DOUGLAS

NEIGHBOURHOOD CONCEPT PLAN

JULY 1999

PLEASE NOTE:

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A. CORPORATE REPORTS

1. The Corporate Reports under date of July 12, 1999 were considered and dealt with as follows:

Item No. C429 Douglas Neighbourhood Concept Plan Stage 2 Report
File: 2350-008

The General Manager, Planning & Development submitted a report regarding the Douglas Neighbourhood Concept Plan Stage 2.

The General Manager, Planning & Development was recommending approval of the recommendations outlined in the report.

COMMITTEE RECOMMENDATION

It was

Moved by Councillor Higginbotham
Seconded by Councillor Steele
That Council:

1. Approve the final and complete Neighbourhood Concept Plan for Douglas (Development Concept Component in Appendix VIII);

2. Approve the arrangements, terms and conditions specified in the Douglas Neighbourhood Concept Plan - Development Concept Component as a means of managing the development and general provision of amenities and facilities for the Douglas area; and

3. Authorize staff to draft an amendment to Zoning By-law, 1993, No. 12000, as amended, to include an amenity contribution provision based upon the density bonus concept for the Douglas Neighbourhood Concept Plan area.

Carried

Item No. C429.1 Douglas Neighbourhood Concept Plan Stage 2 Report
File: 2350-008

The Manager, Utilities and Construction, Engineering submitted a report regarding the Douglas Neighbourhood Concept Plan Stage 2.

The Manager, Utilities and Construction, Engineering was recommending approval of the recommendations outlined in the report.

Responding to a question from Councillor Hunt, the Senior Drainage Engineer advised the Storm Drainage Plan addresses drainage flowing to the United States.

The Planner advised Councillor Higginbotham there has been substantial public consultation throughout this NCP and is now complete. There will be additional public consultation at the Public Hearing stage. Presently there are two applications in the area for sub-division and rezoning.

COMMITTEE RECOMMENDATION

It was

Moved by Mayor McCallum
Seconded by Councillor Steele
That:

Council adopt the engineering servicing and financial strategies as outlined in this report and as specified in the Douglas Neighbourhood Concept Plan Stage 2 Report, Part II - Servicing and Financial Details as the means of managing engineering services for this neighbourhood, subject to:

1. Full payment of Drainage DCC's at the time of Servicing Agreement.
2. Use of levies outlined in this report to assist in funding drainage and major collector road improvements.

Carried

SURREY
CITY OF PARKS

Corporate Report

CITY MANAGER'S DEPARTMENT
NO: C429
COUNCIL DATE: July 12/99

COUNCIL-IN-COMMITTEE

TO:	**Mayor & Council**	DATE:	**July 7, 1999**
FROM:	**General Manager, Planning & Development**	FILE:	**2350-008**
SUBJECT:	**Douglas Neighbourhood Concept Plan - Stage 2 Report**		

RECOMMENDATION

The Planning & Development Department recommends that Council:

1. Approve the final and complete Neighbourhood Concept Plan for Douglas (Development Concept Component in Appendix VIII);

2. Approve the arrangements, terms and conditions specified in the Douglas Neighbourhood Concept Plan - Development Concept Component as a means of managing the development and general provision of amenities and facilities for the Douglas area; and

3. Authorize staff to draft an amendment to Zoning By-law, 1993, No. 12000, as amended, to include an amenity contribution provision based upon the density bonus concept for the Douglas Neighbourhood Concept Plan area.

INTENT

The intent of this Report is to provide an overview of the Neighbourhood Concept Plan for Douglas including a summary of:

1. the planning process;
2. the major components of the Plan;
3. outstanding public concerns;
4. an analysis of the amenity requirements for this Neighbourhood Concept Plan area, and
5. implementation measures.

BACKGROUND

On July 31, 1996, Council granted approval in principle to the proposed Land Use Concept Plan for Douglas (Stage 1 Neighbourhood Concept Plan) (Appendix I) and authorized staff to commence the Stage 2 detailed planning of the NCP, identifying the type, size, location, and densities of the specific land uses, and road hierarchy and alignments based on the Stage 1 Land Use Concept Plan. Council also authorized staff to prepare a comprehensive financial plan that demonstrates adequate funding for specific amenities, infrastructure and utilities, and to resolve outstanding land use issues as part of the Stage 2 planning.

It is noted that a report from the Engineering Department on the detailed servicing, funding and phasing plan is to be considered in conjunction with this report.

DISCUSSION

The Douglas Concept Plan area comprises approximately 150 acres of land and is generally bounded by Highway 99 to the west, Washington State to the south, 4 Avenue to the north, and industrial designated lands adjacent to 176 Street (Pacific Highway) to the east (Appendix I). Lands immediately surrounding the Plan as far east as 176 Street and north to 8 Avenue are considered to be within the sphere of influence and have been identified within the overall Study Area. The majority of the land outside of the Plan Area but within the Study Area is within the Agricultural Land Reserve (ALR). (Appendix VII)

The Plan Area is characterized by small acreages but also includes a number of established, small-lot urban subdivisions, mostly along Zero Avenue and Peace Arch Drive. It includes a number of significant environmental features including Little Campbell Creek and several groves of significant mature trees.

The current population of Douglas is approximately 900 persons in approximately 270 housing units.

Overview of the Physical Component of the Neighbourhood Concept Plan (Appendix II)

The Douglas Neighbourhood Concept Plan (NCP) area is designated Urban in the Official Community Plan. The Official Community Plan (OCP) contains land use strategies and policies on the development of new urban neighbourhoods, the building of complete communities, protection of natural areas, and provision of parks and recreational facilities. These strategies and policies have provided the policy framework for the Douglas NCP. The OCP also contains guidelines and requirements for the preparation and content of Neighbourhood Concept Plans for Surrey's emerging urban areas. The Neighbourhood Concept Plan for Douglas complies with the relevant policies of the Official Community Plan.

The proposed Land Use Plan for Douglas features three residential neighbourhoods generally located west of 172 Street around the future natural park, east of 172 Street surrounding the future school, and along Zero Avenue. The highest residential densities are proposed in the form of townhouses and small single-family lots around Peace Portal Golf Course.

The overall structure of the Land Use Plan is based on a modified grid pattern. This grid pattern provides for interconnectivity within the street system, and improves traffic distribution and pedestrian movement throughout the Plan Area.

A small neighbourhood commercial centre is proposed at 172 Street and 2 Avenue as a focus for the neighbourhood and to provide for convenience and personal service needs of residents.

Areas containing creeks and ravines are preserved as open spaces in accordance with Ministry of Environment and Parks and Department of Fisheries & Oceans' guidelines.

The Land Use Plan proposes a new, 13-acre joint elementary school/park site to meet the education needs of the future population.

The Land Use Plan provides for approximately 954 new housing units with an estimated population of roughly 2900 persons at build-out. Single family housing will be the predominant land use in this new urban neighbourhood (Appendix III).

Two community storm water detention ponds are proposed to manage storm water run-off resulting from future development.

Public Consultation

The preparation of the Douglas NCP has involved extensive public consultation. A total of three public open houses were held to receive community input on the evolution of the Plan. The first two Open Houses were held on October 18, 1995 and February 22, 1996. The most recent Open House was held on April 15, 1999 to present the detailed land use plan, as well as the engineering servicing, development phasing and financial plans. Input from these Open Houses has been utilized to complete the Proposed Stage 2 Land Use Plan.

The Douglas Citizens' Advisory Committee consisting of local property owners assisted City staff throughout the preparation of the Plan. The main role of the CAC has been to bring local knowledge to the plan preparation process and to facilitate local discussion and communication. The CAC met on 8 occasions to discuss, review and provide feedback on the land use plan, engineering plan, development phasing and financial strategies. In addition, staff met on numerous occasions with various groups and individuals to resolve local concerns.

At it's last meeting on March 30, 1999, a clear majority of CAC members (8 out of 9 members who submitted written comments, or 89%) expressed support of the proposed Stage 2 Land Use Plan, including the proposed financing strategy and amenity package. Two of the supporting responses raised questions about the phasing strategy, and were concerned that their respective properties would not be developable for a long time. These sites are currently under Rezoning Application No. 7996-0330-00, which is under review pending completion of the NCP. Following detailed discussion with these residents, they have expressed support for the plan, and will work with Surrey to review possible phasing alternatives. The dissenting member did not identify any concerns.

Feedback received from the April 15, 1999 Open House indicate that the majority of Douglas property owners support the Stage 2 NCP for submission to City Council for approval. There were 102 people in attendance at the Open House. The Stage 2 NCP Report was presented, including detailed information on the proposed servicing strategy and amenity package. Eighty four (84) property owners submitted comment sheets with 69 or 82% supporting the proposed Stage 2 NCP; 14 or 17% not supporting the NCP; and 1 or 1.2% undecided. The responses indicate general support for the NCP.

The following is a summary of the reasons and concerns identified by households who oppose the NCP:

- 9 are concerned about the preservation of the semi-rural lifestyle, and oppose urban development on this basis.
- 2 are concerned about increased traffic and crowding from development, and excessive costs of development.
- 1 is concerned that there was not adequate time to formulate an opinion on the plan.
- 1 is concerned that development will bring increased population, traffic congestion, and impact related to border operations. Access constraints for emergency vehicles to the area was also raised as a concern.
- 4 did not specify reasons for their opposition to the NCP.

These concerns are addressed in more detail in this report under "Outstanding Public Concerns".

Resolution of Outstanding Land Use Issues Identified in the Stage 1 Report

The Stage 1 Neighbourhood Concept Plan Corporate Report identified a number of outstanding land use issues which were to be further analyzed and resolved during the Stage 2 planning process. These included the following:

1. The accommodation of storm water, including determination of size, location and type of detention ponds;
2. The need for a secondary water main feed into the Douglas area.
3. Northeast quadrant servicing issues. A private pump solution will be required to develop this area.
4. Geotechnical concerns that may further limit the serviceable area in the NCP will have to be resolved (related to No. 3)

5. Timing and Feasibility of Ministry of Transportation and Highways widening of 8 Avenue.

All of the outstanding issues identified at Stage 1 have now been addressed. Item No. 3 is discussed below. The remaining items involve servicing issues, and will be discussed in the accompanying Corporate Report completed by the Engineering Department.

Proposed Land Use and Servicing for the Northeast Quadrant

The Stage 1 NCP Report identified a small area in the north-east corner of Douglas (4 Avenue at 175 Street) which is not serviceable by gravity sewer for further consideration and review in Stage 2 (Appendix I). The land use for this quadrant was not established in Stage 1 due to this issue. An analysis of servicing options for the north-east quadrant was subsequently undertaken.

The key issue is that this land is beyond the reach of the existing sewer system without the sewers being constructed at a depth which is considered undesirable. Therefore provision of sewer service to individual lots in this area requires a site-specific strategy. The available servicing options included: retaining the north-east quadrant in an unserviced condition, and therefore undevelopable; extending the existing sewers, which would permit the majority of the quadrant to be serviced but may lead to long term servicing problems due to the depth of the sewer pipes; installation of a shallower sewer, resulting in a sizeable area which remains beyond the reach of sewer service without the aid of individual pumps; and installation of a pump station to serve the quadrant and adjacent larger area to the east.

