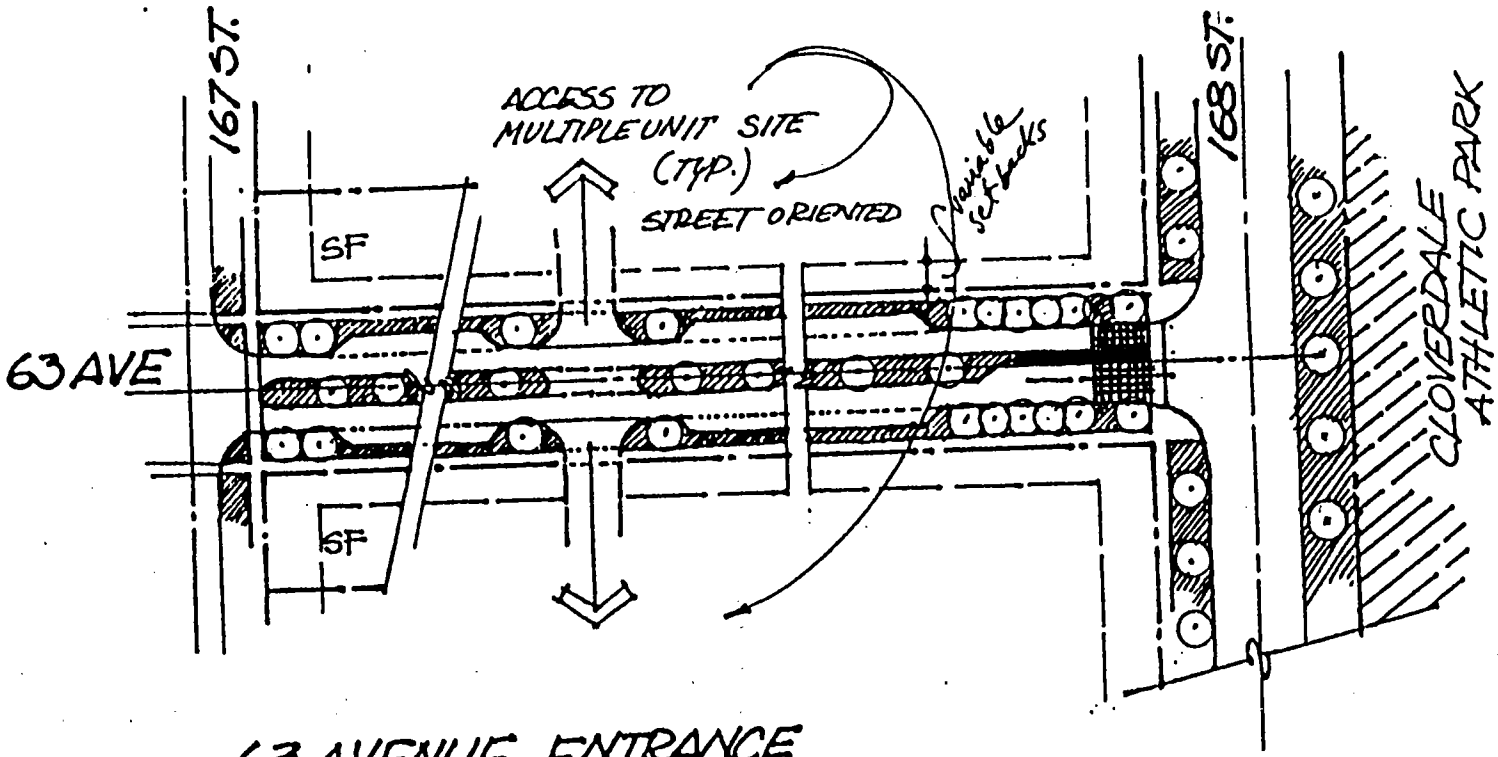




WEST CLOVERDALE
North Neighbourhood

166 STREET ENTRANCE TREATMENT
166 STREET SOUTH

O



63 AVENUE ENTRANCE
(61 AVENUE SIMILAR TREATMENT)

WEST CLOVERDALE
North Neighbourhood

61 AVENUE AND 63 AVENUE ENTRANCES

P

WEST CLOVERDALE

NEIGHBOURHOOD CONCEPT PLAN

NORTH NEIGHBOURHOOD

SECTION II

EVALUATION OF ENGINEERING SERVICES

NOVEMBER 26, 1997

COASTLAND ENGINEERING & SURVEYING LTD.

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APPENDIX V - Agency Comments

APPENDIX VI - General Urban Design Guidelines

APPENDIX VII - Northview Creek Habitat Compensation

1.0 INTRODUCTION

The Engineering Services Report forms Section II of the West Cloverdale North Neighbourhood Concept Plan. This report is in addition to, and supercedes the Stage I Engineering report included in Section I, Land Use Plan and Subdivision Concept as "7.0 Preliminary Stage I Servicing Concepts". This document has been prepared as required by Surrey Council as a condition of development approval for Lands in the West Cloverdale area. The parcel of Land bounded by 168 Street to the east, 60 Avenue to the south, the bottom of escarpment to the west, and the north property boundary of existing properties fronting the north side of 64 Avenue, herein referred to as the "Study Area", has been designated as the north phase of the West Cloverdale Neighbourhood Concept Plan area. Servicing requirements of the Land Uses proposed in the Concept Plan, and the identification of works required to adequately service these uses, are addressed in this Engineering Services Report. Services include Roads and Traffic, Water Supply and Distribution, Sanitary Sewer, and Drainage.

This report has been prepared in accordance with the engineering terms of reference for the West Cloverdale North Neighbourhood Concept Plan, issued by the Land Development, Environment and Research Division of the City of Surrey Engineering Department and are contained in Appendix I.

Report preparation included regular consultations and meetings with the Steering Committee of the West Cloverdale Owners Group, as well as the City of Surrey Engineering Department Staff. The conclusions and recommendations of the Report are endorsed by the above groups.

COASTLAND ENGINEERING & SURVEYING LTD.

Greg Sewell, P.Eng.

November 26, 1997

2.0 LAND USE PLAN

2.1 Proposed Land Uses & Development Pattern

The West Cloverdale North Neighbourhood Concept Plan document prepared by Davidson Yuen Simpson Architects outlines the land uses proposed and provides for a variety of housing types in the form of moderate and high density multiple family townhouse as well as traditional single family development. The Neighbourhood Plan provides for significant green space and includes an Elementary School and Neighbourhood Park as shown on Figure 1.

The areas designated as single family are to be conventional sized lots with front driveway access, except where those lots front arterial roads in which case frontage roads are to be provided. Multi family developments in the Study Area will provide for cluster housing and townhome developments with densities ranging from two to fifteen units per acre and include institutional residential, as well as street-oriented town homes.

Table 2.1 extracted from the Neighbourhood Concept Plan summarizes the projected development yield from the designated land use types:

TABLE 2.1
PROPOSED LAND USE

PROPOSED LAND USE	AREA (ac.)	NO. OF UNITS
Clustering @ ½ Acre Density	65.9	132
Urban Single Family	85.1	468
Clustering @ URB. Single Family Density	4.9	36
Cluster Housing	21.6	208
Townhousing/Rowhousing	51.1	729
Institutional/Residential	5.3	61
Local Commercial	1.0	-
School/Park	14.8	-
TOTAL	249.7	1,634

2.2 Population Projections

The Neighbourhood Concept Plan suggests that every multi-family area within the N.C.P. is potentially a family oriented site. Table 2.2. summarizes the ultimate population projections for the Study Area based on estimates of average household population per housing type as identified in the West Cloverdale Local Area Plan.

TABLE 2.2
POPULATION PROJECTIONS

LAND USE	PERSONS PER DWELLING UNIT	NO. OF DWELLING UNITS	POPULATION
Clustering @ ½ Acre Density	3.2	132	422
Urban Single Family	3.2	468	1498
Clustering @ Urban Single Family Density	3.2	36	115
Cluster Housing	3.2	208	666
Townhousing/Rowhousing	2.0	729	1458
Institutional/Residential	2.0	61	122
Local Commercial	-	-	-
School/Park	-	-	-
TOTAL	N/A	1634	4281

In evaluating service requirements, for the purposes of this report, design populations have been generated from land uses in accordance with the higher of either the West Cloverdale Local Area Plan, or the City Engineering Department Design Criteria Manual (January, 1995).

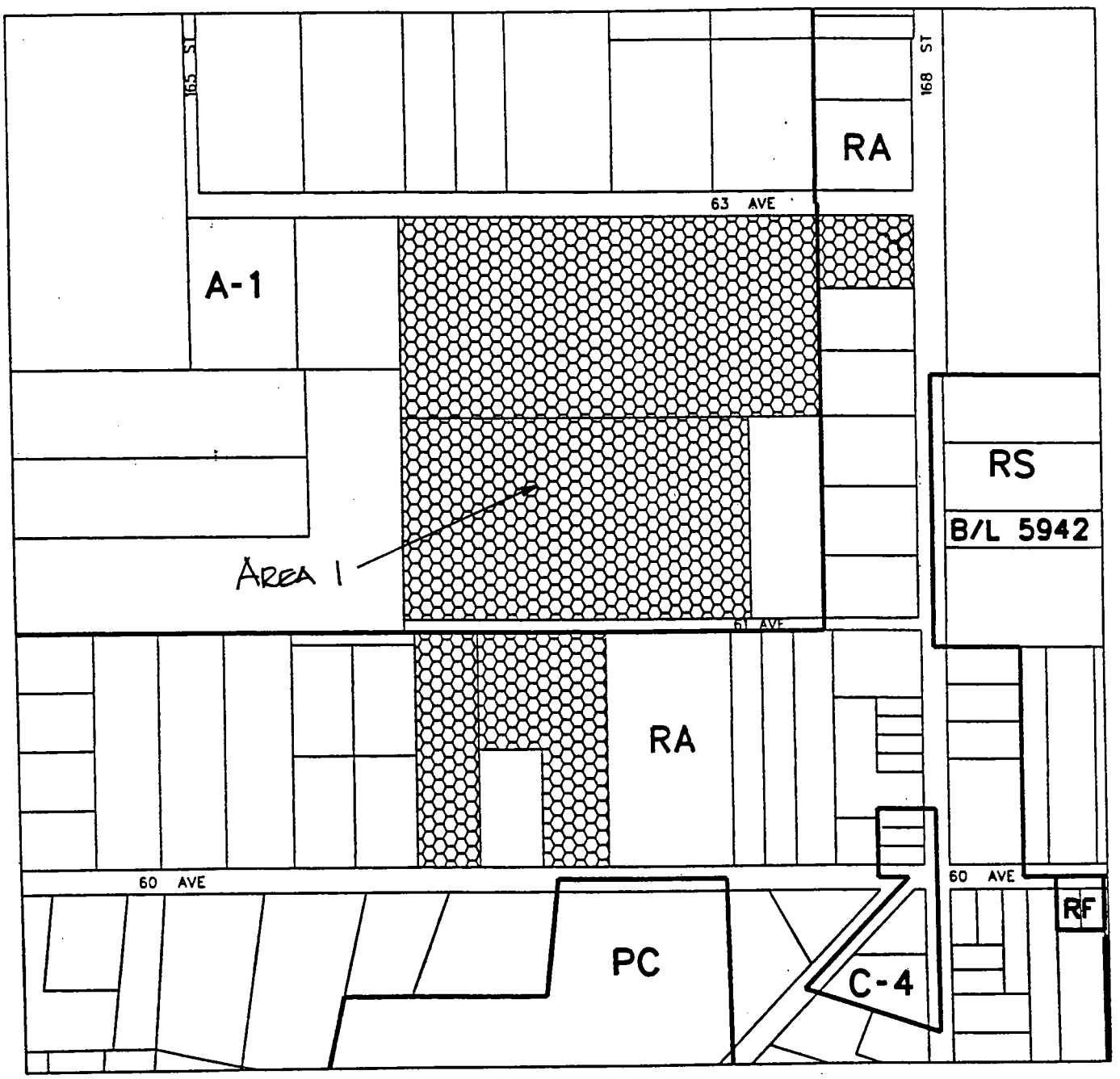
2.3 Development Phasing

The development of the Study Area is expected to proceed generally west from 168 Street. Figure 2 identifies the proposed construction stages as Development Phases 1, 2, & 3. The Stages shown are consistent with the logical extension of services into the Study Area. The development of Phase I will provide a solid foundation for the development of successive stages.

In support of this staging proposal, development applications for several parcels within the Study Area are pending. It is the intent of the frontending applicant(s), with significant holdings (shown on page 5 as Area 1), to proceed with development as soon as approvals are obtained. Other holdings within the Study Area may proceed simply by extending basic services provided by these initial applications. Location maps on pages 5-13, obtained from the City of Surrey Planning Department, show the current applications proposed.

2.0 LAND USE PLAN

APPLICATION NO. 7995-0288-00



2.0 LAND USE PLAN

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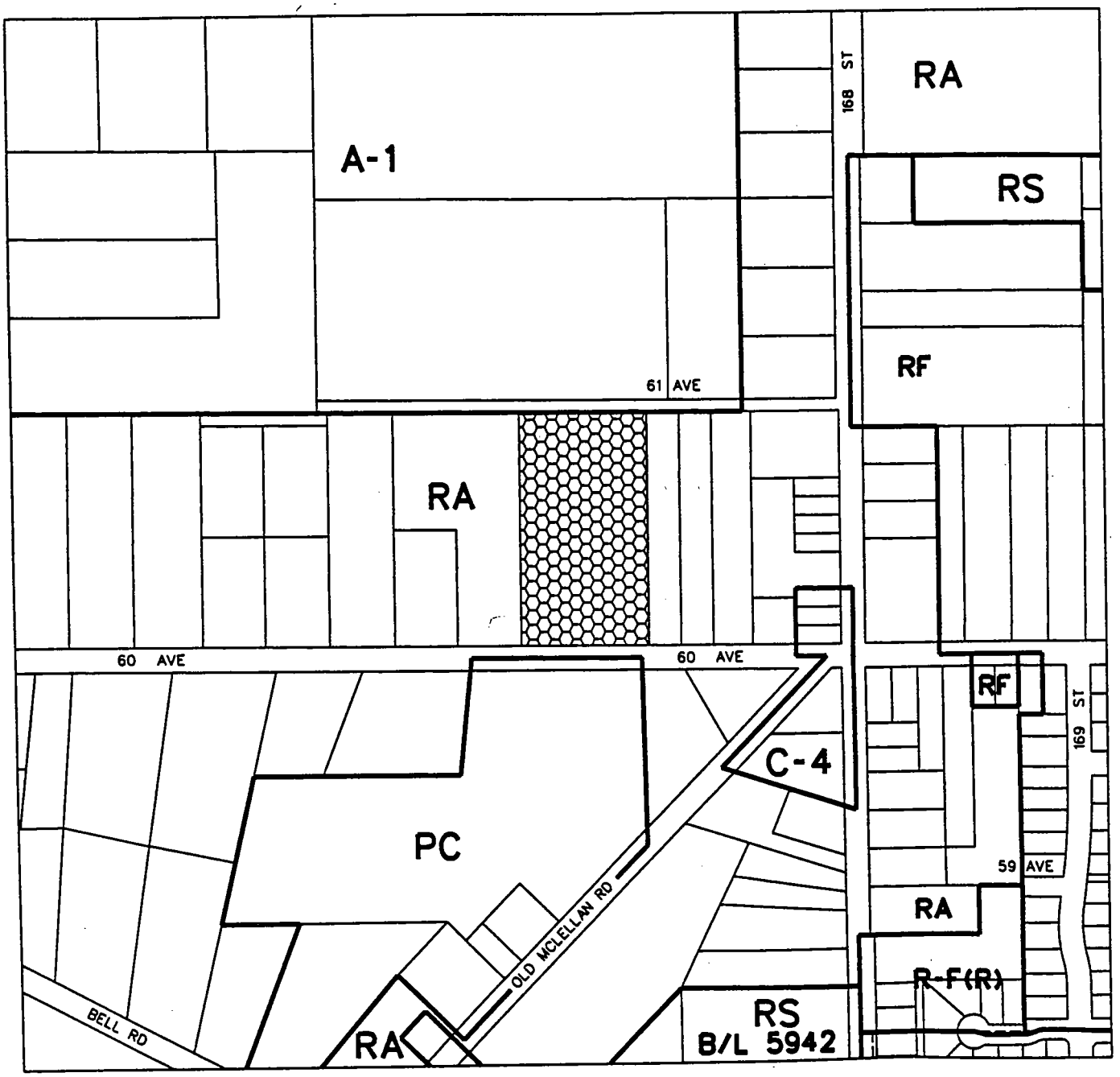

2.0 LAND USE PLAN

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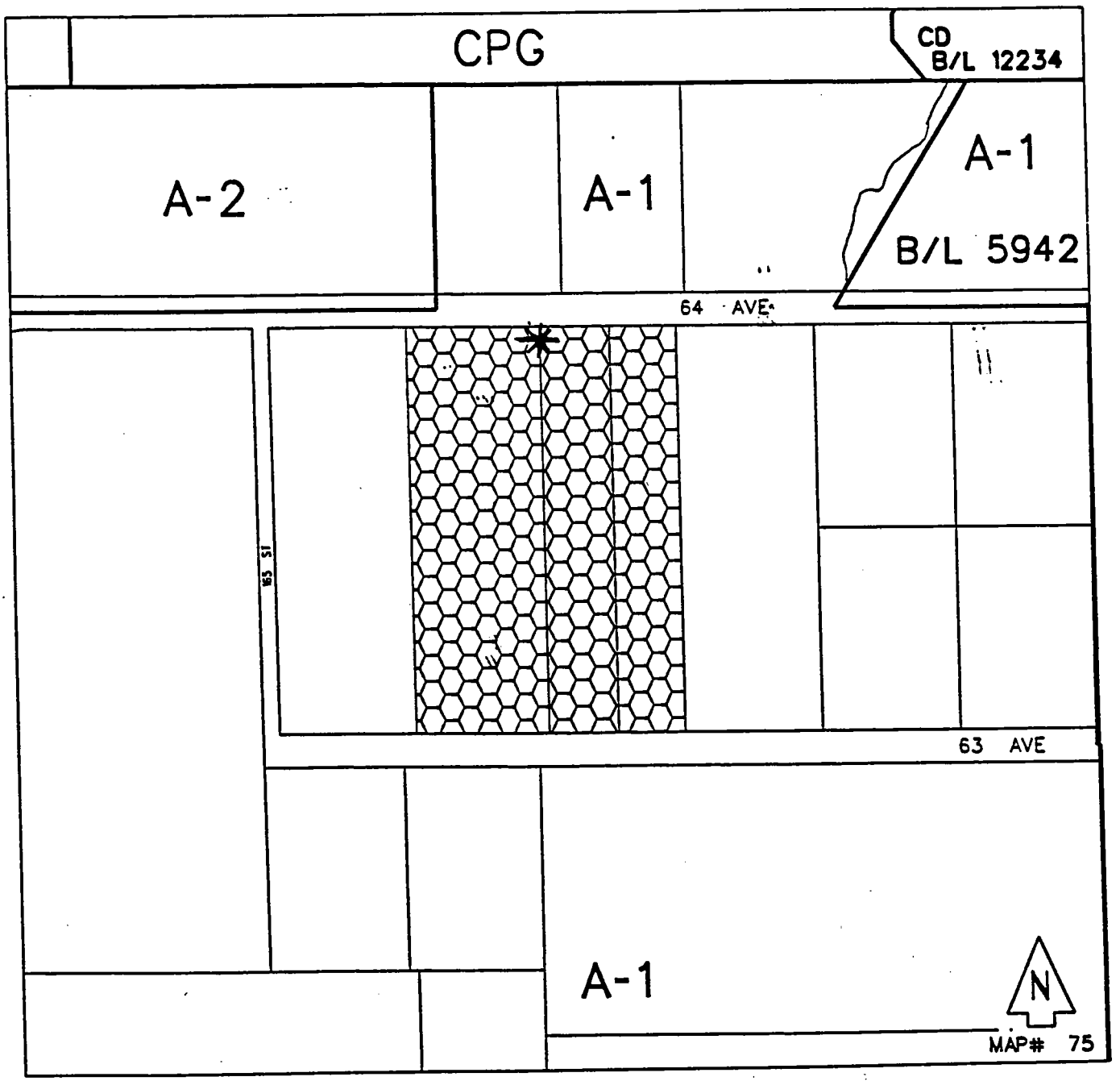

2.0 LAND USE PLAN

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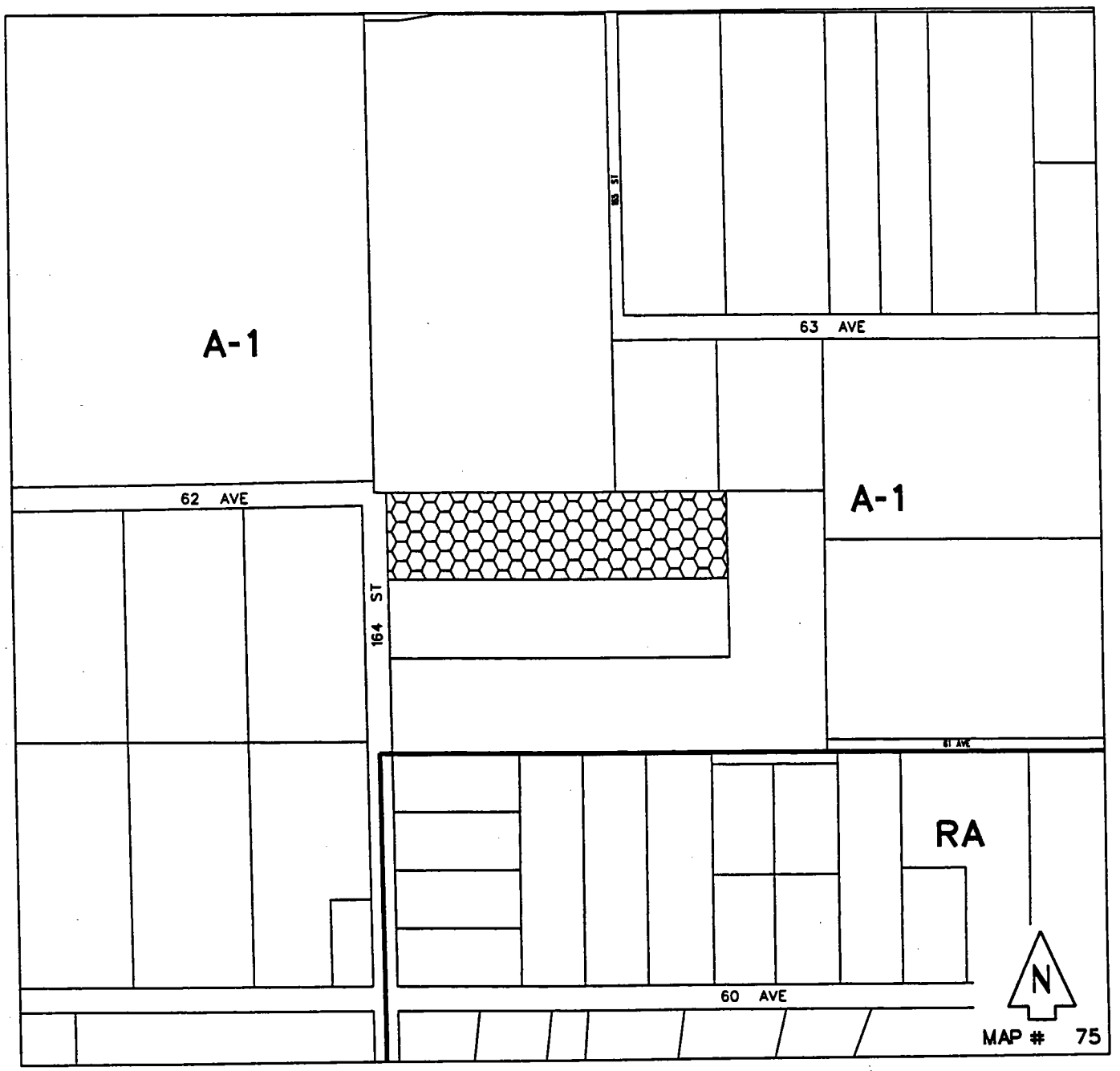
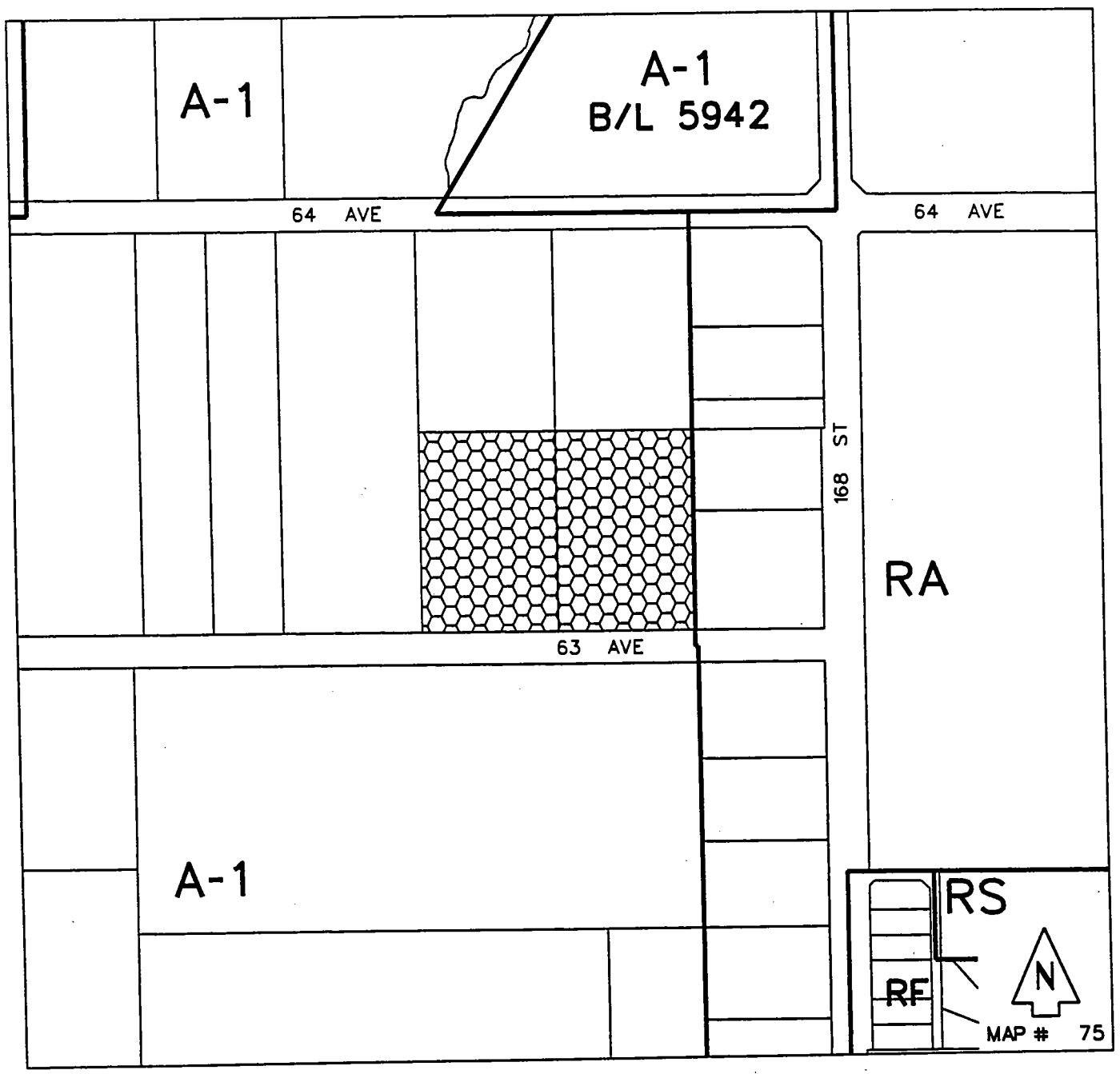


2.0 LAND USE PLAN

APPLICATION NO. 7996-0306-00



2.0 LAND USE PLAN

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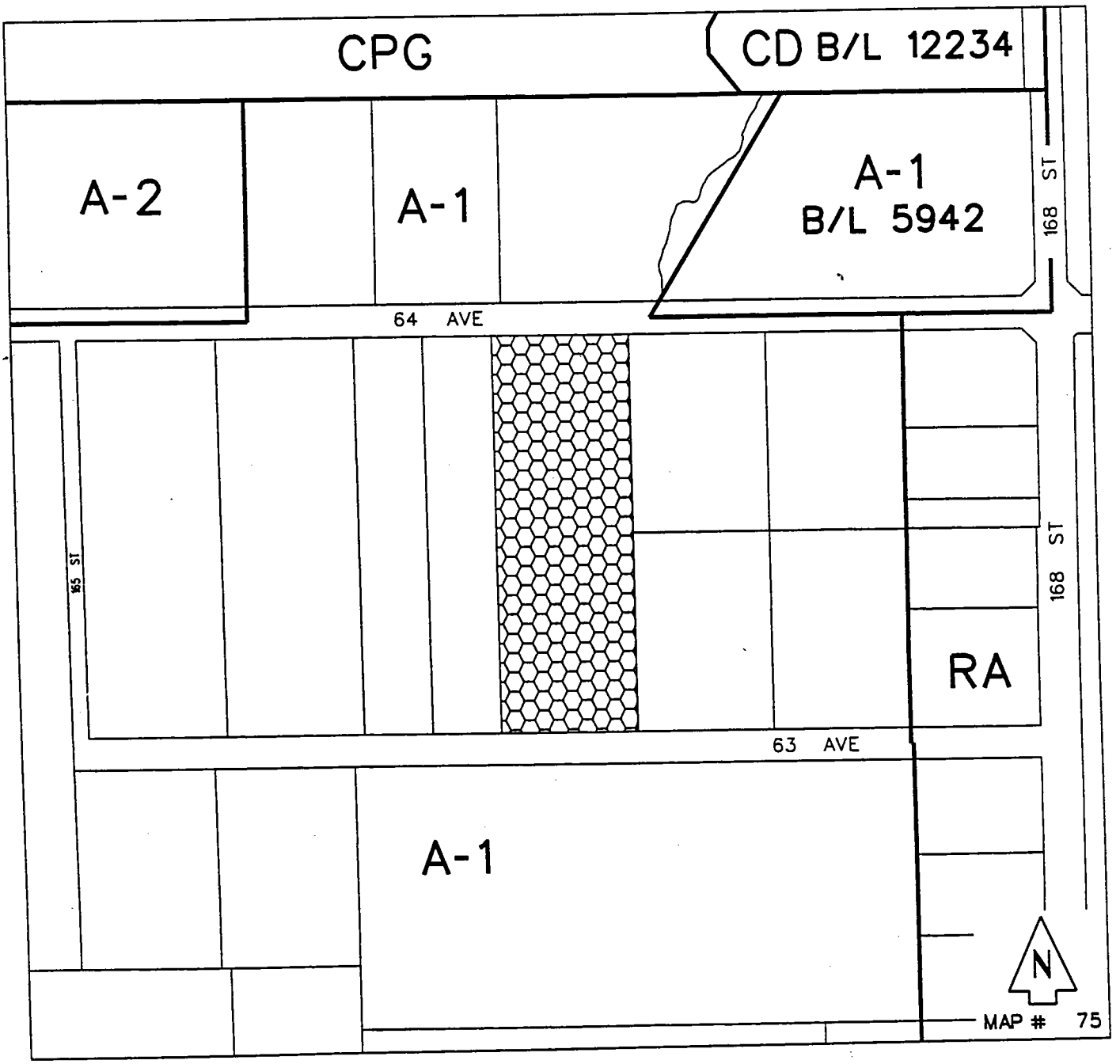
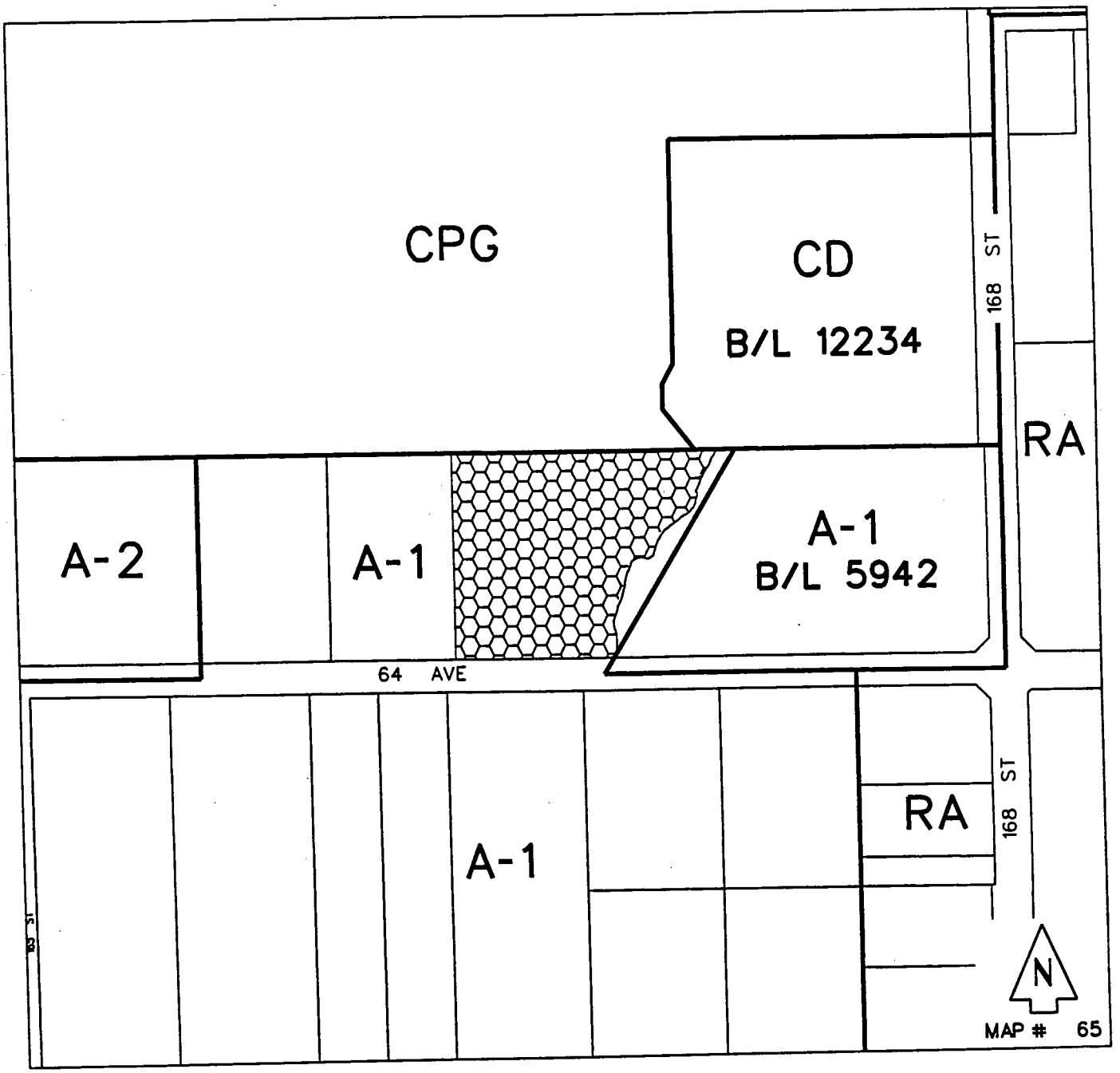


2.0 LAND USE PLAN

APPLICATION NO. 7996-0342-00



2.0 LAND USE PLAN

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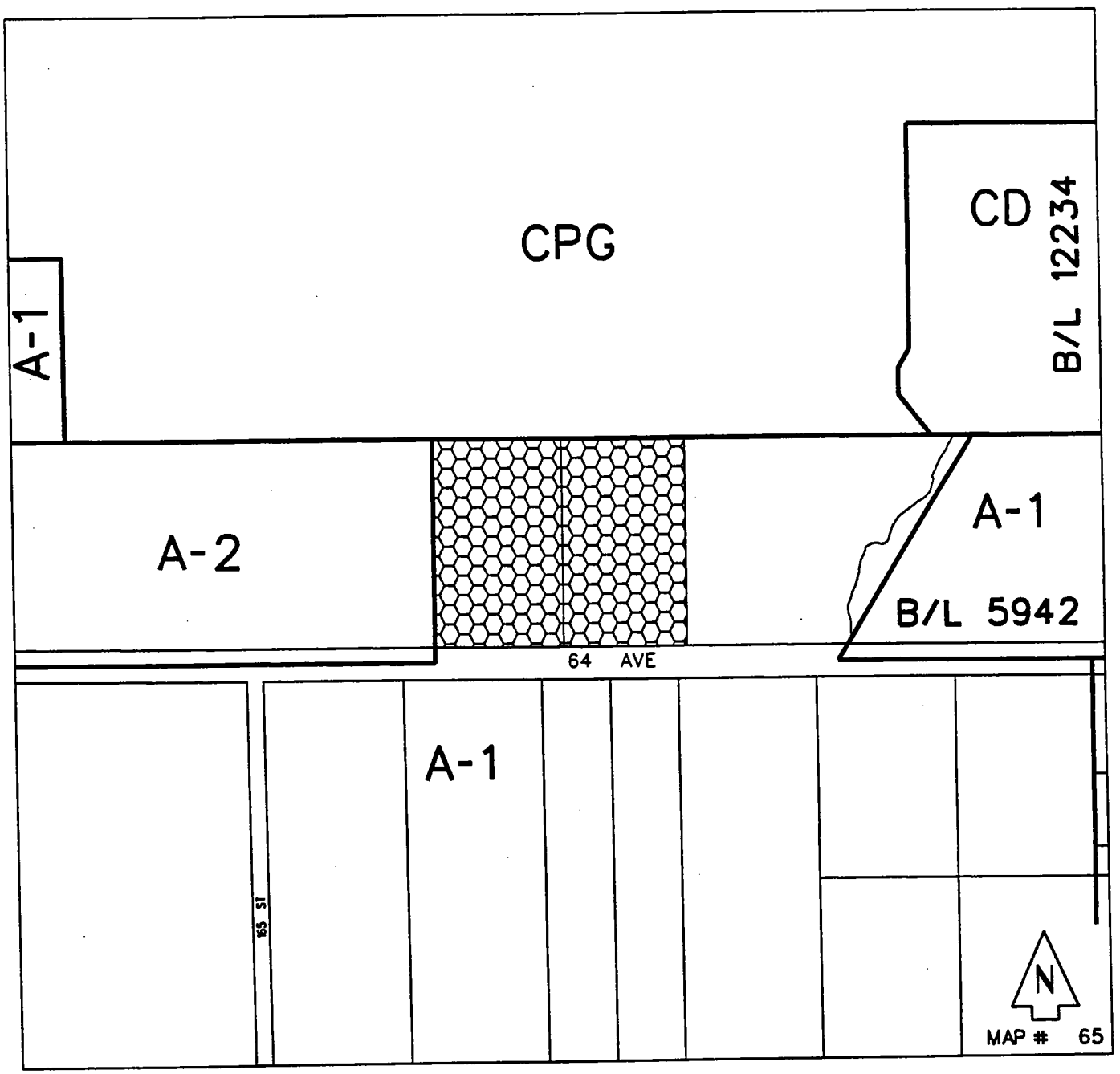

2.0 LAND USE PLAN

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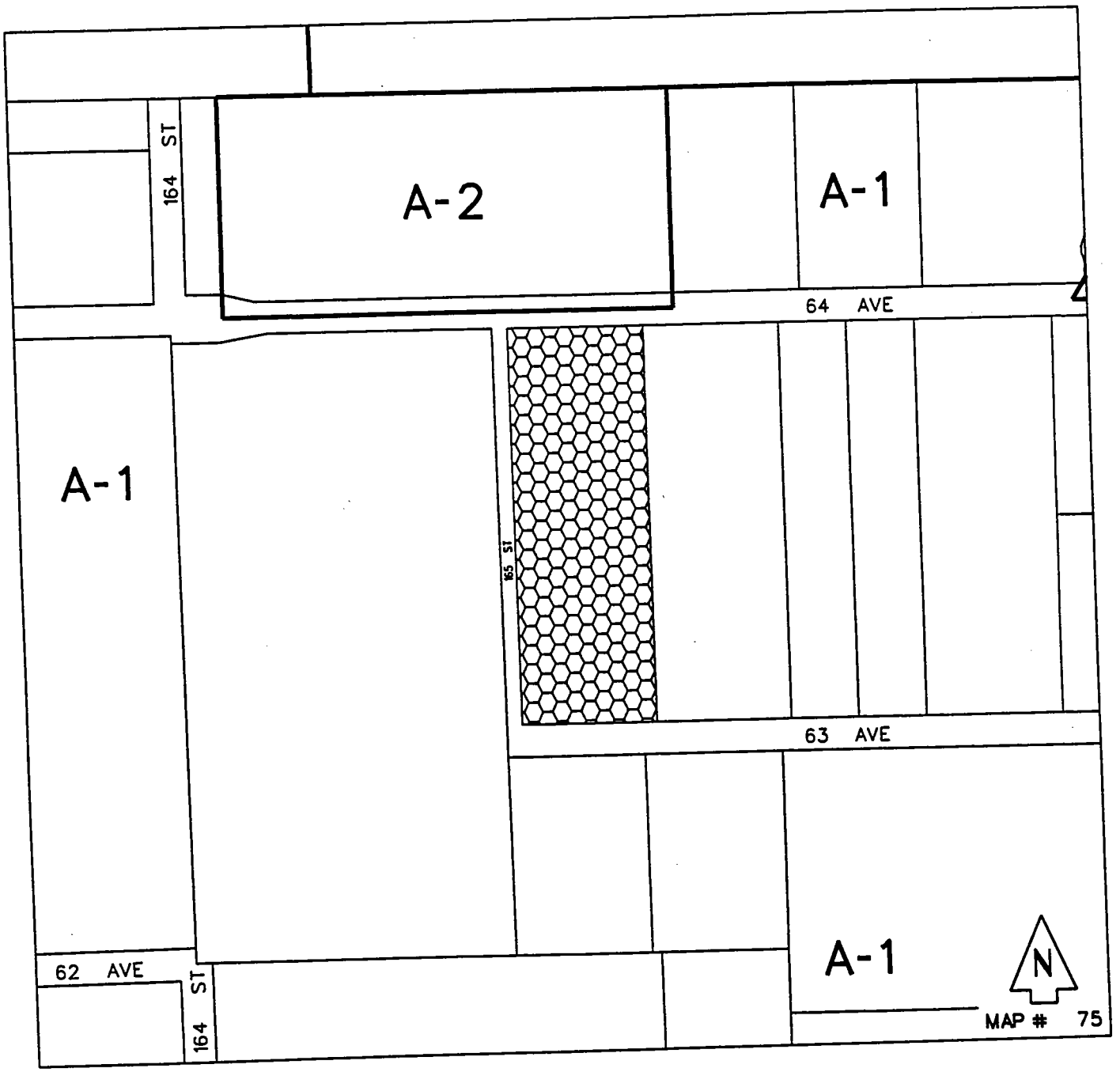


3.0 ROADS AND TRAFFIC

3.1 Existing Road System

The Study Area is serviced by the Regional and Municipal road network. 168 Street, which defines the Study Area on the east, and 64 Avenue, which extends through the northern limits of the Study Area, are high quality designated arterial roads that provide access to both Regional and Municipal road networks. Although not immediately adjacent to the Study Area, the Regional Network is available via Fraser Highway to the north, 176 Street (Pacific Highway) to the east, and Highway No. 10 to the south. 60 Avenue is a designated through collector road east of 168 Street, and a limited collector road west of 168 Street and, as the central axis for both the North and South Neighbourhoods of West Cloverdale, further links the Study Area to the Municipal road network.