The option of retaining the area in an unserviced condition and therefore undevelopable was not appropriate because it excludes a portion of the plan area that is considered to be an integral part of the proposed urban community. It would also generate future pressure to establish alternative servicing strategies independent of the Neighbourhood Concept Plan process. Similarly, the options of installing deep sewers or a pump station to serve the broader area were not supported as they were considered to be technically difficult, cost-prohibitive, and contrary to servicing and planning policy. As a result, it was decided that shallower sewers installed to service bareland strata, single-family developments with private pump systems, would be recommended. Proposed land uses within the north-east quadrant are suburban size single-family lots along 4 Avenue to continue the suburban buffer, conventional urban size single-family lots (6 units per acre) west of 174 Avenue, and small-lot single family development (10 units per acre) east of the future detention pond. (Appendix II)

Modifications to the Stage 1 Land Use Concept Plan

While the proposed Stage 2 Land Use Plan is similar to the approved Stage 1 Land Use Concept Plan, it introduces a number of minor changes to reflect localized conditions and constraints, and public input received through the Stage 2 planning process. These changes are generally intended to provide better interfaces between different land uses; to

better respond to site conditions and neighbourhood context; to maintain an appropriate range of housing choices; to better respond to existing patterns of subdivision and road layouts; and to respond to concerns from residents. These changes are largely supported by the public and are summarized in Appendix IV.

Restrictive Covenants for Suburban Designated Lands

Concern has been expressed by the owner of a property at 17256 - 8 Avenue, which is designated within the Agricultural Land Reserve (ALR) and is presently used for agricultural purposes, regarding potential impacts associated with farming activities. The matter was referred to the Surrey Agricultural Advisory Committee (AAC) for comment. To address this issue and protect the agricultural area, the AAC recommended that a Restrictive Covenant be registered on title for all Suburban designated properties in Douglas to notify perspective owners of existing agricultural uses in the area, and their potential impact such as odour. The Restrictive Covenant will have to be registered as a condition of rezoning and subdivision approval.

Outstanding Issues and Public Concerns

While the majority of the concerns raised through the public consultation process for the Douglas Concept Plan have been resolved, there are a number of concerns which this NCP has attempted to address but which have not been fully satisfied. The outstanding planning-related issues are as follows:

1. Maintaining the semi-rural character of Douglas

A number of local residents remain concerned over the urban densities proposed in this Neighbourhood Concept Plan and feel that the Plan will result in urban development through the area, and does not go far enough in preserving the existing semi-rural and natural setting of this area.

In response to this concern, it is noted that Douglas is designated Urban in the Official Community Plan. Policy A-2.1 of the Official Community Plan promotes complete development in planned urban areas and strives to allocate land use and development opportunities to achieve full and efficient utilization of designated Urban areas, infrastructure services and public amenities, and to provide a broad range of residential and commercial development options. Within this Urban framework, however, the Neighbourhood Concept Plan for Douglas recognizes the existing natural features and requires riparian setbacks/leave strips from all watercourses to remain undisturbed in accordance with Ministry of Environment and Department of Fisheries & Oceans guidelines. Moreover, efforts will be made to incorporate significant stands of trees into future development proposals, and maintain the semi-rural character within the built environment.

2. *Increased Population, Traffic, and Crowding*

Some members of the public are concerned with increased traffic congestion and crowding. A transportation plan has been endorsed by the Engineering Department as part of the Stage 2 Report, which proposes an appropriate road pattern and hierarchy, and traffic control management measures to support the proposed land use plan and minimize transportation impacts. An emphasis has been placed on pedestrian and bicycle connections within Douglas to minimize driving within the neighbourhood.

As noted above, the Douglas area is designated Urban in the Official Community Plan and therefore urban densities and population are considered appropriate within this framework. The proposed servicing and amenity package will ensure infrastructure and community facilities in the area are appropriate to serve the ultimate population.

3. *Douglas Border Crossing- Federal Study*

Discussions with Federal Canadian and US Customs and Immigration Department representatives have been on-going. Recently, consultants for the Federal Government advised Surrey that a land use feasibility study is underway to determine expansion opportunities for the Douglas Border Crossing facilities, which are located west of the Douglas Neighbourhood Concept Plan area. This feasibility study will generate possible expansion options and eventually recommend a strategy for future expansion, including public consultation, land acquisition, planning and development of new/expanded border facilities.

The study is presently on-going, and the potential impact on the Douglas area is unknown at this time. Future issues related to the expansion of the Douglas Border Crossing facilities will be subject to a public process involving a number of Provincial and Federal agencies, US Customs and Immigration, the City of Surrey, and surrounding property owners, and can be addressed at that time under a separate process.

4. *Property Specific Land Use Concerns*

Several property owners have expressed specific concerns pertaining to their individual properties indicating that the proposed Land Use Plan does not maximize the future development potential and value of their properties. These individual concerns are summarized in Appendix V.

Amenity Requirements

To address the amenity needs associated with new growth in Douglas, new development will be required to make a monetary contribution toward the provision of new police and fire protection services, library materials, and the development of new parks, open space, boulevards, and pathways.

The monetary contributions toward police, fire and library materials will offset the capital costs of providing these services to the new development and are applied on a

standardized basis in all of Surrey's Neighbourhood Concept Plan areas. The monetary contributions towards park, boulevard, open space and pathway development are based upon an estimate of the capital costs of these improvements for the Douglas NCP area. The total cost is divided amongst the anticipated number of dwelling units to ensure an equitable contribution arrangement.

The park-related amenity contribution will go towards the development of the parks portion of the joint elementary school/park site; linear connections; boulevard development; and neighbourhood parks. The boulevard development component involves upgrading of street boulevards along 172 Street with additional landscaping, a landscaped median, interlocking pavers, ornate street lights, and traffic circles. The proposed amenity package has been endorsed by property owners at the last Open House. The estimated total cost of developing park-related amenities is approximately $1,040,500.

The applicable amenity contributions (per acre or unit) and the estimated revenue the City can expect to receive from this NCP area is shown in Appendix VI.

Implementation of the Douglas Neighbourhood Concept Plan

1. Park Land Acquisition

The proposed parks in the Douglas Neighbourhood Concept Plan are on the City's priority acquisition list. Development Cost Charge revenues for park land as well as the 5% cash-in-lieu of park dedication (under the Municipal Act) provide funding sources for the acquisition of the proposed parks. The park land revenue and cost estimates indicate that this NCP will be financially self-sustaining as to the acquisition of land for future park sites.

2. School Site Acquisition

The NCP identifies the need for a new elementary school site. The proposed site is located on 2 Avenue at 173 Street. The School District has identified this school within the Five Year Capital Plan, but advises that the timing for construction is contingent on educational demands stemming from the pace of development in the area.

Funding for the acquisition of school sites is subject to the review and approval of the Ministry of Education. There are no financial commitments from the Ministry of Education at this time for any school-related expenditures.

However, Bill 35 (Education Statutes Amendment Act, 1998) received Third Reading on July 28, 1998 and the Province is in the process of preparing Regulations pertaining to this Bill. If enacted, Bill 35 will allow the School District to collect funds for the purpose of acquiring school sites to accommodate new development. The school site identified in the Douglas Neighbourhood Concept Plan will be part of the overall school site requirement established by the Surrey School District. It is anticipated that the Regulations will be enacted later on in 1999.

3. *Zoning By-law Amendments*

An amendment to the Zoning By-law is required to implement the amenity contribution component of the Neighbourhood Concept Plan, and more specifically, to allow bonus densities in exchange for contributions towards the development of various neighbourhood amenities as identified in the NCP. An amendment by-law will be prepared and forwarded for consideration by Council subject to Council's direction.

CONCLUSION

The Douglas Neighbourhood Concept Plan responds to the planning objectives identified by the community and establishes land uses, densities and a development concept that are in conformity with the Official Community Plan. It incorporates a comprehensive servicing, phasing and financial plan to ensure that the costs to service this new urban area can be funded by the NCP. The NCP also includes a strategy for funding various amenities required for Douglas. Prepared by a City project team in consultation with a Citizens' Advisory Committee, this NCP has received general support from the majority of property owners and the public.

Should Council approve the recommendations of the General Manager of the Engineering Department with respect to servicing, phasing and financing, it is recommended that Council approve the final and complete Douglas Neighbourhood Concept Plan as the mechanism to manage the development and provision of amenities for this area. It is further recommended that staff be authorized to draft the necessary by-law amendments to implement the Plan.

Murray D. Dinwoodie
General Manager
Planning & Development Department

RCA/ln

APPENDICES

I. Stage 1 Land Use Concept Plan
II. Stage 2 Land Use Plan
III. Land Use Statistics
IV. Land Use Plan Modifications - Stage 1 to Stage 2
V. Property Specific Land Use Concerns
VI. NCP Amenity Contributions
VII. Douglas NCP- Plan and Study Area Boundaries
VIII Douglas Neighbourhood Concept Plan Development Concept Component

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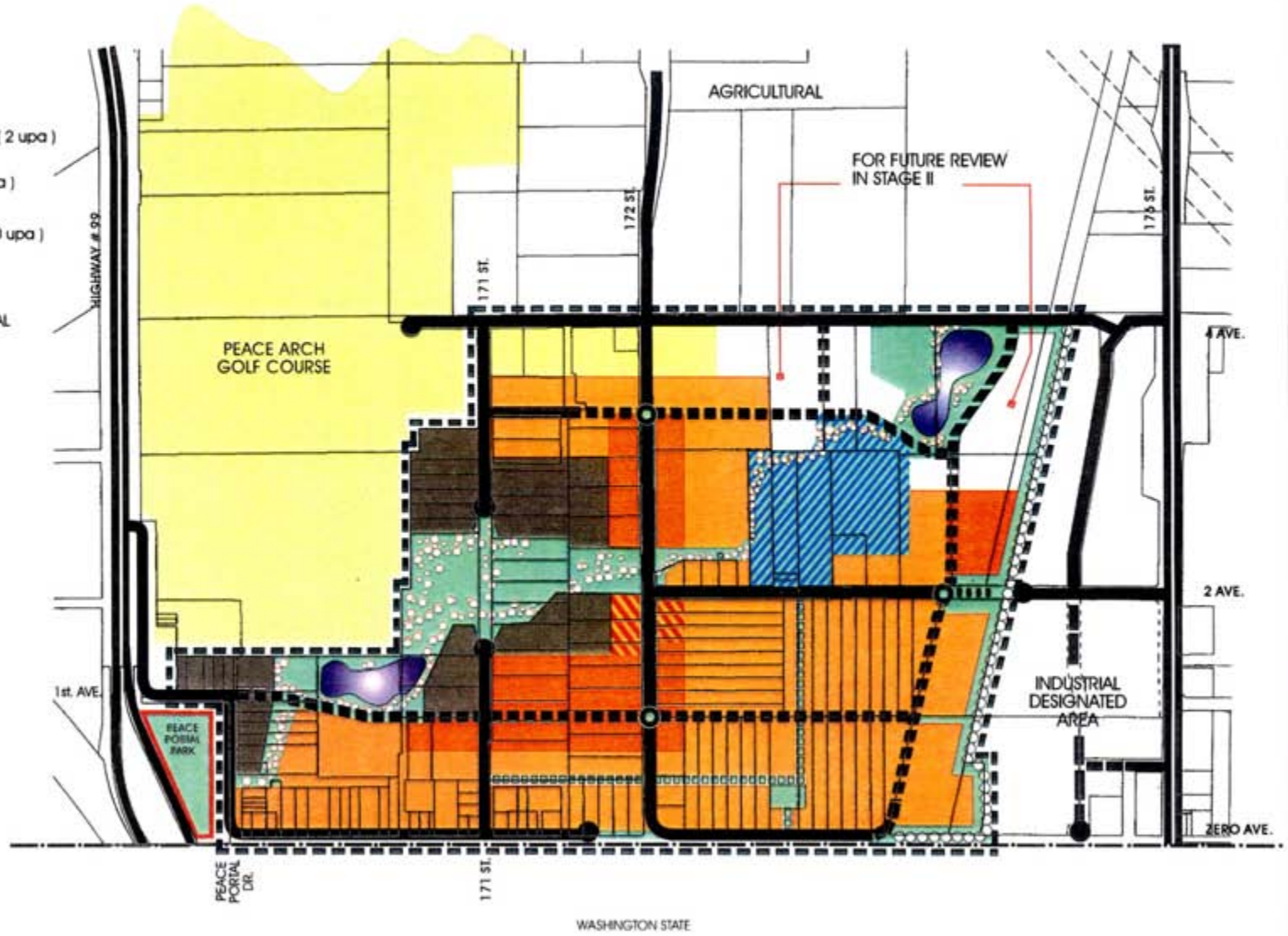
DOUGLAS NEIGHBOURHOOD CONCEPT PLAN
STAGE 1 LAND USE PLAN

option 4.cdr

LEGEND

- SUBURBAN 1/2 ACRE RESIDENTIAL (2 upa)
- SINGLE FAMILY RESIDENTIAL (6 upa)
- SMALL SINGLE FAMILY LOTS (8 - 10 upa)
- TOWNHOUSES (15 upa)
- MIX USE RESIDENTIAL/COMMERCIAL (low density)
- SCHOOL/PARK
- OPEN SPACE
- PROVINCIAL PARK
- PLAN BOUNDARY
- NOISE/VISUAL BUFFER
- TRAFFIC PATTERN CHANGE
- WALKWAY/LINEAR PARK
- NEW ROAD R.O.W.
- DETENTION POND



NOTE: This Plan is conceptual in nature and is only intended to reflect a general pattern of land uses.

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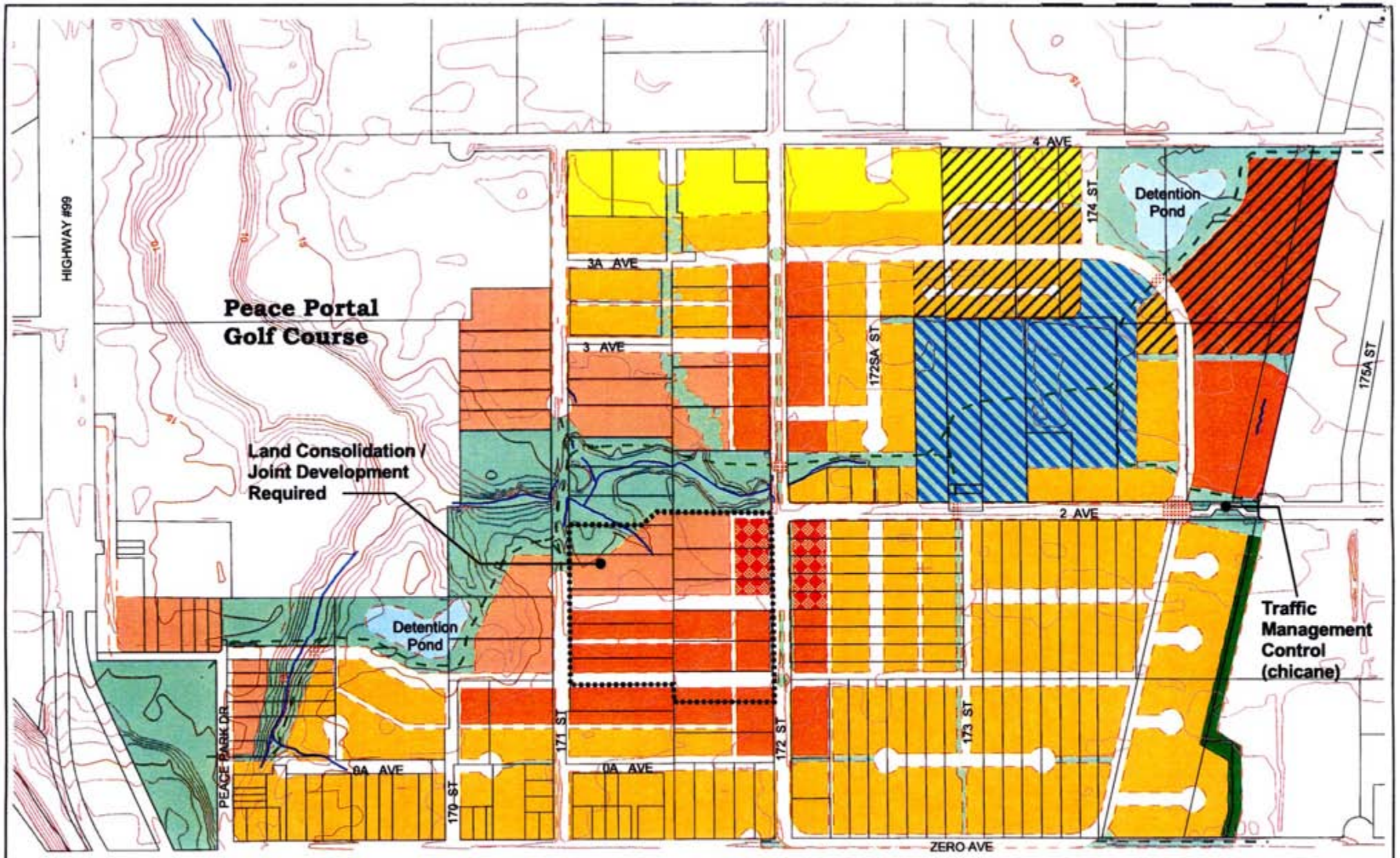

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Douglas NCP Stage 2
Proposed Land Use Plan

City of Surrey Planning & Development Department

NOTE: This Plan is conceptual in nature and is only intended to reflect a general pattern of land uses.

April 15, 1999

- Proposed Road Layout
- Creeks & Rivers
- Contours
- Special Paving Areas
- Strata lots
- Main Pedestrian Corridors
- Buffer to Industrial Area
- Townhouse (15 u.p.a.)
- Small Lot Single Family (10 u.p.a.)
- Urban Single Family (6 u.p.a.)
- Suburban 1/2 Acre (2 u.p.a.)
- Commercial / Residential
- Open Space
- School / Park Site
- Traffic Circles & Landscaped Median
- Significant Vegetation Corridor

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APPENDIX III

DOUGLAS NEIGHBOURHOOD
CONCEPT PLAN
LAND USE STATISTICS

Land Use	Area In Hectares (acres)	Projected Number of New Dwelling Units	Projected Floor Area (Commercial in sq. m.) (Commercial) (sq. ft.)
Suburban	4.35 (10.75)	21	N/A
Single Family	27.4 (67.8)	407	N/A
Single Family Small Lot	9.05 (22.4)	224	N/A
Townhouses (15 upa max)	7.3 (18.1)	272	N/A
Apartments (Above Comm.)	0.7 (1.72)	30	N/A
Commercial	0.7 (1.72)	N/A	3,500 (37,600)
Joint School/Park Site	5.35 (13.2)	N/A	N/A
Detention Ponds	1.4 (3.4)	N/A	N/A
Parks and Open Space	5.3 (13.1)	N/A	N/A
TOTALS	61.6 (152.2)	954	3,500 (37,600)

APPENDIX IV

DOUGLAS NEIGHBOURHOOD
CONCEPT PLAN
PLAN MODIFICATIONS
STAGE 1 TO STAGE 2

1. The Industrial buffer previously shown between the Douglas neighbourhood and the Commercial/Industrial land to the east from Zero Avenue to 4 Avenue has not been extended north of 2 Avenue, as a result of the proposed redesignation of adjacent lands from industrial to multiple residential which negate the need for the buffer.

2. The proposed land use for the north-east quadrant was not identified in Stage 1, pending resolution of servicing constraints in the area. After further review the area has been identified for strata development. The road pattern for this area has also been determined.

3. A small pocket park was identified in the southeast area south of the proposed school, to serve residential development in the area. Following discussion with the Parks, Recreation and Culture Department and the Citizen Advisory Committee, concerns were raised about safety, maintenance costs, and overall benefits associated with such a small park. As a result, this park has been deleted and replaced with a large walkway entrance and walkway extending to Zero Avenue. The Parks, Recreation and Culture Department supports the amendment.

4. The Stage 1 Plan showed the proposed road closure of 2 Avenue at 175 Street west of the industrial area to mitigate border traffic using local roads, and this remains as the long-term objective. However, immediate closure of this road is not possible at this time due to transportation concerns in the surrounding area and long-term plans for the operations of the border. Traffic calming in the form of a chicane is proposed to prohibit trucks and buses from using this connection to the border, and the situation will be monitored and re-assessed in the future to determine the feasibility of a closure in keeping with the long-term objective.

5. Properties south of the natural park are designated for consolidation and joint development, as a result of their off-set location relative to one another, which results in inequitable distribution of required road dedication and development costs. Joint development of parcels identified will be required.

6. The property at 138 Peace Park Drive immediately south of the Peace Portal Golf Course is owned by the Province and is presently used as a maintenance yard for Peace Arch Park. The site was designated in the Stage 1 Plan for future townhousing. Representatives of the Province have indicated that although the site is not actively used as parkland, it is protected as parkland by a Provincial Order-in-Council, therefore it should be designated as park.

7. Properties along 172 Street from 1 Avenue to 2 Avenue have been designated for Small-lot single family development. The interface between small-lot and conventional single-family development designated properties has been extended an additional 30 metres south to 0A Avenue to achieve a more logical delineation of uses.

APPENDIX V

DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
PROPERTY SPECIFIC ISSUES

A. *Required Property Acquisition at 14 Peace Park Drive (Thomson Property) for Construction of 1 Avenue*

The Stage 2 Land Use Concept Plan requires the dedication and construction of 1 Avenue from 172 Avenue to Peace Park Drive. This road represents one of the key access and egress points to the area. However, the proposed location of 1 Avenue will render the entire property at 14 Peace Park Drive (Thomson property) undevelopable, therefore the property will have to be acquired by the City. The cost of acquiring this property for 1 Avenue would normally be borne by property owners within the Neighbourhood Concept Plan area that have development potential.

It is noted that the City has surplus property further to the south at 0A Avenue in the form of a dedicated but unconstructed right-of-way. To facilitate the cost-effective acquisition of the Thomson property, it is proposed that a portion of the 0A Avenue right-of-way be closed and exchanged with the Thomson property at 14 Peace Park Drive. The comparative value of the two sites will be similar, as the majority of the Thomson property is constrained by the existing creek. The proposal will maintain the required walkway connection to Peace Park Drive and accommodate the necessary servicing corridor, and at the same time establish a new single-family lot at 0A Avenue as a buffer between the existing single-family area to the south and future townhouse development to the north. This arrangement is acceptable to the Thomsons in principle, and a road exchange application will be initiated in the immediate future.