There are no new arterial roads designated for the Study Area on the City R91 Grid map, and it is evident that no expansion of this network is required nor proposed by the City in order to service the proposed Neighbourhood Concept Plan.

The existing road on 168 Street has two lanes north/south with gravel shoulders approximately 1.0 metre in width and signalization at the intersection of 64 Avenue. 64 Avenue is a municipal, two-lane east/west arterial road with signalization at 168 Street and, to the east, at 176 Street. 60 Avenue is also a two-lane east/west municipal road with a pavement width of 6.0m west of 164 Street and is discontinuous west of 160 Street. The City has indicated that, from 168 Street to 164 Street, 60 Avenue will be a limited collector road serving only the North and South N.C.P. Neighbourhoods.

Other road dedications existing within the neighbourhood include the following and are shown in Figure 5:

- 63 Avenue is a two lane east/west roadway paved to a rural standard west of 168 Street approximately 250 metres within a 20.1m right-of-way, and terminates at 165 Street.

- 165 Street is a 10.1m dedication width, undeveloped roadway and extends from 63 Avenue north to 64 Avenue. A portion of this dedication between 63 Avenue and 64 Avenue and along the west side of the existing dedication, will not be part of the development road pattern and will, therefore, require closure and/or be exchanged with proposed road dedications. 61 Avenue is a 10.1m dedication width, unopened roadway that extends west from 168 Street to the approximate alignment of 165A Street. Although continuous, this dedication shifts from defining the north half-road dedication east of 168 Street for approximately 425 metres, to defining the south half-road dedication for the remaining westerly 115m. A short section of 61 Avenue

at the proposed 4 way intersection with 166A & 167A Streets will not be a part of the development road pattern and will, therefore, require closure and/or be exchanged with proposed road dedications.

- 164 Street is a two-lane north/south roadway paved to a rural standard from 60 Avenue to 62 Avenue with a 20m right-of-way.

- 62 Avenue is a 20.1m dedication width undeveloped roadway extending west from 164 Street to the Serpentine Canal. The section of this dedication within the Study Area boundary will not be a part of the development road pattern but will be replaced with private road systems within the ½ acre clustering development. It will, therefore, require closure and/or be exchanged with proposed road dedications.

All roadways within the Study Area will become part of the development road pattern.

3.2 Traffic Study

The Traffic Study required as part of the terms of reference for the Engineering Services component of the Neighbourhood Concept Plan, was undertaken by Ward Consulting Group, Traffic Engineering Consultants, and is submitted as a separate document. This report evaluates the area road network under increasing traffic volumes over a nominal 10 year period, estimating normal traffic growth and its resultant impact on the road network as it relates to proposed improvements identified in the current 10 Year Servicing Plan, and by the Ministry of Transportation and Highways (M.O.T.H.). The report then projects the additional increase in traffic volumes generated by the North Neighbourhood Study Area onto these results and identifies the additional improvements required as a result.

3.3 176 Street

176 Street (Highway 15) is a north-south provincial highway located 1.6km east of 168 Street which connects Highway 1 to the U.S. Border. It is generally a two-lane rural facility with gravel shoulders except as it passes through the urbanized area of Cloverdale where it has been widened to a four lane urban cross-section. The posted speed north of 64 Avenue is generally 80 km/h with signalized intersections at Highway 10, 60 Avenue, 64 Avenue and Fraser Highway, and with channelization at the major intersections with Highway 10, 64 Avenue, and Fraser Highway..

3.4 Highway 10 (56 Avenue)

Highway 10 is an east-west provincial highway located approximately 0.8km south of 60 Avenue, which connects Highway 1 near Fort Langley to Highway 91, Highway 99, and Highway 17 in Ladner. In the vicinity of the Study Area it follows the 56 Avenue alignment. It is generally a two-lane rural cross-section west of Highway 15, and a four lane cross-section east of this point to Glover Road in the City of Langley. The posted speed varies between 60km per hour (km/h) in urban areas to 80 km/h in rural areas with major signalized intersections at Highway 15 and 168 Street.

3.5 168 Street

168 Street is a north-south municipal arterial road that extends continuously from north of the Fraser Highway south to Highway 10 and beyond. It is a two-lane facility with gravel shoulders. The posted speed is 50 km/h and it has a sidewalk along the east side between 60 Avenue and 64 Avenue. It has signalized intersections at the Fraser Highway and 64 Avenue, a four-way stop at 60 Avenue and a signalized intersection at Highway 10. The right-of-way width is generally 24.0 metres but it varies from 20.0 to 30.0 metres. Widening will be necessary to conform to the City's requirement for 27.0 metres throughout.

3.6 64 Avenue

64 Avenue is an east-west municipal arterial road which crosses the entire width of Surrey connecting Highway 91 in Delta and Highway 10 in Langley. It is a two-lane road with a posted speed of 60 km/h with left turn lanes at most major intersections, and signalization provided at 152 Street, 168 Street, 176 Street and 184 Street. As with 168 Street, the right-of-way through the Study Area varies, in this case between 22.1 and 24.4 metres. Widening will also be required throughout its Study Area length to provide the required 27.0 metres.

3.7 Development Road Pattern

The proposed Concept Plan provides for access to the Study Area from 64 Avenue at 166 Street, from 168 Street at 63 Avenue and 61 Avenue, and from 60 Avenue at 166 Street and 164 Street. 60 Avenue will provide common access to the North and South Neighbourhoods and is to be designated as a 12.2 metre limited collector road proposed for the Study Area.

There are two internal collector roads proposed for the Study Area. The most significant of these roadways runs north-south as 164 Street from 60 Avenue to 63 Avenue, then curves east-west as 63 Avenue from 164 Street to 168 Street. The 164 Street segment of this system will eventually extend south into the South Neighbourhood when that area develops and, ultimately, terminate as 57A Avenue at 168 Street. The second limited collector runs north-south as 166 Street from 64 Avenue to connect to the 63 Avenue collector. Those collector roads provide the primary access points into the Study Area and provide good circulation throughout, while ensuring that there is little, if any cut-through traffic.

Completing the road hierarchy, access from the collector road system is provided by an arrangement of through local roads and cul-de-sacs, providing an efficient and balanced layout creating graduated access to the collector, arterial road and highway systems.

Direct access to single family and residential lots is not permitted from either 64 Avenue or 168 Street. Residential lots fronting onto arterial roads will be provided access by means of frontage roads or rear lanes in accordance with Surrey standards.

All internal roads, including 60 Avenue, will be the responsibility of developers to construct as required through the rezoning and subdivision approval process. The local road pattern shown on the Neighbourhood Concept Plan is designed to provide an efficient and balanced layout from the arterial and collector road systems. Minor variations to the road layout and standards shown may be permitted based on detailed subdivision evaluation. Developers will be required to ensure that subdivision submissions recognize the subdivision potential of adjacent property owners.

3.8 Surrey Capital Works - 10 Year Servicing Plan

A program of major works, intended to facilitate the construction of municipal engineering services required to accommodate existing and projected growth, is provided in the City of Surrey's current 10 Year Servicing Plan. This plan, adopted by City council on May 5, 1997, covers the time period from 1997 to 2006 and identifies the following road and highway improvements relevant to the Study Area.

TABLE 3.1
CURRENT TEN YEAR SERVICING PLAN

REF #	LOCATION	DESCRIPTION	ESTIMATED COST	STAGE BEFORE	GROWTH RELATED
10099	64 AVE - 164 ST - 176 ST.	ULTIMATE 4 LANES	$6,932,000	2002	YES
10664	168 ST. - 64 AVE. - 78 AVE.	INTERIM WIDENING	$1,000,000	1998	YES
10984	168 ST. - HWY 10 - 60 AVE.	INTERIM WIDENING	$1,000,000	1997	YES
1354	60 AVE - 168 ST. - 176 ST.	ULTIMATE	$1,022,000	1997	YES
4557	60 AVE @ 168 ST.	TRAFFIC SIGNALIZATION	$ 85,000	1997	YES
	GROWTH RELATED TOTAL		*$10,039,000*		

Works noted above have been planned in response to projected growth in the region including the Study Area.

3.9 External Improvements

The Traffic Study identifies several system improvements necessary to mitigate the impact of traffic growth on the adjacent network resulting directly from development of the Study Area. These improvements are expected to provide safe and efficient access for the volume of traffic generated, and are summarized on Table 3.2 as follows:

TABLE 3.2
SUMMARY OF EXTERNAL IMPROVEMENTS

ITEM	DESCRIPTION
Intersection of 168 Street and 64 Avenue	Provide second through lanes on 168 Street to improve level of service to post development requirements. (From 57A Avenue to 66 Avenue)
168 Street	Provide widening and painted channelization for left-turn lanes into the Study Area at 60 Avenue, 61 Avenue, and 63 Avenue.
64 Avenue	Provide widening and painted channelization for left turn lanes into the Study Area at 166 Street.

In addition to the works noted above, the Traffic Study identifies several regional improvements required for background traffic needs (ie - necessary regardless development timing in the Study Area) with suggested scheduling for construction ranging from 1994 to 2004. The timing of these works coincides approximately with the projected completion of development within the Study Area and, where appropriate, consideration should be given to the inclusion of these works in subsequent 10 Year Plan revisions. These works include:

A. For 1994 Background Traffic:

- Additional eastbound and westbound travel lanes on Fraser Highway from 172 Street to 177 Street. These works are to be undertaken by the Ministry of Transportation & Highways (MOTH);
- Additional northbound and southbound through lanes on 152 Street from 55 Avenue to 66 Avenue.
- Installation of signals at the intersection of 168 Street and Highway 10 (completed December 1996); and
- Additional eastbound and westbound travel lanes on 64 Avenue from 150 Street to 156 Street, and from 172 Street to 177 Street.

B. For 1999 Background Traffic:

- Additional eastbound and westbound travel lanes on Highway 10 from 150 Street to 176 Street by MOTH.
- Additional northbound and southbound travel lanes on 176 Street from 60 Avenue to 68 Avenue, and at Highway 10 by MOTH.
- Additional westbound and eastbound travel lanes on 64 Avenue at intersections between 156 Street and 172 Street.

C. For 2004 Background Traffic:

- Additional northbound and southbound travel lanes on 176 Street from 68 Avenue to 77 Avenue, and from 55 Avenue to 57 Avenue by MOTH.
- Additional eastbound and westbound travel lanes on Fraser Highway between 161 Street and 172 Street by MOTH.

Works noted herein that relate to Ministry of Transportation and Highways improvements are not proposed for, and are not eligible for, addition to the 10 year plan.

The works identified in this section are relative to the entire West Cloverdale Local Area Plan of which the Study Area forms the North Neighbourhood, and are consistent with the infrastructure requirements for the South Neighbourhood.

3.10 Internal Road Classification & Design Standards

Road classifications proposed for the internal road network are shown in Figure 6, and are grouped into the following categories:

TABLE 3.3
INTERNAL ROAD CLASSIFICATION AND DESIGN STANDARDS

ROAD CLASSIFICATION	DEDICATION REQUIREMENTS(M)	PAVEMENT WIDTH (M)	SIDEWALKS
ARTERIAL	27	19 (includes 4.4 median)	2
MAJOR COLLECTOR	22*	12.2	2
COLLECTOR	22*	11	1
THROUGH LOCAL	20	8.5	1
LIMITED LOCAL	16.5	8	0

* Note: Under current Surrey Subdivision By-law requirements, the maximum dedication requirement for this classification is 20 metres. However, in order to accommodate the City's "Urban Forest" standard for construction of a Collector, a minimum of 22 metres is required.

The Concept Plan provides for the future widening of both 64 Avenue and 168 Street to full arterial standards along the site frontages and allows for dedicated width requirements from existing centrelines of 13.5 metres. This will help facilitate the ultimate construction of these roadways to full four-lane divided arterial road standards including turning movements at designated intersections. Additional consideration will be required for non-standard dedication requirements on 168 Street as detailed on page 23.

All internal roads are to be finished with streetlights, sidewalks, and curb and gutter in accordance with the City's Subdivision Control Bylaw or as specifically altered through the approval of a development variance permit. Dedications and design cross-sections are to be in accordance with the City of Surrey Engineering Department book of Standard Drawings, specifically Supplementary Standard Drawings SSD-R11 for arterial roads, and SSD-R9 for the major collector, through, and limited local roads. All proposed roadways within the Study Area are to accommodate the City's "urban forest" road standard. Where through local roads front multi-family designated land uses, Schedule A of the Surrey Subdivision Control Bylaw requires that these roads have a minimum 11.0 metre pavement within a 20.0 metre dedicated roadway. However, additional dedication will be required to accommodate "Urban Forest" road standard as noted above.

It must also be noted that the overland emergency overflow for the 100 year storm event discharges from 64 Avenue into Creek 2 per Section 6.0 Drainage. The final design for 64 Avenue must make provision for this overflow to continue to function. Detailed design should provide for overflow discharge and protection at this location in order to avoid potential roadway flooding during the major storm event.

Proposed residential lots fronting 64 Avenue will not be permitted direct access but will, instead, be provided access by means of frontage roads or rear lanes in accordance with Surrey Standards, and will connect to 64 Avenue via the internal Study Area road system.

Multi-family access points are shown conceptually by arrows on Figure 2. Those access locations shown on 168 Street are temporary only. It is essential that the number of accesses to the designated townhouse sites fronting both 64 Avenue and 168 Street be limited. The ultimate construction of 168 Street to a 19.0 metre arterial standard will require that access locations for fronting multi-family development sites be provided from 63 Avenue and 61 Avenue. All existing and/or ultimate lots within this area will require reciprocal access agreements in order to conform to these requirements. Access to multi-family sites on the north side of 64 Avenue will be from 64 Avenue and may be limited to right-in/right-out depending on location. Limiting options to this area, Creek 1 cuts across the site north from 64 Avenue at approximately 167 Street. In order to accommodate multi-directional access and turning movements, access to the 15 u.p.a. multi-family area west of Creek 1 should align with the intersection of 166 Street at 64 Avenue. It may be feasible to allow this area a second right-in/right-out access at a point west of 166 Street, however prospective applicants may be required to demonstrate that sight line and stopping distance criteria can be safely achieved at any location west of 166 Street prior to any submission to the City for review. All existing and/or ultimate lots within this area will require reciprocal access agreements in order to conform to these requirements. As above, access to the 10 u.p.a. duplex clustering site east of Creek 1 should be permitted off both 64 Avenue and 168 Street with both access locations limited to right-in/right-out only. It may be possible, however, to accommodate a multi-directional access to this area provided the access can be located immediately adjacent to the north site property line. The applicant will be required to confirm that a northbound left turn lane into this access can fit back-to-back with a southbound left turn lane at 64 Avenue. Further, the applicant must demonstrate that minimum storage requirements of 30 metres northbound and 50 metres southbound, as well as suitable transition and taper elements can be accommodated at this location. Additional temporary access may be permitted to 168 Street and 64 Avenue provided that mutual access easement agreements and corresponding restrictive covenants specifying that such temporary accesses are

for emergency use only, are implemented. Final locations and requirements are to be confirmed at the time of application for building permit and/or servicing agreement for each individual application. Street oriented townhouses fronting 60 Avenue and 168 Street will not be permitted direct access to either 60 Avenue or 168 Street, but will, instead, be provided access by means of private "lanes". These "lanes" will be provided as an integral part of the internal roadway network for the overall multi-family development whose visual interface with the fronting City roadway is "Street Oriented".

The plan also shows single family cluster developments proposed for the area west of 164 Street. In order for the private roads associated with the development of these areas to be attained, property consolidation will be required. Alternatively, a series of private mutual access easements would have to be registered to allow for traffic circulation within the cluster areas. Road standards within the cluster development, as well as on 60 Avenue which will remain as an open road dedication, are subject to the same standards and requirements as designated limited and through local roads elsewhere within the Study Area.

One exception to the above criteria is proposed for 60 Avenue and the intersection of 60 Avenue and 164 Street. Between 164 and 168 Streets, 60 Avenue has been classified as a collector. It is proposed that this section of 60 Avenue be classified as a limited collector in a 22.0m right-of-way with 12.2 pavement width. This width exceeds the requirements for a limited collector roadway however, it is consistent with the "main street" theme proposed for 60 Avenue. Combined with plantings, the use of contrasting textured paving at crosswalls and narrowing of pavement at intersections, reduced building setbacks, and onsite parking, the proposed streetscape will provide a pedestrian and bicycle friendly environment while contributing to reduced vehicular speeds. A typical cross-section of 60 Avenue has been included on page 25 and textured paving details are shown on page 26. The City may, at their discretion, consider a cross-section more consistent with the "West Cloverdale North NCP, Stage 2 Report, General Urban Design Guidelines" appended to this document as Appendix VI. Any changes to cross-section elements required to accommodate these guidelines are subject to approvals by the City of Surrey Engineering Department, B.C. Hydro, B.C. Tel and B.C. Gas. In keeping with the Village Street Concept, it is also proposed that a traffic circle be constructed at this location (Figure 3).

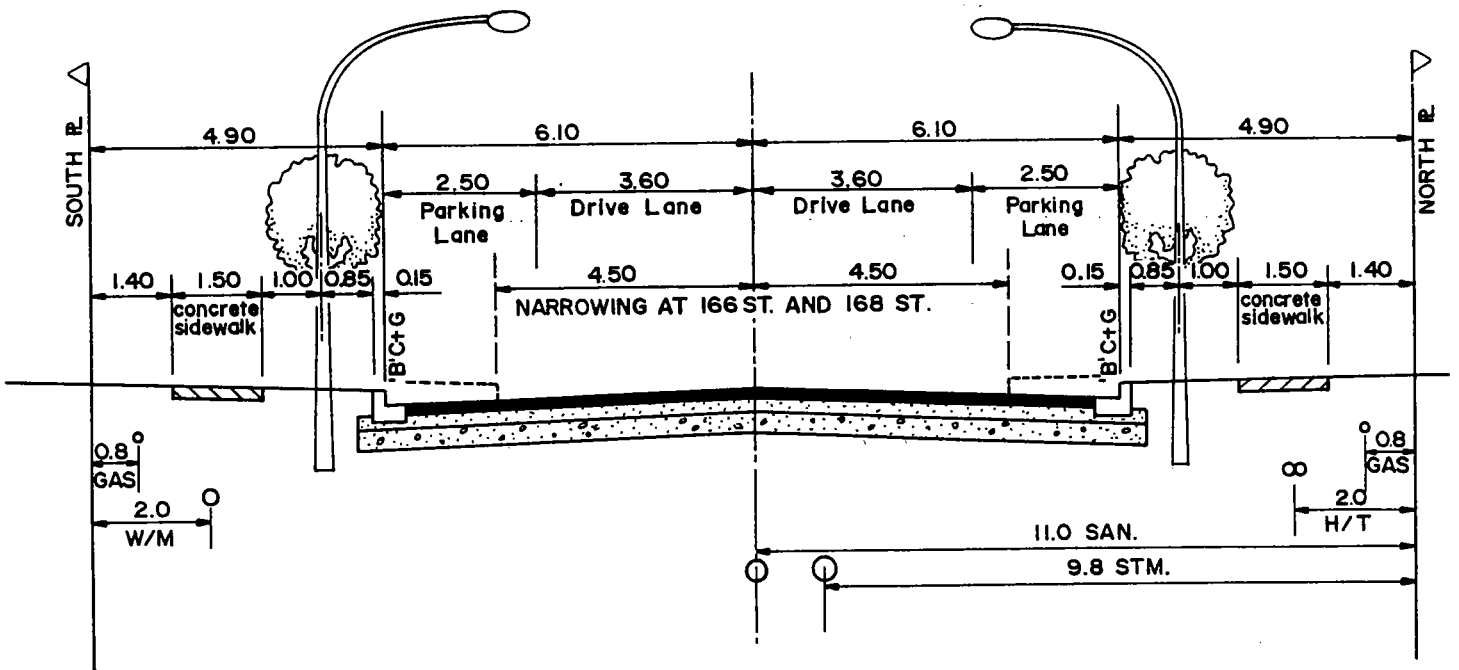
With the western terminus of the limted collector designation at 164 Street, 60 Avenue continues to the west as a limited local road. Although 164 Street north and south of 60 Avenue is a limited collector, signalization of this intersection will not be warranted. However, the installation of a traffic circle is expected to expedite the movement of traffic in a safe and controlled manner through the intersection. This feature will also allow westbound traffic on 60 Avenue, wishing to exit the

neighbourhood without continuing north or south through the Study Areas, including transit, to return directly to 168 Street.

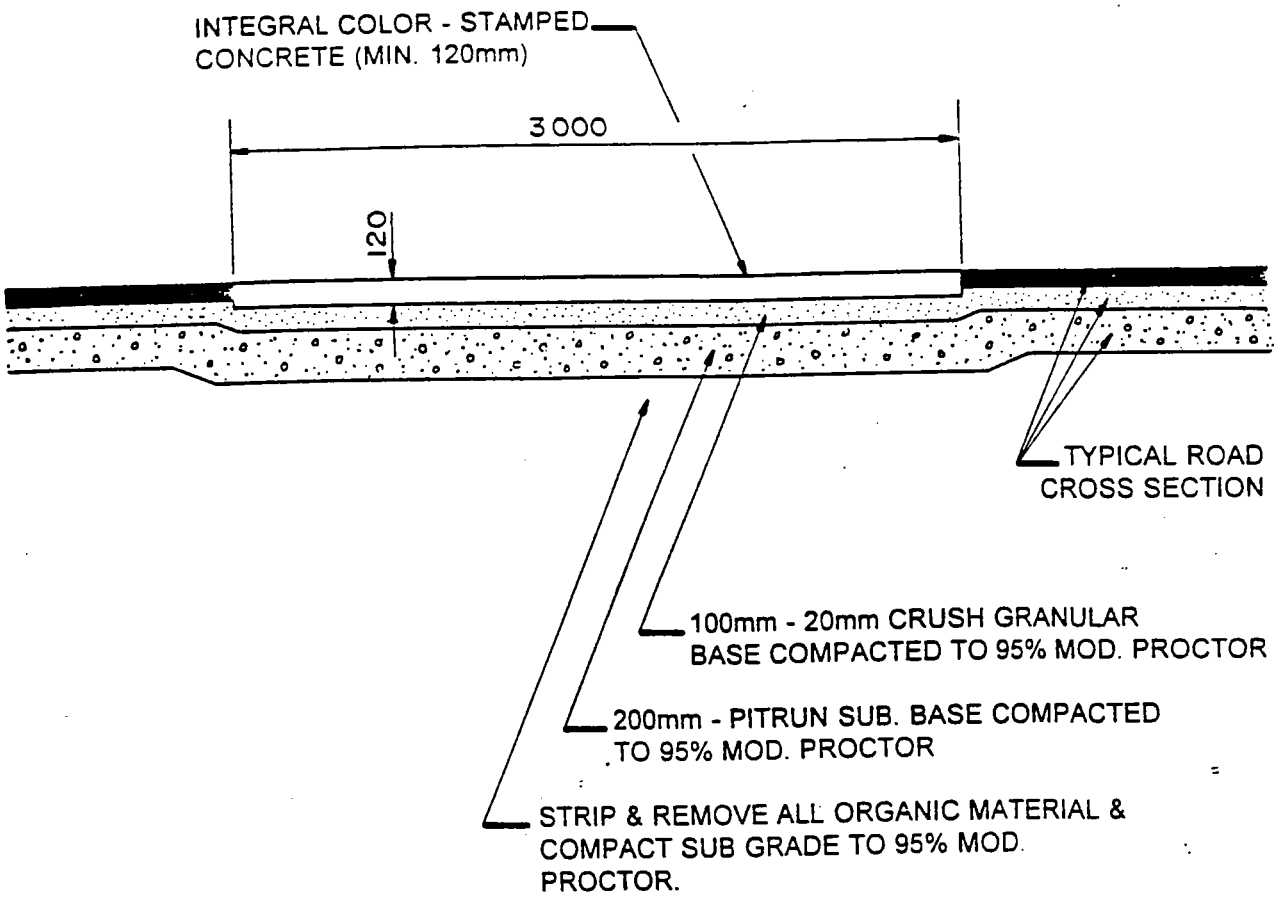
All approaches to the circle will be posted with "Yield" traffic signs. Vehicular movements are always to the right (counter clockwise) with vehicles entering the intersection required to yield to vehicles already within the circle. Vehicles within the circle to the left of an approaching driver always have the right of way. Final design of the traffic circle is to be approved by the City of Surrey Engineering Dept.

There is also a requirement for a non-standard design alignment on 168 Street immediately north and south of 60 Avenue. The existing house located at 16811 - 60 Avenue is under consideration for preservation pending designation as a "heritage house" by the Heritage Committee and the present owner. Initial discussions with the City indicate that the house may not be sound enough structurally to be relocated without significant damage. In order to preserve this house, and since there is less than 3 metres separation between the house and the east property line of 168 Street, additional dedication will be required on the west side of 168 Street to accommodate the ultimate arterial road cross section per Surrey Standard Drawing SSD-R11.

The alignment of 168 Street south of 60 Avenue must match this proposal. The transition to a standard alignment and cross-section northbound will be initiated immediately north of the subject house, and southbound, at an equivalent distance south of 60 Avenue. This will help minimize the offset look of this intersection to approaching northbound and southbound traffic.



TYPICAL SECTION 60 AVENUE



CONCRETE PAVEMENT CROSSING DETAIL
N.T.S.

1) GRADE SUBGRADE TO ALLOW FOR FULL DEPTH OF GRANULAR UNDER COLOR STAMPED CONC.

2) BASE ASPHALT AND FINAL ASPHALT TO BE PLACED CONTINUOUSLY THROUGH PROPOSED PAVEMENT CROSSING. ONCE FINAL LIFT PLACED & PRIOR TO FINAL INSPECTION, CONTRACTOR TO SAW CUT & REMOVE ASPHALT AT CROSSING, AND GRADE BASE TO PROVIDE FULL 120mm DEPTH COLOR STAMPED CONC. PAVEMENT CROSSING.

3) INTEGRAL COLOR-STAMPED CONC. TO BE 30M.P.A. FIBRE MESH REINFORCED BROWN COLORED CONC. PER "KEM-TECH. CONC. SYSTEMS LTD." (TYP) STND. COLOR BROWN AND TEXTURE CONFORMING TO "LONDON COBBLESTONE" OR APPROVED EQUIVALENT.

4) FINISHED SURFACE TO HAVE SURFACE TREATMENT OF SILICON CARBIDE AND BE SEALED WITH WATER BASED SEAL COAT - "BARRIER PRODUCTS LTD." OR APPROVED EQUIVALENT.

All streetlighting levels are to conform to Table 2.7.1 "Street Lighting Spacing", as noted in the Design Criteria Manual, or as otherwise approved by the City.

3.11 Public Transit

As noted in the Traffic Study, transit service to the West Cloverdale area is minimal. There is only one route from the west along Highway 10 (Transit route 340) between the Cloverdale Bus Exchange and the Newton Exchange on a one-hour headway, and two routes from the east along Highway 10 and 60 Avenue (Transit routes 320 and 395 respectively) between downtown Langley and the Cloverdale Bus Exchange.

B.C. Transit has indicated that there is a proposal to modify Route 340 so that it follows 64 Avenue between 152 Street and 168 Street and then 60 Avenue from 168 Street east to the bus exchange at Cloverdale.

The Concept Plan has been reviewed in the context of B.C. Transit's publication *LAND USE PLANNING* and is considered to be compatible with any future transit routes that may be proposed in the Study Area.

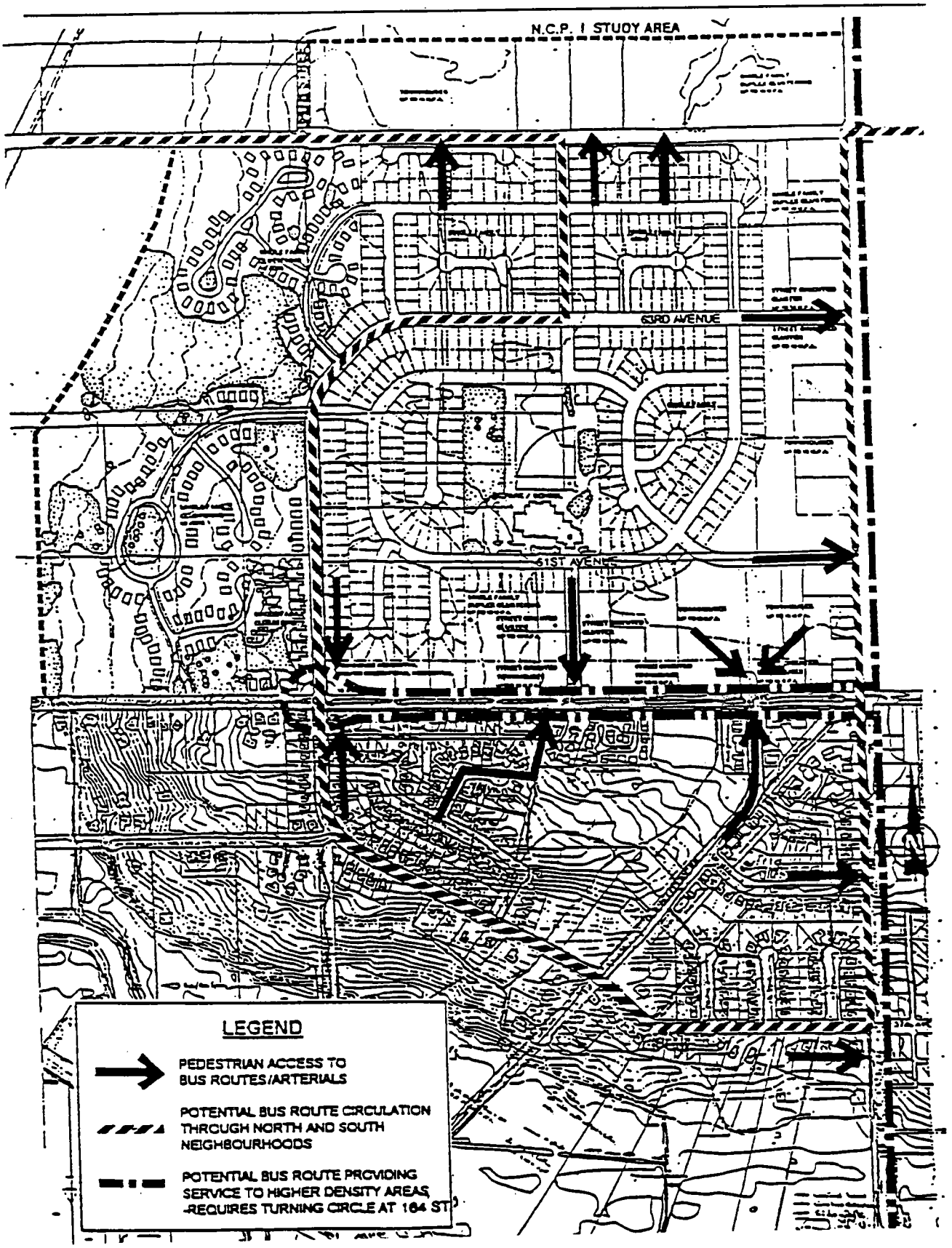
There are three factors which contribute to this compatibility. Initially, it is recognized that the neighbourhood is bounded on two sides by arterial roads which are typically used as transit routes and can readily accommodate buses and bus-bays. Secondly, the onsite network of collector roads allows for two potential internal routings as shown on page 28. Finally, higher density developments are primarily along the arterial roads and 60 Avenue, and the concept plan provides for good pedestrian linkages to potential bus routes on the arterial roads and 60 Avenue as well as to potential internal routes.

3.12 Hydro, Tel and Gas

Expansion of development into the Study Area from 168 Street is consistent with existing B.C. Hydro, B.C. Tel and B.C. Gas, long range planning for infrastructure expansion associated with the West Cloverdale, North Neighbourhood NCP.

B.C. Gas has advised that they have no immediate concerns with servicing the proposed area. Additions or improvements to their distribution system will be designed as development occurs and will consider the requirements of the overall Study Area.

POTENTIAL TRANSIT ROUTES



Three phase overhead feeder service exists on the west side of 168 Street and the south side of 64 Avenue adjacent to the Study Area. B.C. Hydro has advised (February 21, 1997) that it will most likely be necessary to increase the number of three phase circuits to service the Study Area. Hydro wishes to maintain the capability of extending three phase feeders on the four block grid identified by 60 Avenue and 64 Avenue. Similarly the three phase, north-south feeder grid alignment would be 164 Street. Normal design requirements for B.C. Hydro grid systems are to utilize the existing pole lines and upgrade them from single to three phase. Should it become necessary to convert or extend any of this distribution system underground instead of overhead, Hydro has advised that it would be necessary to construct the underground system to feeder capability. This is substantially more expensive than standard single and three phase systems which would be installed underground on any road other than these main feeds, and would require significantly greater road dedication to accommodate the civil and electrical plant. All extensions of service into the N.C.P. area for both single and standard three phase power (ie. non-feeder mains) will be underground. Further, existing overhead single phase Distribution fronting proposed development, within the Study Area, and which is not to be converted to 3 phase feeder status, will be converted to underground at the time of development of the affected frontage. Developments fronting three phase feeders on the proposed 4 block grid will also be required to install secondary underground distribution service along the developed frontage. All grid feeder systems are, therefore, proposed to be installed as, be extended from, or remain as, overhead plant. Standard underground three phase will be required along 61 Avenue from 168 Street to provide service to the proposed school. This is consistent with current B.C. Hydro policy, and City of Surrey practice, in this regard.

In order to accommodate the installation of underground hydro/tel and gas throughout the Study Area roadways, the sidewalk will meander at all hydro surface plant locations. Since the "Urban Forest" standard road section is proposed throughout the Study Area, this can be easily accomplished without adversely impacting proposed developments. Plans submitted in support of development applications that propose non-standard road sections (ie. with medians, expanded sidewalks, etc.) must be prepared in consultation with B.C. Hydro to ensure that the revised elements will support Hydro requirements.

B.C. Tel have advised that they have provided for servicing of the Study Area and have stubbed out conduit on 60 Avenue east of 168 Street as the point of contact for the entire West Cloverdale NCP Study Area. B.C. Tel requests that initial applications consult with B.C. Tel to ensure that proposed plans can accommodate the installation of underground servicing without reliance on temporary aerial cable installations.

Except as noted herein, all existing overhead telephone distribution fronting proposed development within the Study Area will be replaced with an underground distribution system. Existing overhead tel on the south side of 64 Avenue is to remain with local underground service provided to residential lots on the south side of 64 Avenue via frontage roads, and individual drop services provided on the north side of 64 Avenue for specific multi-family developments. Existing overhead telephone distribution on the east side of 168 Street and the south side of 60 Avenue is not to be converted to underground by the North Neighbourhood Study Area.

3.13 Pedestrian and Cyclist Circulation

Pedestrian circulation within the neighbourhood is encouraged through the development of generous pedestrian paths. The proposed schematic design of both the road and pedestrian/bicycle paths has been coordinated to provide safe and convenient access from the residential areas to the main street, commercial areas, bus stops, school and park site, and the arterial road system. Pedestrian pathways and roads are closely aligned with proposed pedestrian paths and roads south of 60 Avenue in order to provide good north-south circulation and easy access to the main street. Pathways and road alignments also allow pedestrian movement from the western slope eastward to the school and commercial areas. The Concept Plan for the Study Area identifies a number of continuous pedestrian and bicycle pathways throughout the Neighbourhood (Figure 7).

A linear park/pedestrian/bicycle path network is proposed along the Study Area boundary on the north side of 64 Avenue and along the west slopes to interconnect that neighbourhood with the rest of Cloverdale, providing a convenient pedestrian route to the Cloverdale Town Centre. Open space nodes or open spaces created through the clustering of houses are to be connected to, and augment, the linear path/cycle system. All through streets are designated to be developed with a strong pedestrian character, including ordered arrangement of street trees, proposed buildings, facades and broad sidewalks in local commercial nodes and standard urban 1.5 metre sidewalks in residential areas. Each principal pedestrian street will link major neighbourhood elements.

The proposed multi-family site on 60 Avenue, across from the new alignment of Old McLellan Road, has a public pedestrian/bike path proposed through the site. This "Main Street Village Centre", is the focus of the neighbourhood with the local convenience centre at the "Five Corners", the majority of higher density housing along this street, and some limited commercial introduced at the corner of 166 Street. A "Pedestrian Plaza" (Figure 4) is proposed at the junction of the pedestrian walkway adjacent to the Townhouse Residential and/or Institutional/Residential site near the high point on 60 Avenue. Land required for this feature would be provided as a condition of the development permit process. Although the plan already provides for good pedestrian connections to 60 Avenue from housing areas to the north, additional connections may be possible from 61 Avenue to 60 Avenue through adjoining townhouse sites. Details and locations for any additional walkways are to be determined during the application and approvals process for these sites. Walkway design should emphasize the separation of private from public space, safety, convenience, an alternative landscape, screening and separation (both vertically and horizontally).

The City's "Bicycle Blueprint" identifies 168 Street as part of the "core network" requiring bicycle lanes or wide curb lanes which are assumed to be accommodated within the 27.0 metre right-of-way.

All pathways within dedicated areas associated with the cluster developments are proposed as crushed limestone surfaces and are to be a minimum of 3.0 metres wide. Walkways linking perimeter walks to the neighbourhood road system, and which pass between residential lots or through designated walkways will be constructed in accordance with standard walkway detail Drawing C10 of the Master Municipal Specifications. Corridor and Landscaping requirements to be in accordance with the General Urban Design Guidelines included as Appendix VI. It is suggested that lighting be installed along walkways in those areas that are not serviced by roadway streetlights.

3.14 Cost Estimates - Major Works

The estimated construction costs of the major works for the external improvements identified in Section 3.9 as resulting from development of the Study Area are shown in Table 3.4.

TABLE 3.4
SUMMARY OF MAJOR WORKS COSTS

ITEM	DESCRIPTION	COST
1.	Add sidewalk and streetlighting on west side 168 St. from 60 Avenue to 64 Avenue.	$ 166,400
2.	Add sidewalk and streetlighting on west side 168 St. from 64 Avenue to 65 Avenue.	$ 41,600
3.	Add sidewalk and streetlighting on both sides 64 Ave. from 164 St. to 168 St. (included in current 10 Year Plan Ref #10099).	$ 403,900
4.	Add widening and painted channelization for left turn lane on 168 Street west to 63 Avenue.	$ 150,000
5.	Add widening and painted channelization for left-turn lane on 64 Avenue south to 166 Street.	$ 150,000
6.	Add second through lanes on 168 Street from 57A Avenue to 66 Avenue.	$ 560,000
7.	Add widening and painted channelization for left-turn lane on 168 Street west to 60 Avenue.	$ 150,000
8.	Add widening and painted channelization for left-turn lane on 168 Street west to 61 Avenue.	$ 150,000
9.	Traffic signal installation on 168 Street at 60 Avenue (included in 10 Year Plan Ref #4557)	$ 85,000
	TOTAL	$1,856,900

Preliminary estimates are expressed in current dollars and include allowances for contingency, engineering, Surrey overhead and administration and "net" G.S.T. as detailed in Section 7 of this report.

3.15 Phasing and Implementation

As noted throughout the various sections of this report, development is expected to proceed according to the phases noted in Figure 2. The site is bounded on the north and east by the arterial road network and is expected to develop generally from north-east to south-west. As development extends westward, roadworks will be extended from 168 Street by each developer as required. Initial stages of development will not require significant external improvements beyond the construction of adjacent sidewalks and streetlighting on 168 Street and 64 Avenue, and left turn channelization northbound on 168 Street at 63 Avenue as well as westbound on 64 Avenue at 166 Street. As development progresses southward on 168 Street from 63 Avenue, adjacent sidewalks and streetlights on 168 Street, and left turn channelization on 168 Street at 61 Avenue, will be required.

The construction of the 60 Avenue collector will be phased concurrent with adjacent development. Initially, construction will be extended eastward from 166 Street starting in 1997/1998 through to 2001. Continuation of 60 Avenue westward to 164 Street is not expected to be completed until 2002/2003. As a limited collector, this road is not eligible for DCC rebates or cost sharing, and must be constructed to a half-road standard by each fronting development as required.

As roadworks are gradually extended west from 168 Street, it may become necessary for individual developers to provide secondary access where development requirements exceed the maximum allowable road lengths for single access. Costs associated with any interim secondary access provisions are the responsibility of the developer, with no compensation implied or forthcoming from the City. Where secondary access is provided in the form of either a full, or half-road along the ultimate alignment, these works would be eligible for cost recoveries through the standard Latecomer process.

At this time there are a number of major development applications within the Study Area which are being processed through the Surrey Planning and Development Department. These applications include a significant portion of the area defined as Development Stage I, and development is expected to proceed in late 1997 and early 1998. The Traffic Study has concluded that the existing external road system, with improvements as noted, will accommodate development of the Lands. Assuming that current and proposed development applications proceed as anticipated, Table 3.5 summarizes the projected scheduling of construction for external Roadworks improvements.

TABLE 3.5
PHASING AND IMPLEMENTATION

ITEM	DESCRIPTION	DEVELOPMENT STAGE	YEAR
1.&2.	Sidewalk and streetlighting Frontage 168 Street - west side	1	1997-2003
3.	Sidewalk and streetlighting 64 Avenue - both sides through study area (168 - 164 St.)	1 - 3	1997-2005
4.	Left turn lane on 168 Street west onto 63 Avenue	1	1997-1998
5.	Left turn lane on 64 Avenue south onto 166 Street	2	1997-1998
6.	Second through lanes on 168 Street from 57'A' Ave to 66 Avenue	3	2001
7.	Left turn on 168 Street west onto 60 Avenue	1	2002
8.	Left turn on 168 Street west onto 61 Avenue	1	2003
9.	Traffic signal installation on 168 Street at 60 Avenue	1	1997

Notwithstanding the above, warrants will be established by the Traffic Consultant and/or the City which would establish a threshold for implementation of the above-noted works with the rate of development monitored to provide a more accurate forecast of the timing of each item.

Works noted above as items 1 & 2 include sidewalks and streetlighting on the west side of 168 Street from 60 Avenue to 64 Avenue, and on both sides of 64 Avenue west from 168 Street to the Study Area boundary. Works on 64 Avenue are included in the current 10 Year Plan as part of reference no. 10099 for construction of the ultimate 19m arterial roadworks from 164 -176 Street. Works on 168 Street are, subject to Council approval, proposed as an addition to the current 10 Year Plan to be reflected in a new DCC bylaw for 1998. Development applications in stages 1-3 inclusive will construct these works at Surrey's request, funded by Development Coordinated Works (D.C.W.) and concurrent with construction associated with site development for each application. However, since ultimate

road widening will eventually be required on both arterials, these works could be done by the Capital Program at Surrey's discretion.

The left turn bays noted for 168 Street at 63 Avenue (item 4), for 64 Avenue at 166 Street (item 5), for 168 Street at 61 Avenue (item 8), and for 168 Street at 60 Avenue (item 7) are, subject to Council approval, also proposed as additions to the current 10 Year Plan to be reflected in a new D.C.C. Bylaw in 1998. Should an interim solution be required by the Study Area before the City has funding in place, costs associated with interim construction will be the responsibility of developers within the N.C.P.

In the event that development proceeds to a point where the implementation of any of the works is required prior to an amendment to the 10 Year Servicing Plan, individual developers would have to consider the impact of constructing works at their cost in advance of eligibility for D.C.C. rebates.

4.1 Existing Water Supply & Distribution

The Study Area lies within the service area of the GVRD Whalley Clayton main on Fraser Highway and is supplied through the 500mm diameter high pressure watermain on 176 Street. From this supply main, water is presently fed into the distribution network with outlet water pressure regulated by pressure reducing valves (P.R.V.) located at 64 Avenue and 168 Street, and on 176 Street south of 64 Avenue. The Study Area is within the 90 metre HGL pressure zone and is serviced from the supply main by a 300mm diameter grid main on 64 Avenue, and a combination of existing grid and distribution mains ranging in size from 150mm to 400mm diameter on, and west of, 176 Street between 64 Avenue and 60 Avenue.

The 300mm diameter main on 64 Avenue extends west along 64 Avenue beyond the Study Area boundary and, through the PRV Station located at 168 Street, feeds existing 200mm diameter distribution mains north and south on 168 Street, and east from 168 Street on 64 Avenue. Local 150mm diameter service mains are extended west from 168 Street on 60 Avenue and provide service to existing residences on 164 Street north and south of 60 Avenue, looping southeast via Bell Road and 57 Avenue to the 200mm main on 168 Street.

The City has advised that a major PRV station has been constructed on the existing 500mm diameter watermain on 176 Street at the 68'A' Avenue alignment identified in the North Cloverdale, West Neighbourhood, Neighbourhood Concept Plan. This will allow grid mains proposed for extension through the study area and along 168 Street and 60 Avenue to be connected directly to the existing grid main on 64 Avenue without P.R.V. stations and valve control at each tie-in. This will also allow the City to abandon or decommission the existing P.R.V. stations at 168 Street and 64 Avenue and at 176 Street and 64 Avenue, which will no longer be required.

A schematic of the existing water distribution system servicing the Study Area is included in Appendix II Water System Analysis.

4.2 Development Demands

The land use designations identified in the Neighbourhood Concept Plan will impose additional water supply demands on the existing municipal water supply system. These demands were calculated based on the proposed land uses with saturation population projected from the West Cloverdale Phase I. Stage I N.C.P. Report, and fire flow requirements consistent with the City of Surrey, Engineering Department, "Design Criteria Manual" as follows:

A. DOMESTIC

Average Day Demand	24.8 litre/second
Maximum Day Demand	49.5 litres/second
Peak Hour Demand	99.0 litres/second

Domestic flows included in these calculations are based upon the total projected Study Area Population of 4281 per Table 2.2 "population Projections" (see pg. 3). Maximum Day Demand is calculated for the domestic requirements of this design population and include 1000 litres/capita/day maximum domestic demand. Design flows are based upon the combination of these maximum domestic requirements and the applicable fire flows for the governing usage. A number of high demand locations were analysed in order to establish the critical node. This location is shown in Figure 8 complete with flow rates and velocities in the proposed grid system.

B. FIRE FLOW	ULTIMATE	INTERIM
Traditional Single Family	60 litres/second	45 litres/second
Multiple Family Townhouse	120 litres/second	90 litres/second
School	120 litres/second	90 litres/second
Commercial	90 litres/second	65 litres/second
Institutional/Residential	120 litres/second	90 litres/second

Although fire flows are based upon the Design Criteria, individual applicants for multi-family sites may find that Surrey Building Division and Fire Department requirements for on-site fire protection exceed the capacity of the proposed watermain to supply. Prior to submission for Building Permit, the applicant must confirm the on-site fire flow requirements that are triggered by the proposed building layout, materials, and construction. In those cases when the grid system cannot provide sufficient flow volumes to conform to the *"Fire Underwriters Survey Guide to Recommended Practice"*, the applicant shall demonstrate through alternative construction techniques, materials, or secondary on-site fire suppression systems (ie. building sprinklers) that the proposed development can be made to conform to these guidelines.

4.3 Designated Grid Mains and Surrey 10 Year Servicing Plan

The current 10 Year Servicing Plan identifies and provides for growth-related improvements to the supply system as shown on the Ten Year Plan schedule for

water supply projects. This schedule includes nine (9) significant improvements within, or adjacent to, the Study Area per Table 4.1.

The City has anticipated the service requirements of saturation development and has designated a grid network within each supply zone of all mains 200mm diameter or larger. The ultimate grid map identifies the requirement for 200mm diameter mains on 164 Street from 60-64 Avenue; on 60 Avenue from 164-168 Street; and on 168 Street from 60-64 Avenue. This grid map serves as a guideline that provides an estimate of the minimum acceptable requirements for development. The City of Surrey, through preparation of the 10 Year Plan has identified grid mains and system improvements for the Study Area that superceed the guidelines noted above as follows:

TABLE 4.1
CURRENT TEN YEAR SERVICING PLAN GROWTH

REF #	LOCATION	DESCRIPTION	ESTIMATED COST	DCC COMPONENT	NON-DCC COMPONENT	STARTS BEFORE	GROWTH RELATED
4664	168 ST: 60-64 AVE	300mm DIA GRID MAIN	$ 347,000	$ 139,000	$ 208,000	2002	YES
4665	60 AVE: 172-176 ST.	400mm DIA GRID MAIN	$ 389,000	$ 155,000	$ 234,000	2002	YES
4687	60 AVE: 168-172 ST.	400mm DIA GRID MAIN	$ 370,000	$ 148,000	$222,000	2002	YES
914	164 ST: 60-63 AVE	300mm DIA MAIN OVERSIZING	$ 178,000	$ 71,000	$ 107,000	2001	YES
2416	60 AVE: 164-168 ST.	300mm DIA MAIN OVERSIZING	$ 345,000	$ 138,000	$ 207,000	2002	YES
2419	168 ST: 57A-60 AVE	350mm DIA GRID MAIN	$ 222,000	$ 89,000	$ 133,000	1999	YES
10750	63 AVE: 164-166 ST.	300mm DIA MAIN OVERSIZING	$ 168,000	$ 67,000	$ 101,000	2006	YES
10751	166 ST: 63-63A AVE	300mm DIA MAIN OVERSIZING	$ 109,000	$ 44,000	$ 65,000	2006	YES
2418	168 ST: 63A-64 AVE	300mm DIA MAIN OVERSIZING	$ 63,000	$ 25,000	$ 38,000	2006	YES
	GROWTH RELATED TOTAL		*$2,191,000*	$ 876,000	$1,315,000		

4.4 Proposed Distribution System

In conformance with the City grid map and current 10 Year Servicing Plan elements, grid mains will be extended south from the existing 300mm diameter grid main on 64 Avenue, and subsequently, west from the proposed 168 Street grid main. In addition to the proposed local grid network, water analyses for the combined North and South, West Cloverdale Study Areas, identify the need for the construction of a 350mm diameter main on 60 Avenue between 168 Street and 176 Street (Ten Year Plan Ref. Nos. 4665 & 4687). The completion of development within the two Study Areas will, ultimately, result in demands that will exceed the capacity of the existing distribution system to supply. Also suggested, although not required, is the installation of 480 metres of 350mm diameter watermain on 168 Street south of 60 Avenue. The extension of this main will ultimately become an integral part of the overall West Cloverdale grid main system providing improved levels of service to developments south of 60 Avenue. These improvements will provide a system adequate to meet domestic and fire flow demands in the Study Area.

The proposed system identified on Figure 8 shows the conceptual layout of the water distribution system within the Study Area based on land use and road patterns as provided in the Neighbourhood Concept Plan. This layout provides for grid mains in conformance with the 10 Year Plan, including a proposed 350mm diameter main on 168 Street from 64 Avenue to 60 Avenue; a proposed 300mm diameter main on 60 Avenue from 168 Street to 164 Street; and a proposed 300mm diameter watermain on 164 Street. This latter main will connect the proposed grid main on 60 Avenue with the existing grid main on 64 Avenue by way of 164 Street, 63 Avenue and 166 Street.

Local mains range in size from 200mm to 250mm diameter, depending upon the governing land use being served.

4.5 Hydraulic Network Analysis

The design criteria established by the City of Surrey for watermain design requires that the proposed mains be capable of operating under the following conditions:

Demand Condition	Residual Head @ Demand Node	Maximum Main Velocity
Peak Hour Demand	28 metres	-
Maximum Day Demand plus Fire Flow	14 metres	2 metres/second

The distribution system proposed for this Study Area was analyzed in accordance with the above criteria. Critical locations on the network were assigned node numbers as shown on Figure 8.

System analysis was initiated from the 500mm diameter feeder main on 176 Street at the approximate location of the new P.R.V. station at 68A Avenue. The starting hydraulic grade level is the discharge head at the station (90m geodetic).

Since the maximum day plus fire flow condition is the determining criteria for watermain design in this application, fire flows were allotted at critical locations throughout the system and the residual head at these nodes was verified. Nodes have typically been located adjacent to Multi-Family sites which have the highest fire flow requirements within the Study Area. The critical node was determined to be node 10 on 164 Street. The flows and velocities noted on Figure 8 are based on a maximum demand of 190 l/s and include 20 l/s domestic demand from the South Neighbourhood Study Area. Details and results of the network analysis are included in Appendix II.

4.6 Cost Estimates - Grid System

Section 4.3 identifies nine (9) major improvements proposed in the Ten Year Plan approved by City Council on May 5, 1997, within, or adjacent to, the Study Area that will be eligible for D.C.C. rebate. Construction of sections of mains within the Study Area will likely proceed in a manner consistent with the timing and intent of the current 10 Year Plan.

The method of allocation of funds would be dependent upon the existing and future requirements for water improvements within the Study Area. There are two initial conditions that will determine the manner in which funding is applied:

1. Existing road allowances with adequate water supply for the proposed development:
   The installation of grid mains in these areas if required by the City, would be D.C.C. rebateable since, based on current Surrey Criteria Manual requirements, existing mains will accommodate the proposed zoning, and;

2. New road allowances with no existing watermains:
   Funding for the installation of grid mains in these areas would be based on current Surrey policy for oversizing from the main size required by the

applicant, to the grid main size proposed as part of the overall system. Reimbursements will not be considered for incomplete systems with interim conditions requiring mains larger than the nominal requirement. Any upsizing to accommodate development based on interim flows would be at the applicant's expense as a cost of development.

Where mains have been identified as eligible for partial or full funding by the City, it is understood that, in accordance with Surrey policy, if the installation of these mains are not required to provide interim fire flows to the developers lands, those lands may proceed to development. However, if a main, or portion thereof is required to provide interim fire flows, the applicant will proceed to install the minimum work required in order to conform to his requirement, and the City will contribute upsizing costs in accordance with the set scale within the Subdivision Bylaw. If it is a capital item budgeted by the City during the same year as the proposed development, the City will contribute the balance from the rate revenue.

Under current policy, the recovery of DCC's by a frontending developer cannot exceed the total DCC's paid for a particular utility under each separate application, with costs incurred in excess of this recovery the responsibility of the frontender as costs of development. The recovery of non-reimbursed costs is only possible through the Latecomer Bylaw which allows the frontender to recoup, over a maximum ten year limit, the non-reimbursable remainder of these costs from future benefitting applicants.

The format of the recently approved 10 Year Servicing Plan: 1997-2006 has been changed from previous editions. Under the new plan, grid mains and offsite improvements that had hitherto been fully rebatable, are now eligible for DCC rebate only up to a maximum of either the lessor of 40% of the cost of construction, or the water DCC's paid by the applicant. However, should it be possible to defer the timing of construction of these mains to coincide with the 10 Year Plan, the City Water Utility would either fund the remainder from the rate revenue as noted above, or arrange for installation of the mains through City sponsored and supervised contracts, dependent upon the utilization of allocated revenues that, subject to Council approval, have been budgeted for this work via the 10 Year Plan. The timing of works identified in the current plan is contingent upon budgeting and need. The City may, at their discretion, revise scheduling to suit either increased or diminished demands, or to accommodate changes in long range planning if necessary to provide improved levels of service to the neighbourhood.

The estimated costs for these works in excess of the costs of construction of the nominal size main, or in addition to existing network mains are shown in Table 4.2: and are for mains as identified in Figures 9 and 10.

TABLE 4.2
SUMMARY OF UPSIZING COSTS, DCC REBATES & PHASING

ITEM	PROJECTED CONSTRUCTION (BASED ON ULTIMATE FLOW REQUIREMENTS)	DESCRIPTION	ESTIMATED * DCC REBATES (based on 40% of total cost)	TOTALS
1	1997 & 1998	• 805 l.m. - 350⌀ W/M 168 St. (60-64 Ave) Portion Ref. #4664	$139,000 (of total cost of $347,000)	
2		• 418 l.m. - 300 ⌀ W/M 60 Ave (166-168 St.) Portion Ref #2416	$ 73,105	$271,905
3		• 250 l.m. - 300⌀ W/M 166 St. (63-63B Avenue) & 63 Ave west of 166 St.	$ 60,800	
4	1999 & 2000	• 338 l.m. - 300⌀ W/M 63 Ave (165A- 164 St.)	$ 50,200	$ 50,200
5	2001 - 2002	• 220 l.m. - 300⌀ W/M 164 St. (62-61 Ave) Portion Ref. #2418	$ 42,600	
6		• 810 l.m. - 350⌀ W/M 60 Ave (168-172 St.) Portion Ref. #2416	$ 148,000 (of total cost of $370,000)	
7		• 190 l.m. - 300⌀ W/M 60 Ave (166 St. to 190m west) Portion Ref. #2416	$ 32,775	$ 223,375
8	2003	• 810 l.m. - 350 ⌀ W/M 60 Ave (172-176 St.) Portion Ref. #2416	$ 155,000 (of total cost of $389,000)	
9		• 192 l.m. - 300 ⌀ W/M 60 Ave (190m west 166 St. to 164 St.) Portion Ref. #2416	$ 32,120	$ 216,520
10		• 195 l.m. - 300⌀ W/M 164 St. (60-61 Ave.)	$ 28,400	
11	2007	• 480 l.m. - 350⌀ W/M 168 St. (60 Ave - 480m South) Part Ref. #2419.[1]	$ 89,000 (of total cost of $222,000)	$ 89,000
		TOTALS		$ 851,000

[1] Suggested Works Only - Not Required to Service Study Areas.

NOTE: Estimated DCC Rebates are based on 40% of the total "set scale" costs identified in the current 10 Year Plan.

It must be noted that, as mains are extended progressively within the Study Area without looping, individual developments may require mains larger than the nominal size to meet fire flow demands. In such instances, upsizing contributions would be based upon the difference between the larger size required by the applicant, and the ultimate grid size with the result that total upsizing costs might be less than the values noted herein once servicing has been completed. Should development require mains that are larger than the designated grid in order to provide interim flow demands, no compensation is available.

Conversely, where individual applications do not include multi-family or other high demand components, upsizing would be based on the difference between the smaller size required by the applicant and the ultimate grid size, with the result that total upsizing costs may be greater than the values noted herein on completion of servicing. A full summary of anticipated major servicing costs has been provided in Section 7.

4.7 Phasing & Implementation

Development phasing is expected to proceed generally from east to west beginning at 168 Street. Watermain will be extended in accordance with the conceptual layout plan shown in Figure 8 by each developer as required. As each application proceeds through the process, it will be required to prove that the system, as extended, will be capable of complying with the City's design criteria for interim and ultimate fire flow conditions, with regards to fire flow, velocity, and residual pressure.

There are major applications pending for properties within the area identified as Phase 1 which will extend along, and both north and south of 63 Avenue from 168 Street. Based on ultimate fire flow conditions the initial applicants will be required to extend and upgrade the ultimate system west from 168 Street, as well as construct a section of the 350mm grid main on 168 Street from 64 Avenue to approximately 50 metres north of 61 Avenue. It is anticipated that these works will be installed during late 1997 or early 1998.

As development continues through the remainder of Phase 1 and expands into Phase 2, the internal 300mm diameter grid main will be extended from 64 Avenue generally southwest to 60 Avenue. The 350mm diameter watermain on 168 Street will be extended south to 61 Avenue. Mains will also be extended east along 61 Avenue completing the internal loop and connecting to the proposed 300mm diameter grid main at 164 Street. Concurrently, as Phase 1 continues to develop southward along 168 Street, and Phase 1 and 2 extend to 60 Avenue, the 350mm

diameter grid main on 168 Street will be extended to 60 Avenue. To provide ultimate flows the completion of the 350mm diameter main on 168 Street, identified in the Ten Year Plan as Reference No. 4664, will be required before the combined development of the North and South Neighbourhoods of the West Cloverdale Study Areas exceeds the approximately 670 units estimated for completion by early 1999.

As development continues beyond this threshold, and demands on the existing infrastructure increase, offsite works identified in Table 4.2 become necessary. It is expected that, by 2001, the combined development of the North and South NCP Study Areas will exceed 1100 units (909 units north of 60 Avenue and 276 units south of 60 Avenue). At that time, ultimate demand will exceed the capacity of the existing system to supply. The construction of a 350mm diameter main on 60 Avenue east from 168 Street to 172 Street will be required in 2001-2002 in order to provide the necessary level of service. By 2003, development in both the North and South Neighbourhoods is expected to approach 1600 units (1176 units north of 60 Avenue, and 404 units south of 60 Avenue). This will require that the 350mm diameter main on 60 Avenue be further extended from 172 Street to 176 Street, including connection to the existing 400mm diameter main at 176 Street. These works will allow both the North and South Study Areas to fully develop and meet ultimate flow requirements. Should development within the Study Areas require that the works be constructed before they have been included in the City's Capital Budget, the non-reimbursable component of the associated costs would be a cost of development with additional recoveries possible only through the Latecomer process.

As described in Section 4.4, there are supplementary works that, although not required to service the combined Study Areas, will provide for better secondary grid main interconnections to form part of a good, reliable system. The extension of the 350mm diameter main on 168 Street 480 metres south of 60 Avenue have been scheduled for completion by 2007. By this time the combined Study Areas are expected to have fulfilled their full DCC commitments, leaving a revenue surplus that can be allocated for these works.

The development of Phase 3 is not expected to proceed until Phase 2 has been extended to 164 Street since it is entirely dependent upon the extension of water service either west through Phase 2 along 63 Avenue and 63'B' Avenue, or west from 168 Street along 60 Avenue and north on 164 Street. The earliest projected extension of water to 164 Street is the year 2000. However it is not anticipated that the Phase 3 area will proceed to development at that time since the proposed 1/2 acre Single Family Clustering will require the consolidation of all properties west of 164 Street. The mostly likely scenario provides for the completion of the grid main on 164 Street by Phase 2 applicants as detailed herein, with the works described above to be installed by development Phases 1 and 2 from 1999 to 2002. In order to encourage initial development, it is recommended that items referenced in the

current Ten Year Plan where possible, be advanced with respect to Program Year in order to conform to ultimate grid timing detailed herein. Mains eligible for upsizing or DCC rebate are shown on Figure 9.

The projections noted above for the timing of construction for the grid mains on 168 Street from 60 Avenue to 64 Avenue (Ref. #4664) , and on 60 Avenue from 168 Street to 176 Street (Ref. Nos. 4665 & 4687), are based on the requirement to provide **ultimate** flows as established by population thresholds detailed on pages 43 and 44. However, preliminary analyses, utilizing **interim** flow requirements, indicate that the entire Study Area can develop without the need to upgrade either of these systems. Table 7.7A "Summary: Interim Water, NCP Infrastructure Financing and Funding" shows that the existing infrastructure can support interim flows to the entire Study Area and that construction of these mains can be deferred either to later stages of development, with installation consistent with the timing outlined in the 10 Year Plan, or deferred until completion of development within the defined North and South Study Areas. This would enable the City to accumulate "seed monies" required to construct these mains in accordance with the 10 Year Plan, or as otherwise required.

Each applicant will be required to demonstrate that interim flows can be achieved for each proposed development without upgrading the 168 Street and 60 Avenue mains. Calculations in support of these applications must include all existing developed areas within the North and South NCP Study Areas, as well as any concurrent applications within these areas that predate the affected applicant in the approvals process, and that will be dependent upon the existing system. Further, applicants with proposals that include multi-family development (including duplex clustering up to 10 u.p.a. and townhouses up to 15 u.p.a.) must ensure that onsite fire flow requirements, as outlined in Section 4.2 Development Demands, can be achieved. However, if for any reason an applicant is unable to demonstrate that interim flows are available to service a proposed development within the Study Area, the applicant will be required to construct sufficient portions of the proposed system to achieve minimum required flows. As previously noted, if these works are constructed before they have been included in the City's Capital Budget, the non-reimbursable component of the associated costs would be born by the applicant as a cost of development, with additional recoveries possible only through the Latecomer process.

As identified in Table 4.2, construction of the ultimate grid main system should be phased consistent with the development demands of the combined Study Areas. As further detailed in Section 7, Summary of Major Works and Funding, the collection of water DCC contributions for these improvements from scheduled developments is expected to always exceed the costs of their construction.

In reviewing those areas where existing watermains are to remain in place, and based upon current Surrey Engineering Design Criteria, the hydraulic analysis has confirmed that when the network is completed, the existing mains are adequate for the intended use.

5.0 SANITARY SEWER

5.1 Existing Sewer System

There are no existing gravity sanitary sewers within the West Cloverdale, North Neighbourhood. There are, however, two locations where local sewerage can be accommodated by existing sewers adjacent to the Study Area. An existing 300mm diameter gravity sanitary sewer runs south on 168 Street from 60 Avenue. This system extends a 200mm diameter local service main north on 168 Street approximately 135 metres from 60 Avenue, as well as a short section of 300mm diameter main west on 60 Avenue. The 168 Street branch of this system cannot be extended further north due to topographic constraints on 168 Street and is limited to service adjacent properties and the Northview Golf & Country Club force main. It is possible, however, to extend the 60 Avenue branch further west to service all fronting properties east of 164 Street. A second gravity sewer has been extended through a recently completed development opposite the Study Area on 168 Street at approximately 61 Avenue. This sewer was installed with the intention of extending gravity service west from 168 Street and is capable of providing service to proposed development between 60 Avenue and 61 Avenue. Although this system was lowered as a means of accommodating a larger portion of the Study Area catchment, a combination of topographic and geotechnical constraints limit its usefulness. In order for this system to be extended into the Study Area as originally planned, low lying areas of the site, shown as a hatched area on Figure 11, were originally to be filled in varying depths up to 1.2 metres. Subsequently, the development of the subdivision immediately east of the Study Area and north of 60 Avenue revealed that the sub-surface soils in this area have little resistance to superimposed loading. Based on these findings, Levelton Associates Ltd. have advised that the placement of structural fills (ie: for roadworks, buildings, etc.) in excess of 0.45 metres thick would likely cause the underlying materials to compress and, as a result, subside. If the placement of fill was the only solution, the affected areas would have to be pre-loaded and allowed to stabilize over time. The benefits of filling the site for the sole purpose of extending the sanitary sewer are offset by the direct construction costs and resulting time delays that pre-loading would entail. Since this area can be more easily serviced by a new sanitary trunk sewermain, it would be more cost and time effective to direct the resultant flows to a new trunk system.

The existing 168 Street system runs south on 168 Street to connect to the G.V.S. & D.D. 1200mm diameter trunk main south of Highway #10.

The existing sanitary sewer system at 61 Avenue and 168 Street, identified as the Richardson Trunk, runs through the development east of 168 Street and crosses 60 Avenue at 169 Street before continuing south on 168A Street and joins the 168 Street system noted above at 57A Avenue.

5.0 SANITARY SEWER

5.2 Sewer Catchments - External and Internal

.1 External

The sewer extension servicing 60 Avenue development west of 168 Street will also provide service to a small area of the West Cloverdale, South Neighbourhood N.C.P. Study Area contributory to 60 Avenue (Figure 11). Similarly, the construction of the proposed overland sanitary trunk sewer will provide service to the existing lands north of 64 Avenue between 168 Street and 176 Street that currently lie outside the Agricultural Land Reserve (ALR), and have development potential in accordance with the West Cloverdale Local Area Plan. For calculations and flows relating to both the internal and external catchment areas, refer to Appendix III.

.2 Internal

As noted in Section 5.1, a major portion of the Study Area north of 61 Avenue lies outside the existing sanitary sewer catchment and is not, therefore, serviced by a gravity sanitary sewer. In order to provide gravity service for this area, a sewer extension is required from 64 Avenue at approximately 168 Street, to the future Clayton trunk sanitary sewer at 177 Street and 68'A' Avenue, with flows subsequently directed to the interim North Cloverdale sanitary pump station at 176 Street and 68A Avenue. The topography south of 61 Avenue is conducive to the extension of services from the existing gravity systems at 61 Avenue at 168 Street, and 60 Avenue at 168 Street.

For sanitary purposes, two primary catchments have been identified in the Study Area; one draining south to the 168 Street sewer system; and one draining north to the proposed 168 - 177 Street trunk sewer system. The southerly catchment has been further defined by two sub-catchments - Catchment A discharging to a sewer extension on 60 Avenue directly to the existing 168 Street system, and Catchment B discharging to a sewer extension on 61 Avenue from the existing Richardson Trunk at 168 Street. These two systems eventually join at 168 Street and 57A Avenue to connect to the G.V.S. & D.D. trunk sewer as noted in Section 5.1.

The half-acre cluster residential area planned west of 164 Street, and forming a part of the Northerly Catchment, will require lot consolidation and, private onsite pumping systems in order to connect to gravity sewer on 164 Street, provided each consolidated legal lot fronts a gravity sewer. All lots which require on-site pumping systems will be required to have restrictive covenants registered upon title placing responsibility for replacement of pumps, and perpetual operation and maintenance with the owner, prior to final development approvals being granted by the City. The possibility does exist to service these areas by gravity through the Cloverdale South NCP Study Area, however, the comparison detailed in Section 5.7 "Servicing

Options - Cluster Developments" indicates that this alternative may be the least desireable option for the cluster areas. These catchment areas are shown on Figure 11.

Each applicant within the Study Area will be responsible for extending sanitary sewers as required in accordance with the City's Subdivision Bylaw. Where gravity sewer mains may be required to be located within the side yards of individual lots, a pedestrian walkway within a dedicated Right of Way will have to be constructed to provide access to the sewer. It may be possible, however, during the subdivision application process, for individual developments to redirect or relocate short sections of sewer mains in order to avoid this type of alignment. Each affected applicant will be required to resolve this issue with the City as part of the approvals process. Where it is feasible to reroute those sewers, the applicant will be required to demonstrate to the City that there are no detrimental impacts to the downstream system resulting from any such redirection. Figure 12 shows a conceptual layout for the sanitary sewer system internal to the Study Area. This sewer arrangement is consistent with the internal sanitary catchment boundaries noted above.

5.3 Designated Trunk Sewers & Surrey 10 Year Servicing Plan

The West Cloverdale Local Area Plan (LAP) identified two (2) sanitary sewer trunk extensions as required to service the development of the West Cloverdale area. This LAP identified a new trunk along the toe of the south and west slopes of the North and South Study Areas, connected to the GVS and DD trunk sewer main at Highway #10. Originally this trunk was expected to provide service to the lands west of 164 Street. A second trunk was proposed to connect into the existing main on 168 Street at 57A Avenue, that would allow lands north of 60 Avenue to 64 Avenue to be serviced. These trunks, originally referenced in the 1993-2002 version of the 10 Year Servicing Plan, have been deleted from the 10 Year Servicing Plan: 1997-2006 adopted by Council on May 5, 1997.

The servicing concepts proposed for the North Neighbourhood Study Area include the development of the west escarpment as ½ acre gross density, single-family cluster, with servicing to be provided by private sanitary pump stations for consolidated legal lots west of, and fronting, the internal gravity system on 164 Street. Although gravity sewer is proposed to be extended to 60 Avenue through the West Cloverdale South Neighbourhood Study Area, it does not meet the criteria for consideration as a trunk facility. As a result, the trunk proposed in the LAP for the west toe of slope, is no longer applicable to the North Neighbourhood Study Area, and has been discharged from the new 10 Year Servicing Plan. A detailed review of the servicing requirements of the cluster areas follows in Section 5.7 "Servicing Options - Cluster Developments".

The second sanitary trunk sewer, identified by the West Cloverdale LAP has been constructed in a revised form to provide service to the Study Area at 61 Avenue and 168 Street. However, it was not possible to install this trunk sewer at depths that would have facilitated the extension of service either north to 64 Avenue, or north-west to fully service the North Neighbourhood.

This sewer will provide service to that area defined as Catchment B per Section 5.2. The revised 10 Year Servicing Plan identifies a new trunk sanitary main from 64 Avenue at 168 Street, to 68'A' Avenue at 176'A' Street, that will provide service to the Study Area as detailed in Section 5.6 "Off-Site Servicing Options - "North" Catchment".

TABLE 5.1
CURRENT TEN YEAR SERVICING PLAN

REF #	LOCATION	DESCRIPTION	ESTIMATED COST	START BEFORE	GROWTH RELATED
4739	64 AVE & 168 ST. TO 68A AVENUE & 176A ST.	66 AVENUE TRUNK	$ 1,679,000	2002	YES
		GROWTH RELATED TOTAL	*$ 1,679,000*		

5.4 Development Sewage Flows

Using data from Section 2 of this report which identifies the land uses designated within the internal sewer sub-catchment boundaries, as well as the City of Surrey

5.0 SANITARY SEWER

Design Criteria for the calculation of sewage flows, the following peak flows were determined as contributory to the existing and proposed sewer systems as follows:

SOUTH CATCHMENT
- CATCHMENT 'A' - 10.0 lps (litres per second)
- CATCHMENT 'B' - 16.5 lps

NORTH CATCHMENT - 47.3 lps

5.5 System Capacity Analysis - "Southerly" Catchment

As noted in Section 5.2, the southerly catchment area has two sub-catchments designated A and B. Catchment A is proposed to discharge to an existing 300mm diameter sewer on 168 Street. This sewer runs south on 168 Street from 60 Avenue, increasing in size to 450mm diameter at 57'A' Avenue with discharge to the GVS and DD trunk main at Highway #10, and includes pumped sewage flows from the Northview Golf & Country Club. The design of this system, as provided by McElhanney Engineering Services Ltd., includes a portion of the Study Area fronting 60 Avenue and totalling approximately 8.2 hectares. This area was included as Suburban Residential with a population equivalency of 10 people per hectare. The NCP identifies the area fronting 60 Avenue as a combination of institutional residential and street oriented townhouses at a maximum density of 37 units per hectare (15 units per acre), and a population of 2 persons per unit. Additionally, the north-west corner of 60 Avenue at 168 Street is proposed as Commercial with an equivalent population of 90 people per hectare. Although the net contributing area at 4.4 hectares is less, the total contributing design population is greater.

Based upon the City's design criteria for sewage flows, the existing 168 Street sewer, was analyzed for capacity with the increased flows from 60 Avenue, the golf course pumped flows, and the flows resulting from the full development of adjacent, contributory serviced lands to the land uses designated in the Local Area Plan.

The development of Catchment B would require the extension of the recently completed "Richardson"Trunk at 61 Avenue west from 168 Street. This main was provided through the existing development east of 168 Street and connects to the 168 Street trunk at 57'A' Avenue. Sized to accommodate a major portion of the Study Area, previously noted constraints limit the effective catchment area to proposed development south of, and adjacent to, the 61 Avenue extension with service provided to fewer than 1000 people.

Both of these existing systems have sufficient spare capacity to accommodate the contributing flows without exceeding the design criteria requirements.

5.6 Off-Site Servicing - "North" Catchment

As described in Section 5.1, there is no existing sanitary sewer available for the portion of the Study Area defined as the "North" Catchment. Two options were initially investigated as potential solutions to this problem. Option 1 included the initial construction of a temporary sanitary pump station and force main at a location north and west of the Study Area at approximately 170 Street and 65 Avenue. The location identified by the City would permit the development of all areas identified for growth within the L.A.P., and is shown on Figure 11. This system would have provided temporary service until such time as a gravity trunk sewermain could be constructed overland from 168 Street to 176 Street. Interim flows would be directed down 168 Street to connect to the "Richardson" Trunk at 62 Avenue. Surrey advised that, as a temporary facility, the proposed pump station and forcemain would not be eligible for cost sharing by the City. The City further advised that, the purchase of property and/or the negotiation of rights-of-way required for an interim pump station, or any additional expense to relocate it to any other technically appropriate and City approved site, would be the responsibility of the frontender as costs of development. The only recoveries available to an interested frontender would have been through an amendment to the Latecomer Bylaw which provides a mechanism by which a frontender could recoup, over a maximum 10 year time limit, a portion of their costs from all of the benefitting property owners area wide.

It is estimated that the cost to the Study Area for a temporary pump station facility, constructed to ultimate standards, would be in the order of $1.1 million. This amount did not include land acquisition and right-of-way costs associated with the location shown in Figure 13, nor the ultimate connector to the North Cloverdale Pump Station and force main system.

Option 2 includes the construction of the ultimate gravity trunk sewer overland from 168 Street to 176 Street and is shown on Figure 14. Based on current Surrey criteria, sanitary trunk sewer mains are defined by flows in excess of 40 lps. This main would be constructed over rights-of-way initially along the ALR boundary east of 164 Street, and then generally east north-east overland to 176 Street at 68 Avenue. At this point a dual inverted siphon would carry flows north on 176 Street to 68A Avenue, and then east on 68A Avenue to connect to a section of the proposed 1050 mm diameter Clayton Trunk gravity sewer main at 177 Street.

Since the Clayton Trunk is to be temporarily diverted to the North Cloverdale pump station at 176 Street pending its future extension south to Highway #10, flows will be directed west by the proposed 68 Avenue trunk and, along with flows from the North Cloverdale East and West NCP Study Areas, be pumped south on 176 Street to 61A Avenue. The City has designed this station to accommodate flows from the West Cloverdale Study Area.

Construction costs for this trunk sewer are estimated to be $1,221,000 and include 375mm and 450mm diameter gravity mains, as well as a 200mm/250mm diameter dual inverted siphon. However the addition of this trunk sewermain to the 10 Year Servicing Plan has resulted in its becoming a DCC rebatable item. This does not, however, imply that a prospective frontender can expect Day 1 funding to recover the costs of this installation beyond the extent of the applicant's sewer DCC's paid.

The construction of this main within the context of the 10 Year Plan is subject to priorizing by the City. Under current City policy the recovery of DCC's by a frontending developer cannot exceed the total of DCC's paid for that particular utility under each separate application. Costs incurred in excess of this recovery would be the responsibility of the frontender.

The initial applications proposed by the frontender (or a consortium of frontenders), as shown in Section 2. Development Phasing, includes approximately 220 single family lots, and 325 multi-family units, with DCC contributions and recoveries as follows:

TABLE 5.2
SUMMARY OF FRONTENDER DCC CONTRIBUTIONS AND REBATES

TOTAL UNITS FRONTENDER	DCC CONTRIB. PER UNIT	TOTAL DCC CONTRIB.	ESTIMATED COST SANITARY TRUNK	MAXIMUM DCC REBATE	BALANCE
SF =220 MF =325	$ 930 $ 810	204,600 263,250	$ 1,221,000	467,850	(-) 753,150

Based on the above criteria, the frontending applicants would be responsible for the $ 753,150 shortfall, as costs of development.

However, it is recognized that, over the long term, sufficient DCC monies will be collected to finance the total trunk improvement costs. It is therefore proposed that the City establish a mechanism for this specific sewer trunk installation to enable the frontending Developer to be reimbursed the difference between the total costs of this trunk and their initial DCC rebates. This reimbursement would be funded from sanitary DCC's collected by the City from all developments benefiting from the subject works. Monies would then be reimbursed to the frontender on a semi-annual, or annual basis. In this way, initial costs incurred by the frontender will be offset in accordance with Surrey Policy by future DCC contributions from subsequent benefiting applications.