B. *Future Suburban Subdivision Pattern at 17162- 4 Avenue (Peterson Property)*

The agents for the owner of the property at 17162- 4 Avenue (Mr. Ron Peterson) have requested redesignation of the Suburban designated strip south of 4 Avenue to Urban, in order to allow future development of urban single-family lots. The petitioners have been advised that the Suburban designation strip is intended to provide a reduction in density as a buffer to the agricultural-designated land on the north side of 4 Avenue, and therefore cannot be supported.

Suburban-designated properties on the south side of 4 Avenue will be required to comply with the maximum density restriction of 2 units per acre as per the Official Community Plan, and will be subject to a Development Permit as required for development adjacent to the Agricultural area.

C. *Proposed Land Use and Road Layout Amendment for 61- 170 Street (Hambrook Property)*

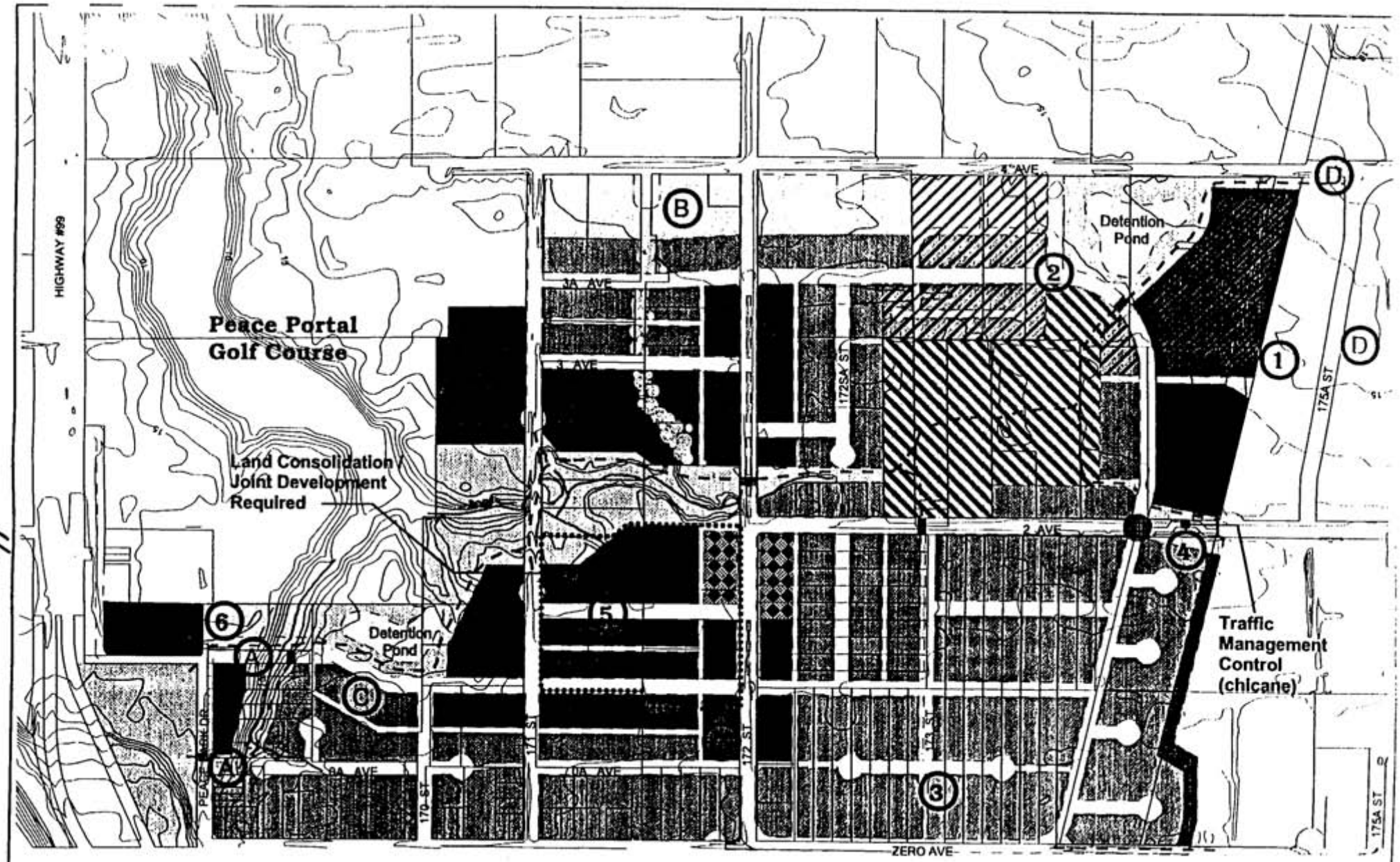
The owner of the property located immediately south of the Peace Portal Golf Course at 61- 170 Street (Mr. Alan Hambrook) requested consideration of an alternative land use and road pattern on his property, which involved relocation of the required detention pond to the southwest immediately adjacent to the creek, and elimination of 1 Avenue.

Following discussion with the Engineering Department and Engineering consultant, the applicant was advised that the proposed amendment was not supportable, as the detention pond location was generally fixed due to technical requirements. In addition, elimination of 1 Avenue and relocation of this road south of the property would result in greater impact to the established single family area to the south, and therefore is not desirable.

D. *175A Street/4 Avenue Proposed Channelization*

The Douglas Neighbourhood Concept Plan proposes plans for intersections immediately around the Neighbourhood Concept Plan area to address issues related to transportation impacts affecting this future urban community. One of the key issues identified from the outset by area residents is the impact of southbound traffic, particularly trucks and buses, using Douglas as a shortcut route to access the Pacific Highway Border Crossing and avoid queues on Pacific Highway (176 Street). To address this concern, it is proposed that the intersections of 4 Avenue/176 Street and 4 Avenue/175A Street be channelized to restrict eastbound to southbound turning manoeuvre, thus eliminating the tendency for cross border traffic to short-cut through the Douglas area.

The City is presently reviewing Rezoning application No. 7997-0193-00 at the southeast corner of 4 Avenue/175A Street for commercial development (205- 176 Street), and this application is at Third Reading awaiting completion of outstanding development requirements. Based on the recommendations in the Douglas Neighbourhood Concept Plan, the applicants were advised of the proposed channelization at this intersection. The proponents have expressed their opposition to this traffic control measure at 4 Avenue/175A Street, and have requested full turning movements at this intersection. The applicants have been advised that the channelization is supported by the Douglas residents, and that any proposal to amend this traffic control would necessitate consultation with the Douglas Citizen Advisory Committee. The applicants have indicated that they may initiate a public consultation process to pursue this amendment in the future.



STATE OF WASHINGTON

Douglas NCP Stage 2 Modification (Stage 1 to Stage 2) and Property Specific Issues

City of Surrey Planning & Development Department

NOTE: This Plan is conceptual in nature and is only intended to reflect a general pattern of land uses.

April 15, 1999

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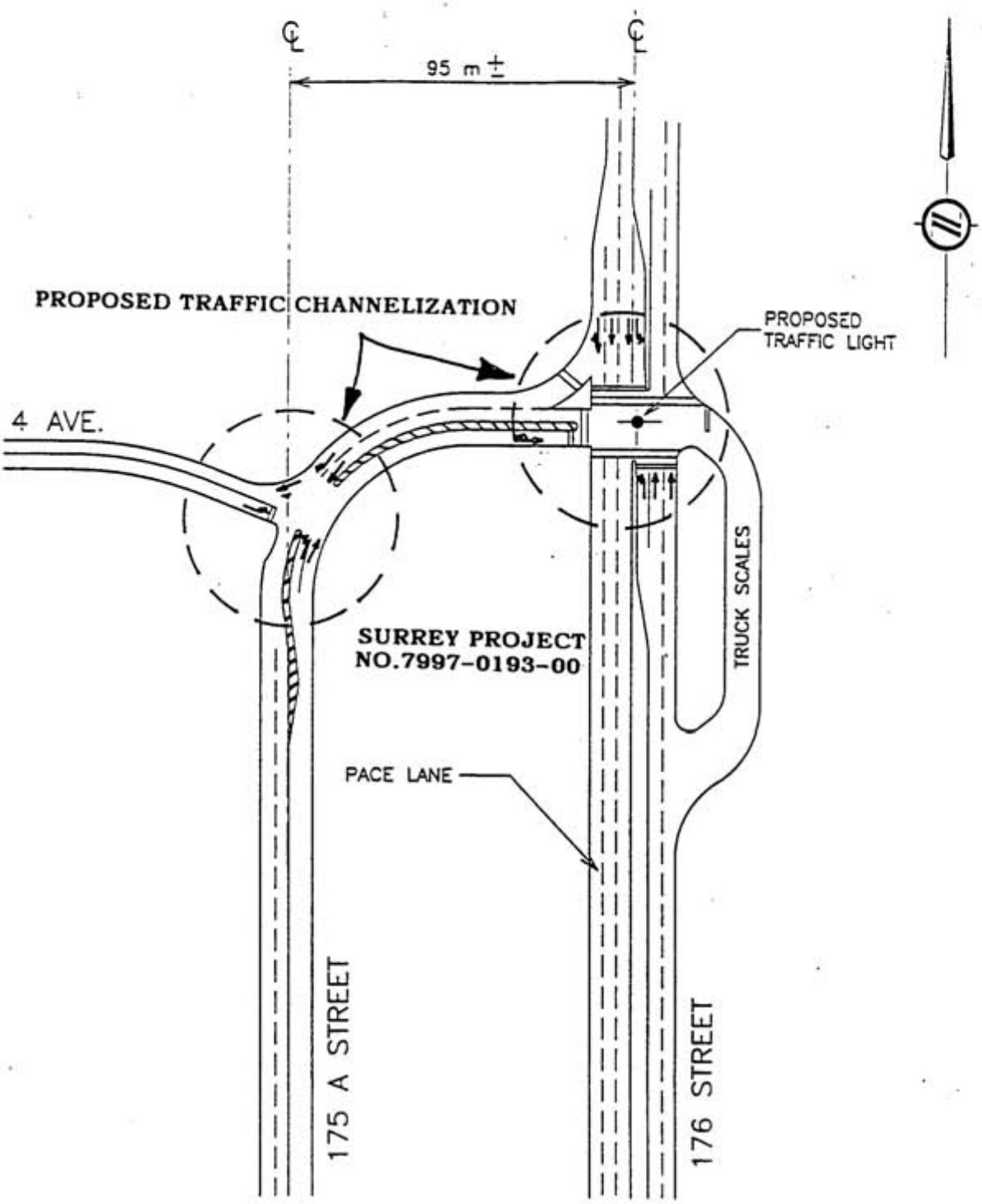

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DOUGLAS

NEIGHBOURHOOD CONCEPT PLAN

PROPOSED ROAD & INTERSECTION CONFIGURATION ON 4th AVENUE BETWEEN 175A AND 176 STREETS

FIGURE R8

McElhanney

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APPENDIX VI

DOUGLAS NEIGHBOURHOOD
CONCEPT PLAN
AMENITY CONTRIBUTIONS AND ANTICIPATED REVENUES

	Residential (per dwelling unit)	Non-Residential (per acre)***	Anticipated Revenues
Parks, Boulevard, and Related Public Amenities	$1,085.38	$5,038.65	$1,040,500.00
Library Materials	$114.65	N/A	$109,376.10
Fire Protection	$220.13	$3,301.95	$215,617.33
Police Protection	$50.96	$764.40	$49,915.32
Total Amenity Contribution	$1,471.12	$9,105.00	$1,415,408.70

***Contributions from commercial development are based upon an equivalency factor of 1 hectare (2.47 acre) of land being equivalent to 15 residential units.

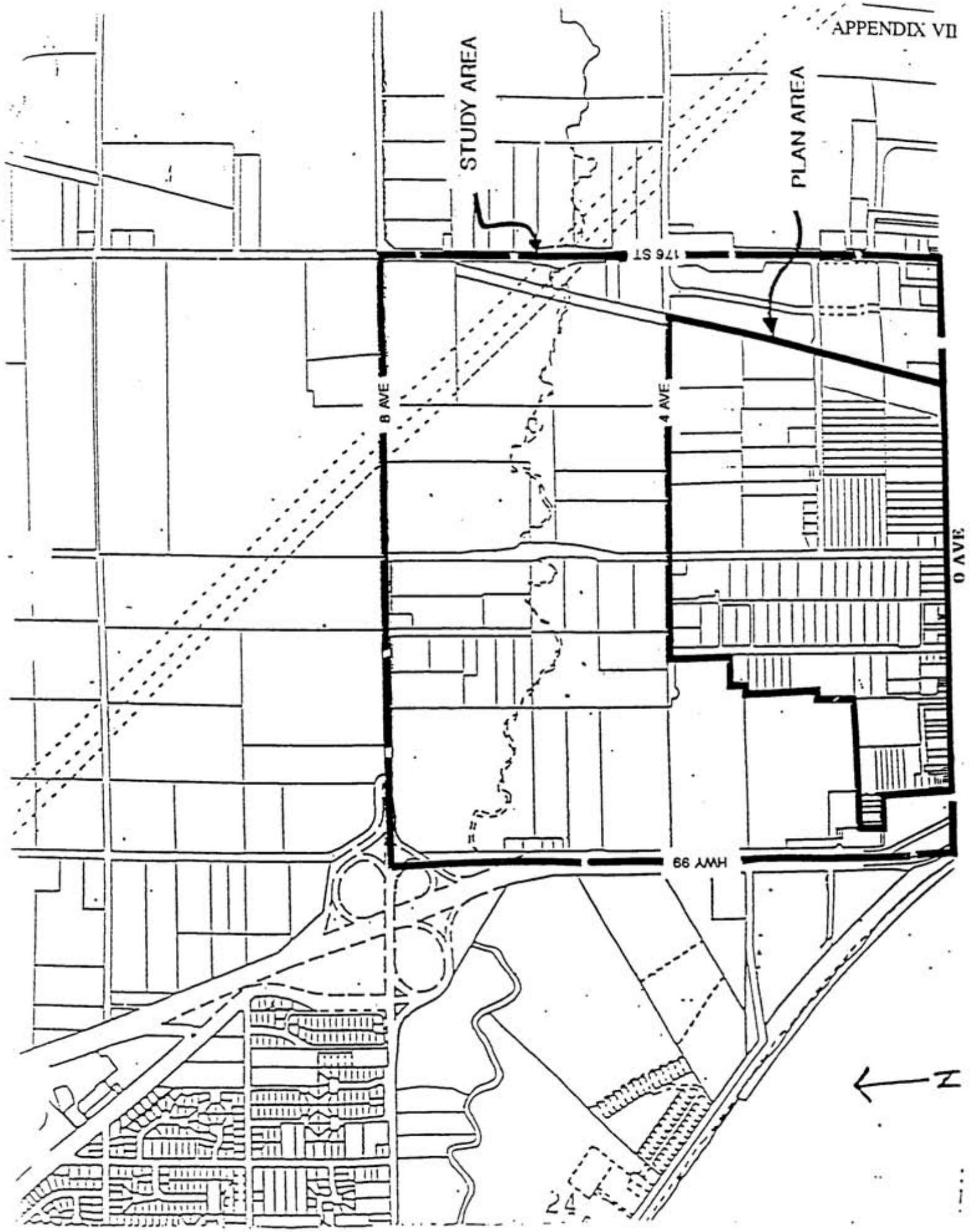
The contributions towards park and boulevard-related amenities will pay for:

- the development of a joint elementary school/park site;
- linear connections
- boulevard development; and
- the development of neighbourhood parks.

Contributions for library, fire and police will go toward capital improvements and equipment to serve the new population in this neighbourhood.

Contributions are payable at rezoning for single family subdivisions and at the building permit stage for multiple residential and non-residential development.

APPENDIX VII



Appendix VIII

SURREY
CITY OF PARKS

DOUGLAS NEIGHBOURHOOD CONCEPT PLAN

Development Concept Component

June, 1999

DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
PART I
DEVELOPMENT CONCEPT COMPONENT
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DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN

PART I
DEVELOPMENT CONCEPT COMPONENT

1. INTRODUCTION

The Douglas Neighbourhood Concept Plan responds to the planning objectives identified by the community and establishes land uses, densities and a development concept that are in conformity with the Official Community Plan. It incorporates a comprehensive servicing, phasing and financial plan to ensure that the costs to service this new urban area can be funded by the NCP. The NCP also includes a strategy for funding various amenities required for Douglas.

Prepared by a City project team in consultation with a Citizens' Advisory Committee, this NCP has received general support from the majority of property owners and the public.

2. PLAN AREA CHARACTERISTICS

The Douglas Concept Plan area comprises approximately 150 acres of land and is generally bounded by Highway 99 to the west, Washington State to the south, 4 Avenue to the north, and industrial designated lands adjacent to 176 Street (Pacific Highway) to the east (Appendix I). Lands immediately surrounding the Plan as far east as 176 Street and north to 8 Avenue are considered to be within the sphere of influence and have been identified within the overall Study Area. The majority of the Study Area north of the Plan area is designated within the Agricultural Land Reserve (ALR).

The Plan Area is characterized by small acreages but also includes a number of established, small-lot urban subdivisions, mostly along Zero Avenue and Peace Arch Drive. It includes a number of significant environmental features including Little Campbell Creek and groves of significant mature trees.

The location of the Plan Area between Peace Arch Golf Course and Highway No. 99 to the west, the United States border to the south, and the Douglas and Pacific Highway Border Crossings to the east and west, results in limited access and egress opportunities.

The current population of Douglas is approximately 900 persons in approximately 270 housing units.

3. POLICY FRAMEWORK - SURREY'S OFFICIAL COMMUNITY PLAN

Most of the Douglas Neighbourhood Concept Plan (NCP) area is designated Urban in the Official Community Plan. The northerly portion of the Douglas area along the Agricultural boundary is designated Suburban. The Official Community Plan (OCP) contains land use strategies and policies on the development of new urban

neighbourhoods, the building of complete communities, protection of natural areas, and provision of parks and recreational facilities. These strategies and policies have provided the policy framework for the Douglas NCP. The OCP also contains guidelines and requirements for the preparation and content of Neighbourhood Concept Plans for Surrey's emerging urban areas. The Neighbourhood Concept Plan for Douglas complies with the relevant policies of the Official Community Plan.

4. PLAN PREPARATION PROCESS

The Neighbourhood Concept Plan for Douglas has been prepared by a City project team consisting of representatives of the Planning & Development, Engineering, and Parks, Recreation & Culture Departments. The engineering component of the Plan including detailed servicing, financing and development phasing was undertaken by McElhanney Consulting Services Limited under the direction of the City Engineering Department. The preparation of this Plan has also involved the participation of the Surrey School District, Ministry of Environment & Parks, Department of Fisheries & Oceans, and the Ministry of Transportation & Highways.

The preparation of the NCP followed a two-stage process. Stage 1 involved the preparation of a generalized conceptual land use plan and servicing concept and was approved by Council in July, 1996. The Stage 2 process involved the preparation of the detailed land use plan identifying the type, size, location and densities of specific land uses and road alignments based on the Stage 1 land use concept plan. The Stage 2 process also included the preparation of a detailed engineering servicing plan, development phasing strategy, and financial plan.

The preparation of the Douglas NCP has involved extensive public consultation. A total of three public open houses were held to receive community input on the evolution of the Plan. A Citizens Advisory Committee (CAC) consisting of local property owners assisted City staff throughout the preparation of the Plan. The main role of the CAC has been to bring local knowledge to the plan preparation process and to facilitate local discussion and communication. The CAC met on 8 occasions to discuss, review and provide feedback on the land use plan, engineering plan, development phasing and financial strategies. In addition, staff met on numerous occasions with various groups and individuals to resolve local concerns.

5. GOALS AND OBJECTIVES

The following broad goals and objectives are intended to provide direction for future development in Douglas:

- Recognize the ALR boundary along 4 Avenue, which limits future development north of 4 Avenue to agriculture, and consider the interface of this agricultural area with future Suburban uses south of 4 Avenue.
- Minimize the impact of the two Border Crossings on the Douglas area.
- Recognize and protect development patterns and character of existing single family urban subdivisions in planning for future land uses.

- Recognize fixed land uses, including Peace Portal Golf Course to the west, Peace Arch Provincial Park to the south, Commercial/Industrial designated lands to the east, and narrow residential lots fronting Zero Avenue.
- Ensure that the types of and densities of land uses in Douglas are in keeping with the hierarchy of urban centres promoted in the Official Community Plan.
- Identify, preserve and enhance, where possible, the natural environment and water courses, including creeks and ravines, and significant stands of vegetation.
- Manage stormwater run-off to mitigate the adverse impacts of development on watercourses and fish habitat.
- Provide a mix of housing densities and types including suburban, conventional, and small-lot single family dwelling lots, and well-designed townhouses to create a "complete community" and accommodate a range of economic and lifestyle needs.
- Create opportunities to enhance community facilities in Douglas as a focus for the community.
- Recognize the limited potential for commercial development in Douglas, which may comprise a small commercial node to serve local needs.
- Create pedestrian-friendly, walkable neighbourhoods.
- Ensure the provision of cost-efficient and effective engineering services to meet the needs of the area without undue financial burden on the City.
- Provide for public amenities, schools and parks which are appropriate to meet the needs of present and future area residents.

6. THE GENERAL PLAN

6.1 Land Use Plan Overview (Appendix II)

The Land Use Plan for Douglas features three residential sub-neighbourhoods generally located west of 172 Street around the future natural park, east of 172 Street surrounding the future school, and along Zero Avenue. The highest residential densities are proposed in the form of townhouses and small single-family lots around Peace Portal Golf Course.

The overall structure of the Land Use Plan is based on a modified grid pattern. This grid pattern provides for interconnectivity within the street system, and improves traffic distribution and pedestrian movement through the Plan Area.

The Land Use Plan provides for approximately 954 new housing units with an estimated population of roughly 2800 persons at build-out. Single family housing will be the predominant land use in this new urban neighbourhood (Appendix III).

Areas containing creeks and ravines are preserved as open spaces in accordance with Ministry of Environment, Lands and Parks and Department of Fisheries & Oceans' guidelines.

The Land Use Plan proposes a new joint elementary school/park site to meet the education needs of the future population.