Of the two options noted, the proposed gravity trunk sewermain (Option 2) was chosen over the interim sanitary pump station and force main. Although initial estimates indicated higher construction costs, this option represents the ultimate solution and, as a trunk facility, included in a revised Ten Year Plan, allows the

frontender to potentially recover the full construction costs. Construction of an interim pump station and forcemain would have been non-recoverable.

As noted herein, rights-of-way will be required for construction of the Trunk system. At the request of the West Cloverdale North Neighbourhood NCP Steering Committee, the City initiated informal discussions with property owners on whose lands the gravity trunk is proposed to be installed. All of the affected parties have granted their approval in principle of this alignment and advised that they were prepared to provide rights-of-way as required to the City.

5.7 Servicing Options - Cluster Developments

The proposed half acre cluster developments shown west of 164 Street along the West Cloverdale escarpment, have been identified within the West Cloverdale North Neighbourhood NCP Stage II Report as areas that may require private on-site sanitary sewage pumping stations as a means of providing service.

However there are two available options for servicing the half acre and urban single family cluster areas with sanitary sewer.

Option One requires that the subject area connect, by means of private onsite pump stations and force mains, to the gravity sanitary sewer internal to the West Cloverdale North Neighbourhood Study Area on 164 Street (Figure 12), and subsequently discharge through a proposed gravity trunk sewermain to the North Cloverdale sanitary sewer pump station and forcemain at 176 Street and 68'A' Avenue (see Figure 14). In order to comply with the requirements of the City of Surrey as they relate to pumped sanitary sewer, each affected lot must front a City gravity sanitary sewer. To allow the subject area to develop and meet these criteria, individual lots included in this zone must be consolidated into single legal entities that front 164 Street. This requires the full cooperation of the individual lot owners since, if consolidation does not occur, those lots that do not physically front 164 Street will not be able to develop.

The overall benefit of this option is that sanitary sewer, roadworks and watermain will become available at the same time as development extends through the Study Area westward from 168 Street.

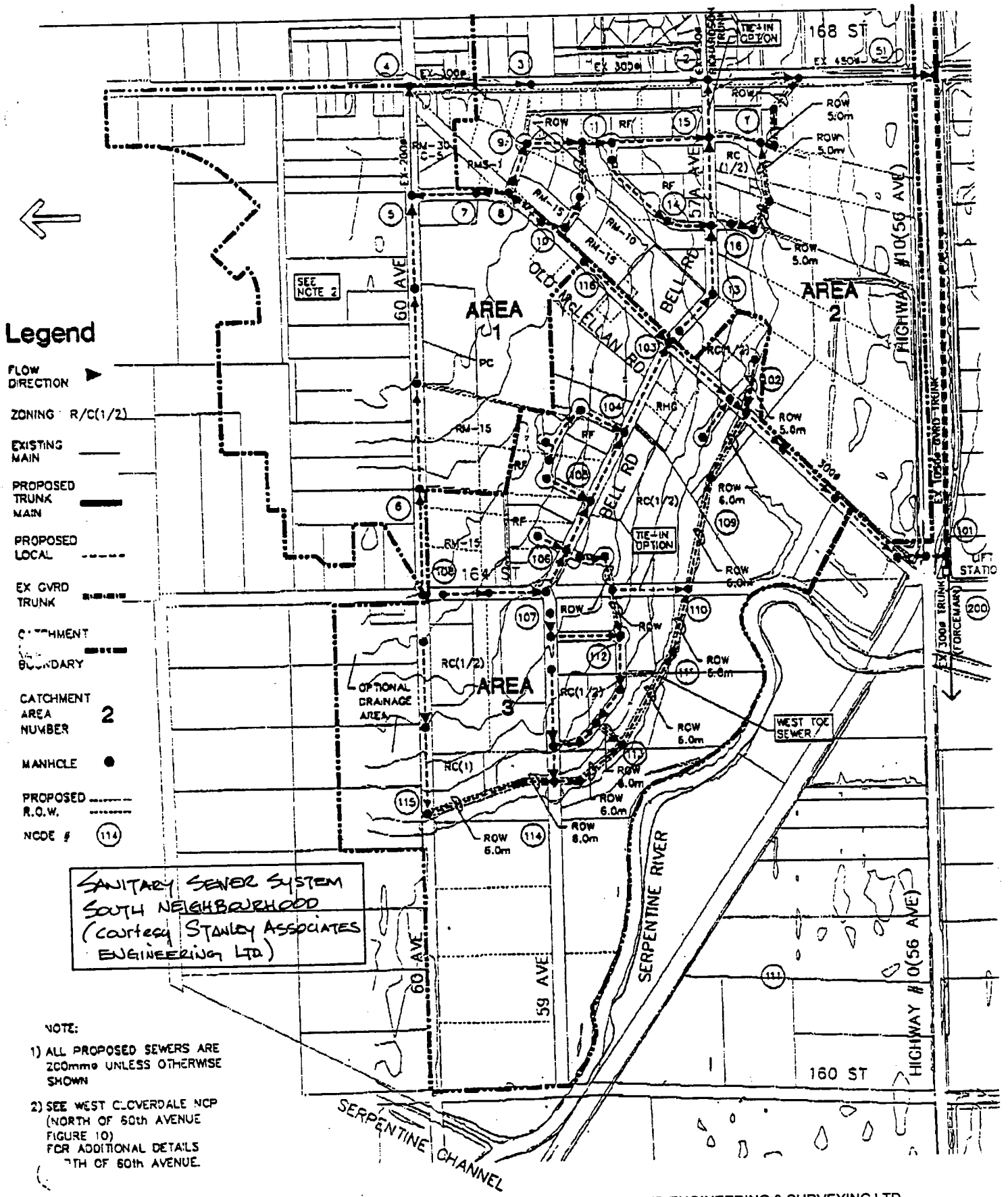
There is, however, a possibility that gravity sanitary sewer will be available west of 164 Street at 60 Avenue via the West Cloverdale South Neighbourhood NCP area (Option Two). As a condition of their Stage II report, gravity sanitary sewer is to be extended along the base of the escarpment from Old McLellan Road to 60 Avenue, then east on 60 Avenue to service fronting lots west of 164 Street. A copy of the proposed sanitary sewer system for the West Cloverdale, South Neighbourhood

NCP Study Area, as provided by Stanley Associates Engineering Ltd. is, with their permission, shown on page 56. Under the design guidelines established for the South Neighbourhood Study Area, this sewer is proposed to be installed at a depth and size that provides a gravity sewer as an alternative to pumping for the cluster area north of the frontage of these lots.

There are some potential obstacles inherent with this option. If, for example, the development of the South Neighbourhood Study Area does not keep pace with expected development in the North Study Area, the proposed gravity sewer might not be available at 60 Avenue concurrent with roads and watermains extended through the North Neighbourhood. Depending upon the extent of development in the South Study area, development of the cluster area might require significant offsite works to provide this sewer. Off-site sewer extension could range from as little as 210 metres from 59 Avenue to 60 Avenue, if the South Neighbourhood is mostly developed, to as much as 930 metres from Old McLellan Road to 60 Avenue plus a further 390 metres of sewer south of Old McLellan Road to Highway #10 if development of their Stage 3 has not proceeded.

Notwithstanding the cost of this work, negotiations and costs associated with the acquisitions of Rights-of-Way across the several affected South Neighbourhood properties would be the responsibility of the cluster area developer as a cost of development. Rights-of-way will also be required through existing lots within the designated cluster area to allow this system to be extended north from 60 Avenue to 62 Avenue. Further, this toe of slope sewer is not a trunk facility, and is not eligible for DCC rebates from, nor cost sharing by, the City. Once completed, however, this system could provide gravity sewer frontage to each existing lot within the cluster area.

5.0 SANITARY SEWER



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A detailed summary of these options, including estimated costs, and the pros and cons of each, has been included in Appendix III "Sanitary System Analysis". This summary concluded that the pumped alternative was the most suitable in this application, and was provided to each property owner in the 1/2 acre single family cluster development area for their review and approval. In this regard there has been singular lack of interest/response from these owners with respect to any future servicing requirements (Kurrein pers. comm. 1996 - see Appendix V).

As a result this Stage II report has been based on Option One as detailed herein namely, that a consolidation of existing lots is required and, that once consolidated, the cluster areas will be required to discharge sanitary sewage by means of private onsite pump stations into the proposed North Neighbourhood internal gravity sewer system contributing, ultimately, to the North Cloverdale sanitary sewer pump station and force main system. This does not, however, preclude the possibility that this area might ultimately be serviced by a gravity system.

5.8 Study Area Sewage Collection System

A conceptual layout for the sanitary sewer system internal to the Study Area is shown on Figure 12. All of the proposed development lands as described herein can, in their final form be serviced by either an extension of the sewer system on 60 Avenue from 168 Street for Catchment A, the existing sewer at 61 Avenue and 168 Street for Catchment B, and the construction of the sewer system overland to the Clayton Trunk in North Cloverdale.

5.9 Cost Estimates

Cost estimates for the West Cloverdale trunk sewer outlined in the preceding section are summarized as in Table 5.3:

TABLE 5.3
WEST CLOVERDALE TRUNK SEWER COST ESTIMATE

ITEM	ESTIMATED COST
1. OVERLAND ULTIMATE SANITARY SEWER - 167A ST. TO 176 ST. .1 167A ST. TO 170 ST. .2 170 ST. TO 176 ST.	 $ 335,000 $ 721,000
2. DUAL INVERTED SIPHON 176 ST. TO 177 ST.	$ 165,000
TOTAL COST	$ 1,221,000

5.10 Phasing and Implementation

Development applications are currently pending on several properties within Phase I of the Study Area (Figure 2). An additional application is also being processed for a development site adjacent to the Study Area at 60 Avenue and 168 Street that will be contingent upon the resolution of servicing issues pertinent to the Study Area. The timing of the West Cloverdale North Neighbourhood trunk sanitary sewer is, therefore, critical to the continued processing of these applications. Further, the operation of this facility is conditional upon the completion of the North Cloverdale Sanitary Pump Station, and force main, the 176 Street gravity sewer, and the 68 "A" Avenue gravity sewer.

The North Cloverdale Sanitary Pump Station facilities were included in the 1996 Capital Works program, to be funded by the Sewer utility, and constructed under the supervision of the City.

Also in the 1996 Capital program was the upgrading of the existing 176 Street gravity sewer system to 600mm diameter from 60 Avenue to 65'A' Avenue. Construction of the 176 Street gravity sewer and force main began in mid November of 1996 and was completed by mid February of 1997.

As the preferred option, the West Cloverdale trunk sewer is to be constructed by the "first-in" developer in the Study Area. The extension of this sewer from 168 Street to 177 Street, is estimated to cost $1,221,000. These works will be Rebatable as detailed in Section 5.6 "Offsite Servicing Options - "North" Catchment.

5.0 SANITARY SEWER

Lands within Phases 1, 2 and 3 will be able to successively extend service directly from this main in accordance with the conceptual Sanitary Sewer System servicing plan (Figure 12).

Although there are no additional facilities required specifically to service these development areas, as each development proceeds to the Servicing Agreement stage, developers will be required to pay up-front, the full amount of the sanitary sewer component of the Development Cost Charges. This requirement will apply equally to all developments benefitting from the subject works.

Sections of the Study Area that form the South Catchment are not likely to proceed to development until Phase I north of 61 Avenue has been completed. Although serviced by existing sanitary sewers at both 60 Avenue and 61 Avenue, storm sewer will not be available until developments north of 61 Avenue have extended the drainage works south and west from 64 Avenue at 168 Street. These works will be available once the area included in the initial Study Area application (page 5) has been fully serviced.

The following table summarizes the projected development expected within the Study Area. Based on this projection it is anticipated that these developments will generate the DCC's noted:

TABLE 5.5
PHASING, DCC AND SPECIFIED CHARGES SUMMARY
D.C.C. CONTRIBUTIONS

YEAR	DEVELOPMENT PHASE	CONTRIBUTING UNITS	DCC RATES	DCC CONTRIBUTIONS
1997 (Fall) & 1998	1	220 SF 325 MF	$ 930 $ 810	$ 467,850
1999	1 & 2	89 SF 142 MF	$ 930 $ 810	$ 197,790
2000	1 & 2	61 SF 72 MF	$ 930 $ 810	$ 115,050
2001	1 & 2	41 SF 99 MF	$ 930 $ 810	$ 118,320
2002	2	39 SF 88 MF	$ 930 $ 810	$ 107,550
2003	1, 2 & 3	54 SF 125 MF	$ 930 $ 810	$ 151,470
2004	3	0 SF 147 MF	$ 930 $ 810	$ 119,070
2005	3	64 SF 0 MF	$ 930 -	$ 59,520
2006	3	68 SF 0 MF	$ 930 -	$ 63,240
	TOTAL	1634		$ 1,399,860

6.0 DRAINAGE

6.1 General

To assess the impact of West Cloverdale Area 1 on downstream drainage facilities, UMA Engineering Ltd. was retained to prepare a Stage Two Drainage Report. Further to their work on the North and West Cloverdale Master Drainage Plan (UMA, 1996), additional analyses have been completed specifically for the NCP, including a field investigation as well as consideration of financing and funding issues. Their report is attached as a separate document.

6.2 Existing Storm Drainage System

West Cloverdale Area 1 currently drains into three separate drainage basins. Most of the study area drains north into Creek 1. This creek flows through the Northview Golf and Country Club north of the NCP area and into the 168 Street Dyke which discharges to the Serpentine River. The northwestern portion of the NCP area above the escarpment flows into Creek 2 which drains directly into the Serpentine Channel. The western portion of the study area (called Subcatchment WC-K in this report) flows overland into lowland ditches which drain into the Serpentine Channel and River. An Unnamed Watercourse (referred to as Creek 3 in this report) east of 168 Street, lies outside West Cloverdale Area 1 but is also tributary to the Dyke. However, this creek will not be affected by development in the Area 1 NCP. Creek 1, Creek 2, Creek 3, and the 168 Street Dyke form the major watercourses in the overall West Cloverdale region. The topography and existing watercourses are shown on page 62.

Creek 1 originates near 168 Street, north of the 61 Avenue alignment and ends at the 168 Street Dyke. Flows drain through a channelized ditch to the lands west of 168 Street. A culvert conveys flow beneath 64 Avenue, and the creek continues through a wooded area to the Northview Golf and Country Club. From here, the watercourse passes through a well defined ravine to a grassed wetland. A corrugated steel culvert conveys the flow through an earth berm to the 168 Street Dyke. The Creek 1 sub-basin has a catchment area of 128.7 ha.

The 168 Street Dyke is a wide-bermed channel that parallels the west side of the road for a length of 575 m. Flows discharge by gravity into the Serpentine River from the dyke through three 1,300 mm diameter corrugated steel culverts fitted with top mounted flap gates. The discharge capacity is controlled by a complex storage discharge relationship which depends on the Serpentine River water level, (see Section 6.6.4.). The drainage basin for this watercourse is 281.5 ha and includes tributary areas, Creek 1 and Creek 3 (which is outside the NCP area).

Creek 2 extends from 64 Avenue, 500 m west of 168 Street, through an excavated ditch to the Northview Golf and Country Club. Within the golf course, water is recirculated from a lower to upper pond for aesthetic reasons. Flows pass through the golf course to an open channel dyke tie-in on the Serpentine Channel. The watercourse is characterized by extended periods of negligible or no flows. The sub-basin has a drainage area of 37.4 ha.

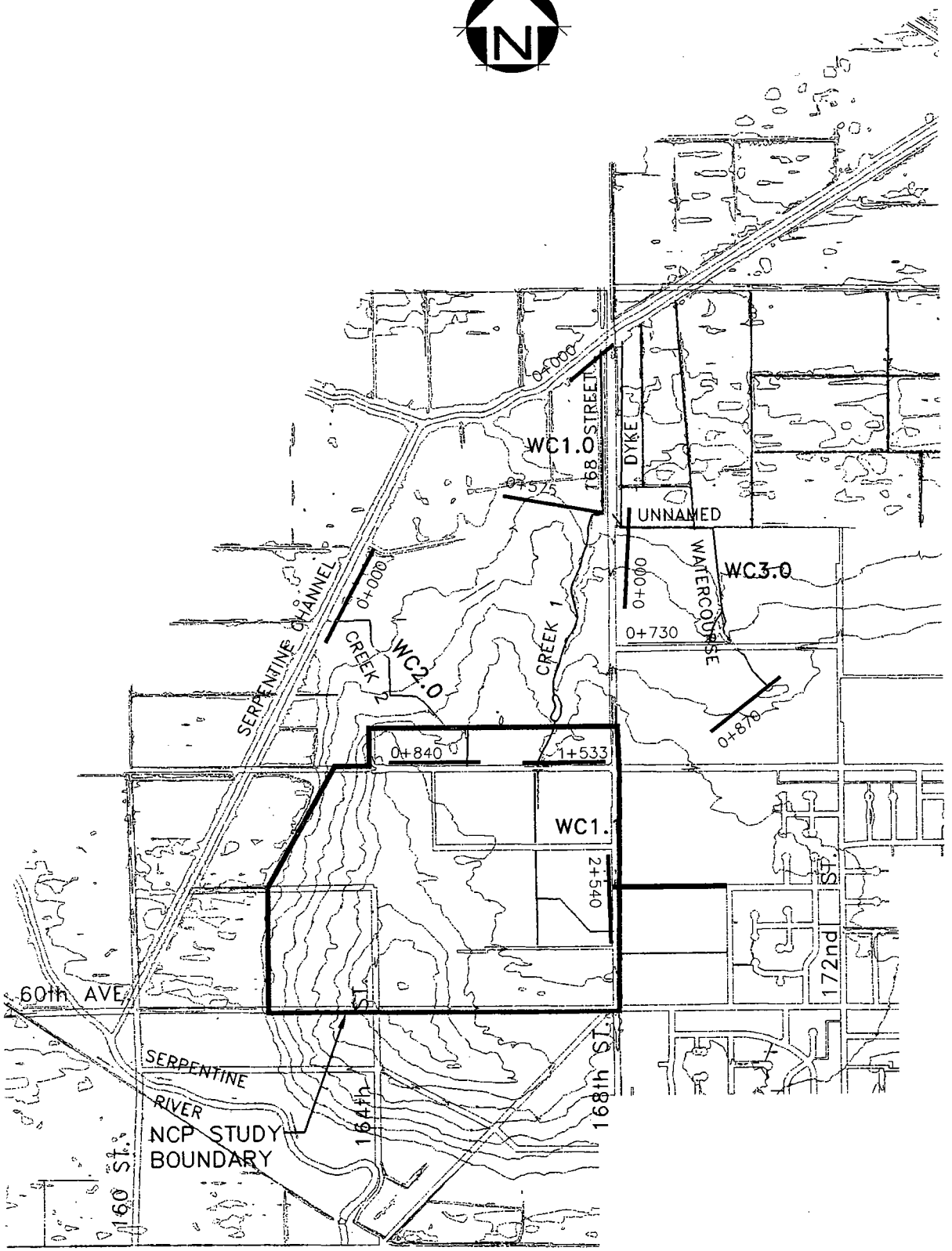
WC-K is the subcatchment that incorporates the western part of the NCP study area. Bounded by the Serpentine Channel to the north and west, the eastern boundary for this area generally follows the top of the escarpment face. To the south, the subcatchment is bounded by the Serpentine River and Old McLellan Road. This drainage area of 116.4 ha drains directly to the Channel and River without entering a defined watercourse. Surface runoff is conveyed overland and enters a system of local ditches. The main ditches are located south of 64 Avenue and along the 62 Avenue R.O.W. Flows are discharged into the Serpentine system by ten flood boxes.

The external and internal catchment areas comprising the drainage sub-basins are shown on page 63.

6.3 Neighbourhood Development Drainage System

In accordance with the City's Design Criteria Manual (City of Surrey, 1995a) and Storm Drainage Update (City of Surrey, 1995b), a minor system drainage scheme has been proposed for West Cloverdale Area 1 to convey five year return peak flows. Storm sewers located along the internal road alignments will service proposed land uses. For NCP lands east of the top of the escarpment, the local sewers will drain into a trunk system along 61 and 63 Avenues and 168 Street. Trunk mains are defined as any storm drain servicing an area 20 hectares or greater. The proposed minor storm sewer system for the NCP area including trunk mains is shown in Figure 17.

Runoff in Subcatchment WC-K is proposed to be drained by a system of local storm sewers and ditches to either 64 Avenue or 62 Avenue, where flows will discharge into the Serpentine Channel through the existing floodboxes or pump station.



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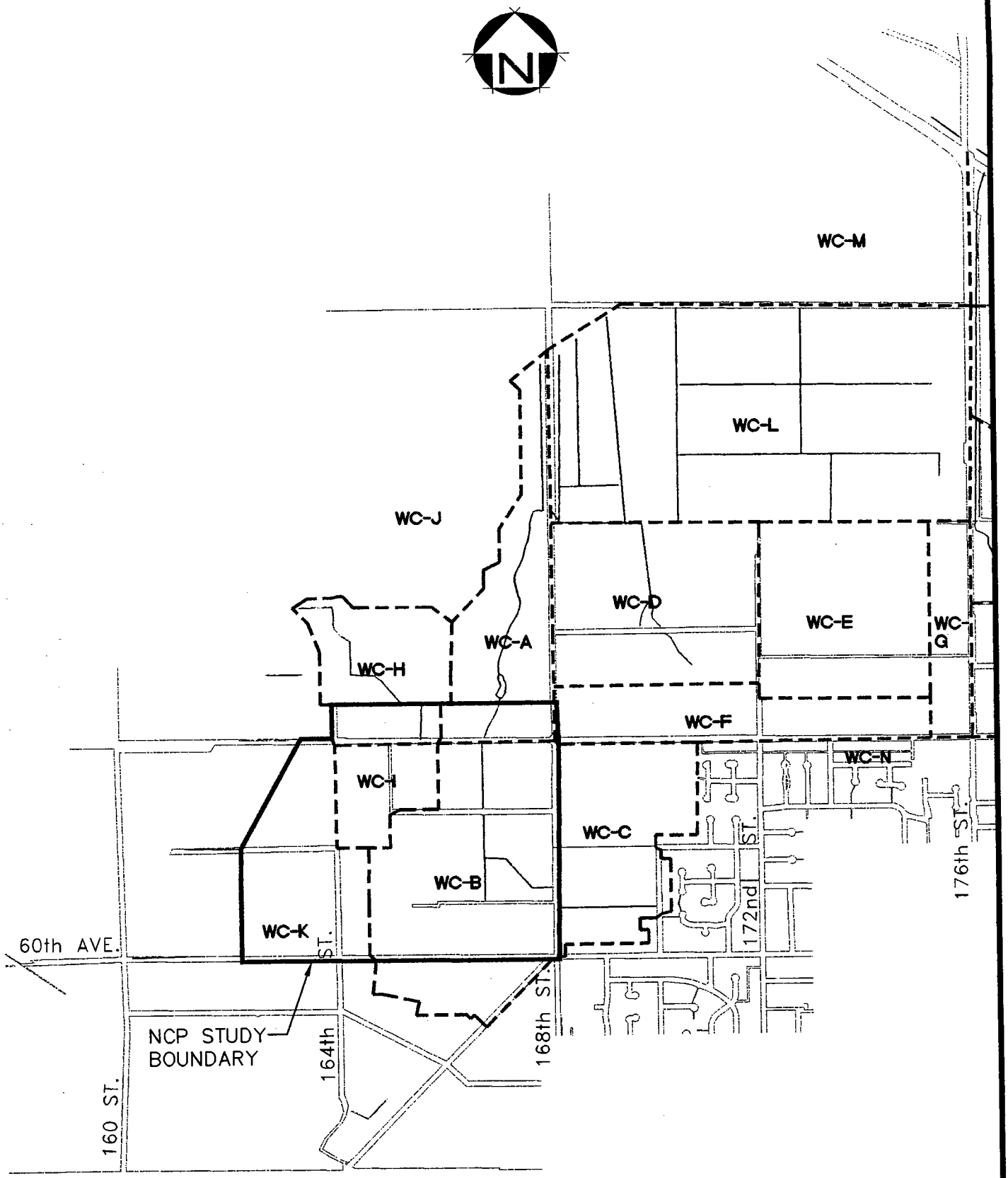
COASTLAND ENGINEERING LTD.

WEST CLOVERDALE AREA 1 STAGE 2 NCP DRAINAGE
TOPOGRAPHY AND EXISTING WATERCOURSES

C640-001-00-02

SCALE: 1:20,000



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COASTLAND ENGINEERING LTD.

WEST CLOVERDALE AREA 1 STAGE 2 NCP DRAINAGE EXTERNAL AND INTERNAL CATCHMENTS

C640-001-00-02

SCALE: 1:20,000

A conceptual stormwater control plan should be developed to provide for the orderly extension of new storm sewers into the developing areas. In addition, lot grading within the study area should include the following Best Management Practices (BMPs) as a means of mitigating the impact of development on the downstream system: the discharge of roof drainage onto splash pads and/or rain barrels, the use of infiltration trenches or sodded swales for minor drainage, and the preservation of topsoil and natural vegetation on building sites to the greatest extent possible. During construction, flow control or sedimentation ponds will be required on development sites.

An existing private pond on Creek 1 north of 64 Avenue will be retrofitted to provide for fish habitat compensation. The facility will serve to maintain and enhance baseflows in the downstream reaches and provide improved water quality. Low flows will be directed to this facility at a rate of up to approximately 200 l/s.

6.4 Hydrologic Analysis

The existing and post-development flows were modelled as part of the West Cloverdale Master Drainage Plan (UMA, 1996). Design storms were selected with return periods of 2, 5, 10, and 100 years and durations of 2, 6, 12, and 24 hours. A worst case runoff scenario was modelled assuming that there would be no runoff control. From the results, the impacts of development on the watercourses and the lowland area were assessed, and stormwater management strategies developed.

6.5 Major System Flood Routing

The major system flow will be conveyed overland along internal roadways. Creeks 1 and 2 downstream of the NCP area will continue to act as major system flow paths up to the 100 year return period post-development flow. 168 Street will also be an overland route for 100 year flows. The overland flood paths along roads will serve to address the flood prone sections of Creeks 1 and 2. For Subcatchment WC-K, the 100 year flow will be directed to the surface ditches within the 62 and 64 Avenue R.O.W. The ditch flow will discharge through a system of floodboxes to the Serpentine Channel. It must also be noted that the overland emergency overflow for the 100 year storm event discharges from 64 Avenue into Creek 2. The final design for 64 Avenue must make provision for this overflow to continue to function. Detailed design should provide for overflow discharge and protection at this location in order to avoid potential roadway flooding during the major storm event. The proposed major system flow paths for the NCP area are shown in Figure 18.

6.6 Drainage System Evaluation

6.6.1 *Creek 1 and 168 Street Dyke*

The section of Creek 1 in the NCP area south of 64 Avenue is proposed to be enclosed. This ditch has intermittent flow and at present, primarily serves to drain a new development east of 168 Street and the existing flows from the NCP area. The 5 year post-development flow in the subcatchment will be conveyed to a trunk storm sewer on 168 Street. A storm water diversion is proposed to be located in the vicinity of 64 Avenue and Creek 1 to maintain baseflow in the watercourse. The flow discharging to Creek 1 should pass through an oil/grit separator before entering the watercourse. The trunk sewer will discharge into the 168 Street Dyke.

Approval in principle has been obtained from the Ministry of Environment, Lands, and Parks (MOELP) and Department of Fisheries and Oceans (DFO) to enclose the upper reach of Creek 1 (Appendix V). In return, fish habitat compensation will be provided around an existing wet pond, on Mr. Stewart's property on the west side of 168 Street, north of 64 Avenue. A letter has been obtained from Mr. Stewart indicating his agreement to allow retrofitting of the pond on his site and is included in Appendix V - Agency Comments. Negotiations are currently in progress to obtain a R.O.W. in favour of the City of Surrey to permit access to the facility for operations and maintenance purposes in perpetuity (Refer to Section 6.10 Habitat Compensation.)

Four hydraulic structures on Creek 1 are inadequate to convey uncontrolled post-development flows and/or have existing problems. The proposed 168 Street trunk sewer diversion will convey the 5 year developed flow away from the creek. A flow control device will maintain baseflow in Creek 1. During the 1:5 year event, the creek will receive 0.22 m^3/s of runoff. This is equivalent to the 1:2 year existing flow. Creek 1 will also act as a major system flow route. During the 1:100 year event, flows up to the existing 1:100 year flow of approximately 0.6 m^3/s will be routed down the channel. The remainder will be diverted down the 168 Street R.O.W. Diversion will be achieved by grading the roads toward 168 Street. Major system flow boundaries are shown in Figure 18. Since the flow is being controlled to existing levels, additional hydraulic capacity for the downstream culverts will not be required. However improvements for structural reasons or to improve fish passage may be necessary.

At present, some stream bank erosion is evident within the ravine. The 1:5 year future flows are being controlled to 1:2 year existing flows. By reducing the flow and associated velocity below existing levels the stability of the stream bank should

improve. Some minor bank stabilization works may be required as part of the fish habitat compensation plan. Any future development that may occur beyond the limits of the Study Area and north of 64th Avenue will require a separate plan to address potential impacts to this system.

6.6.2 *Creek 2*

There is one culvert (800 mm diameter concrete pipe) on the Creek 2 system at the north boundary of the NCP area. Near the confluence with the Serpentine Channel, a concrete spillway with a 0.5 m vertical drop impedes the movement of salmonids to upstream sections of Creek 2.

It is proposed that a short reach of the upper section of Creek 2 be enclosed. This reach is presently a shallow grassed swale with intermittent flow. Runoff within the sub-basin south of 64 Avenue will be redirected into storm sewers on 64 Avenue to 168 Street. Although Creek 2 is an ephemeral stream, a flow control device on 64 Avenue has been proposed to provide some baseflow in that watercourse during rainfall periods. Compensation for displaced habitat values in the form of upgrading the existing wet pond on Creek 1 has received approval in principle from MOELP and DFO (Appendix V).

This watercourse will act as a major flow path for the townhouse development north of 64 Avenue. Approximately 4 ha of land will contribute a major flow of 0.15 m^3/s, during the 1:100 year event, to the creek. This will result in no increase in flows for the 1:100 year event. The flow control device will limit the 1:5 year future flows to the 1:2 year existing condition flows (0.05 m^3/s).

Compensation works required for Creeks 1 and 2 are to be undertaken by development as upstream reaches for these creeks are enclosed. The Ministry will evaluate each application to determine the scope of the work involved. All costs associated with these works are conditions of development.

6.6.3 Lowland Drainage

Flows from a significant portion of the NCP area drain to the Serpentine River via the 168 Street Dyke. The operation and conveyance capacity of the Dyke is dependent on the water level in the River. When the level in the River exceeds a ten year return period, there is minimal to no discharge, and water from the upstream system is stored. During most storm events, the water level in the 168

Street Ditch / Dyke is above the River level, and the differential head allows sufficient discharge to contain storm runoff from the uplands area in the Ditch.

The Nicomekl and Serpentine Integrated Watershed Study (KPA, 1995) reported several factors such as tidal influence, the sea dam, runoff from upland areas, and storage in the lowland cells, that control the level in the Serpentine River. The flood model for the Serpentine River predicted that a 10 year return period river water level of 1.7m is adequate to protect the lowland from a ten year return flood level in the River.

The Agri-Food Regional Development Subsidy Agreement (ARDSA) drainage criteria requires runoff from the ten year, five day storm to be removed within five days in the winter, and runoff from the ten year, two day storm to be removed in two days in the growing season. The ten year return period is the standard which governs the design of many drainage and irrigation works on agricultural lands, and as part of the Stage 2 NCP Report, an analysis of the impact of West Cloverdale Area 1 on the Dyke and lowland has been conducted to this level of protection.

Five and ten year post-development flows were calculated using the OTTHYMO hydrologic computer model. The five year return period flows were found to range from 1.38 m^3/s to 1.67 m^3/s, depending on the storm duration. The ten year post-development flows were found to range from 1.7 m^3/s to 2.5 m^3/s, depending on the storm duration. Three 1,300 mm diameter culverts have a maximum capacity of 12 m^3/s and are therefore capable of discharging runoff from the NCP development for all but the most severe Serpentine flood levels.

Further work was conducted to analyze the 168 Street ditch/dyke operation, with both low and high water levels in the Serpentine River, for both the existing and future land use scenarios. The analysis was conducted with a five (5) day duration storm with return periods of 2, 5 and 10 years. The approach involved modeling the 168 Street ditch/dyke with the OTTHYMO Route Reservoir command. Two (2) different rating curves were developed, one for a low water level and the second for a high water level, in the Serpentine River. Computer simulations were then conducted for the different return periods and land use scenarios.

The analysis found that the water levels were almost identical for both existing and future conditions. The results summarized in Table 6.1 show that the rate of discharge will increase by approximately 0.5 m^3/s and the water level will increase by 0.01m.

To mitigate this small increase, runoff could be routed directly to the Serpentine River, or a pump station constructed to pump the increased runoff to the Serpentine. The flow increase could also be accommodated by providing additional floodbox capacity; however this would not address the anticipated slight increase in the duration and frequency of flooding.

The recommended approach will involve directing a portion of the storm flow from the 168 Street trunk sewer directly to the Serpentine River. The diversion structure will be located approximately 800m upstream of the 168 Street Serpentine River crossing. The 750mm diameter diversion sewer is intended to operate as a pressure sewer throughout much of its length. The sewer and diversion structure will be able to convey flows up to 1.0m^3/s. The diversion structure will be designed so that low flows will continue to pass to the 168 Street dyke, however increased runoff volume that results from development will be diverted to the Serpentine. It is estimated that between 5% and 30% of storm runoff may be directed to the Serpentine depending on the type and magnitude of the storm event.

Table 6.1
Comparison of Existing and Future Flows
in the 168th Street Ditch/Dyke System

Serpentine River Level (m)	5 Day Storm Return Period (year)	Existing Flow (m^3/s)	Existing Water Level (m)	Future Flow (m^3/s)	Future Water Level (m)
Low 1.3	2	1.18	1.32	1.29	1.32
Low 1.3	5	1.73	1.33	2.03	1.33
Low 1.3	10	1.98	1.33	2.32	1.33
High 1.73	2	1.18	1.75	1.29	1.75
High 1.73	5	1.73	1.76	2.03	1.77
High 1.73	10	1.98	1.77	2.32	1.78

In the future the height of the 168 Street dyke will have to be increased. The existing 168 Street ditch/dyke has a top elevation of approximately 2.0m. The predicted future water level in the dyked area is 1.77m which provides for a freeboard of 0.23m. Consequently the existing 168 Street dyke can contain future flows. However when the City's Lowland Drainage and Flood Control Strategy is implemented, the Serpentine Dyke as well as the dyke tie-in will be raised. This will have the effect of increasing the ten year return period water level to approximately 2.3m. Consequently the 168 Street dyke tie-in will have to be raised to approximately 2.9m. Since raising the dyke is related to a City wide program the costs have not been included in the financial analysis for this NCP area.

During major storm events, i.e. those beyond the ten year return period, extensive innundation of the lowland area around the 168 Street Dyke is anticipated. Under this scenario when the River is high and minimal to no discharge is possible through the culverts, the Dyke was found by the UMA model to be incapable of containing the runoff for even existing land use. In this case the major system flows will occur as a directed spill and convey overflow across the golf course. Under this worst case scenario the impact of the NCP area on the level of innundation was analyzed for a development plan consisting of three phases similar to the pattern shown in Figure 2. Analysis revealed that Phase 1 development (construction to 1998) could increase the depth of water in the existing lowland ponds by 0.045 m. For full development to Phase 3 (construction to 2000), the flooding depth could increase by 0.118 m. These increases were for the 6 hour event, which results in the greatest volume change due to development and were calculated assuming no discharge to the Serpentine River either from the golf course or the 168 Street dyke. The water levels will be higher for longer duration events, however the increase due to development will be smaller. All of the increases are relatively small and can be accommodated by the existing drainage system ponds within the golf course.

The western portion of the NCP area catchment drains to the Serpentine Channel through 3 outlets. There is currently a ditch along the 62 Avenue R.O.W. leading to a 750mm diameter floodbox. Major and minor flow routes will be similar to current conditions. The southern portion of the West Cloverdale North NCP area cluster development is proposed to drain to the West Toe Sewer in the West Cloverdale South NCP area. The proposed 450mm diameter West Toe Sewer can accommodate approximately 10ha of development from an area north 60th Avenue to south of 62nd Avenue.

The portion of the cluster development from just south of 62nd Avenue to 64th Avenue will be serviced by new or improved drainage systems which will follow the existing easements. The precise configuration and sizing will be determined at the time of development, however it is generally proposed that the runoff be directed to a water quality facility located part way up the valley slope and then discharged to the Serpentine via a 750mm diameter pressure sewer. Alternatively, dyke tie-in, floodbox or pump station improvements may be required at 64th Avenue and 62nd Avenue. At 64th Avenue a wider easement will likely be required since the existing ditch appears to be on private property. The current owner of the lowland ditch has property within the proposed cluster development area. Consequently, as a condition of development, an easement could be acquired and drainage improvements undertaken.

6.7 Surrey Capital Works - Ten Year Servicing Plan

Drainage works in the current Ten Year Servicing Plan (Surrey, 1997) within West Cloverdale Area 1 or those that are of direct relevance to the NCP area are summarized in Table 6.3.

Table 6.3
Current Ten Year Servicing Plan

Project ID	Location	Description	Estimated Cost	Start Before	Growth Related
9857	168 St. from ex. ditch to 64 Avenue.	860m - 1050/1500 TD on 168 St.	$ 940,000	1998	Yes
9858	168 St. 64-61 Ave.	600m - 675/900 TD between 168th and 61st Ave.	$ 470,000	1998	Yes
9859	63 Ave from 168 St. to 167 St.	180m - 900mm on 63 Avenue.	$ 170,000	1998	Yes
9860	167A St. from 62A to 63 Ave.	85m - 750mm on 168 St.	$ 70,000	1999	Yes
Subtotal			**$ 1,650,000**		
9867 *	Between 64 Ave and 168 St. (East Ck.)	Creek Protection	$ 320,000	2002	Yes
13752 *	64 Ave/165A St.	Flow Control Structure	$ 30,000	2006	Yes
13753 *	64 Ave/167 St.	Flow Control Structure	$ 30,000	2006	Yes
13757 *	64 Ave/168 St.	Upgrade Exst. Det. Pond	$ 250,000	2006	Yes
9862	East of Serp. Channel between 64 & 62 Avenues	400m-750mm to 62 Avenue	$ 310,000	2006	non DCC Trib. Area <20 ha
9863	East of Serp. Channel between 60 & 62 Avenues	320m-750mm to 62 Avenue	$ 280,000	1998	non DCC Trib. Area <20ha
9864	62 Ave from 162 St. to Serp. Channel	200m-750mm on 62 Avenue	$ 160,000	1998	non DCC Trib. Area <20ha

* Items to be constructed by the developer without rebate.

6.8 Cost Estimates - Proposed Trunk Drainage Improvements

Preliminary construction cost estimates have been completed for the required drainage works to service the NCP area in accordance with unit prices for utilities as set forth by the City (Whitlock, pers. comm, 1996) and as detailed in Section 7 of this report. A summary of the estimated costs for the proposed trunk sewers and community facilities is provided in Table 6.4.

Table 6.4
Summary of Trunk Drainage Improvement Costs

Item No.	Location	Description	Estimated Cost
1	167A St.: to 63 Ave.	85 m - 900 mm dia. Trunk Sewer	$79,100
2	63 Ave.: 167 - 168 St.	180 m - 900 mm dia. Trunk Sewer	$167,400
3	168 St.: 61 - 63 Ave.	345 m - 675 mm dia. Trunk Sewer	$217,400
4	168 St.: 63 - 64 Ave.	260 m - 1050 mm dia. Trunk Sewer	$280,800
5	168 St.: 64 Ave.north	840 m - 1050 mm dia. Trunk Sewer	$907,200
6	168 St.: to Outlet	20 m - 1500 mm dia. Trunk Sewer	$33,300
7*	64 Ave. and Creek 1	Flow Control Structure and Water Quality Inlet	$45,000
8*	64 Ave. and Creek 2	Flow Control Structure and Water Quality Inlet	$45,000
9*	168 St. and 64 Ave.	Existing Wet Pond Upgrade/ Rehabilitation & Compensation	$120,000
10*	WC 1.0	Erosion Protection	$250,000
11*	HS 202	Culvert Improvement (re: fish habitat)	$16,200
12	168 St.: Diversion to Serpentine	800m-750mm P.E. Diversion sewer and manhole	$225,000
	* Items to be constructed by the developer without rebate	TOTAL	$2,386,400
		Less Developer Servicing	476,200
		Reimbursable Works	$1,910,200

6.9 Phasing and Implementation

A number of points are noted with respect to comparison of Tables 6.3 and 6.4:

- Reference #9862, #9863, and #9864 all refer to drainage works that would service the cluster development. Since the tributary to each trunk is less than 20 ha, they are not included in the DCC program.

- Reference items #9867, #13752, #13753, #13757 will be included as part of the development servicing and will not be included as DCC rebatable items.