In addition to the above land uses, the Land Use Plan also shows the approximate size and location of two community storm water detention ponds. These ponds will be needed to manage storm water run-off stemming from future development.

6.2 Residential

The Land Use Plan for Douglas features a variety of residential densities ranging from suburban half-acre lots, to ground-oriented townhousing and two-storey apartment units. The areas of highest densities are focused around major amenities, including a proposed neighbourhood commercial node, a future natural park area and Peace Portal Golf Course. Pockets of small single family lots form the interface between townhouse nodes and conventional single family neighbourhoods.

While the thrust of this NCP is for the future urban development, the land along the south side of 4 Avenue immediately adjacent to the agricultural area is designated Suburban. The Land Use Plan proposes creation of a strip of Suburban 1/2 acre residential lots along the south side of 4 Avenue as a transition between agricultural uses to the north and future urban uses to the south. To ensure future property owners are aware of existing agricultural uses in the area and thus minimize nuisance complaints about agricultural odours and other potential impacts, registration of a Restrictive Covenant on title for all Suburban designated properties in Douglas will be required. Suburban Residential half-acre land uses comprise approximately 11 acres.

Conventional single family residential lots at a maximum density of 6 units per acre dominate the NCP area. Approximately 70 acres of the Plan Area are designated for future conventional Single Family residential use. The Land Use Plan also features areas of small (compact) single family lots with a density range of 8 to 10 units per acre. These small lot areas are generally located along both sides of 172 Street (the Main Street), along 1 Avenue, and adjacent to townhouse areas around the natural park and golf course. Pockets of small-lot single-family development are also proposed at the eastern edge of the NCP adjacent to the proposed school/park site. Single Family small lots comprise approximately 22 acre of land within the Plan Area.

A number of multiple residential areas in the form of townhouses and apartments are proposed in the plan. The largest area of multi-family housing is located around the golf course and adjacent to the future natural park. This location provides a substantial amenities for ground-oriented housing.

Mixed commercial/residential development is proposed along the main street (172 Street) south of 2 Avenue, and will enable residential apartment units above commercial at-grade development. This will provide an opportunity to create an active street for all times of the day, strengthen the commercial viability of future businesses along this strip, and increase the range of available housing stock.

The maximum density for apartments is 45 units per acre and the maximum density for townhouses is 15 units per acre. Approximately 19 acres are designated for townhouses and approximately 2 acres for apartments.

6.3 Commercial

A small neighbourhood-oriented, commercial node is proposed at 172 Street at 2 Avenue, providing street-oriented commercial services. This node is intended to provide a focal point for the neighbouring residential areas, and will provide a limited range of commercial services to serve the immediate convenience and personal service needs of the neighbourhood. The range of commercial uses will be strictly delineated to avoid large stores and encourage more neighbourhood oriented businesses. This neighbourhood shopping node is centrally located, and will be accessible by walking and cycling, thereby eliminating the need for area residents to commute for basic service needs.

As noted above, this neighbourhood commercial area also allows commercial/residential development in the form of residential units located above retail uses, to accommodate owner-occupied residences and a mix of residential accommodation. These residential units will also create a more viable commercial development.

Approximately 2 acres of land are designated Mixed Commercial-Residential in the Land Use Plan.

6.4 Schools and Parks

The Land Use Plan includes a new joint elementary school/park site comprising approximately 13.75 acres of land. The proposed school/park site reflects the optimal location in terms of overall lot size, access, and configuration, and has been approved by the Parks, Recreation and Culture Department and the School District.

6.5 Natural Preservation Areas

The Land Use Plan identifies areas containing creeks, ravines, and other significant natural features as Environmental Preservation Areas. Included in this designation are setback areas adjacent to streams and vegetation communities contiguous with watercourse corridors where there may be opportunities for habitat protection. These areas are largely undevelopable because of their environmental sensitivity and statutory restrictions imposed by the Ministry of Environment in terms of creek bank protection.

The Land Use Plan requires riparian setbacks/leave strips from watercourses to be in accordance with the current Ministry of Environment & Parks and Department of Fisheries & Oceans guidelines, i.e. 15 metres (50 feet) from top of bank for residential developments with a density of 6.0 units per acre or less, and 30 metres (100 feet) from top of bank for residential developments with a density greater than 6.0 units per acre as well as all commercial development.

The location and significance of watercourses shown in the Land Use Plan are based upon the City of Surrey Fisheries Watercourse Classification map and supplemented by an environmental assessment of Douglas prepared by Envirowest Environmental Consultants. Where there may be disagreement as to the precise location and significance of a watercourse, it will be up to individual property owners to undertake supplemental field surveys including top of bank surveys, to refine the presence and exact location of watercourses and remaining areas that may be developed.

6.6 Open Space

An extensive open space system is proposed in the Land Use Plan, including an active park adjacent to the elementary school, a passive park, and a linear park system connecting the entire neighbourhood through a variety of walkways and greenways. The major open space feature is the natural park west of 172 Street developed around a series of open creeks adjacent to the golf course and a drainage detention pond required to accommodate the drainage needs of the south neighbourhood of Douglas. The active park adjacent to the school is proposed to include a sports field, ball diamond and playground area.

A well-developed linear park system is proposed to provide pedestrian and bicycle accessibility to all residents in the neighbourhood. The proposed width of walkways and trails will vary depending on the location, length and function of the connection, and is based on the following hierarchy:

- Linkages between Streets- 4m pavement on 5m wide walkway right-of-way;
- Neighbourhood Linkages- 4m pavement on 8m wide walkway right-of-way;
- Greenways- 4m pavement on variable width (5 to 10m) right-of-way.

The linear open space system extends from the northeast corner of the Douglas neighbourhood to Peace Arch Park at the southwest corner, and incorporates active park areas, natural parks, multi-use trails and stormwater detention pond areas.

7.0 LAND DEVELOPMENT

To ensure compatibility and feasible development areas, avoid remnant pieces of land, and achieve an equitable distribution of road dedication and construction costs amongst properties, certain groups of properties in the Plan Area will need to be developed together through consolidation of larger land assemblies or coordinated development. This includes properties bounded by 172 Street to the east, 171 Street to the west, the proposed natural park to the north, and 1 Avenue to the south, where several properties will be inequitably affected by proposed roads. The affected properties have been identified in the Land Use Plan (Appendix II). The properties within this area will require consolidation and a coordinated approach towards development.

8.0 ENGINEERING SERVICES, FINANCING AND PHASING

An engineering servicing and financial plan has been prepared as an integral part of the Douglas Neighbourhood Concept Plan. Prepared by McElhanney Consulting Services Limited, this report deals with major engineering infrastructure elements which could be added to the City's Development Cost Charge (DCC) program. A comprehensive stormwater study is also included as part of the engineering study. The engineering report also addresses development phasing as well as a comprehensive financial analysis.

A key objective of the NCP process is to ensure the provision of cost-efficient and effective engineering services to meet the needs of the area without undue financial burden on the City. To address this objective, the Consultant has prepared a financial analysis based on an expected sequence of development in the Douglas area. This sequence or phasing plan expects development to begin in the northeast catchment before proceeding in the southeast. This will ensure an adequate cost recovery for developers upfronting the cost of the northeast detention pond.

The Consultant has summarized the projected DCC revenues and construction costs for each engineering service component for ultimate buildout based on the expected development sequence. The projected revenues are based on the current DCC by-law as well as the growth projections. The results of the financial analysis indicates that projected DCC revenues are not sufficient to fund the major DCC works to service the NCP area, resulting in a shortfall. A servicing levy of approximately $375 per unit will therefore be required to be contributed in addition to the DCC rates in order to finance the major infrastructure required.

9.0 AMENITY REQUIREMENTS

To address the amenity needs associated with new growth in Douglas, new development will be required to make a monetary contribution toward the provision of new police and fire protection services, library materials, and the development of new parks, open space, linear open space, and boulevards.

The monetary contributions toward police, fire and library materials will offset the capital costs of providing these services to the new development and are applied on a standardized basis in all of Surrey's Neighbourhood Concept Plan areas. The monetary contributions towards park, open space and pathway development are based upon an estimate of the capital costs of these improvements for the Douglas NCP area. The total cost is divided among the anticipated number of dwelling units to ensure an equitable contribution arrangement.

The park-related amenity contribution will go towards the development of a joint elementary school/park site, linear connections; neighbourhood parks, and boulevards. The estimated cost of developing park-related amenities is approximately $1,085.38.

The applicable amenity contributions (per unit) and the estimated revenue the City can expect to receive from this NCP area is shown in Appendix IV.

10.0 DESIGN GUIDELINES

A set of design guidelines has been developed to guide the future development of Douglas. These guidelines complement the Development Permit Guidelines contained in the Official Community Plan and are intended to achieve the overall development objectives defined in this Plan (Appendix V). Some of the key principles of these guidelines include the following:

- Development of pedestrian-friendly streets with sidewalks shaded by trees and streetscapes not dominated by garages and cars parked in front yards.
- Development of an aesthetically pleasing community by integrating existing residential areas and preserving natural features, where possible.
- Development of a linear park system linking the entire community through greenways, neighbourhood walkways, and connections to adjacent areas.
- Development of an identifiable and unique community composed of several interconnected compact, walkable neighbourhoods to allow people to shop and play within walking distance of home.
- Preserve the semi-rural theme of the Douglas area by integrating new buildings which share common architectural character and features conveying this theme.
- Development of the Douglas Village Main Street as an identifiable focus for the surrounding community.
- Development of a strong public street character through application of design guidelines for public streets and a variety of boulevard improvement measures, including street trees, pavements, and design controls on front yards and fencing.

11.0 IMPLEMENTATION

11.1 Park Land Acquisition

It is estimated that at today's value, the proposed parks in the Douglas NCP will cost approximately $5,880,000. (19.6 acres at $300,000 per acre). This estimate is based on an average land value only, and does not account for specific restrictions to development which may exist on specific properties. The proposed parks are on the City's priority acquisition list. Development Cost Charge revenue for park land as well as the 5% cash-in-lieu of park dedication (under the Municipal Act) provide funding sources for the acquisition of the proposed parks.

It is estimated that this NCP will generate approximately $4,800,000 in park land development cost charges, based on current DCC rates and the projected development for each land use. While these monies will be used to acquire park land on a City-wide basis, the park land revenue and cost estimates indicate that this NCP will be financially self-sustaining as to the acquisition of land for future park sites. In addition, to development cost charge revenues, it is estimated that the 5% cash-in-lieu of park dedication will

generate an additional $1,515,000 from residential subdivisions, based on a total subdivision area of 101 acres and a estimated land cost of approximately $300,000 per acre.

A comparison of the estimated park land acquisition costs and the estimated park land revenues generated by Development Cost Charges and 5% cash-in-lieu indicates that this NCP will be financially self-sustaining as to the acquisition of land for future park sites.

11.2 School Site Acquisition

The NCP identifies the need for a new elementary school site, and this has been identified in the School District Capital Plan.

Funding for the acquisition of school sites is subject to the review and approval of the Ministry of Education. There are no financial commitments from the Ministry of Education at this time for any school-related expenditures in Douglas.

However, Bill 35 (Education Statutes Amendment Act, 1998) received Third Reading on July 28, 1998 and the Province is in the process of preparing regulations pertaining to this Bill. If enacted, Bill 35 will allow the School District to collect funds for the purpose of acquiring school sites to accommodate new development. The school sites identified in the Douglas Neighbourhood Concept Plan will be part of the overall school site requirement established by the Surrey School District. It is anticipated that the Regulations will be enacted later in 1999.