- It is proposed that construction of required trunk improvements be funded by current DCCs, with the recommended changes to the Ten Year Servicing Plan.

- The total expected DCCs generated will be approximately $2,486,000 as shown in Table 6.5. This amount exceeds the total trunk improvement costs of $1,910,000 associated with development from Table 6.4, and therefore no long term cash shortfall is expected.

Table 6.5
Projected Yearly Storm Drainage DCC Revenues

		Contributing Units		DCC Contributions		
Year	Phase	RC,RF or RF-	RM-10 or RM-15	RC, RF, or RF-G $2,120/unit	RM-10 or RM-15 $1,140/unit	Total Drainage DCCs Collected
1997	1	120	225	$254,400	$256,500	$510,900
1998	1	100	100	$212,000	$114,000	$326,000
1999	1,2	89	142	$188,680	$161,880	$350,560
2000	1,2	61	72	$129,320	$ 82,080	$211,400
2001	1,2	41	99	$ 86,920	$112,860	$199,780
2002	2	39	88	$ 82,680	$100,320	$183,000
2003	1,2,3	54	125	$114,480	$142,500	$256,980
2004	3	0	147	0	$167,580	$167,580
2005	3	64	0	$135,680	0	$135,680
2006	3	68	0	$144,160	0	$144,160
Total	**1634**	**636**	**998**	**$1,348,320**	**$1,137,720**	**$2,486,040**

Individual developments within the study area will be proceeding as soon as development approvals are obtained, and as the market dictates. As discussed in previous sections of this submission, development phasing is expected to proceed in an east to west manner. Yet the City's policy is for each NCP area to be self financing. Due to a short term cash deficiency in the DCC fund, the City does not have sufficient funds to immediately upfront the cost of required improvements.

With this financial constraint, two cost recovery options are available:

1) Developer could construct all proposed drainage works. Although development could proceed relatively quickly, this option involves significant upfront cost to the Developer;

2) development could proceed with selected downstream improvements together with the completion of interim detention and temporary piping. The Developer would be wholly responsible for construction of the required interim works, and such costs would not be rebatable through DCCs. Over time, when sufficient DCC funds are collected, the City would construct trunk facilities. A disadvantage of this Option is the possible constraint imposed by temporary servicing. For example, initial development discharging into an interim detention pond may prevent the construction of basements due to the flat topography in portions of the NCP area.

   In the case of Option 1, the following scenarios are possible.

   - If at the time of initial development, the required trunk drainage works in the Ten Year Servicing Plan (or those improvements substituted for the Plan) have not been constructed, the Developer may wish to construct the works and receive a DCC rebate up to the maximum value of the charge paid by the Developer. It is noted that the cost of the works will greatly exceed the DCC rebate. However, it is recognized that, over the long term, sufficient DCC monies will be collected to finance the total trunk improvement costs. It is therefore proposed that the City establish mechanism for this specific storm sewer trunk installation to enable the frontending Developer to be reimbursed the difference between the total costs of this trunk and the initial DCC's paid, as detailed in Section 5.0 "Sanitary Sewer, 5.6 Off-site Servicing Options - "North" Catchment".

- Should the Developer wish to proceed with development prior to the City's construction of trunk improvements, he could pay for the full costs and register a Latecomer Agreement over affected properties that benefit from the proposed work. However, the Developer would be required to pay DCCs, and there would be no rebate possible. It is noted that with a Latecomer arrangement, the amount and schedule of cost recovery is uncertain, since reimbursement is dependent on subsequent development proceeding in a timely manner.

Option 1 with a scenario that allows the initial Developer who front ends trunk improvement costs, to be reimbursed for the portion above his DCC contribution over time by the DCCs paid from subsequent Developers is recommended for the following reasons:

- conventional Latecomer Agreements are structured on a frontage basis, and recovery is only possible from those lands that front the works. Such Latecomer charges are disproportionately unfair, as lands that benefit from the works but do not front them are not required to pay a Latecomer charge;
- this option results in the timely construction of required trunk facilities and does not impose any possible delays for the Developer;
- the reimbursement scheme resolves the City's short term funding shortfall;
- the Developer could construct the required works in a cost effective manner, incorporating the trunk facilities with subdivision requirements. Further, the actual construction cost is expected to be substantially less than what has been estimated, as the City's unit prices allow for inflation, administration, and other costs; and
- construction of drainage works by the Developer would reduce administration costs to the City.

Regardless of the cost recovery scheme, the Developer will be responsible for all required utilities not considered trunk and all interim facilities with no DCC relief or rebate.

Based on the assumption that proposed development applications proceed as anticipated, the following table (Table 6.6) summarizes the projected scheduling for completion of the storm drainage trunk improvements identified.

Table 6.6
Scheduling of Proposed Storm Drainage Improvements

Item No.	Location	Description	Phase	Year
1	167A St.: to 63 Ave.	85 m - 900 mm dia. Trunk Sewer	1	1997
2	63 Ave.: 167 - 168 St.	180 m - 900 mm dia. Trunk Sewer	1	1997
3	168 St.: 61 - 63 Ave.	345 m - 675 mm dia. Trunk Sewer	1	1998
4	168 St.: 63 - 64 Ave.	260 m - 1050 mm dia. Trunk Sewer	1,2	1997
5	168 St.: 64 Ave. north	840 m - 1050 mm dia. Trunk Sewer	1,2	1997
6	168 St.: to Outlet	20 m - 1500 mm dia. Trunk Sewer	1,2	1997
7	64 Ave. and Creek 1	Flow Control Structure	1	1998
8	64 Ave. and Creek 2	Flow Control Structure	2	1999
9	168 St. and 64 Ave.	Wet Pond Upgrade	1	1998
10	WC 1.0	Erosion Protection	1	1999
11	HS 202	Replace Culvert	1	1999
12	168 St. Diversion to Serpentine	800m - 750mm dia. P.E. Diversion sewer and manhole	1	1998

6.10 Habitat Compensation

As initial applications in the Study Area proceed through to construction, the existing ditch south of 64 Avenue will require infilling as noted in Section 6.6.4 Drainage System Evaluation. In order to accommodate this infill, B.C. Environment requires that the Study Area compensate for any loss of habitat and/or riparian corridor by undertaking stream improvements and pond upgrading in the existing creek system north of 64 Avenue (Creek #1). These requirements have been detailed in two drawings titled "West Cloverdale NCP, Northview Creek Habitat Compensation, - Northview Creek #1, Fishway (Dwg. 383-06-01); and Northview Pond Wetland (Dwg. 383-06-02) prepared by ECL Envirowest Consultants Ltd., and included as Appendix VII. The costs of the works identified in these plans are estimated at $120,000. B.C. Environment requires that these works be undertaken by a frontender (or a consortium of frontenders) prior to, or concurrent with the infilling of the existing ditch by initial applications as shown in Section 2. Development Phasing.

It must be noted that the Ministry has not, as of the date of this document, provided final comments on the proposed Compensation Plan, and that ultimate requirements and costs may be subject to revision. The final plan and associated costs will be submitted when available as an addendum to this report.

It is necessary to ensure that the creek and pond will continue to function as intended once the proposed improvements have been completed. As a means of providing access to City of Surrey maintenance personnel and equipment, the City requires that a drainage Right-of-Way be registered over the existing creek from 64 Avenue to and including the existing pond. These rights-of-way will include both the creek and the pond, and will extend to a minimum 5.0 metres from the respective tops-of-bank. In return for these rights-of-way, the City has advised that they are prepared to assume responsibility for the long term maintenance of the improved system however, the scheduling of all maintenance will be at the discretion of the City of Surrey.

Negotiations have been initiated with affected property owners for the pond right-of-way however, rights-of-way through the proposed multi-family development sites north of 64 Avenue will be provided by each applicant as a condition of development.

7. SUMMARY OF MAJOR SERVICING WORKS & FUNDING

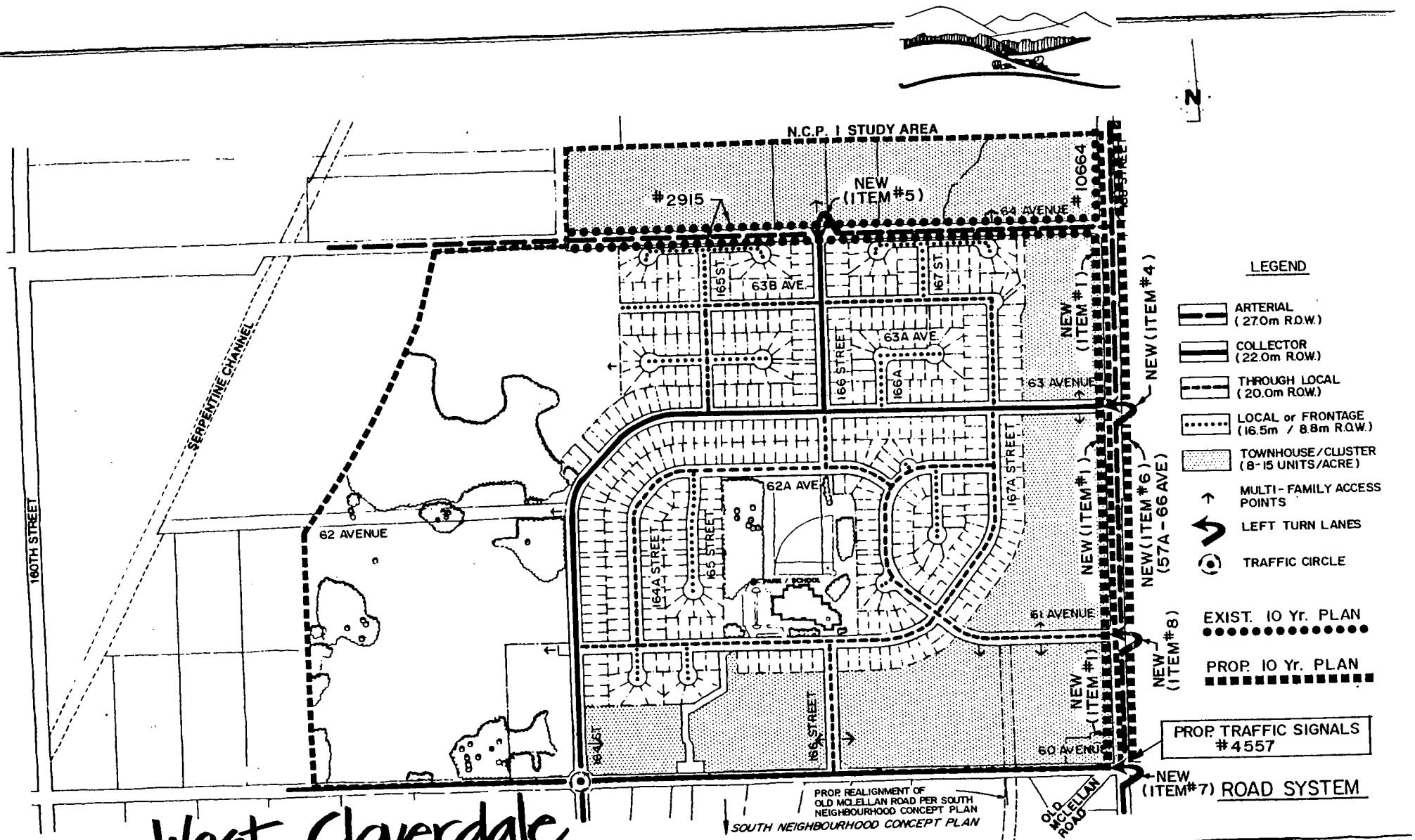
The following tables summarize the major servicing works that have been identified as necessary to provide trunk engineering services for the West Cloverdale North Neighbourhood Concept Plan. Each table identifies the projected construction completion year and provides a preliminary estimate of costs. The intention herein is to provide servicing cost projections and recoveries as they relate not only to the Study Area as a whole, but also to individual construction stages currently proposed per Figure No. 2. The tables identify items which are eligible for inclusion in Development Cost Charge funded works once the proposed amendments to the Development Cost Charge Bylaw and 10 Year Servicing Plan, as recommended in previous sections of this document, are adopted by Council. Costs provided have been based on the current City of Surrey "Unit Rates for Roads/Utilities Within NCP Areas", as provided by the Engineering Department on February 16, 1996. These unit rates are included in Appendix I following the Terms of Reference. D.C.C. contributions indicated throughout this proposal are based on rates set under current By-Law 12618, May 30, 1995. Please note that, unless specifically shown otherwise, no land costs have been included in these figures, since the required lands would be dedicated as roads and R.O.W.'s as development proceeds.

TABLE 7.1
NCP INFRASTRUCTURE FINANCING AND FUNDING
ROADS AND TRAFFIC

ITEM (Estimates) (Location)	Type of Work	Current or Addition	ID# Current 10 Yr Plan	Amount Current Program ($)	Add/Delete to Program ($)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Proposed Funding Method	Construction by (Surrey/Dev.)	Year Requested
Item #1 - 168 ST: 60 - 64 AVE	Rd - Arterial SW & ST. LIGHTS	Addition	-	-	(+)$ 166,400		Y	DCW	DEV	1997-2001
Item #2 - 168 ST: 64 - 65 AVE	Rd. - Arterial SW & ST. LIGHTS	Current	Included in #10664	$ 41,600 (part of $1,000,000)		Y		DCW	DEV	2003
Item #3 - 64 AVE: 168 - 164 ST	Rd - Arterial SW & ST. LIGHTS	Current	Included in #10099	$ 403,900 (part of $ 6,932,000)		Y		DCW	DEV	1997-2005
Item #4 168 ST: @ 63 AVE	Rd - Arterial Left Turn Lane	Addition			(+)$ 150,000		Y	DCW	DEV	1997-1998
Item #5 - 64 AVE: @ 166 ST	Rd - Arterial Left Turn Lane	Addition			(+)$ 150,000		Y	DCW	DEV	1997-1998
Item #6 - 168 ST: 57A - 66 AVE	Rd - Arterial Widening	Addition			(+)$ 560,000		Y	CAPITAL WORKS	SURREY	2001
Item #7 - 168 ST: @ 60 AVE	Rd - Arterial Left Turn Lane	Addition			(+)$ 150,000		Y	DCW	DEV	2002
Item #8 - 168 ST: @ 61 AVE	Rd - Arterial Left Turn Lane	Addition			(+)$ 150,000		Y	DCW	DEV	2003
Item #9 - 168 ST: @ 60 AVE	Rd - Arterial Traffic Signal Req'd.	Current	#4557	$ 85,000		Y		CAPITAL WORKS	SURREY	2002
			TOTALS	**$ 530,500**	**(+)$1,326,400**					

NOTE: (1) Funding Methods (Current):

- DCC Rebate — DCCR
- Development Coordinated Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary) — UPS
- Frontage Latecomer — FLAT
- Area Latecomer (Sanitary Pump Station and Force Main) — ALAT



West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD

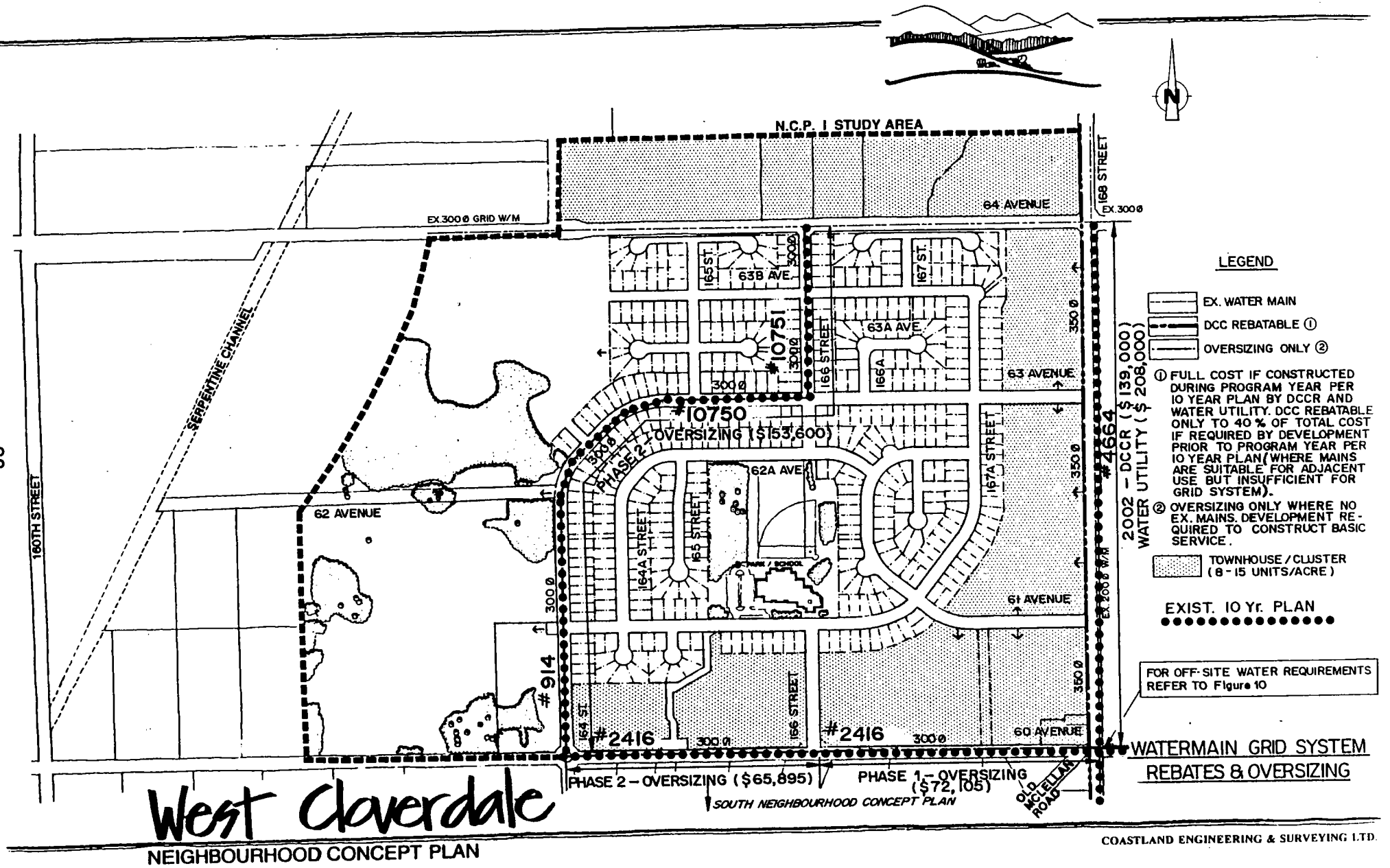
TABLE 7.2
NCP INFRASTRUCTURE FINANCING AND FUNDING
WATER SUPPLY & DISTRIBUTION

ITEM (Estimates) (Location)	Type of Work	Current or Addition	ID# Current 10 Yr Plan	Amount Current Program ($)	Add/Delete to Program ($)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Proposed Funding Method	Construction by (Surrey/Dev.)	Year Requested
Item #1 - 168 ST: 60 - 64 AVE	350mm DIA.MAIN 60 - 64 AVE	Current	#4664	139,000 (included in $347,000)	-	Y	-	DCCR	DEV	1997&1998
Item #2 - 60 AVE: 164 - 168 ST.	300mm DIA.MAIN 166 - 168 ST.	Current	#2416	72,105 (included in $345,000)	-	Y	Y	UPS	DEV.	1998
Item #3 - 166 ST: 63 - 64 AVE; and 63 AVE: 164-166 ST.	300mm DIA.MAIN 166 ST: 63 - 64 AVE & 63 AVE W. 166 ST.	Current	#10751 & #10750	60,800 (included in total of $109,000 & 168,000 resp.)	-	Y	Y	UPS	DEV	1998
Item #4 - 63 AVE: 164 - 166 ST.	300mm DIA.MAIN 63 AVE: 165A - 164 ST.	Current	#10750	50,200 (included in $168,000)	-	Y	Y	UPS	DEV	1999&2000
Item #5 - 164 ST: 60 - 63 AVE	300mm DIA.MAIN 164 ST: 63 - 61 AVE	Current	#914	42,600 (included in $178,000)	-	Y	Y	UPS	DEV.	2001&2002
Item #6 - 60 AVE: 168 - 172 ST.	350mm DIA.MAIN 168 - 172 ST.	Current	#4687	148,000 (included in $370,000)	-	Y	-	DCCR	DEV.	2002
Item # 7 - 60 AVE: 164 - 168 ST.	300mm DIA.MAIN W. OF 166 ST.	Current	#2416	32,775 (included in $345,000)	-	Y	Y	UPS	DEV.	2002
Item #8 - 60 AVE: 172 - 176 ST.	350mm DIA.MAIN 172 - 176 ST.	Current	#4665	155,000 (included in $389,000)	-	Y	Y	DCCR	DEV.	2003
Item #9 - 60 AVE: 164 - 168 ST.	300mm DIA.MAIN W.166 - 164 ST.	Current	#2416	33,120 (included in $345,000)	-	Y	Y	UPS	DEV.	2003
Item #10 - 164 ST: 60 - 63 AVE .	300mm DIA.MAIN 60 - 61 AVE.	Current	#914	28,400 (included in $178,000)	-	Y	Y	UPS	DEV.	2003
Item #11 - 168 ST: 57A -68 AVE	350mmø W/M 60 AVE - 480m S.	Current	#2419	89,000 (included in $222,000)	-	Y	-	–	SURREY	2007
			TOTALS	$ 851,000						

* ITEMS 10 & 11 SUGGESTED WORKS ONLY - NOT REQUIRED TO SERVICE STUDY AREA.

NOTE: (1) Funding Methods (Current):

- DCC Rebate — DCCR
- Development Coordinated Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary) — UPS
- Frontage Latecomer — FLAT
- Area Latecomer (Sanitary Pump Station and Force Main) — ALAT



West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.

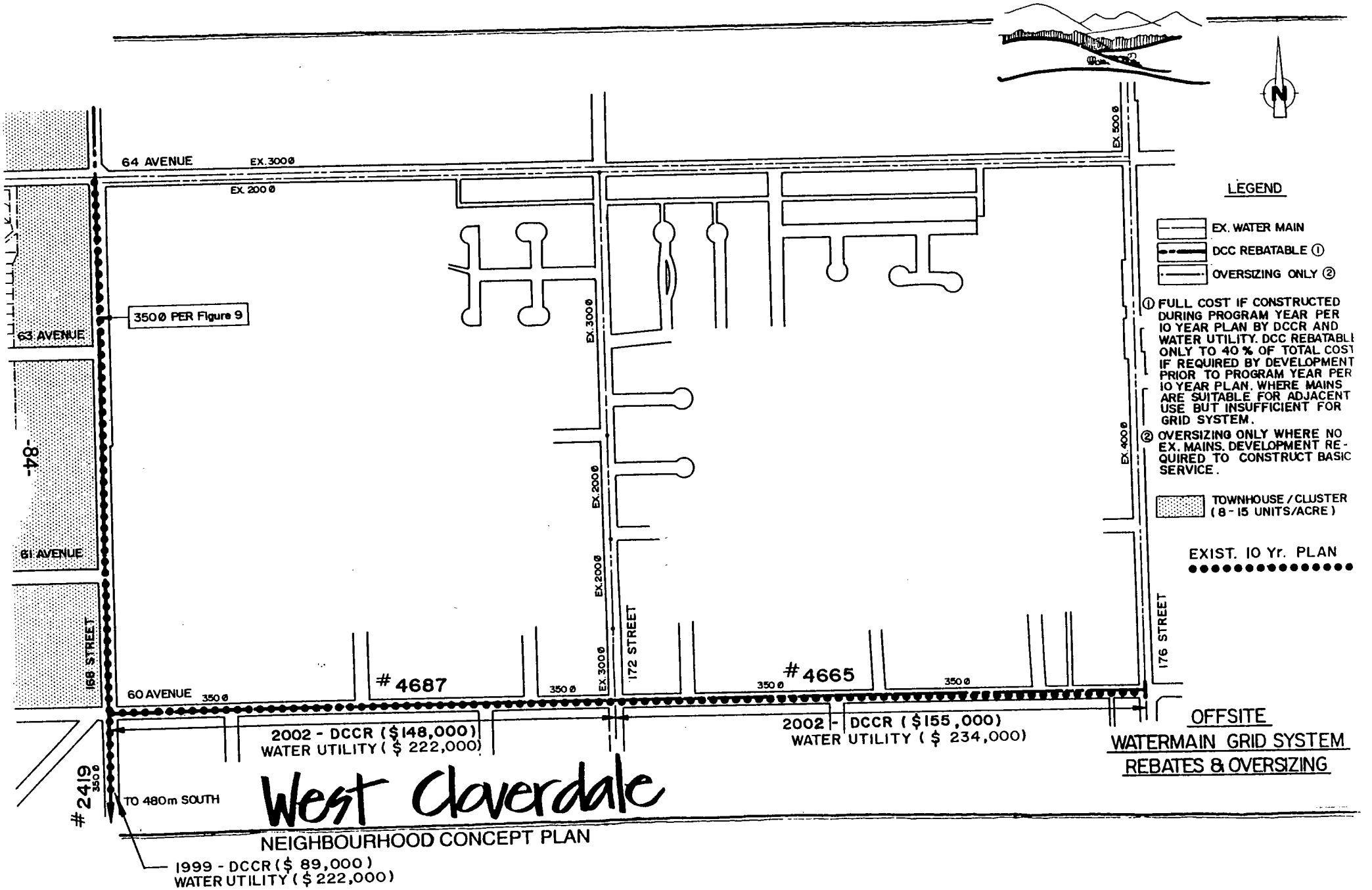

64 AVENUE
EX. 300Ø
EX. 200Ø
EX. 500Ø
EX. 400Ø
EX. 300Ø
EX. 200Ø
EX. 200Ø
EX. 300Ø
350Ø PER Figure 9
63 AVENUE
61 AVENUE
168 STREET
172 STREET
176 STREET
60 AVENUE
350Ø
350Ø
350Ø
350Ø
350Ø
#4687
#4665
#2419
350Ø
TO 480m SOUTH
2002 - DCCR ($148,000)
WATER UTILITY ($ 222,000)
2002 - DCCR ($155,000)
WATER UTILITY ($ 234,000)
1999 - DCCR ($ 89,000)
WATER UTILITY ($ 222,000)
N
LEGEND
EX. WATER MAIN
DCC REBATABLE ①
OVERSIZING ONLY ②
① FULL COST IF CONSTRUCTED DURING PROGRAM YEAR PER 10 YEAR PLAN BY DCCR AND WATER UTILITY. DCC REBATABLE ONLY TO 40 % OF TOTAL COST IF REQUIRED BY DEVELOPMENT PRIOR TO PROGRAM YEAR PER 10 YEAR PLAN. WHERE MAINS ARE SUITABLE FOR ADJACENT USE BUT INSUFFICIENT FOR GRID SYSTEM.
② OVERSIZING ONLY WHERE NO EX. MAINS. DEVELOPMENT REQUIRED TO CONSTRUCT BASIC SERVICE.
TOWNHOUSE / CLUSTER (8 - 15 UNITS/ACRE)
EXIST. 10 Yr. PLAN
OFFSITE
WATERMAIN GRID SYSTEM
REBATES & OVERSIZING
West Cloverdale
NEIGHBOURHOOD CONCEPT PLAN

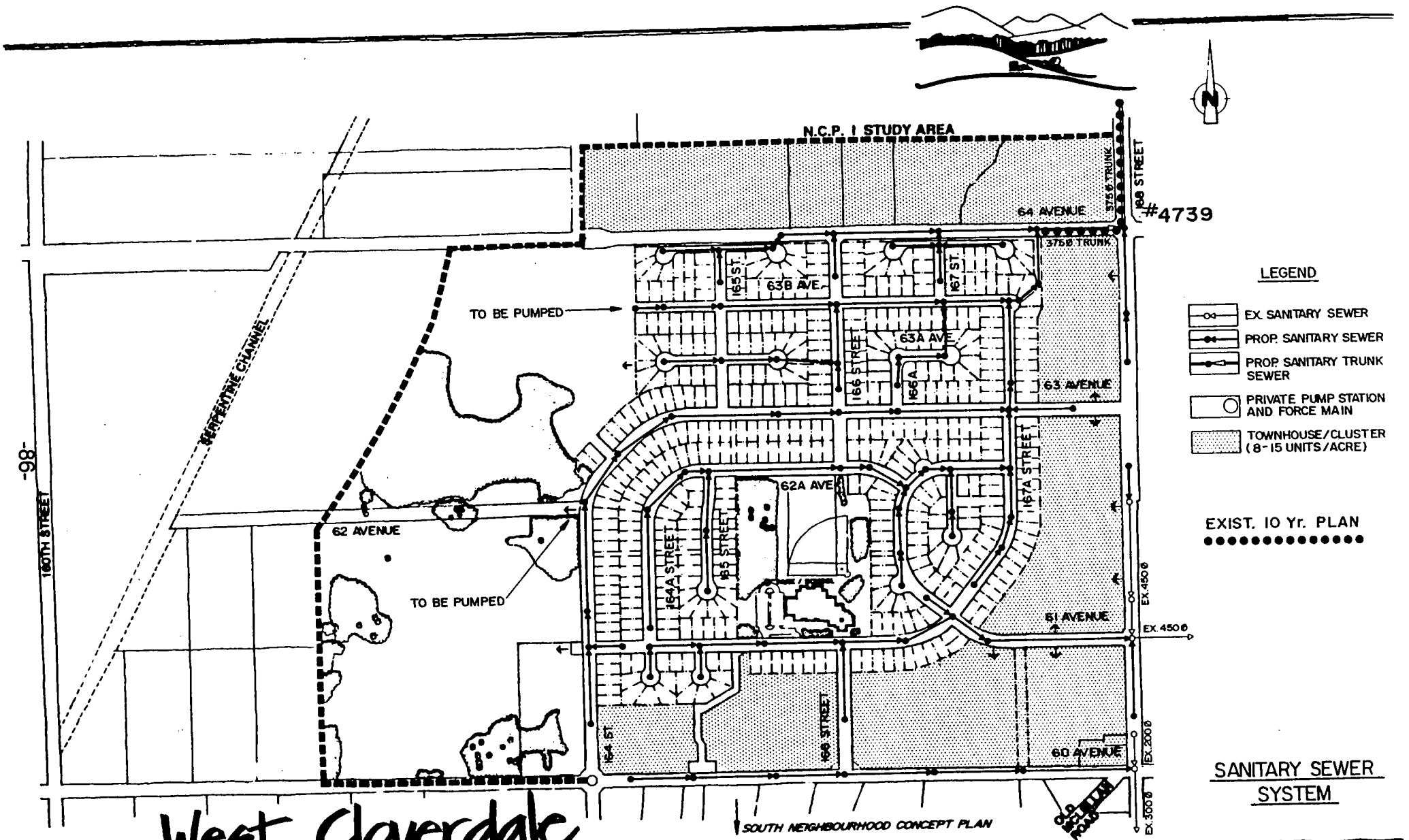
TABLE 7.3
NCP INFRASTRUCTURE FINANCING AND FUNDING
SANITARY SEWER

ITEM (Estimates) (Location)	Type of Work	Current or Addition	ID# Current 10 Yr Plan	Amount Current Program ($)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Proposed Funding Method	Construction by (Surrey/Dev.)	Year Requested
Item #1: 66 AVE TRUNK 167A ST - 170 ST.	770m - 375mm dia. Trunk Sewer	Current	4739	$ 335,000 (included in $1,679,000)	Y	Y	DCCR	DEV	1997
Item #2 66 AVE TRUNK 170 ST - 176 ST	1501m - 450mm dia. Trunk Sewer	Current	4739	$ 721,000 (included in $1,679,000)	Y	Y	DCCR	DEV	1997
Item #3 66 AVE TRUNK 176 ST - 176A ST	250m - 200/250mm dia. Trunk Siphon	Current	4739	$165,000 (included in $1,679,000)	Y	Y	DCCR	DEV	1997
			TOTALS	**$1,221,000**	**= TOTAL ESTIMATED NCP TRUNK IMPROVEMENT COSTS.**				

NOTE: (1) Funding Methods (Current):

- DCC Rebate — DCCR
- Development Coordinated Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary) — UPS
- Frontage Latecomer — FLAT
- Area Latecomer (Sanitary Pump Station and Force Main) — ALAT

C:\WP60\DOC\IAN\886-7-3 TBL


N.C.P. I STUDY AREA
#4739
64 AVENUE
168 STREET
375Ø TRUNK
165 ST
63B AVE
167 ST
63A AVE
166 STREET
166A
63 AVENUE
TO BE PUMPED
SERPENTINE CHANNEL
160TH STREET
62 AVENUE
62A AVE
164A STREET
165 STREET
167A STREET
61 AVENUE
EX.450Ø
EX 450Ø
164 ST
166 STREET
60 AVENUE
EX.200Ø
EX.300Ø
SOUTH NEIGHBOURHOOD CONCEPT PLAN
LEGEND
EX. SANITARY SEWER
PROP. SANITARY SEWER
PROP. SANITARY TRUNK SEWER
PRIVATE PUMP STATION AND FORCE MAIN
TOWNHOUSE/CLUSTER (8-15 UNITS/ACRE)
EXIST. 10 Yr. PLAN
SANITARY SEWER SYSTEM
West Cloverdale
NEIGHBOURHOOD CONCEPT PLAN
COASTLAND ENGINEERING & SURVEYING

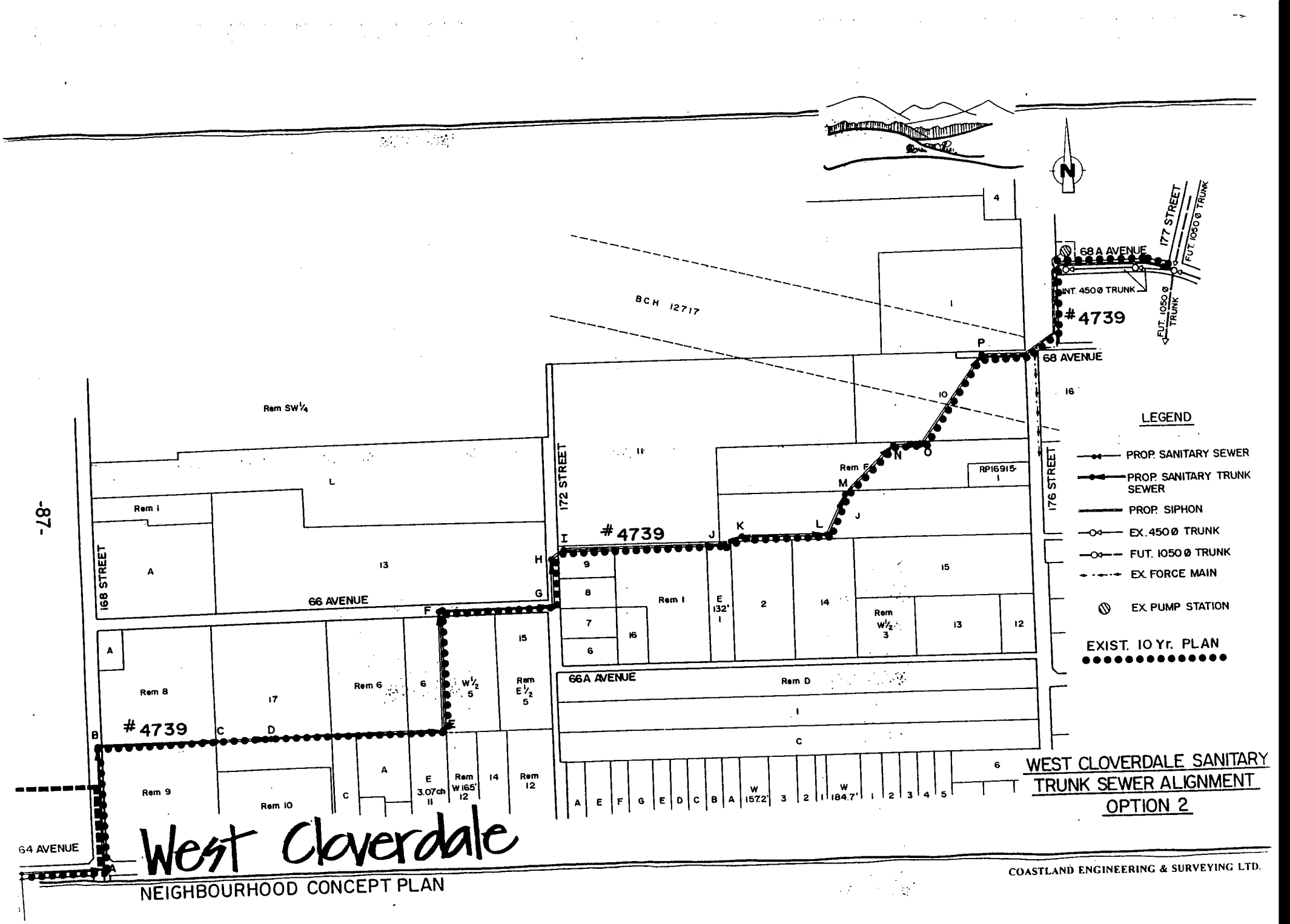
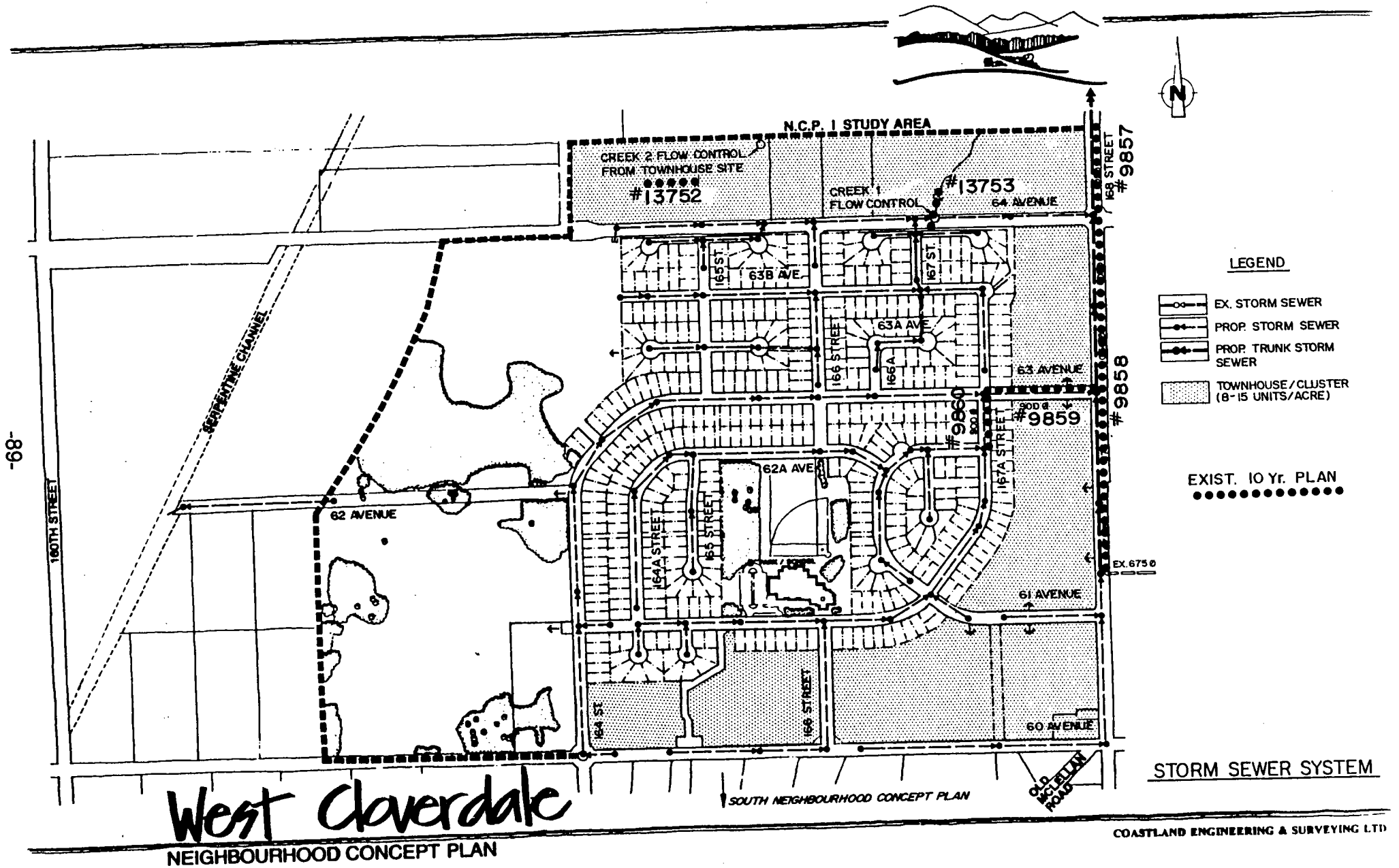