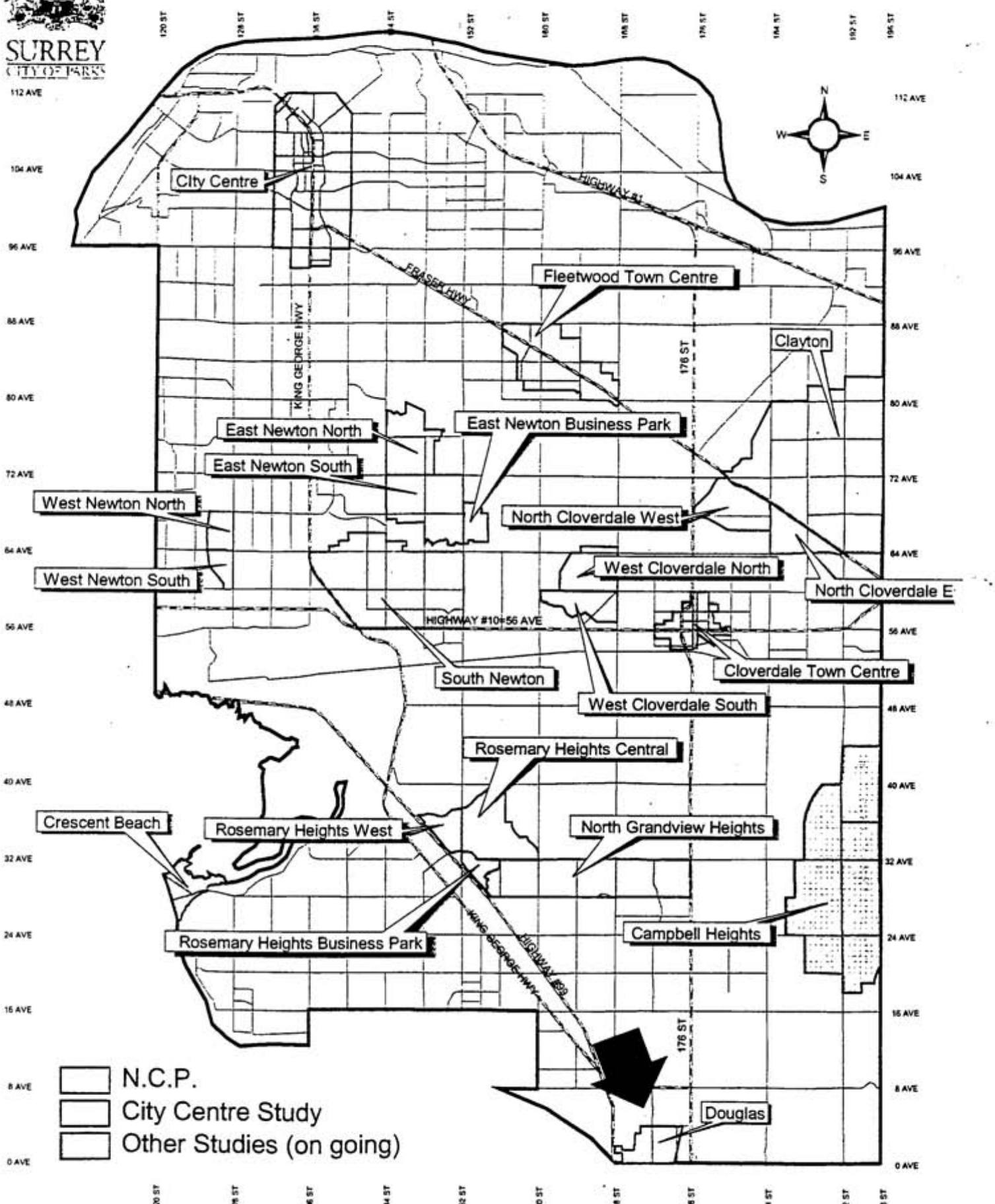
11.3 Zoning By-law Amendments

An amendment to the Zoning By-law is required to implement the amenity contribution component of the Neighbourhood Concept Plan, and more specifically, to allow bonus densities in exchange for contributions towards the development of various neighbourhood amenities as identified in the NCP.

11.4 NCP Amendments

Any proposed major or minor amendments to this Neighbourhood Concept Plan must be undertaken in accordance with Council's approved Neighbourhood Concept Plan amendment policy.

Neighbourhood Concept Plan Areas



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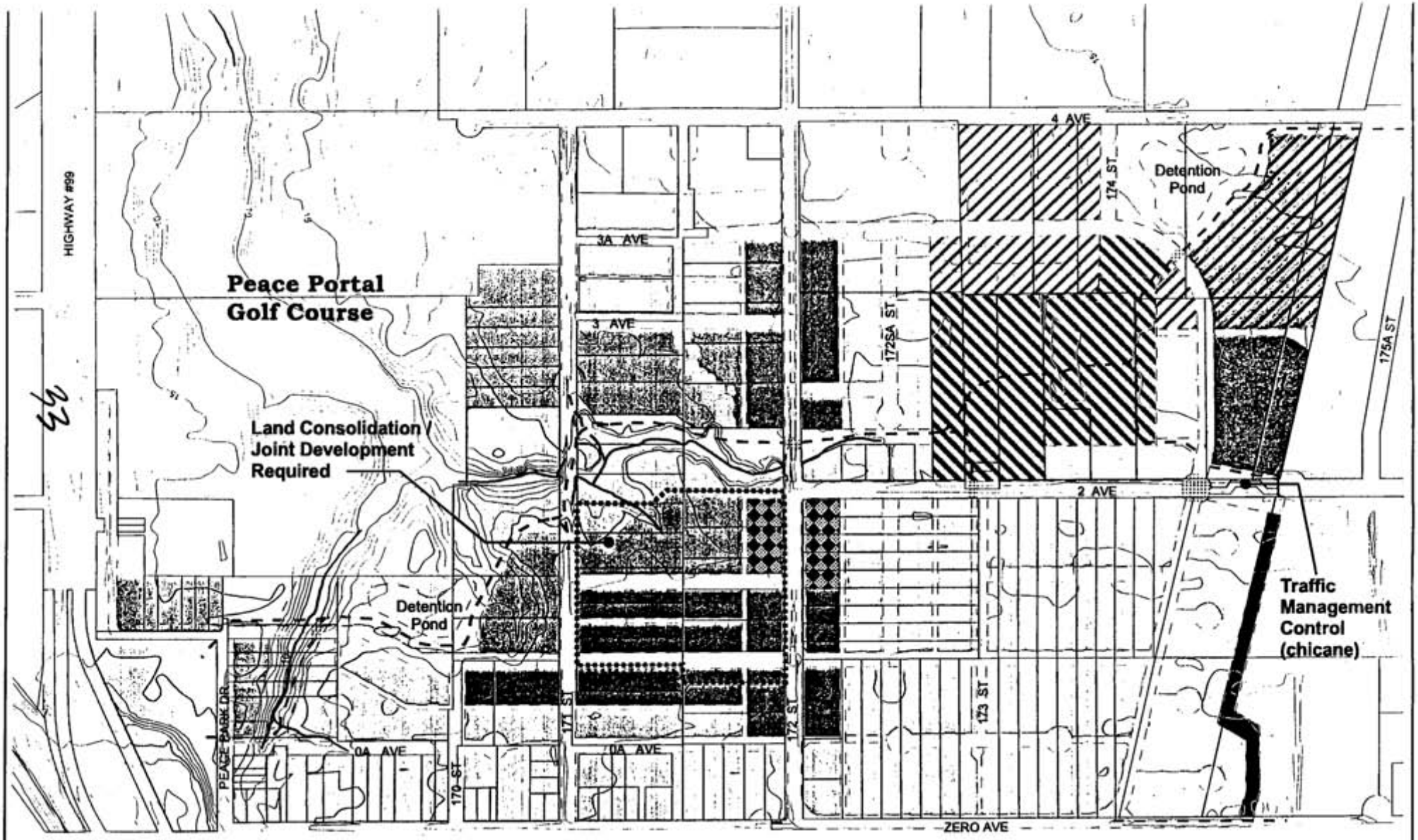

SURREY
CITY OF PARKS

Douglas NCP Stage 2
Proposed Land Use Plan

City of Surrey Planning & Development Department

NOTE: This Plan is conceptual in nature and is only intended to reflect a general pattern of land uses.

April 15, 1999

- Proposed Road Layout
- Creeks & Rivers
- Contours
- Special Paving Areas
- Strata lots
- Main Pedestrian Corridors
- Buffer to Industrial Area
- Townhouse (15 u.p.a.)
- Small Lot Single Family (10 u.p.a.)
- Urban Single Family (6 u.p.a.)
- Suburban 1/2 Acre (2 u.p.a.)
- Commercial / Residential
- Open Space
- School / Park Site
- Traffic Circles & Landscaped Median
- Significant Vegetation Corridor

N

APPENDIX C

DOUGLAS NEIGHBOURHOOD CONCEPT PLAN LAND USE STATISTICS

Land Use	Area In Hectares (acres)	Projected Number of New Dwelling Units	Projected Floor Area (Commercial in sq. m.) (Commercial) (sq. ft.)
Suburban	4.35 (10.75)	21	N/A
Single Family	27.4 (67.8)	407	N/A
Single Family Small Lot	9.05 (22.4)	224	N/A
Townhouses (15 upa max)	7.3 (18.1)	272	N/A
Apartments (Above Comm.)	0.7 (1.72)	30	N/A
Commercial	0.7 (1.72)	N/A	3,500 (37,600)
Joint School/Park Site	5.35 (13.2)	N/A	N/A
Detention Ponds	1.4 (3.4)	N/A	N/A
Parks and Open Space	5.3 (13.1)	N/A	N/A
TOTALS	61.6 (152.2)	954	3,500 (37,600)

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APPENDIX D

DOUGLAS NEIGHBOURHOOD CONCEPT PLAN AMENITY CONTRIBUTIONS AND ANTICIPATED REVENUES

	Residential (per dwelling unit)	Non-Residential (per acre)***	Anticipated Revenues
Parks, Boulevard, and Related Public Amenities	$1,085.38	$5,038.65	$1,040,500.00
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Total Amenity Contribution	$1,471.12	$9,105.00	$1,415,408.70

***Contributions from commercial development are based upon an equivalency factor of 1 hectare (2.47 acre) of land being equivalent to 15 residential units.

The contributions towards park and boulevard-related amenities will pay for:

- the development of a joint elementary school/park site;
- linear connections
- boulevard development; and
- the development of neighbourhood parks.

Contributions for library, fire and police will go toward capital improvements and equipment to serve the new population in this neighbourhood.

Contributions are payable at rezoning for single family subdivision and at the building permit stage for multiple residential and non-residential development.

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Appendix E

SURREY
CITY OF PARKS

DOUGLAS NEIGHBOURHOOD CONCEPT PLAN

Design Guidelines

June, 1999

DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN

Design Guidelines

The following design guidelines will apply to developments within the Douglas Neighbourhood Concept Plan area. These guidelines are intended to complement the Development Permit Guidelines contained in Surrey's Official Community Plan (OCP).