West Cloverdale
NEIGHBOURHOOD CONCEPT PLAN
WEST CLOVERDALE SANITARY TRUNK SEWER ALIGNMENT OPTION 2
COASTLAND ENGINEERING & SURVEYING LTD.
LEGEND
PROP. SANITARY SEWER
PROP. SANITARY TRUNK SEWER
PROP. SIPHON
EX. 450Ø TRUNK
FUT. 1050Ø TRUNK
EX. FORCE MAIN
EX. PUMP STATION
EXIST. 10 Yr. PLAN
#4739
168 STREET
172 STREET
176 STREET
177 STREET
64 AVENUE
66 AVENUE
66A AVENUE
68 AVENUE
68A AVENUE
Rem SW¼
BCH 12717
EX. 450Ø TRUNK
FUT. 1050Ø TRUNK
FUT. 1050Ø TRUNK
-87-

TABLE 7.4
NCP INFRASTRUCTURE FINANCING AND FUNDING
DRAINAGE

ITEM (Location)	Type of Work	Current or Addition	ID# Current 10 Yr Plan	Amount Current Program ($)	Add/Delete to Program ($)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Proposed Funding Method	Construction by (Surrey/Dev.)	Year Requested
Item 1: 167 St.: to 63 Ave	85m - 900mm dia. Trunk Sewer	Current	9860	$ 70,000	(+) $ 9,100	Y		DCCR	DEVELOPER	1997
Item 2: 63 Ave.: 167 - 168 St.	180m - 900mm dia. Trunk Sewer	Current	9859	$170,000	(-) $ 2,600	Y		DCCR	DEVELOPER	1997
Item 3: 168 St.: 61 -63 Ave.	345m - 675mm dia. Trunk Sewer	Current	9858	$200,000	(+) $ 17,400	Y		DCCR	DEVELOPER	1998
Item 4: 168 St.: 63 - 64 Ave.	260m - 1050mm dia. Trunk Sewer	Current	9858	$270,000	(+) $10,800	Y		DCCR	DEVELOPER	1997
Item 5: 168 St.: 64 Ave. north	840m - 105mm dia. Trunk Sewer	Current	9857	$907,000	(+) $ 200	Y		DCCR	DEVELOPER	1997
Item 6: 168 St.: to Outlet	20m- - 1500mm dia. Trunk Sewer	Current	9857	$ 33,000	(+) $ 300	Y		DCCR	DEVELOPER	1997
Item 7: 64 Ave. and Creek 1	Flow Control Structure	Current	13752	$ 30,000	(-) $ 30,000	N	Y	N/A	DEVELOPER	1998
Item 8: 64 Ave. and Creek 2	Flow Control Structure	Current	13753	$ 30,000	(-) $ 30,000	N	Y	N/A	DEVELOPER	1999
Item 9: 168 St. and 64 Ave.	Wet Pond Upgrade	Current	13757	$250,000	(-) $250,000	N	Y	N/A	DEVELOPER	1999
Item 10: WC 1.0	Erosion Protection	Current	9867	$320,000	(-) $ 320,000	N	Y	N/A	DEVELOPER	1999
Item 11: 168 St. Diversion to Serpentine	800m-750mm PE & diversion MH	Addition		0	(+) $225,000	Y	Y	DCCR	DEVELOPER	1998
East of Serp. Channel between 64 & 62 Ave	400m-750⌀	Current	9862	$310,000	(-) $310,000	Y	Trib. Area <20 ha			
East of Serp. Channel between 60 & 62 Ave	320m-750⌀	Current	9863	$280,000	(-) $280,000	Y	Trib. Area <20 ha			
62 Ave: 162 St. to Serp. Channel	200m-750⌀	Current	9864	$160,000	(-) $160,000	Y	Trib Area <20 ha			
TOTALS	–	–	Totals	$ 3,030,000	(-) $1,119,800	$1,910,200	=TOTAL NCP	Trunk	Improvement	Costs
Note: [1] Funding Methods (Current):										
	DCC Rebate			DCCR						
Item 11: HS 202	DCC Funds			DCCF						



West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

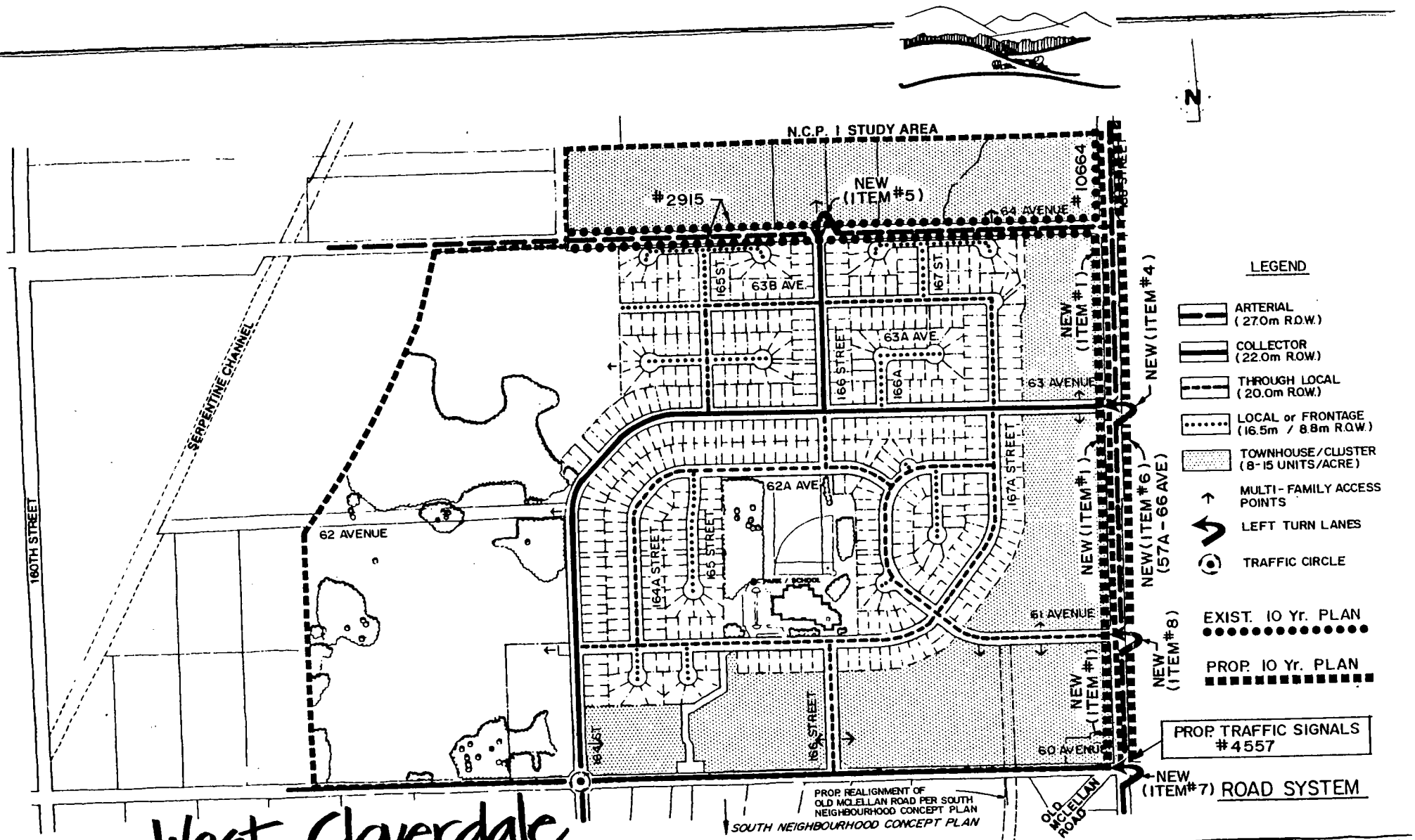
COASTLAND ENGINEERING & SURVEYING LTD

TABLE 7.1
NCP INFRASTRUCTURE FINANCING AND FUNDING
ROADS AND TRAFFIC

ITEM (Estimates) (Location)	Type of Work	Current or Addition	ID# Current 10 Yr Plan	Amount Current Program ($)	Add/Delete to Program ($)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Proposed Funding Method	Construction by (Surrey/Dev.)	Year Requested
Item #1 - 168 ST: 60 - 64 AVE	Rd - Arterial SW & ST. LIGHTS	Addition	-	-	(+)$ 166,400		Y	DCW	DEV	1997-2001
Item #2 - 168 ST: 64 - 65 AVE	Rd. - Arterial SW & ST. LIGHTS	Current	Included in #10664	$ 41,600 (part of $1,000,000)		Y		DCW	DEV	2003
Item #3 - 64 AVE: 168 - 164 ST	Rd - Arterial SW & ST. LIGHTS	Current	Included in #10099	$ 403,900 (part of $ 6,932,000)		Y		DCW	DEV	1997-2005
Item #4 168 ST: @ 63 AVE	Rd - Arterial Left Turn Lane	Addition			(+)$ 150,000		Y	DCW	DEV	1997-1998
Item #5 - 64 AVE: @ 166 ST	Rd - Arterial Left Turn Lane	Addition			(+)$ 150,000		Y	DCW	DEV	1997-1998
Item #6 - 168 ST: 57A - 66 AVE	Rd - Arterial Widening	Addition			(+)$ 560,000		Y	CAPITAL WORKS	SURREY	2001
Item #7 - 168 ST: @ 60 AVE	Rd - Arterial Left Turn Lane	Addition			(+)$ 150,000		Y	DCW	DEV	2002
Item #8 - 168 ST: @ 61 AVE	Rd - Arterial Left Turn Lane	Addition			(+)$ 150,000		Y	DCW	DEV	2003
Item #9 - 168 ST: @ 60 AVE	Rd - Arterial Traffic Signal Req'd.	Current	#4557	$ 85,000		Y		CAPITAL WORKS	SURREY	2002
			TOTALS	**$ 530,500**	**(+)$1,326,400**					

NOTE: (1) Funding Methods (Current):

- DCC Rebate — DCCR
- Development Coordinated Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary) — UPS
- Frontage Latecomer — FLAT
- Area Latecomer (Sanitary Pump Station and Force Main) — ALAT



West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD

TABLE 7.2
NCP INFRASTRUCTURE FINANCING AND FUNDING
WATER SUPPLY & DISTRIBUTION

ITEM (Estimates) (Location)	Type of Work	Current or Addition	ID# Current 10 Yr Plan	Amount Current Program ($)	Add/Delete to Program ($)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Proposed Funding Method	Construction by (Surrey/Dev.)	Year Requested
Item #1 - 168 ST: 60 - 64 AVE	350mm DIA.MAIN 60 - 64 AVE	Current	#4664	139,000 (included in $347,000)	-	Y	-	DCCR	DEV	1997&1998
Item #2 - 60 AVE: 164 - 168 ST.	300mm DIA.MAIN 166 - 168 ST.	Current	#2416	72,105 (included in $345,000)	-	Y	Y	UPS	DEV.	1998
Item #3 - 166 ST: 63 - 64 AVE; and 63 AVE: 164-166 ST.	300mm DIA.MAIN 166 ST: 63 - 64 AVE & 63 AVE W. 166 ST.	Current	#10751 & #10750	60,800 (included in total of $109,000 & 168,000 resp.)	-	Y	Y	UPS	DEV	1998
Item #4 - 63 AVE: 164 - 166 ST.	300mm DIA.MAIN 63 AVE: 165A - 164 ST.	Current	#10750	50,200 (included in $168,000)	-	Y	Y	UPS	DEV	1999&2000
Item #5 - 164 ST: 60 - 63 AVE	300mm DIA.MAIN 164 ST: 63 - 61 AVE	Current	#914	42,600 (included in $178,000)	-	Y	Y	UPS	DEV.	2001&2002
Item #6 - 60 AVE: 168 - 172 ST.	350mm DIA.MAIN 168 - 172 ST.	Current	#4687	148,000 (included in $370,000)	-	Y	-	DCCR	DEV.	2002
Item # 7 - 60 AVE: 164 - 168 ST.	300mm DIA.MAIN W. OF 166 ST.	Current	#2416	32,775 (included in $345,000)	-	Y	Y	UPS	DEV.	2002
Item #8 - 60 AVE: 172 - 176 ST.	350mm DIA.MAIN 172 - 176 ST.	Current	#4665	155,000 (included in $389,000)	-	Y	Y	DCCR	DEV.	2003
Item #9 - 60 AVE: 164 - 168 ST.	300mm DIA.MAIN W.166 - 164 ST.	Current	#2416	33,120 (included in $345,000)	-	Y	Y	UPS	DEV.	2003
Item #10 - 164 ST: 60 - 63 AVE .	300mm DIA.MAIN 60 - 61 AVE.	Current	#914	28,400 (included in $178,000)	-	Y	Y	UPS	DEV.	2003
Item #11 - 168 ST: 57A -68 AVE	350mmø W/M 60 AVE - 480m S.	Current	#2419	89,000 (included in $222,000)	-	Y	-	–	SURREY	2007
			TOTALS	$ 851,000						

* ITEMS 10 & 11 SUGGESTED WORKS ONLY - NOT REQUIRED TO SERVICE STUDY AREA.

NOTE: (1) Funding Methods (Current):

- DCC Rebate — DCCR
- Development Coordinated Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary) — UPS
- Frontage Latecomer — FLAT
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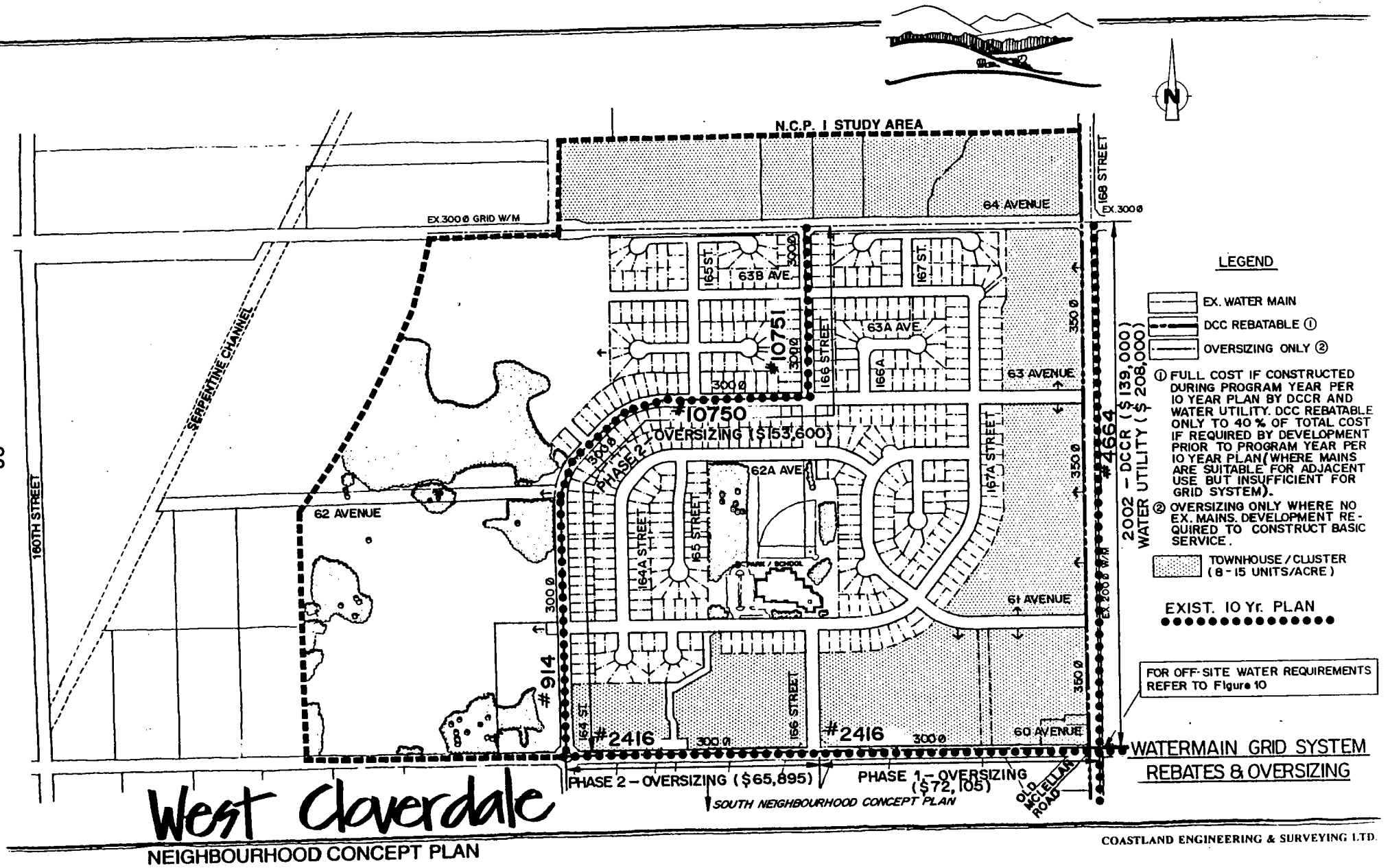
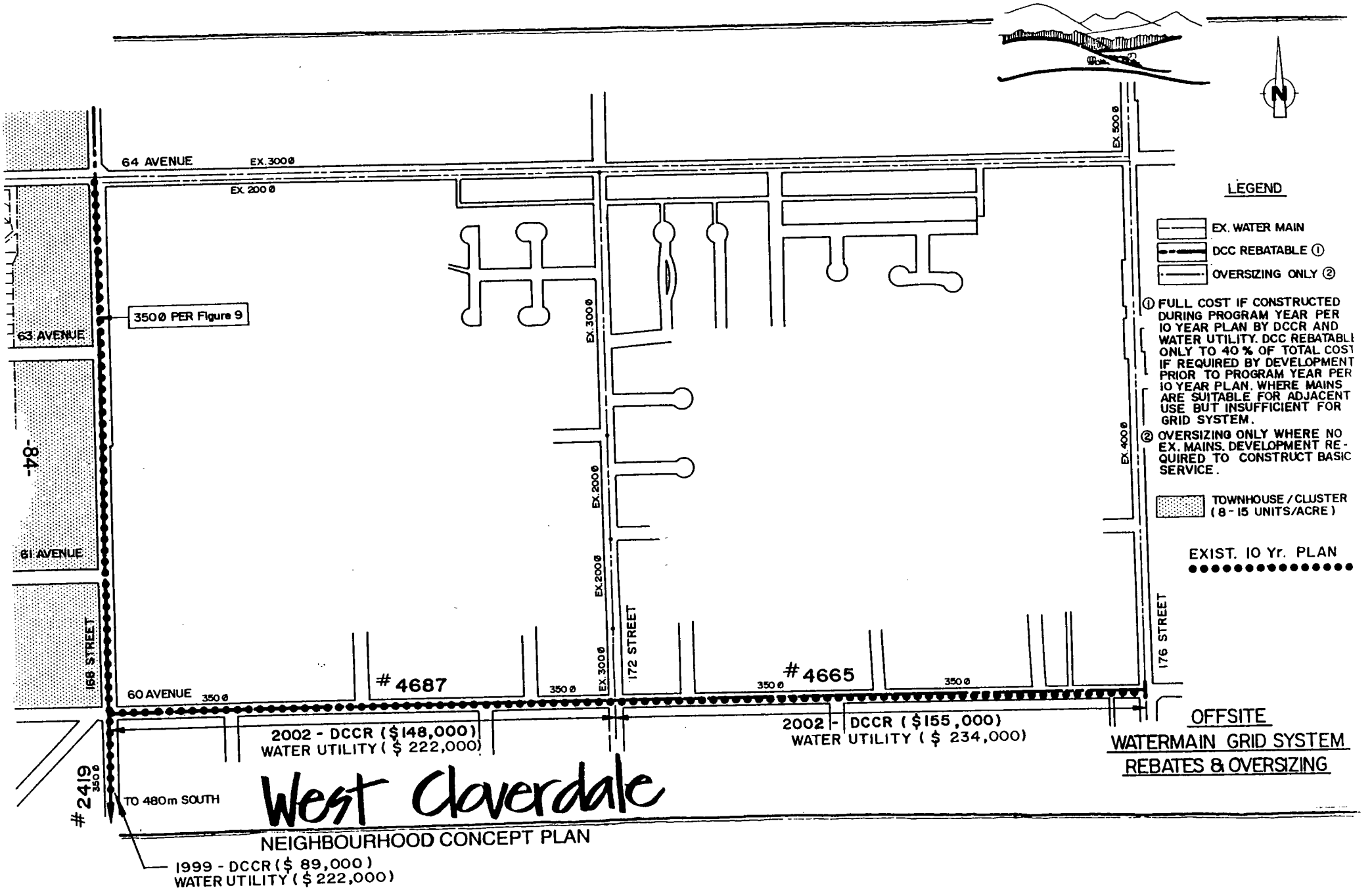


West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.


64 AVENUE
EX. 300Ø
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EX. 500Ø
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EX. 200Ø
EX. 300Ø
350Ø PER Figure 9
63 AVENUE
61 AVENUE
168 STREET
172 STREET
176 STREET
60 AVENUE
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350Ø
#4687
#4665
#2419
350Ø
TO 480m SOUTH
2002 - DCCR ($148,000)
WATER UTILITY ($ 222,000)
2002 - DCCR ($155,000)
WATER UTILITY ($ 234,000)
1999 - DCCR ($ 89,000)
WATER UTILITY ($ 222,000)
N
LEGEND
EX. WATER MAIN
DCC REBATABLE ①
OVERSIZING ONLY ②
① FULL COST IF CONSTRUCTED DURING PROGRAM YEAR PER 10 YEAR PLAN BY DCCR AND WATER UTILITY. DCC REBATABLE ONLY TO 40 % OF TOTAL COST IF REQUIRED BY DEVELOPMENT PRIOR TO PROGRAM YEAR PER 10 YEAR PLAN. WHERE MAINS ARE SUITABLE FOR ADJACENT USE BUT INSUFFICIENT FOR GRID SYSTEM.
② OVERSIZING ONLY WHERE NO EX. MAINS. DEVELOPMENT REQUIRED TO CONSTRUCT BASIC SERVICE.
TOWNHOUSE / CLUSTER (8 - 15 UNITS/ACRE)
EXIST. 10 Yr. PLAN
OFFSITE
WATERMAIN GRID SYSTEM
REBATES & OVERSIZING
West Cloverdale
NEIGHBOURHOOD CONCEPT PLAN

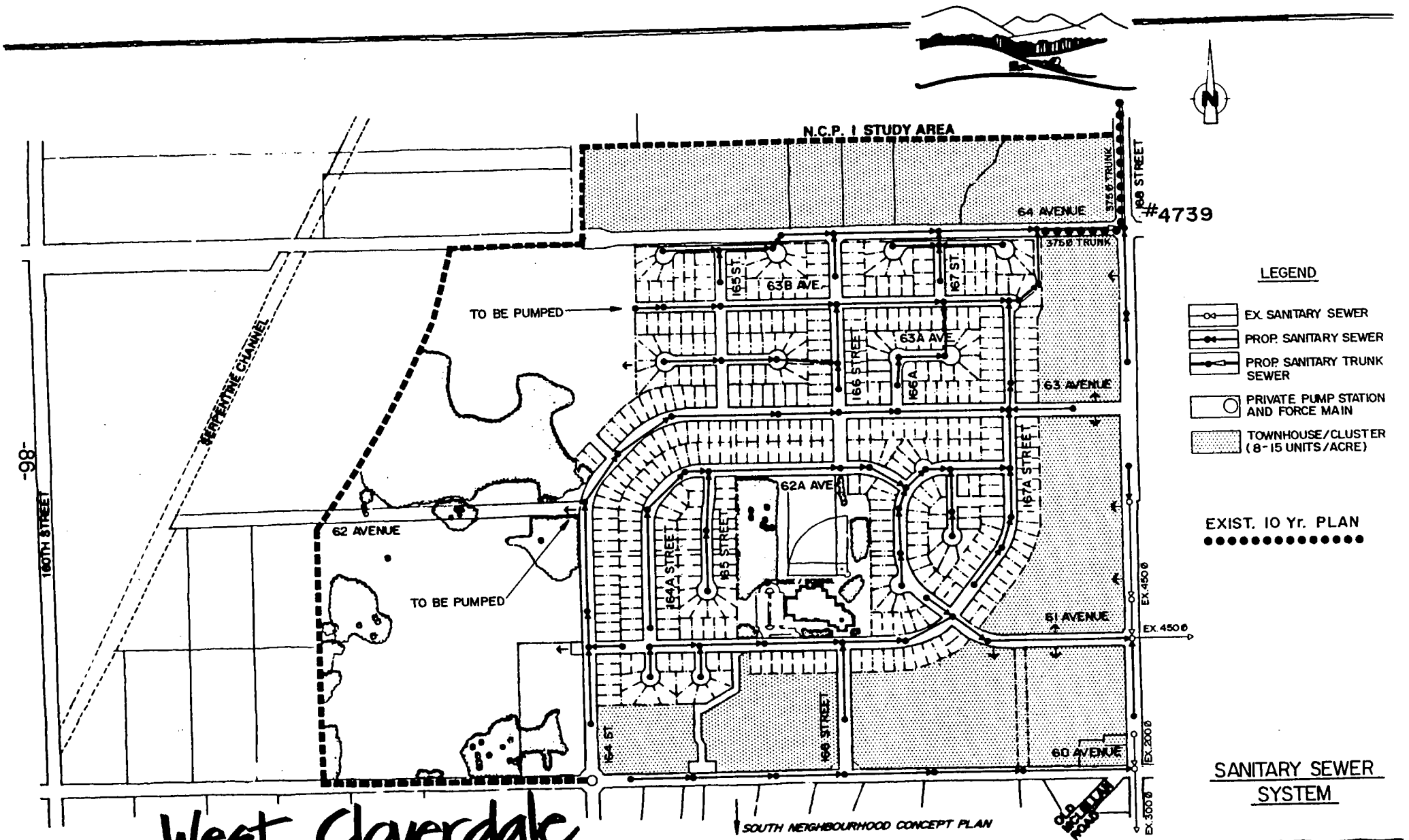
TABLE 7.3
NCP INFRASTRUCTURE FINANCING AND FUNDING
SANITARY SEWER

ITEM (Estimates) (Location)	Type of Work	Current or Addition	ID# Current 10 Yr Plan	Amount Current Program ($)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Proposed Funding Method	Construction by (Surrey/Dev.)	Year Requested
Item #1: 66 AVE TRUNK 167A ST - 170 ST.	770m - 375mm dia. Trunk Sewer	Current	4739	$ 335,000 (included in $1,679,000)	Y	Y	DCCR	DEV	1997
Item #2 66 AVE TRUNK 170 ST - 176 ST	1501m - 450mm dia. Trunk Sewer	Current	4739	$ 721,000 (included in $1,679,000)	Y	Y	DCCR	DEV	1997
Item #3 66 AVE TRUNK 176 ST - 176A ST	250m - 200/250mm dia. Trunk Siphon	Current	4739	$165,000 (included in $1,679,000)	Y	Y	DCCR	DEV	1997
			TOTALS	**$1,221,000**	**= TOTAL ESTIMATED NCP TRUNK IMPROVEMENT COSTS.**				

NOTE: (1) Funding Methods (Current):

- DCC Rebate — DCCR
- Development Coordinated Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary) — UPS
- Frontage Latecomer — FLAT
- Area Latecomer (Sanitary Pump Station and Force Main) — ALAT

C:\WP60\DOC\IAN\886-7-3 TBL


N.C.P. I STUDY AREA
#4739
64 AVENUE
168 STREET
375Ø TRUNK
165 ST
63B AVE
167 ST
63A AVE
166 STREET
166A
63 AVENUE
TO BE PUMPED
SERPENTINE CHANNEL
160TH STREET
62 AVENUE
62A AVE
164A STREET
165 STREET
167A STREET
61 AVENUE
EX.450Ø
EX 450Ø
164 ST
166 STREET
60 AVENUE
EX.200Ø
EX.300Ø
SOUTH NEIGHBOURHOOD CONCEPT PLAN
LEGEND
EX. SANITARY SEWER
PROP. SANITARY SEWER
PROP. SANITARY TRUNK SEWER
PRIVATE PUMP STATION AND FORCE MAIN
TOWNHOUSE/CLUSTER (8-15 UNITS/ACRE)
EXIST. 10 Yr. PLAN
SANITARY SEWER SYSTEM
West Cloverdale
NEIGHBOURHOOD CONCEPT PLAN
COASTLAND ENGINEERING & SURVEYING

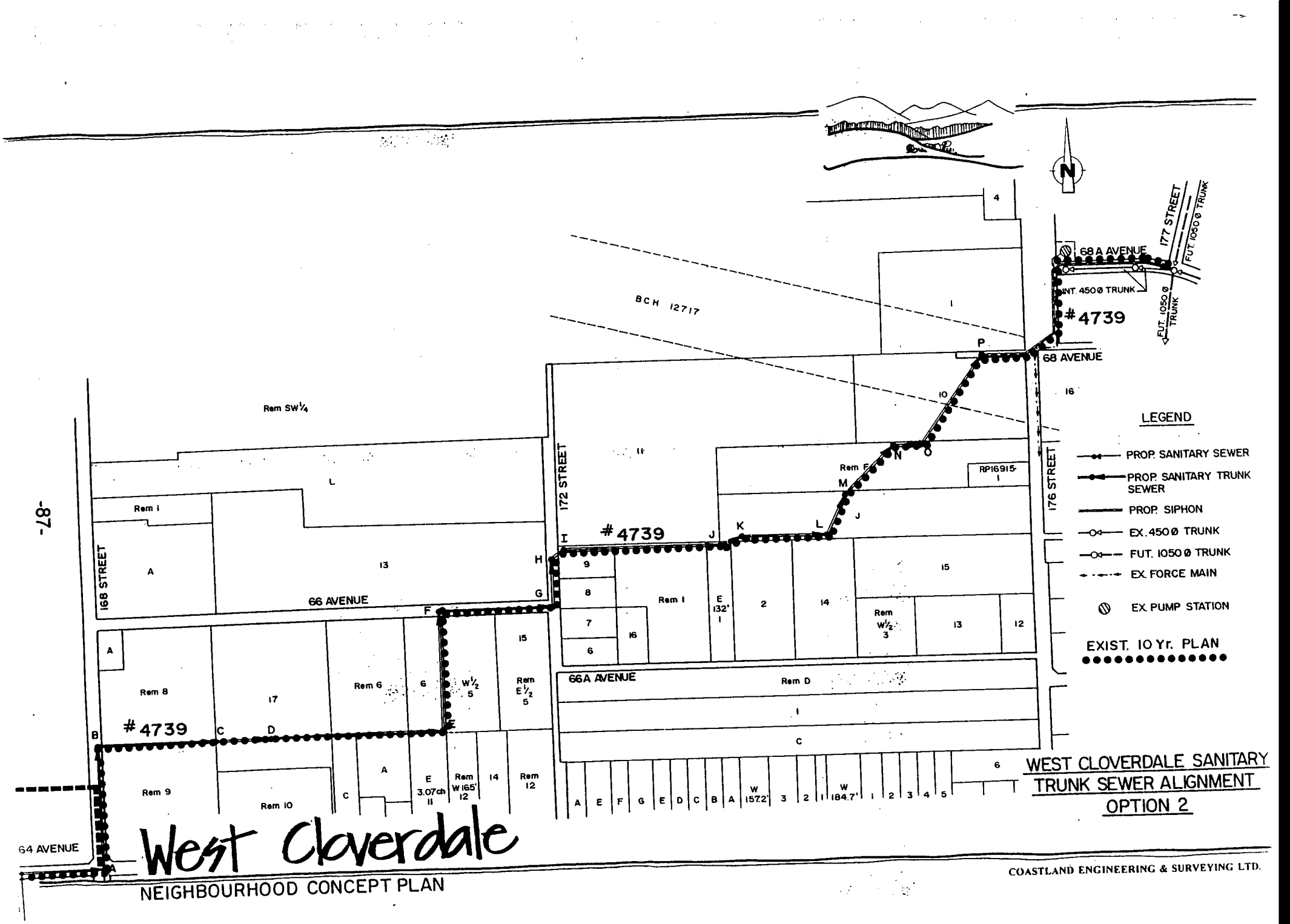
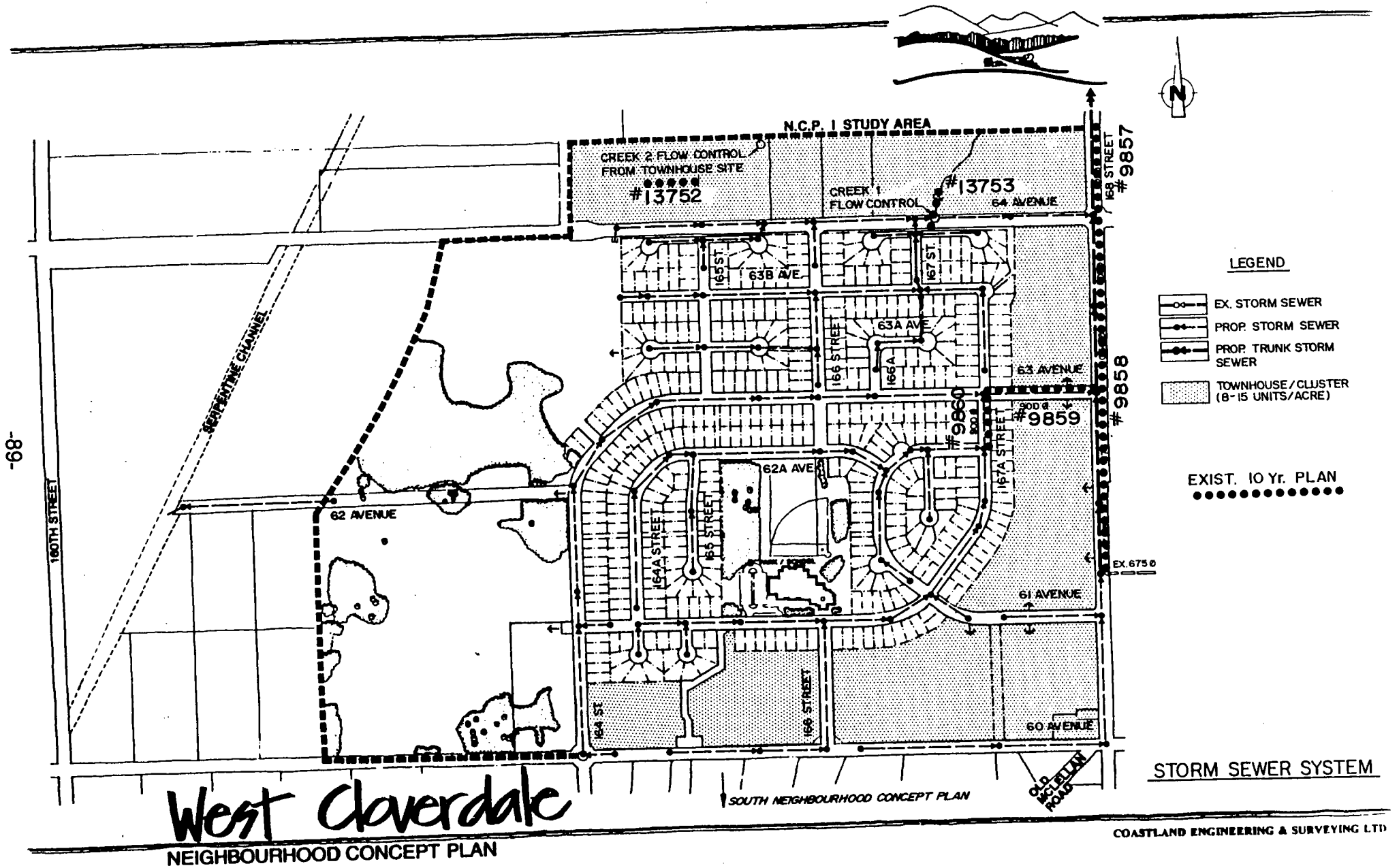

West Cloverdale
NEIGHBOURHOOD CONCEPT PLAN
WEST CLOVERDALE SANITARY TRUNK SEWER ALIGNMENT OPTION 2
COASTLAND ENGINEERING & SURVEYING LTD.
LEGEND
PROP. SANITARY SEWER
PROP. SANITARY TRUNK SEWER
PROP. SIPHON
EX. 450Ø TRUNK
FUT. 1050Ø TRUNK
EX. FORCE MAIN
EX. PUMP STATION
EXIST. 10 Yr. PLAN
#4739
168 STREET
172 STREET
176 STREET
177 STREET
64 AVENUE
66 AVENUE
66A AVENUE
68 AVENUE
68A AVENUE
Rem SW¼
BCH 12717
EX. 450Ø TRUNK
FUT. 1050Ø TRUNK
FUT. 1050Ø TRUNK
-87-

TABLE 7.4
NCP INFRASTRUCTURE FINANCING AND FUNDING
DRAINAGE

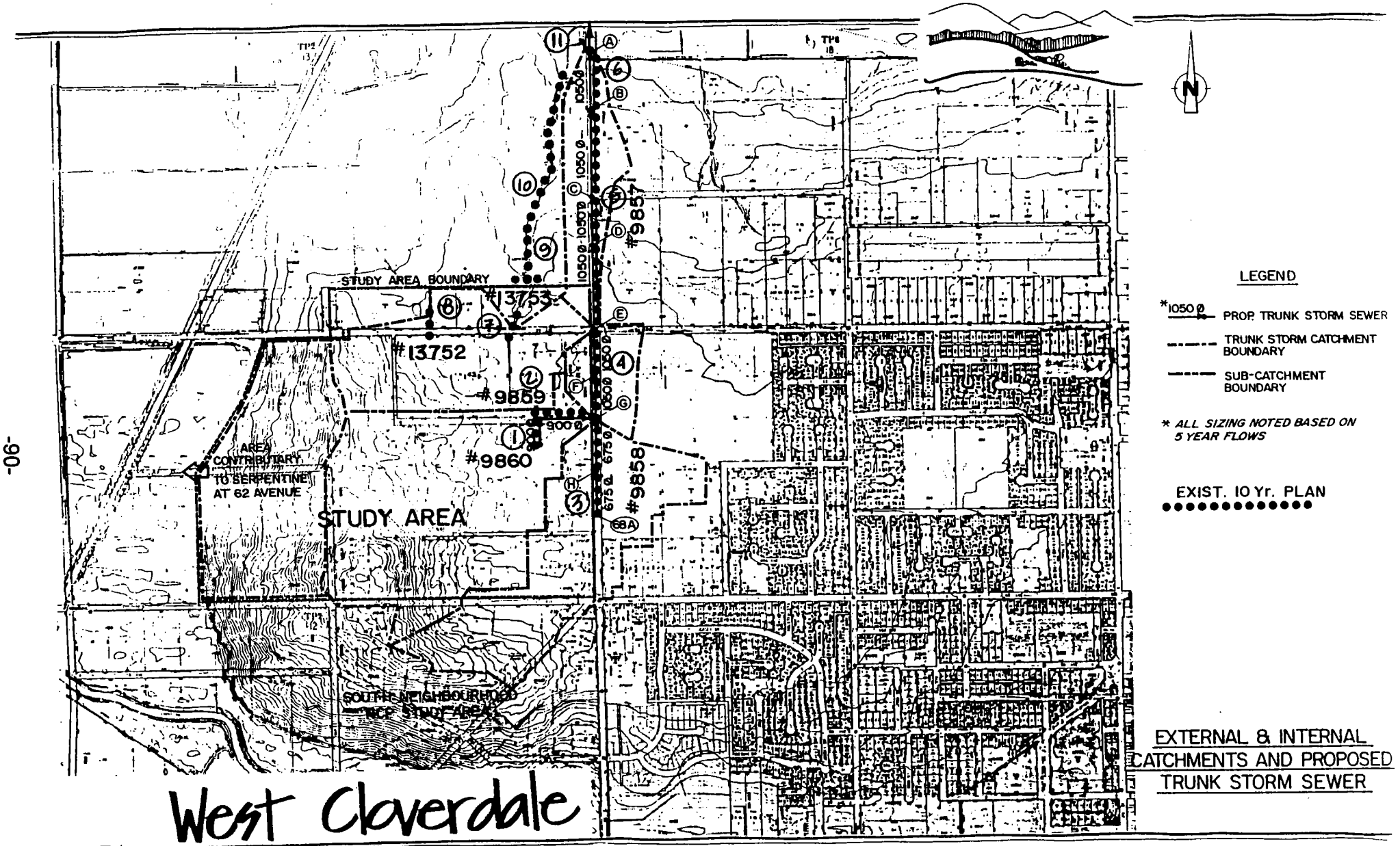
ITEM (Location)	Type of Work	Current or Addition	ID# Current 10 Yr Plan	Amount Current Program ($)	Add/Delete to Program ($)	Eligible for DCC Program (Y/N)	Refinement of DCC Program	Proposed Funding Method	Construction by (Surrey/Dev.)	Year Requested
Item 1: 167 St.: to 63 Ave	85m - 900mm dia. Trunk Sewer	Current	9860	$ 70,000	(+) $ 9,100	Y		DCCR	DEVELOPER	1997
Item 2: 63 Ave.: 167 - 168 St.	180m - 900mm dia. Trunk Sewer	Current	9859	$170,000	(-) $ 2,600	Y		DCCR	DEVELOPER	1997
Item 3: 168 St.: 61 -63 Ave.	345m - 675mm dia. Trunk Sewer	Current	9858	$200,000	(+) $ 17,400	Y		DCCR	DEVELOPER	1998
Item 4: 168 St.: 63 - 64 Ave.	260m - 1050mm dia. Trunk Sewer	Current	9858	$270,000	(+) $10,800	Y		DCCR	DEVELOPER	1997
Item 5: 168 St.: 64 Ave. north	840m - 105mm dia. Trunk Sewer	Current	9857	$907,000	(+) $ 200	Y		DCCR	DEVELOPER	1997
Item 6: 168 St.: to Outlet	20m- - 1500mm dia. Trunk Sewer	Current	9857	$ 33,000	(+) $ 300	Y		DCCR	DEVELOPER	1997
Item 7: 64 Ave. and Creek 1	Flow Control Structure	Current	13752	$ 30,000	(-) $ 30,000	N	Y	N/A	DEVELOPER	1998
Item 8: 64 Ave. and Creek 2	Flow Control Structure	Current	13753	$ 30,000	(-) $ 30,000	N	Y	N/A	DEVELOPER	1999
Item 9: 168 St. and 64 Ave.	Wet Pond Upgrade	Current	13757	$250,000	(-) $250,000	N	Y	N/A	DEVELOPER	1999
Item 10: WC 1.0	Erosion Protection	Current	9867	$320,000	(-) $ 320,000	N	Y	N/A	DEVELOPER	1999
Item 11: 168 St. Diversion to Serpentine	800m-750mm PE & diversion MH	Addition		0	(+) $225,000	Y	Y	DCCR	DEVELOPER	1998
East of Serp. Channel between 64 & 62 Ave	400m-750⌀	Current	9862	$310,000	(-) $310,000	Y	Trib. Area <20 ha			
East of Serp. Channel between 60 & 62 Ave	320m-750⌀	Current	9863	$280,000	(-) $280,000	Y	Trib. Area <20 ha			
62 Ave: 162 St. to Serp. Channel	200m-750⌀	Current	9864	$160,000	(-) $160,000	Y	Trib Area <20 ha			
TOTALS	–	–	Totals	$ 3,030,000	(-) $1,119,800	$1,910,200	=TOTAL NCP	Trunk	Improvement	Costs
Note: [1] Funding Methods (Current):										
	DCC Rebate			DCCR						
Item 11: HS 202	DCC Funds			DCCF						



West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD

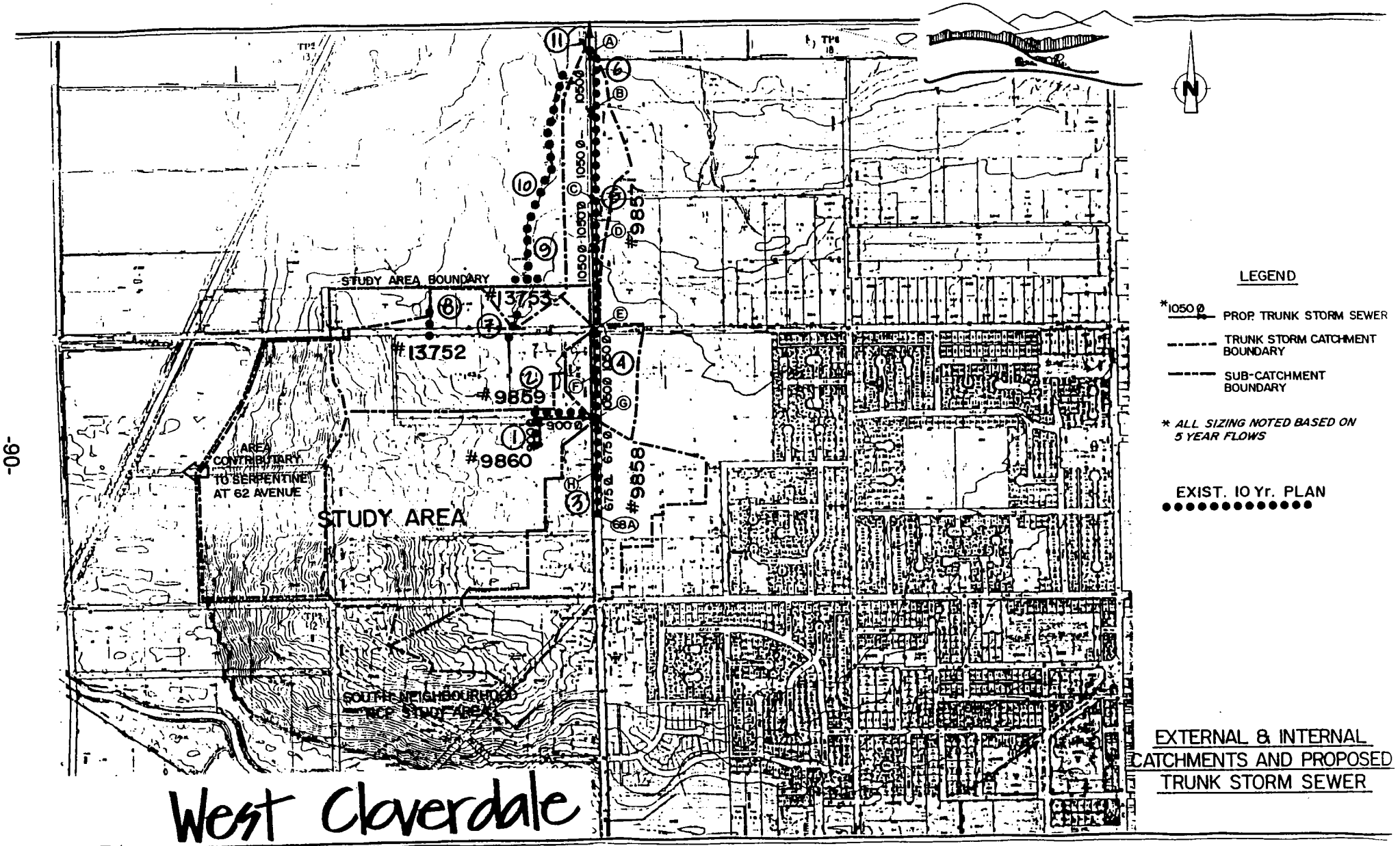


West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

EXTERNAL & INTERNAL CATCHMENTS AND PROPOSED TRUNK STORM SEWER

COASTLAND ENGINEERING & SURVEYING LTD



West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

EXTERNAL & INTERNAL CATCHMENTS AND PROPOSED TRUNK STORM SEWER

COASTLAND ENGINEERING & SURVEYING LTD

SUMMARY

NCP INFRASTRUCTURE FINANCING & FUNDING

OCTOBER 10, 1997

TABLE 7.5
SUMMARY: ROADS - MAJOR COLLECTOR
NCP INFRASTRUCTURE FINANCING & FUNDING

Development Phase	Year	Units & Rates	DCC Contributions	Construction	Current T.Y.P.	Balance
Phase 1	1997 (Fall) & 1998	220 S.F. @ $1220 325 M.F. @ $1220	(+) $664,900	-	-	(+) $664,900
Phase 1 & 2	1999	89 S.F.@ $1220 142 M.F.@ $1220	(+) $281,820	-	-	(+) $281,820
Phase 1 & 2	2000	61 S.F.@ $1220 72 M.F.@ $1220	(+) $162,260	-	-	(+) $162,260
Phase 1 & 2	2001	41 S.F.@ $1220 99 M.F @ $1220	(+) $170,800	-	-	(+) $170,800
Phase 2	2002	39 S.F. @ $1220 88 M.F. @ $1220	(+) $154,940	-	-	(+) $154,940
Phase 1, 2 & 3	2003	54 S.F. @ $1220 125 M.F. @ $1220	(+) $ 218,380	-	-	(+) $218,380
Phase 3	2004	0 S.F. 147 M.F. @ $1220	(+) $ 179,340	-	-	(+) $179,340
Phase 3	2005	64 S.F. @ $1220 0 M.F.	(+) $ 78,080	-	-	(+) $ 78,080
Phase 3	2006	68 S.F.@ $1220 O M.F.	(+) $ 82,960	-		(+) $ 82,960
TOTALS		**1634 units**	**(+)$1,993,480**			**(+)$1,993,480**

TABLE 7.6
SUMMARY: ROADS - ARTERIAL
NCP INFRASTRUCTURE FINANCING & FUNDING

Development Phase	Year	Units & Rates	DCC Contributions	Construction	Current T.Y.P.	Balance
Phase 1	1997 (FALL) & 1998	220 S.F. @ $4800 325 M.F. @ $4800	(+) $2,616,000	(-) $ 329,745 168 ST - SW & ST. LTS. (NORTH 61-63 AVE) 64 AVE. - SW & ST. LTS.(165A-167 ST)-BOTH SIDES 64 AVE. LEFT TURN LANE @ 166 ST.	REF. #10099 $6,932,000*	(+) $2,286,255
Phases 1 & 2	1999	89 S.F. @ $4800 142 M.F. @ $4800	(+) $1,108,800	(-) $ 242,940 168 ST - SW & ST. LTS.(61 AVE - NORTH 61 AVE) 64 AVE(S) SW & ST. LTS. (164A-165B ST) & 167 -167B ST)	-	(+) $ 865,860
Phases 1 & 2	2000	61 S.F. @ $4800 72 M.F @ $4800	(+) $ 638,400	(-) $ 86,650 168 ST - SW & ST. LTS. (63A-64 AVE) & N60-61 AVE) 64 AVE (S) SW & ST. LTS. (167B-168 ST)	-	(+) $ 551,750
Phases 1 & 2	2001	41 S.F. @ $4800 99 M.F. @ $4800	(+) $ 672,000	(-) $ 590,980 168 ST - SECOND THROUGH LANES (57A-66 AVE) 168 ST - SW & ST LTS (63 - 63A AVE)	-	(+) $ 81,020
Phase 2	2002	39 S.F. @ $4800 88 M.F. @ $4800	(+) $ 609,600	(-) $ 235,000 168 ST - LEFT TURN LANE @ 60 AVE 168 ST @ 60 AVE - TRAFFIC SIGNAL	REF #4557 $ 85,000*	(+) $ 374,600
Phases 1, 2 & 3	2003	54 S.F. @ $4800 125 M.F. @ $4800	(+) $ 859,200	(-) $ 242,565 168 ST - SW & ST. LTS. (60 - N. of 60 AVE) 168 ST - SW & ST. LTS. (64 - 65 AVE) 64 AVE (N) - SW & ST. LT. (167 - 168 ST) 168 ST - LEFT TURN LANE @ 61 AVE	REF #10664 $ 1,000,000*	(+) $ 616,635
Phase 3	2004	0 S.F. @ $4800 147 M.F. @ $4800	(+) $ 705,600	(-) $ 69,560 64 AVE(N) - SW & ST. LT. (164 - 165A ST)	-	(+) $ 636,040
Phase 3	2005	64 S.F. @ $4800 0 M.F.	(+) $ 307,200	(-) $ 59,460 64 AVE(S) - SW & ST. LT. (163 - 164 ST)	-	(+) $ 247,740
Phase 3	2006	68 S.F. @ $4800 0 M.F.	(+) $ 326,400	-		(+) $ 326,400
TOTALS		**1634 units**	**(+) $7,843,200**	**(-) $1,856,900**	**N/A***	**(+) $5,986,300**

NOTE: *REF. #10099, 4557, and 10664 in current T.Y.P. and funded from exist DCC Bylaw and include Ultimate 19m along 64 Ave Frontage through study area (163-168 St.), traffic signal replacement at 168 St. and 60 Ave, and ultimate along 168 St. from 64-65 Ave.
- Amount has not been included in summary or balance.

TABLE 7.1

SUMMARY: WATER - ULTIMATE DEMAND
NCP INFRASTRUCTURE FINANCING & FUNDING
BASED ON CONSTRUCTION PRIOR TO TEN YEAR PROGRAM

DEVELOPMENT PHASE	YEAR	UNITS & RATES	D.C.C. CONTRIBUTIONS	GRID WATERMAIN CONSTRUCTION BASED ON ULTIMATE DEMANDS	CURRENT T.Y.P.	MAXIMUM DCC REBATE (IF WORKS CONSTRUCTED BEFORE PROGRAM YEAR)	COST TO DEVELOPMENT (IF WORKS CONSTRUCTED BEFORE PROGRAM YEAR)	BALANCE (+/-) DCC's (IF WORKS CON-STRUCTED BEFORE PROGRAM YEAR)
Phase 1	1997 (FALL) & 1998	220 S.F. @ $1070 325 M.F.@ $ 940	(+) $ 540,900	• 805 l.m. - 350 ⌀ W.M. (Grid) 168 ST:(60-64 AVE) (-) $347,000 • 418 l.m. - 300⌀ W.M. (Oversizing) 60 AVE:(166-168 ST) (-)$ 72,105 • 250 l.m. - 300⌀ W.M. (Oversizing) 166 ST: (63-64 AVE) & 63 AVE: (165A to 166 ST)(-)$ 60,800	#4664 #2416 #10750 & #10751	$ 139,000 $ 72,105 $ 60,800	(+) $ 208,000	(+) $ 268,995
Phases 1 & 2	1999 & 2000	150 S.F. @ $1070 214 M.F @ $ 940	(+) $ 361,660	• 338 l.m. - 300 ⌀ W.M. 63 AVE: (165A-164 ST) (-)$ 50,200	#10750	$ 50,200		(+) $ 311,460
	2001 & 2002	80 S.F. @ $1070 187 M.F.@ $ 940	(+) $ 261,380	• 220 l.m. - 300⌀ W.M. (Oversizing) 164 ST: (62-61 AVE) (-)$ 42,600 • 810 l.m. - 350 ⌀ W.M. (Grid) 60 AVE: (168-172 ST) (-)$ 370,000 • 190 l.m. - 300 ⌀ W.M. (Oversizing) 60 AVE: (166-165 ST) (-)$ 32,775	#914 #4687 #2416	$ 42,600 $ 148,000 $ 32,775	(+) $ 222,000	(+) $ 38,005
	2003	54 S.F. @ $1070 125 M.F. @ $ 940	(+) $ 175,280	• 810 l.m. - 350 ⌀ W.M. (Grid) 60 AVE: (172-176 ST) (-)$ 389,000 • 192 l.m. - 300 ⌀ W.M. (Oversizing) 60 AVE: (165-164 ST) (-)$ 33,120 • 195 l.m. - 300⌀ W.M. (Oversizing) 164 ST: (60-61 AVE)(-)$28,400	#4665 #2416 #914	$ 155,000 $ 33,120 $ 28,400	(+) $ 234,000	(-) $ 41,240
Phases 1, 2 & 3	2004	0 S.F. 147 M.F.@ $ 940	(+) $ 138,180	-	-	-	-	(+) $ 138,180
	2005	64 S.F. @ $1070 0 M.F.	(+) $ 68,480	-	-	-	-	(+) $ 68,480
	2006	68 S.F. @ $1070 0 M.F.	(+) $ 72,760	-	-	-	-	(+) $ 72,760
	2007	–	–	• 480 l.m. - 350 ⌀ W.M. 168 ST: (60 AVE to 480m SOUTH) (-) $ 222,000	#2419	$ 89,000	(+) $ 133,000	(-) $ 89,000
TOTALS		1634 units	(+) $1,618,640 - A	(-) $ 1,648,000 - B	N/A*	$ 851,000 - C	(+) $ 797,000 - D	(+) $767,640- E

NOTE: Works identified in 2007 totaling $222,000 are suggested only and are not required to service the West Cloverdale, North & South Neighbourhood NCP Study Areas.

- the timing of works noted herein allows for concurrent development within the adjacent west Cloverdale, South Neighbourhood NCP Study Area based on their development of 92 units by 1998; plus 184 units by 2000; plus 158 units by 2003; plus 171 units by 2007 (Total 6050 population)
- This summary is exclusive of DCC contributions from the South Neighbourhood.
- TOTAL A = TOTAL C Plus TOTAL E
- TOTAL B = TOTAL C Plus TOTAL D

TABLE 7.6

SUMMARY: WATER - INTERIM DEMAND
NCP INFRASTRUCTURE FINANCING & FUNDING
BASED ON CONSTRUCTION CONCURRENT WITH T.Y.P. PROGRAM YEAR

DEVELOPMENT PHASE	YEAR	UNITS & RATES	D.C.C. CONTRIBUTIONS	GRID WATERMAIN CONSTRUCTION BASED ON INTERIM DEMANDS	CURRENT T.Y.P.	MAXIMUM DCCR	WATER UTILITY FUNDING/ CONST'N	REVENUE SURPLUS(+) SHORTFALL (-)	CUMULATIVE BALANCE (+/-) (CONSTRUCTION)	CUMULATIVE BALANCE(+/-) DCC'S
Phase 1	1997 (FALL) & 1998	220 S.F. @ $1070 325 M.F. @ $940	(+)$ 540,900	• 418 l.m. - 300ø W.M. (Oversizing) 60 Ave: (166-168 St.) (-) $72,105 • 250 l.m. - 300ø W.M. (Oversizing) 166 St. (63-64 Ave) & 63 Ave (165A to166 St.) (-) $60,800	#2416 # 10750 & # 10751	(+)$72,105 (+)$60,800	-	0.00	0.00	(+) 407,995
Phases 1 & 2	1999 & 2000	150 S.F. @ $1070 325 M.F. @ $940	(+) $ 361,660	• 338 l.m. - 300ø W.M. (Oversizing) 63 Ave (165A St.-164 St.) (-)$ 50,200	# 10750	(+)$50,200	-	0.00	0.00	(+) 719,455
	2001 & 2002	80 S.F. @ $1070 187 M.F. @ $940	(+) $ 261,380	• 220 l.m. - 300ø W.M. (Oversizing) 164 St: (62-61 Ave) (-) $ 42,600 • 190 l.m. - 300ø W.M. (Oversizing) 60 Ave: (166-165 St.) (-) $ 32,775	# 914 # 2416	(+)$75,375	-	0.00	0.00	(+) 905,460
	2003	54 S.F. @ $1070 125 M.F. @ $940	(+) $ 175,280		#4664	(+) $139,000	(+)$208,000	0.00	0.00	(+)$1,080,740
Phases 1, 2 & 3	2004	0 S.F. 147 M.F. @ $940	(+) $ 138,180	-	-	-	-	-	-	(+)$1,218,920
	2005	64 S.F. @ $1070 0 M.F.	(+) $ 68,480	-	-			0.00	0.00	(+) $1,287,400
	2006	68 S.F. @ $1070 0 M.F.	(+) $ 72,760	-	-			0.00	0.00	(+) $1,360,160
	2007	-	-	• 480 l.m. - 350ø W.M. (Grid) 168 St: 57A - 60 Ave (-) $ 222,000	# 2419	(+) $89,000	(+)$133,000	0.00	0.00	(+) 767,640
				• 810 l.m. - 350ø W.M. (Grid) 168 St: (60-64 Ave) (-)$347,000 • 810 l.m. - 350ø W.M. (Grid) 60 Ave: (168-172 St.) (-) $370,000 • 810 l.m. - 350ø W.M. (Grid) 60 Ave: (172-176 St.) (-) $389,000 • 192 l.m. - 300ø W.M. (Oversizing) 60 Ave: (165-164 St.) (-) $ 33,120 • 195 l.m. - 300ø W.M. (Oversizing) 164 St. (60-61 Ave) (-) $28,400	#4664 #4687 #4665 #2416 #914	(+)$139,000 (+)$148,000 (+)$155,000 (+)$33,120 (+)$28,400	(+)$208,000 (+)$222,000 (+)$234,000			
TOTALS	-	1634 units	(+) 1,618,640	(-) 1,648,000	-	851,000	797,000	--	--	(+) 767,640

TABLE 7.9
SUMMARY: SANITARY SEWER
NCP INFRASTRUCTURE FINANCING & FUNDING

DEVELOPMENT PHASE	YEAR	UNITS & RATES	D.C.C. CONTRIBUTIONS	WEST CLOVERDALE TRUNK (168 - 176 ST.)	REVENUE SURPLUS(+) SHORTFALL(-)	CUMULATIVE BALANCE (+/-)
Phase 1	1997 (FALL) & 1998	220 S.F. @ $930 325 M.F.@ $810	(+) $ 467,850	(-) $ 1,221,000	(-) $ 753,150	(-) $ 753,150
Phases 1 & 2	1999	89 S.F. @ $930 142 M.F @ $810	(+) $ 197,790	-	(+) $ 197,790	(-) $ 555,360
Phases 1 & 2	2000	61 S.F. @ $930 72 M.F. @ $810	(+) $ 115,050	-	(+) $ 115,050	(-) $ 440,310
Phases 1 & 2	2001	41 S.F. @ $930 99 M.F. @ $810	(+) $ 118,320	-	(+) $ 118,320	(-) $ 321,990
Phase 2	2002	39 S.F. @ $930 88 M.F. @ $810	(+) $ 107,550	-	(+) $ 107,550	(-) $ 214,440
Phases 1, 2 & 3	2003	54 S.F. @ $930 125M.F. @$810	(+) $ 151,470	-	(+) $ 151,470	(-) $ 62,970
Phase 3	2004	0 S.F. 147 M.F. @ $810	(+) $ 119,070	-	(+) $ 119,070	(+) $ 56,100
Phase 3	2005	64 S.F. @ $ 930 0 M.F.	(+) $ 59,520	-	(+) $ 59,520	(+) $ 115,620
Phase 3	2006	68 S.F. @ $930 0 M.F.	(+) $ 63,240	-	(+) $ 63,240	(+) $ 178,860
TOTALS		**1634 units**	**(+) $1,399,860**	**(-) $ 1,221,000**	**(+) $ 178,860**	**(+) $ 178,860**

NOTE: Projected DCC contributions do not include potential developments beyond the Study Area boundaries that will discharge to the proposed trunk sewer.

TABLE 7.10
SUMMARY: DRAINAGE
NCP INFRASTRUCTURE FINANCING & FUNDING

DEVELOPMENT STAGE	YEAR	UNITS & RATES	D.C.C. CONTRIBUTIONS	CONSTRUCTION	CURRENT T.Y.P.	REVENUE SURPLUS (+) SHORTFALL(-)	CUMULATIVE BALANCE (+/-)
Phase 1	1997 (FALL) & 1998	220 S.F. @ $2120 325 M.F. @ $1140	(+)$ 836,900	Item 1: 167 St: to 63 Ave. 85m - 750mm dia. Trunk Sewer $ 79,100 Item 2: 63 Ave: 167 - 168 St. 180m - 900mm dia. Trunk Sewer $ 167,400 Item 4: 168 St.: 63 - 64 Ave. 260m -1050mm dia. Trunk Sewer $ 280,800 Item 5: 168 St.: 64 Ave. north - 840m-1050mm dia. Trunk Sewer $ 907,200 Item 6: 168 St.: to Outlet 20m-1500mm dia. Trunk Sewer $33,300 Item 11: 168 St. Diversion $215,000	#9860 #9859 #9858 #9857 #9857	(-) $ 845,900	(-) $845,900
Phases 1 & 2	1999	89 S.F. @ $2120 142 M.F.@ $1140	(+) $ 350,560	Item 3: 168 St.: 61 - 63 Ave 345m-675mm dia. Trunk Sewer $ 217,400	#9858 #13752	(+) $133,160	(-) $712,740
Phases 1 & 2	2000	61 S.F. @ $2120 72 M.F. @ $1140	(+) $ 211,400		#13573 #13757 #9867	(+) $ 211,400	(-) $501,340
Phases 1 & 2	2001	41 S.F. @ $2120 99 M.F.@ $1140	(+) $ 199,780		-	(+) $ 199,780	(-) $ 301,560
Phase 2	2002	39 S.F.@ $2120 88 M.F. @ $1140	(+) $ 183,000		-	(+) $ 183,000	(-) $ 118,560
Phases 1, 2 & 3	2003	54 S.F. @ $2120 125 M.F. @ $1140	(+) $ 256,980		-	(+) $ 256,980	(+) $ 138,420
Phase 3	2004	0 S.F. @ $2120 147 M.F.@ $1140	(+) $ 167,580		-	(+) $ 167,580	(+) $ 306,000
Phase 3	2005	64 S.F. @ $2120 0 M.F.	(+) $ 135,680		-	(+) $ 135,680	(+) $ 441,680
Phase 3	2006	68 S.F. @ $2120 0 M.F.	(+) $ 144,160		-	(+) $ 144,160	(+) $ 585,840
TOTALS		**1634 units**	**(+) $ 2,486,040**	**(-) $ 1,900,200**	**N/A**	**(+) $ 585,840**	**(+) $ 585,840**

8.0 NCP PREPARATION COSTS AND AMENITIES

The West Cloverdale Neighbourhood Concept Plan - North Neighbourhood will place additional pressure on amenities, protective and social services in the City. It was established in the East Neighbourhood of North Cloverdale that the costs of the Planning and Preliminary Engineering Studies to prepare the N.C.P. and contributions to fund the provision of amenities be dealt with on an equitable basis and be collected on a per unit basis.

The items requiring funding have been established in the adopted Local Area Plan, a City of Surrey Amenity Study, the N.C.P. Land Use approval and through discussions and review with City Staff. To allow development to proceed the owners and developers within the N.C.P. boundary are prepared to front-end their contribution towards these costs, based on the following formulae. These financial contributions would be payable upon individual rezoning, subdivision, or building permit approvals in accordance with Surrey policies.

8.1 Planning and Preliminary Engineering

Planning and Preliminary Engineering Studies to prepare the Neighbourhood Concept Plan for the West Cloverdale North Neighbourhood have been paid for by Progressive Construction Ltd. and Narland Homes Ltd.

Progressive Construction Ltd./Narland Homes Ltd. engaged the following consultants to prepare the Neighbourhood Concept Plan for the West Cloverdale North Neighbourhood:

Planning Consultant	Davidson Yuen Simpson Architects
Engineering Consultant	Coastland Engineering & Surveying Ltd.
Environmental Consultant	ECL Envirowest Consultants Ltd.
Drainage Consultant	U.M.A. Environmental
Traffic Consultant	Ward Consulting Group

The projected population for the North Neighbourhood is approximately 4,278 which is based on a total of 1,631 units being created.

The costs to complete both the (Stage I/Stage II) reports and plans from June 1993 to their completion in September 1997 was approximately $320,000.

8.0 NCP PREPARATION COSTS AND AMENITIES

As the main proponents of the NCP, Progressive Construction Ltd. and Narland Homes Ltd. have agreed to underwrite 50% of the costs of preparing the plan. The remaining 50% will be paid for by developers/owners in the NCP Study Area who will contribute their proportionate share at the time of rezoning approvals.

Under the terms of this agreement, Progressive and Narland will combine to underwrite a total of 50% of the costs for planning and preliminary engineering. Their rezoning application (No. 7995-0228-00) currently on file with the Planning Department is, therefore, exempt from any preparation costs, as they are included in this initial 50%. For properties included in this application refer to the map in Section 2, Land Use Plan, 2.3 Development Phasing, page 5. Additional units created under subsequent Progressive or Narland applications are also to be exempt from preparation costs. Every other unit created within the NCP Study Area will pay a contribution based on a 1 in 1392 share (1631 total units - 239 Progressive/Narland units) of the remaining 50% of the total NCP Planning and Engineering Costs of $320,000 per the table below.

Payments will be collected by the City as noted herein and the repayment to Progressive Construction Ltd./Narland Homes Ltd., to a maximum of $160,000 will be on a yearly basis, with payments due on January 1 of every year provided that a minimum of $1,000 has been received by the City from the rezoning applications.

TABLE 8.1
N.C.P. PREPARATION COSTS

Planning & Preliminary Eng costs paid by Progressive/Narland to June 1997	Costs Underwritten by Progressive/ Narland (50%)	Contribution Required by remaining 1395 units in Study Area (50%)	Per Unit Contribution
$ 320,000	$ 160,000	$160,000	$114.94

8.2 Parkland Development

The NCP is providing a combined school and park site totalling 12 acres (4.86ha.)

The Local Area Plan and the Neighbourhood Concept Plan have identified the need to fund landscaping and development costs of the Neighbourhood Park in combination with the athletic needs of the Elementary School. It is proposed that the school and park site provide a combined soccer pitch and softball diamond along with general landscaping of the site. Some funds will also be established for viewpoint improvements, and the rehabilitation of the Loyal Orange Lodge, as well as improvements to the two major corridors connecting 60 Avenue to 61 Avenue.

It should also be noted that the watermains proposed for this neighbourhood are of sufficient size to provide the recommended fire protection for a private day care centre to be located in most areas within the N.C.P.

Based on an evaluation of costs obtained from the City Parks & Recreation Department, it is proposed that $627,100 be budgeted for these amenities (see table following). This corresponds to a per unit cost of $384.49.

TABLE 8.1
PARKLAND DEVELOPMENT
WEST CLOVERDALE NCP
Cost estimates, Public Amenities, Parks & Recreation

Description	Quantities	Cost
Joint School Park Site		$ 93,000.00
Soccer Field		250,000.00
Baseball diamond		150,000.00
Landscaping		8,600.00
Signage		5,000.00
Playground		20,000.00
Walkways		50,500.00
Viewpoints improvements		25,000.00
Rehabilitation of Loyal Orange Lodge (partial funding only)		25,000.00
Total		$ 627,100.00

Note:

It is anticipated that the City will be creating a D.C.C. for Park Development in the near future. If the D.C.C. is established prior to the complete development of this neighbourhood, then any remaining undeveloped properties should NOT be responsible for the $384.49 per unit charge.

8.3 Library Books

According to the Surrey Public Library the standard for providing library material per capita in Surrey is 1.5 items per capita at a cost of $25.00 per item.

Based on the projected population at an average of 3.0 people per unit, this corresponds to a charge of $112.50 per unit.

8.4 Fire Protection

Fire Hall #8 in Cloverdale serves the neighbourhood. This volunteer fire hall is located at 17572 - 57th Avenue.

The Fire Chief has provided information on the Fire Department's Total Capital Budget and expenditures for previous years and for future projections. The Fire Chief has determined that each new N.C.P. area shall pay a flat fee of $216.00 per unit to handle the increased demand for this essential service.

The Fire Department had also indicated that they require an aerial device if buildings within the neighbourhood are going to exceed 30 feet (10m) in height. It is therefore recommended that any multiple family development with units that exceeds 10m in height pay an **additional** "apartment dwelling" charge of $128.00 per unit, as established by the Fire Department.

8.5 Police Protection

The Police Department (R.C.M.P.) has suggested that a contribution be established for all property owners within the N.C.P. areas to fund the capital costs associated with police protection. A contribution of $50.00 per unit is to be included for future neighbourhood needs. Therefore, based upon 1631 contributing units, at a per unit contribution of $50.00, the total contribution for Police Protection from the Study Area is $81,550.

Schedule of Amenities:

ITEM	BUDGET	PER UNIT CONTRIBUTION
Parkland Development	$ 526,600	$ 322.87
Bike Racks, Seating & Misc. Improvements at View Points	$ 75,500	$ 46.29
Rehabilitation of "Orange Hall" (50% of cost)	$ 25,000	$ 15.33
Library Books	$ 183,487	$ 112.50
Fire Protection	$ 352,296	$ 216.00*
Police Protection	$ 81,550	$ 50.00
TOTAL AMENITY CONTRIBUTION	$ 1,244,433	$ 762.99

* Multiple family developments with units that exceed 10m in height will pay an **additional** charge of $128.00 per unit, as detailed in Section 8.4.

The foregoing cost estimates and revenue calculations are based on 1996 dollars. In order to accommodate for inflation over the time frame of this schedule, the costs for Planning and Preliminary Engineering and Amenity Contributions should be allowed to increase by the annual increase in the Consumer Price Index. Furthermore, interest revenues accrued from the Amenity Contributions should remain within the North Neighbourhood account for expenditure within the North Neighbourhood only.

W:\WP60\DOC\0986\986.AMN

LEGEND

- RC — SUBURBAN SINGLE FAMILY CLUSTERING 2 U.P.A.
- RF-G — URBAN SINGLE FAMILY CLUSTERING 7.5 U.P.A.
- RF/RF-SS/RM-D — SINGLE FAMILY URBAN
- RM-D/RM-F/RM-10 — SINGLE FAMILY DUPLEX/DETACHED CLUSTERING 10 U.P.A.
- RM-15 — TOWNHOUSES 15 U.P.A.
- RMS-1/PA-1/RM-15 — TOWNHOUSE AND / OR INSTITUTIONAL RESIDENTIAL 15 U.P.A.
- C-4 — COMMERCIAL
- PARK / SCHOOL AND OPEN SPACE
- POSSIBLE ACCESS POINTS
- STREET ORIENTED

NORTHVIEW GOLF COURSE

NCP 1 STUDY AREA

ALR

64TH AVENUE

164TH STREET

TOWNHOUSES UP TO 15 U.P.A.

SINGLE FAMILY DUPLEX CLUSTERING UP TO 10 U.P.A.

168TH STREET

165TH ST

166TH STREET

SINGLE FAMILY URBAN

SINGLE FAMILY CLUSTERING 2 U.P.A.

SERPENTINE CHANNEL

HERITAGE FOREST

MAJOR TREE PRESERVATION AREA

63RD AVENUE

STREET ORIENTED

CLOVERDALE ATHLETIC PARK

62ND AVENUE

160TH STREET

SUBURBAN SINGLE FAMILY CLUSTERING 2 U.P.A.

PASSIVE PARK

PARK / SCHOOL

61ST AVENUE

GREEN PLAZA

URBAN SINGLE FAMILY CLUSTERING 7.5 U.P.A.

TOWNHOUSE RESIDENTIAL AND / OR INSTITUTIONAL RESIDENTIAL

PLAZA

C-4

COMMERCIAL

"FIVE CORNERS"

60TH AVENUE

THE "VILLAGE STREET"

SURREY CENTRE CEMETERY

OLD McLELLAN ROAD

West Cloverdale Proposed Land Use Plan

Neighbourhood Concept Plan 1

Scale

May 15, 1997

COASTLAND — DAVIDSON YUEN SIMPSON

Figure 1

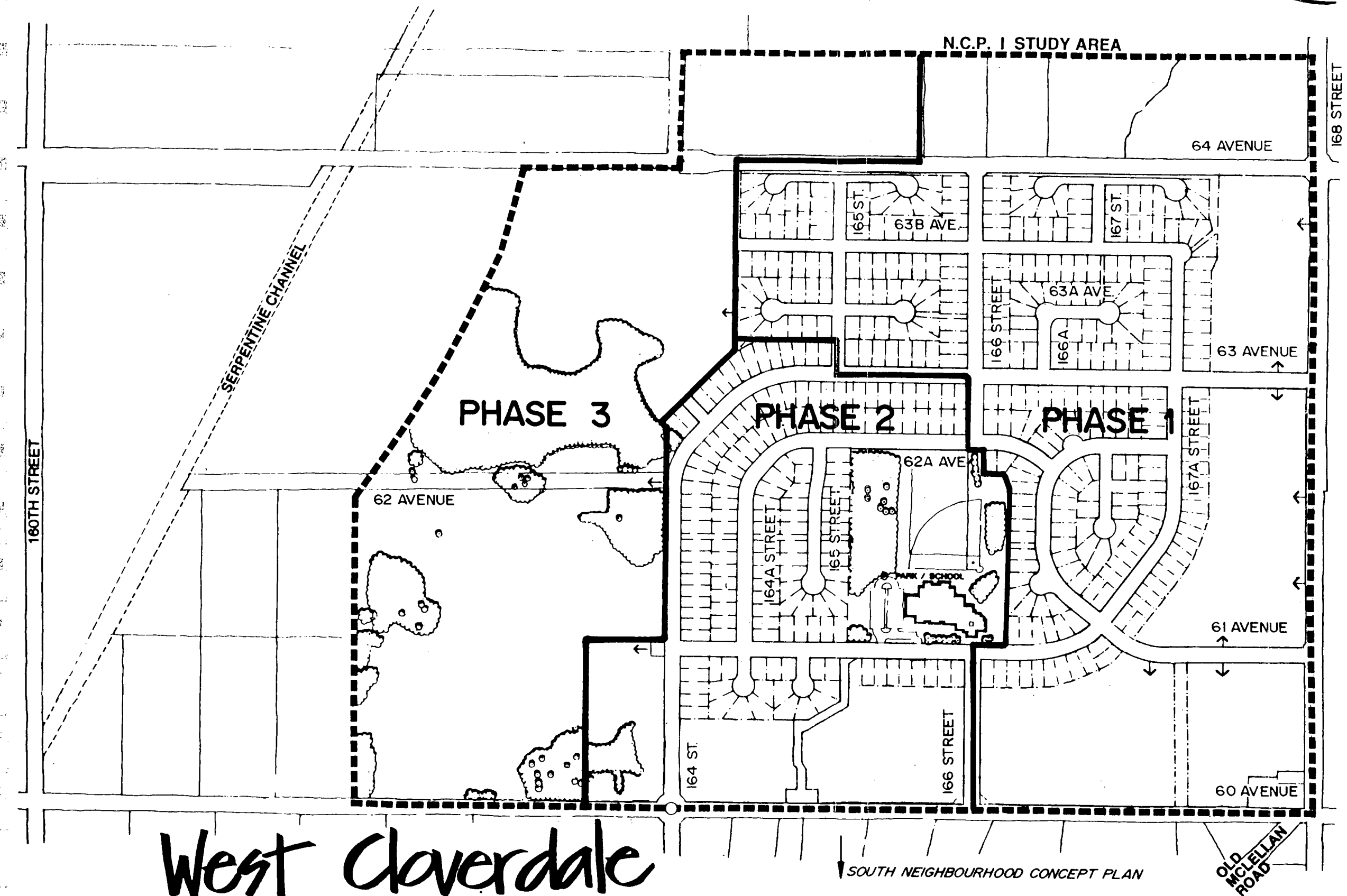


Figure 2
DEVELOPMENT PHASING
SCALE 1:5000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.

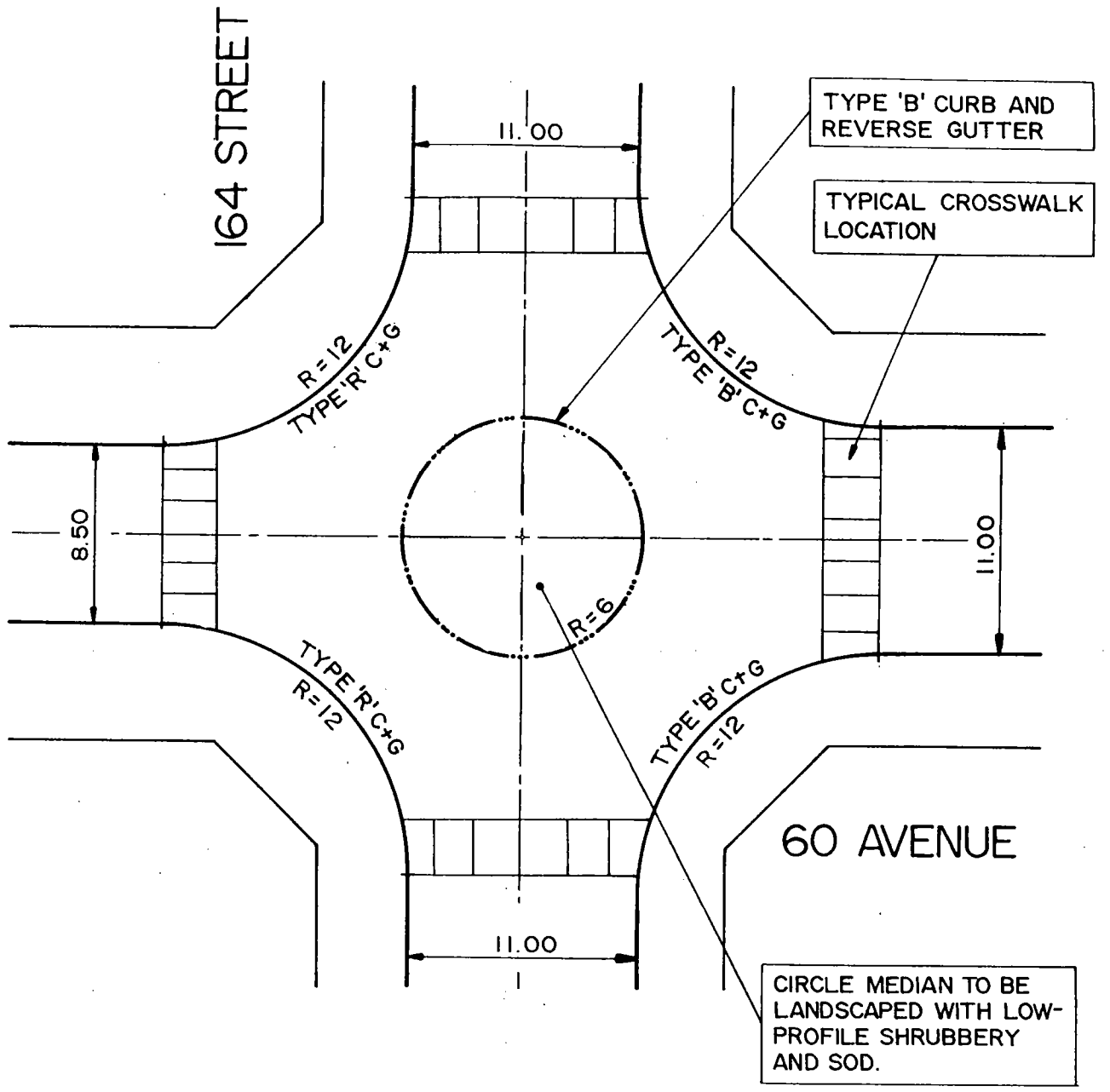


Figure 3

60 AVENUE & 164 STREET

CONCEPTUAL TRAFFIC CIRCLE SCHEMATIC

N.T.S.

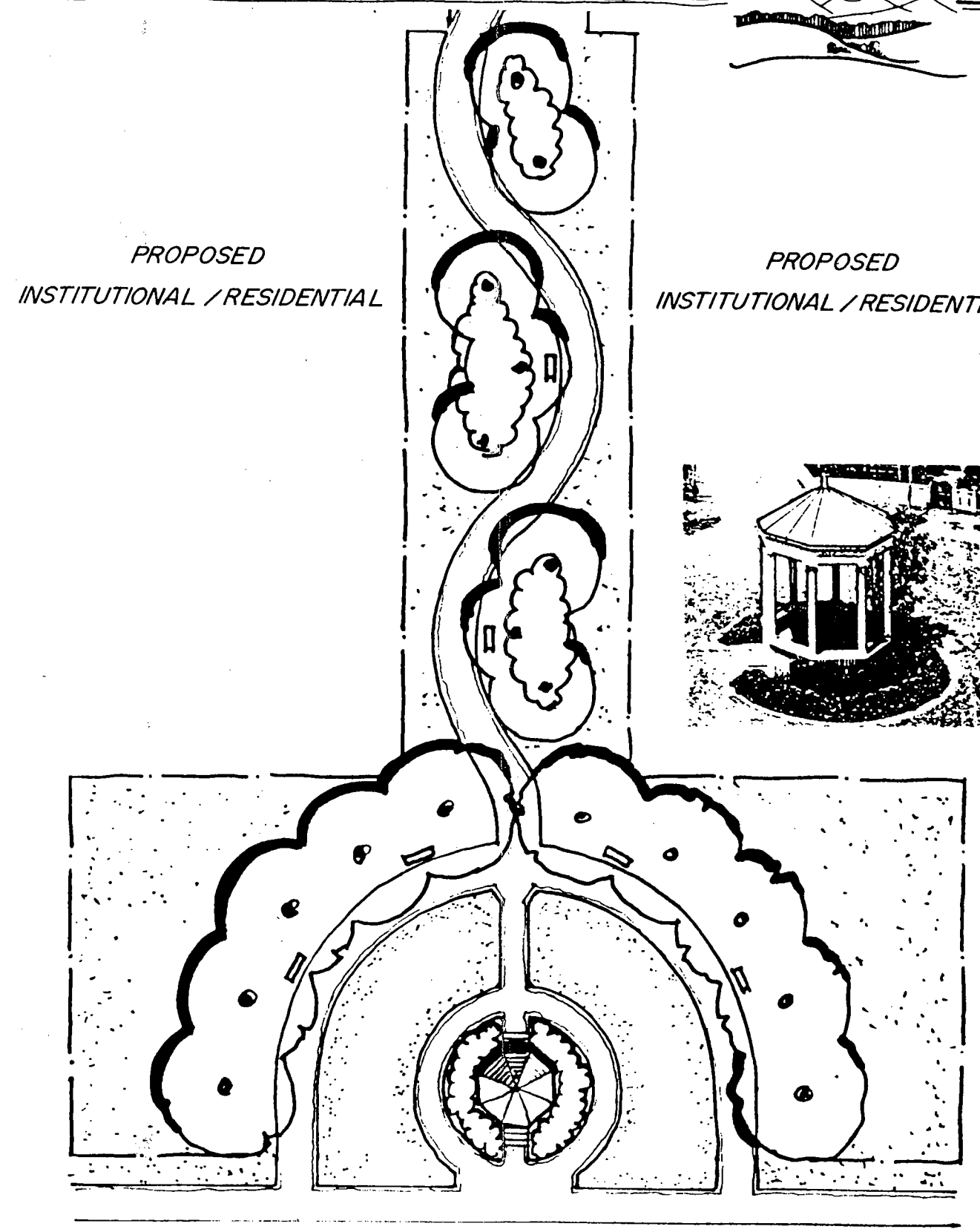


Figure 4

60 AVENUE & 164'A' STREET

CONCEPTUAL PEDESTRIAN PLAZA

SCALE 1:250

N.C.P. I STUDY AREA

N

LEGEND

PROPOSED ROAD CLOSURE / EXCHANGE.

NOTE: FINAL ROAD EXCHANGE REQUIREMENTS ARE SUBJECT TO DETAILED PLANNING AND FINAL ROAD LOCATIONS AND MAY NOT BE EXACTLY AS SHOWN.

Figure 5

EXISTING LEGAL AND ROAD DEDICATIONS

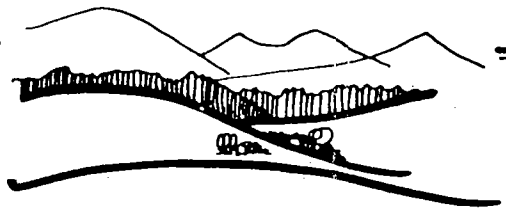
SCALE 1:5000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

SOUTH NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.



N

N.C.P. I STUDY AREA

168 STREET

64 AVENUE

165 ST.

63B AVE.

167 ST.

166 STREET

63A AVE.

166A

63 AVENUE

167A STREET

SERPENTINE CHANNEL

160TH STREET

62 AVENUE

62A AVE.

164A STREET

165 STREET

PARK / SCHOOL

61 AVENUE

164 ST.

166 STREET

60 AVENUE

PROP. REALIGNMENT OF OLD MCLELLAN ROAD PER SOUTH NEIGHBOURHOOD CONCEPT PLAN

SOUTH NEIGHBOURHOOD CONCEPT PLAN

OLD MCLELLAN ROAD

LEGEND

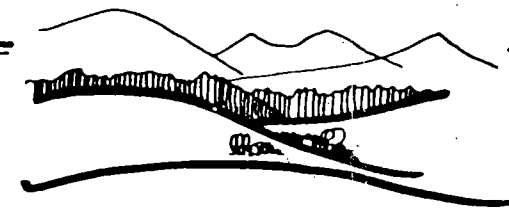
- ARTERIAL. (27.0m R.O.W.)
- COLLECTOR (22.0m R.O.W.)
- THROUGH LOCAL (20.0m R.O.W.)
- LOCAL or FRONTAGE (16.5m / 8.8m R.O.W.)
- TOWNHOUSE/CLUSTER (8-15 UNITS/ACRE)
- MULTI-FAMILY ACCESS POINTS
- LEFT TURN LANES
- TRAFFIC CIRCLE

Figure 6
ROAD SYSTEM
SCALE 1:5000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.



N.C.P. I STUDY AREA

64 AVENUE

168 STREET

165 ST

63B AVE.

167 ST.

166 STREET

63A AVE.

166A

63 AVENUE

167A STREET

62A AVE.

164A STREET

165 STREET

PARK / SCHOOL

61 AVENUE

164 ST

166 STREET

60 AVENUE

OLD MCLELLAN ROAD

SERPENTINE CHANNEL

160TH STREET

62 AVENUE

CONCEPTUAL ONLY IN HALF ACRE CLUSTER AREAS (TYP.)

SOUTH NEIGHBOURHOOD CONCEPT PLAN

LEGEND

SIDEWALK

BICYCLE PATH/TRAIL (64 AVE. & 168 ST. PART OF CORE NETWORK)

TOWNHOUSE/CLUSTER (8-15 UNITS/ACRE)

Figure 7

PEDESTRIAN & CYCLIST ROUTES

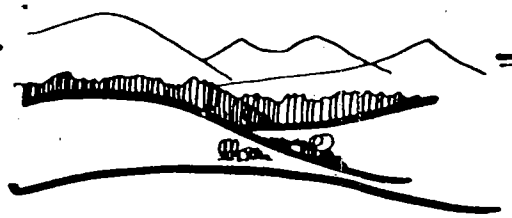
SCALE 1:5000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.

A	75.75 l/s	at	1.07m/s
B	43.97 l/s	at	0.62m/s
C	43.97 l/s	at	0.62m/s
D	35.83 l/s	at	0.51m/s
E	55.67 l/s	at	0.79m/s
F	70.22 l/s	at	0.99m/s
G	110.64 l/s	at	1.57m/s
H	79.36 l/s	at	1.12m/s
I	79.36 l/s	at	1.12m/s
J	74.64 l/s	at	1.06m/s
K	114.25 l/s	at	1.19m/s
L	39.61 l/s	at	0.41m/s
M	7.72 l/s	at	0.08m/s
N	31.78 l/s	at	0.33m/s



N.C.P. I STUDY AREA

TO 68 AVE.

EX. PRV TO BE ABANDONED

64 AVENUE

350Ø W/M

168 STREET

EX.300Ø

EX 300Ø GRID W/M

63B AVE.

165 ST.

300ØW/M

167 ST.

63A AVE.

166 STREET

166A

63 AVENUE

300Ø W/M

62A AVE.

164A STREET

165 STREET

167A ST.

350Ø W/M

EX 200Ø W/M

SERPENTINE CHANNEL

160TH STREET

62 AVENUE

300Ø W/M

PARK / SCHOOL

61 AVENUE

164 ST.

166 STREET

300Ø W/M

60 AVENUE

TO 176 ST.

TO 56 AVE. VIA OLD McLELLAN ROAD

SOUTH NEIGHBOURHOOD CONCEPT PLAN

OLD McLELLAN ROAD

TO 56 AVE.

LEGEND

- EX. GRID WATERMAIN
- PROP. GRID WATERMAIN
- EX. LOCAL WATERMAIN
- PROP. LOCAL WATERMAIN
- PRIVATE LOCAL
- (15) PIPE NUMBER
- (17) NODE/NODE NUMBER
- EX. PRESSURE REDUCING VALVE
- PROP. FUTURE GRID MAIN EXTENSION
- TOWNHOUSE / CLUSTER (8-15 UNITS/ACRE)
- DIRECTION OF DESIGN FLOW FOR MAX DEMAND OF 190 l/s at NODE 10 (RATE & VELOCITY)
- A

Figure 8

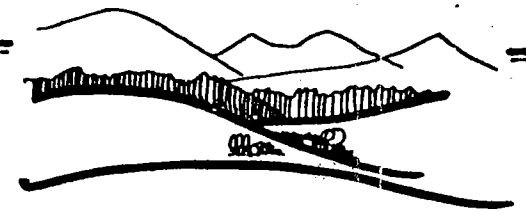
WATER DISTRIBUTION SYSTEM

SCALE 1:5000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.



N.C.P. I STUDY AREA

EX.300Ø GRID W/M

64 AVENUE

168 STREET

EX.300Ø

SERPENTINE CHANNEL

160TH STREET

165 ST.

63B AVE.

300Ø

167 ST.

166 STREET

63A AVE.

166A

63 AVENUE

350Ø

300Ø

300Ø PHASE 2 – OVERSIZING ($153,600)

62A AVE.

164A STREET

165 STREET

PARK / SCHOOL

167A STREET

62 AVENUE

300Ø

61 AVENUE

EX. 200Ø W/M

164 ST.

166 STREET

300Ø

60 AVENUE

PHASE 2 – OVERSIZING ($65,895)

PHASE 1 – OVERSIZING ① ($72,105)

OLD MCLELLAN ROAD

SOUTH NEIGHBOURHOOD CONCEPT PLAN

PHASE 1 – DCCR ② ($139,000)
(WATER UTILITY $208,000)

LEGEND

- EX. WATER MAIN
- NEW MAINS SUBJECT TO UPSIZING CONTRIBUTION FROM THE CITY.

① FULL COST IF CONSTRUCTED DURING PROGRAM YEAR PER 10 YEAR PLAN BY DCCR AND WATER UTILITY. DCC REBATABLE ONLY TO 40 % OF TOTAL COST IF REQUIRED BY DEVELOPMENT PRIOR TO PROGRAM YEAR PER 10 YEAR PLAN (WHERE MAINS ARE SUITABLE FOR ADJACENT USE BUT INSUFFICIENT FOR GRID SYSTEM).

② OVERSIZING ONLY WHERE NO EX. MAINS. DEVELOPMENT REQUIRED TO CONSTRUCT BASIC SERVICE.

- TOWNHOUSE / CLUSTER (8 - 15 UNITS/ACRE)

FOR OFF-SITE WATER REQUIREMENTS REFER TO Figure 10

Figure 9

WATERMAIN GRID SYSTEM REBATES & OVERSIZING

SCALE 1:5000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

64 AVENUE

EX. 300Ø

EX. 200Ø

EX. 500Ø

63 AVENUE

350Ø PER Figure 9

EX. 300Ø

EX. 400Ø

61 AVENUE

EX. 200Ø

EX. 200Ø

168 STREET

172 STREET

176 STREET

60 AVENUE

350Ø

350Ø

EX. 300Ø

350Ø

350Ø

2002 - DCCR ($148,000)
(WATER UTILITY $ 222,000)

2002 - DCCR ($155,000)
(WATER UTILITY $ 234,000)

350Ø

TO 480m SOUTH

LEGEND

EX. WATER MAIN

DCC REBATABLE ①

OVERSIZING ONLY ②

① FULL COST IF CONSTRUCTED DURING PROGRAM YEAR PER 10 YEAR PLAN BY DCCR AND WATER UTILITY. DCC REBATABLE ONLY TO 40 % OF TOTAL COST IF REQUIRED BY DEVELOPMENT PRIOR TO PROGRAM YEAR PER 10 YEAR PLAN (WHERE MAINS ARE SUITABLE FOR ADJACENT USE BUT INSUFFICIENT FOR GRID SYSTEM).

② OVERSIZING ONLY WHERE NO EX. MAINS. DEVELOPMENT REQUIRED TO CONSTRUCT BASIC SERVICE.

TOWNHOUSE / CLUSTER (8 - 15 UNITS/ACRE)

Figure 10

OFFSITE
WATERMAIN GRID SYSTEM
REBATES & OVERSIZING
SCALE 1:5000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

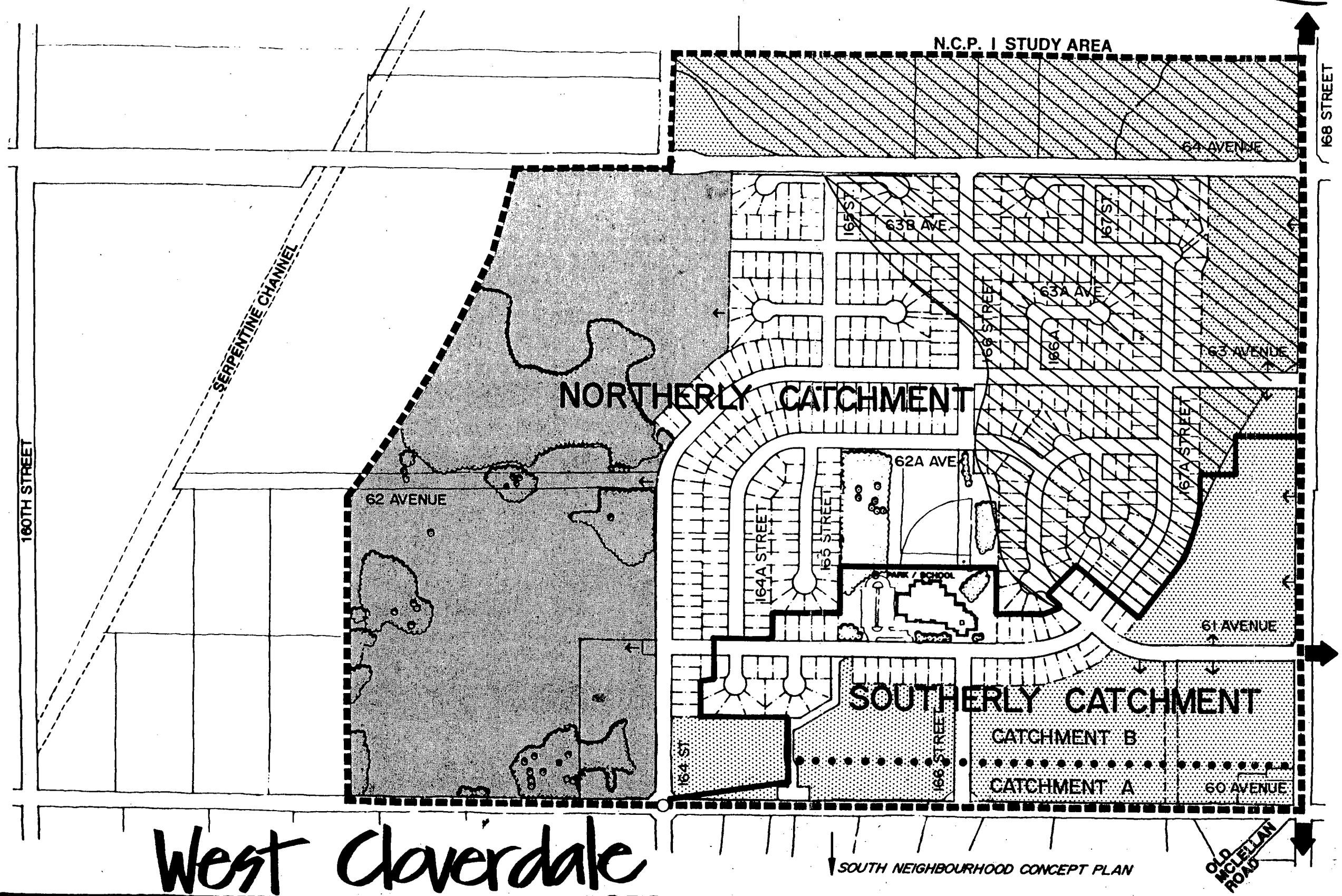


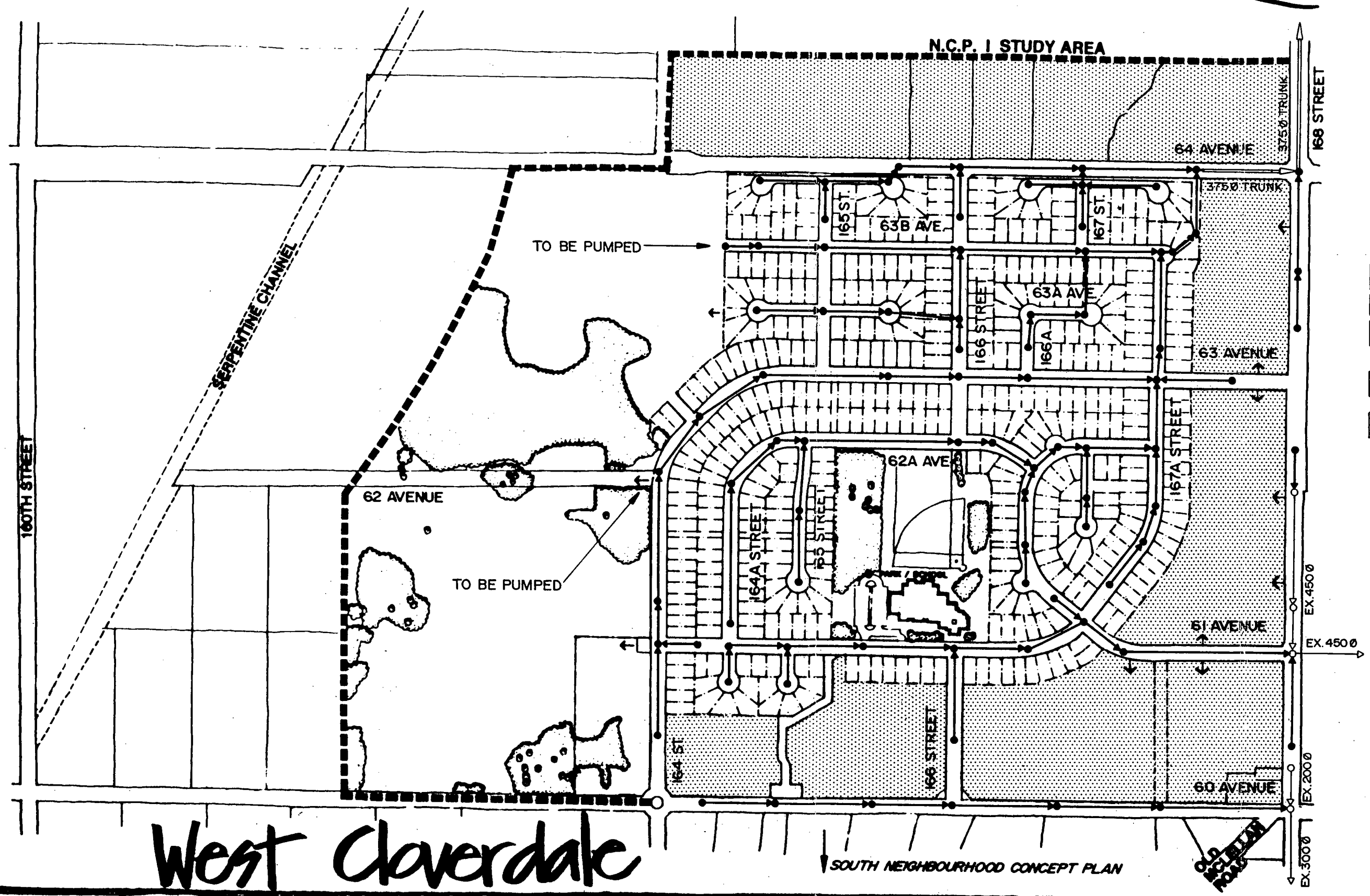
Figure 11

ON-SITE SANITARY SEWER CATCHMENTS

SCALE 1:5000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN



LEGEND

- EX. SANITARY SEWER
- PROP. SANITARY SEWER
- PROP. SANITARY TRUNK SEWER
- PRIVATE PUMP STATION AND FORCE MAIN
- TOWNHOUSE/CLUSTER (8-15 UNITS/ACRE)

Figure 12
SANITARY SEWER SYSTEM
SCALE 1:5000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.

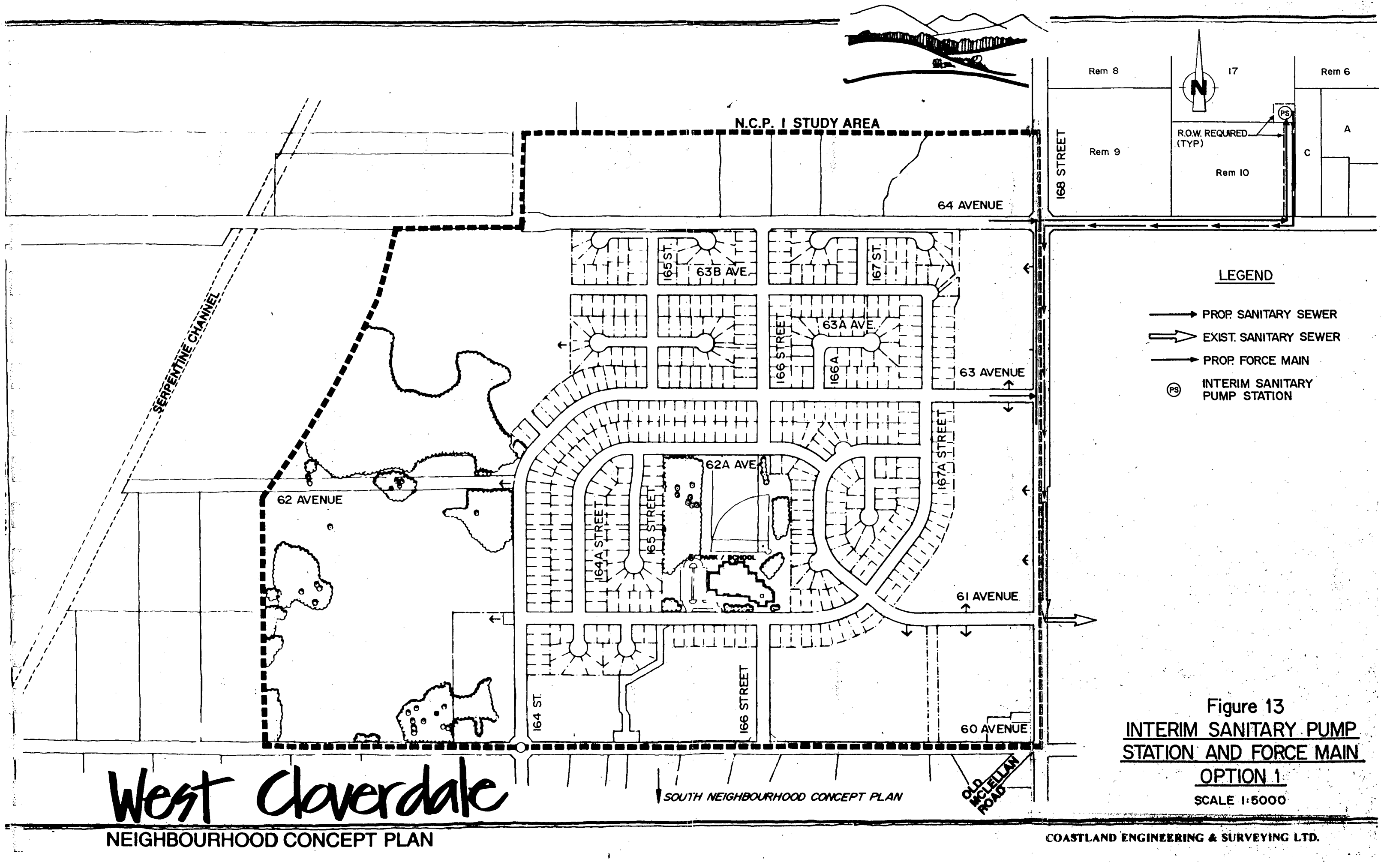
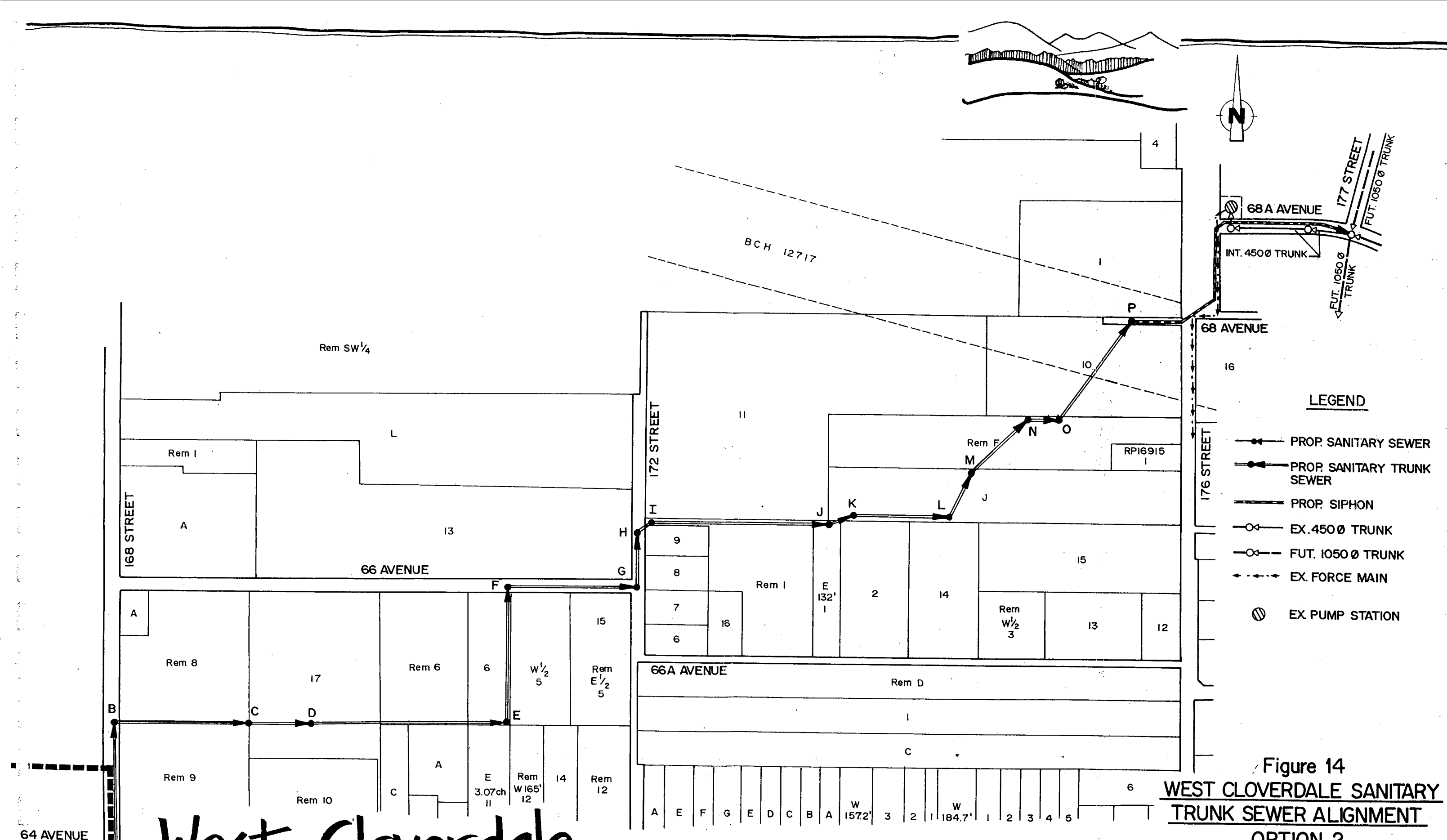


Figure 13
INTERIM SANITARY PUMP STATION AND FORCE MAIN OPTION 1
SCALE 1:5000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.



West Cloverdale

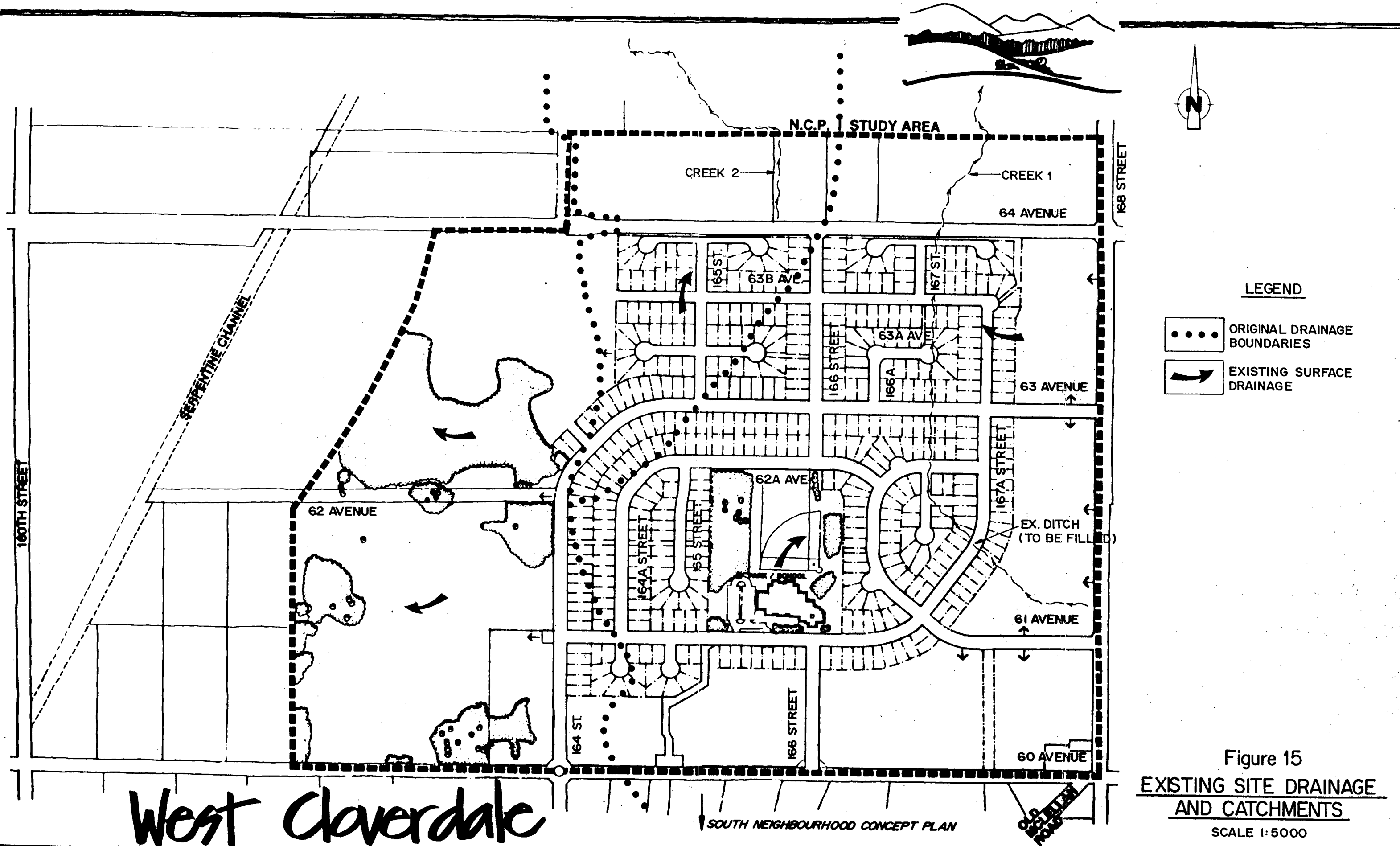
NEIGHBOURHOOD CONCEPT PLAN

Figure 14

WEST CLOVERDALE SANITARY TRUNK SEWER ALIGNMENT OPTION 2

SCALE 1:5000

COASTLAND ENGINEERING & SURVEYING LTD.



West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

Figure 15

EXISTING SITE DRAINAGE AND CATCHMENTS

SCALE 1:5000

COASTLAND ENGINEERING & SURVEYING LTD.

GRAVITY OUTFALL TO DITCH (1050 Ø)

SEALED PIPE SYSTEM TO SERPENTINE RIVER (750Ø)

SPLITTER MANHOLE

1050Ø

1050Ø

1050Ø

1050Ø

1050Ø

900Ø

900Ø

675Ø

675Ø

A

B

C

D

E

F

G

H

68A

STUDY AREA BOUNDARY

AREA CONTRIBUTARY TO SERPENTINE AT 62 AVENUE

STUDY AREA

SOUTH NEIGHBOURHOOD NCP STUDY AREA

N

LEGEND

*1050Ø PROP. TRUNK STORM SEWER

TRUNK STORM CATCHMENT BOUNDARY

SUB-CATCHMENT BOUNDARY

* *ALL SIZING NOTED BASED ON 5 YEAR FLOWS*

Figure 16

EXTERNAL & INTERNAL CATCHMENTS AND PROPOSED TRUNK STORM SEWER

SCALE 1:10 000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.

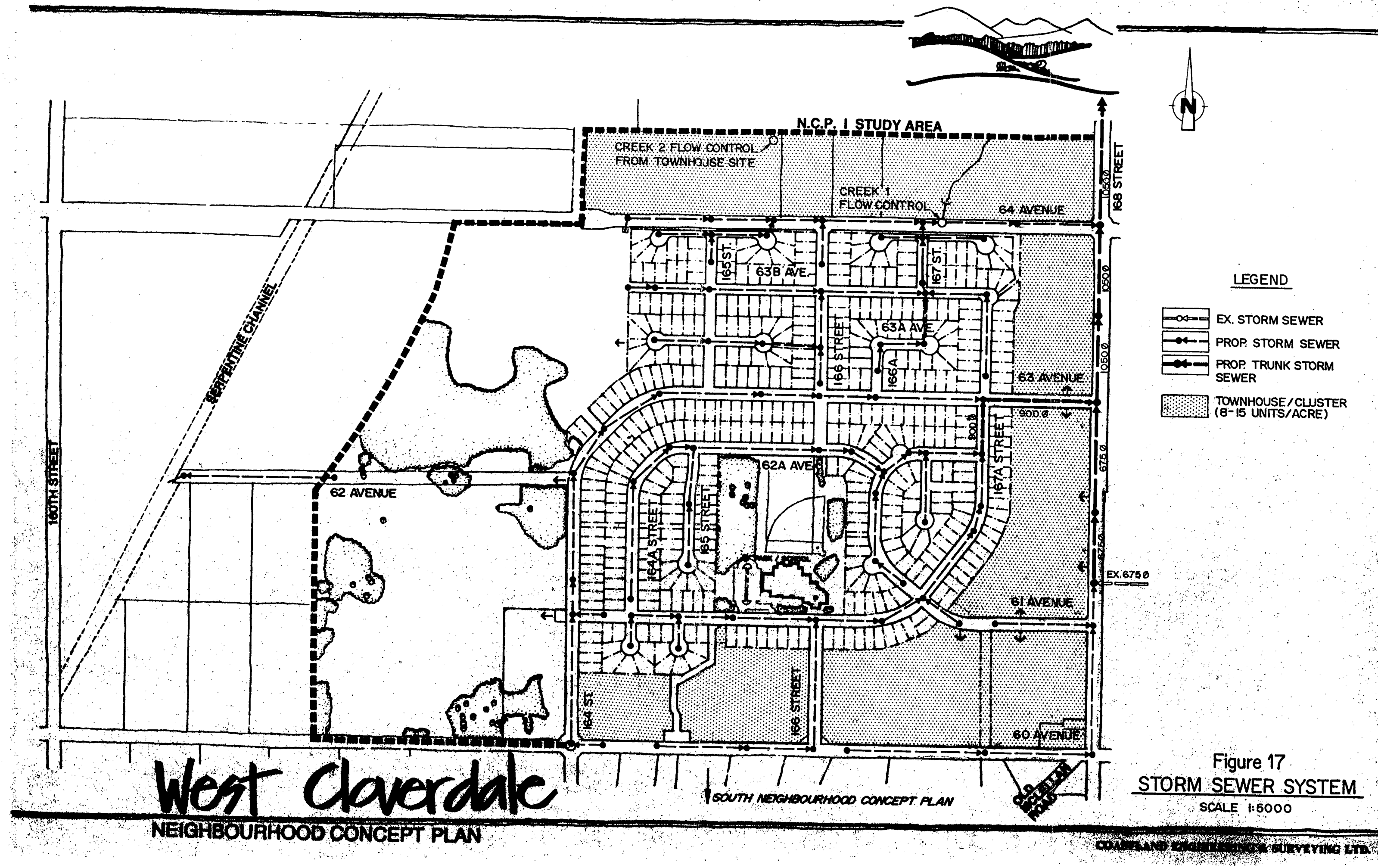
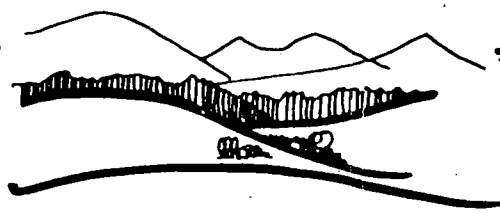


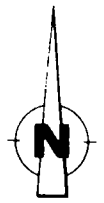
Figure 17
STORM SEWER SYSTEM
SCALE 1:5000

West Cloverdale
NEIGHBOURHOOD CONCEPT PLAN

SOUTH NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.





N.C.P. I STUDY AREA

64 AVENUE

168 STREET

165 ST.

63B AVE.

167 ST.

166 STREET

63A AVE.

166A

63 AVENUE

SERPENTINE CHANNEL

160TH STREET

62 AVENUE

62A AVE.

164A STREET

165 STREET

PARK / SCHOOL

167A STREET

61 AVENUE

164 ST

166 STREET

60 AVENUE

OLD MCLELLAN ROAD

SOUTH NEIGHBOURHOOD CONCEPT PLAN

LEGEND

- MAJOR FLOW ROUTE
- SURFACE DRAINAGE
- TOWNHOUSE/CLUSTER (8-15 UNITS/ACRE)
- FLOOD BOX (EXISTING)
- PUMP STATION (EXISTING)
- PROPOSED FLOW PATHS

Figure 18

PROPOSED OVERLAND FLOW PATHS

SCALE 1:5000

West Cloverdale

NEIGHBOURHOOD CONCEPT PLAN

COASTLAND ENGINEERING & SURVEYING LTD.

a) Creek 1 - Existing Pond and Hydraulic Structure 203 - Viewing North

b) Creek 1 - Existing Pond - Viewing North

PLATE 1

a) Creek 1 - Existing Pond and Hydraulic Structure 213 - Viewing South

b) Creek 1 - Existing Pond - Viewing South From North End

PLATE 2

a) Creek 1 - Watercourse Downstream of Hydraulic Structure 203