The following design objectives have been identified:

- To recognize the Agricultural-designated lands north of 4 Avenue adjacent to Douglas.
- To preserve the unique and identifiable local semi-rural character for the Village of Douglas through the progressive development of coordinated streetscapes and common architectural features that reinforce this character.
- To reinforce and enhance the local flavour of the Village as a pedestrian-oriented residential community with a strong human scale and unity of character.

1.0 DESIGN GUIDELINES FOR PUBLIC STREETS (Map IV)

1.1 Street Character

1.1.1 The application of the City's Neo-traditional road standards is recommended to accentuate a friendlier, pedestrian oriented character/atmosphere of the Village's residential streets

1.1.2 Use of changes in pavement to accentuate pedestrian crossings, major intersections or landmark areas is recommended. (See street pavement details)

1.1.3 Use alternate hard surfaces such as grass-crete, interlocking pavers, etc. in all parking areas to reinforce the semi-rural quality of the streets.

1.1.4 Curb extensions and chokers are recommended to establish a good edge definition of areas used for on-street parking (See street details 1 to 6).

1.1.5 A low stone or brick faced wall is recommended along the front of all residential lots on Main Street (172 Street) and on 173 Street to establish a formal edge beside the sidewalk.

1.1.6 Where no rear lane is provided, garage doors should not dominate the streetscape. Garages should be recessed back from the front of the house.

1.1.7 On corner lots, garage access is to be provided from the flanking street.

1.1.8 No fences are desirable on the front yard area of any residential site; shrubs and hedges are recommended. If fences are unavoidable, use a low, transparent fence in combination with shrubs and hedges on both sides of the fence.

1.1.9 Landscaping (shrubs, climbers, and trees where possible) are recommended with fences along the lanes.

1.2 Treatment of Intersections and Parking Areas

1.2.1 Curb extensions (narrowing) should be provided to reduce the crossing distance for pedestrians and to limit vehicle speed.

1.2.2 Chokers and landscaping (with trees) should be considered.

1.2.3 Different texture (stamped concrete or other paving treatment) that adds texture and colour differentiation should be used at the major street intersections and pedestrian crossings (See sketches of various node details).

1.2.4 Formal tree planting in grates and unique sidewalk pavement (colour, pattern, texture) are required along the Main Street commercial area (See sketches).

1.3 Street Lighting

1.3.1 Special lamp posts with single or double luminaries with a strong heritage/rural flavour are recommended for use along the Main Street commercial area, and these lamps should be primarily oriented to serve pedestrians (lower, with a gentler glow and placed at short intervals).

1.3.2 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.

1.3.3 Implementation of the street lighting concept will be coordinated by Surrey Engineering through the servicing agreement process.

1.4 Streetscape Design Guidelines (Sidewalks, Fences, Driveways)

1.4.1 Landscaping, definition of yard edges, and design of open space areas along public streets should achieve continuity, and help to unify the streetscape.

1.4.2 Transparent, low fences (wrought iron, picket, split-rail, lattice, three board fences or similar) are recommended in front yards, in combination with shrubs and hedges.

1.4.3 To maintain visual continuity of front yards (and landscaping), fences built along the side property lines (generally 1.80 m high) should not extend within the 7.5 m. area of the required front yard (where max. permitted height of fences is 1.2 m).

1.4.4 In multiple family sites, no portion of a fence which is on or closer than 0.90 m. from the property line along a public street should be solid, continuous and without articulation. Continuous straight fences should provide 0.90 m. wide space in front of the fence for landscaping on private property.

1.4.5 Recreational vehicle parking, garbage container enclosures, satellite dishes and other service elements should be screened with shrubs and hedges and not be exposed to views from the street.

1.4.6 Consider arbours, trellises and other creative elements to define the threshold to residential sites.

1.4.7 Chain link fences are not considered appropriate to the character of Douglas and should be avoided. If chain link must be used, it should be a maximum of 1.2m high and only in combination with climbers and dense shrubs planted on both sides of the fence.

1.4.8 Lattice is recommended for the upper part of any fence along lanes, pedestrian paths and flanking streets.

2.0 GUIDELINES FOR RESIDENTIAL AREAS (AREAS "B" AND "C")

2.1 Design Guidelines for Small-Lot Areas

2.1.1 In order to achieve privacy on porches, verandahs and patios/decks located toward a public street, the finished grade of these dwelling units should be between 0.60 to 1.00 metre above the level of the sidewalk.

2.1.2 Recommend the use of cedar shingles or similar (in terms of colour and texture), and high profile asphalt shingles to relate to the semi-rural character of the area.

2.1.3 Metal or red roof tiles are not considered acceptable. Roof tiles and duroid may be considered only if they resemble cedar shakes in terms of texture, form and colour.

2.1.4 Houses on narrow lots to be more than one storey high. It is desirable that upper level(s) be contained within the roof envelope.

2.1.5 High pitch and strong roof slopes are recommended. Minimum desirable roof slope is 8/12.

2.1.6 Simple roof forms with strong gable lines, dormers and habitable attics are preferred.

2.1.7 Verandahs, porches or roof projections across the front façade are recommended to provide a friendlier, human scale at street level. Entrance areas should not be higher than one storey.

2.1.8 Incorporate strong roof overhangs, projections, eave brackets, weather vanes, etc. to convey a rural character.

2.1.9 *Use rectangular windows with dominant mullions that accentuate vertical lines; wide trim is recommended around doors and windows.*

2.1.10 *Apply light colours for fascia, soffits and trim in contrast with strong colours of siding.*

2.1.11 *Use of clapboard siding, scale siding, and board and batten for exterior walls is encouraged; the use of stone as accent material is also recommended.*

2.2 Design Guidelines for Townhouse Developments

2.2.1 *Most of the characteristics of houses on small lots should also be incorporated in the design of townhouse developments.*

2.2.2 *Where applicable, retain and incorporate clusters of existing trees.*

2.2.3 *Continuity of the public sidewalk pavement across the access driveways should be maintained to establish the dominance of pedestrians over vehicles.*

2.2.4 *Consider variation in building height, separations, roof line and setbacks between buildings to provide visual diversity within the same development.*

2.2.5 *The design of townhouses fronting a public street should have a strong single family character and provide direct pedestrian access from the sidewalk to the main entrance door of all units along a public road.*

2.2.6 *The design of townhouse clusters along the street should not be repetitive and duplex clusters should avoid the mirror image effect.*

2.2.7 *No flat roofs will be permitted in the Village of Douglas; simple roof lines are encouraged.*

2.2.8 *Corner units of townhouse developments, and any housing unit exposed to side views, should provide sufficient architectural detailing to all street-fronting elevations.*

2.2.9 *To reinforce the single family flavour of the Village, the design of townhouse clusters fronting on to the street should incorporate, as a dominant facade component, one or several of the following architectural features/elements:*

- *Gable roof forms or a dominant gable roof component toward the street with a minimum 8/12 slope. Gabled dormers, pitched roofs. etc.;*
- *Strong roof overhangs/eave projections;*
- *Louvered ventilation on gables, wind vanes, copulas, shingled or scaled gable end walls, etc.;*
- *Bay windows; Windows with muntins and mullions; Rectangular/square shaped windows; French doors;*

- *Porches, verandahs, colonnades;*
- *Horizontal siding and wide trim around windows, etc.(stucco to be used only as a secondary component and in combination with other exterior finishing materials);*
- *Architectural components of the facade at the entrance should not be higher than one storey.*

2.2.10 *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.*

2.2.11 *Landscaping at the perimeter of the site should be designed to reflect the flavour of front yards in single family areas. Use of hedges and shrubs is recommended as an alternative to fences in yard along a public street.*

2.2.12 *No solid, unarticulated high fences are desirable along streets. If unavoidable, any solid portion of a fences/low wall (1.20 m. maximum height) along a public street should be set-back 0.90 m. from the property line and include landscaping on the street side of the fence.*

2.2.13 *The use of chain link fences in front yards is not acceptable anywhere in Douglas.*

3.0 DESIGN GUIDELINES FOR COMMERCIAL AREAS (Area "A" in Map I)

The following guidelines are intended to achieve a harmonious relationship and co-ordination amongst commercial buildings, and between commercial buildings and the street, and to achieve a unity of character and reinforce the identity of the Village:

3.1 Commercial Frontage

3.1.1 *Commercial building frontage should be continuous along both sides of the street.*

3.1.2 *Continuity of the commercial frontage is to be achieved by a series of narrow frontage retail bays instead of a large single commercial space.*

3.1.3 *Developments located at corner sites should have active frontage on both abutting streets. Facades to provide same type of detailing on both streets. These buildings should anchor the corner and act as visual landmarks.*

3.1.4 *Create interest and articulation of the building mass by creative use of balconies, projections, colours, roof lines and roof slopes, etc.*

3.1.5 *Provide small front yard setbacks and extend the sidewalk pavement to the building frontage. To achieve a pedestrian-oriented character of commercial areas a minimum 2.00 m. setback is recommended. Changes in setback are recommended to achieve frontage articulation along the length of the street.*

3.1.6 *Frontage of the buildings should reflect a strong human, pedestrian scale; direct access to ground level retail uses at short intervals from the street is encouraged.*

3.1.7 Sidewalk surface pattern should extend to the face of the building.

3.1.8 Provide tree planting in grates to accentuate and differentiate the commercial from the residential area.

3.1.9 Buildings should reflect a strong local residential character. Roof form, window shapes, storefronts and overall appearance to incorporate characteristic architectural details found in the residential areas.

3.1.10 Provide terraces, balconies and/or decks on the levels above the street level retail commercial uses. Upper level(s) should be set back from the ground floor level.

3.1.11 Bay windows and recessed doors should be incorporated as standard features in commercial storefronts. Muntins and wide trims are desirable.

3.1.12 Store fronts should consider the use of wood for window and door frames. It is recommended that the doors to the retail units fronting the street be made of wood with raised details, and consider inset glass panels.

3.2 Parking in Commercial Areas

3.2.1 Short term on-street parking to be provided along the commercial frontage.

3.2.2 Commercial parking and loading areas to be located behind the buildings, and screened from direct views from abutting streets and residential areas. Access to parking areas to be provided from the lane.

3.2.3. Use a low (max. 1.00 m. high) transparent fence combined with landscaping (including trees) to screen parking areas from the lane

3.2.4 Buildings should provide corridors that provide access to the front of the building from the parking area at the back.

3.2.5 The edge of parking areas along lanes should be defined with transparent low metal fence (and/or low raised planter) and high canopy trees.

3.2.6 Use decorative pavers to identify parking areas.

3.2.7 Provide pedestrian scale decorative lamp posts/luminaries in parking areas and along the lane along commercial areas.

3.3 Canopies and Signs

3.3.1 The use of canopies and awnings over the sidewalk is encouraged for commercial development on the Main Street (172 St.) to provide continuous weather protection along the building.

3.3.2 A 45 degree inclination slope is recommended for canopies; Compatibility and co-ordination of canopies is encouraged. Round canopies are not recommended.

3.3.3 *Canopies should be of a flat, solid colour and should be coordinated with the colour scheme of the building.*

3.3.4 *Sign size, location and information thereon should be designed and oriented to pedestrians and relate to the scale and character of the commercial area.*

3.3.5 *Fascia signs, projecting signs and window signs which provide a flavour of the "old general store" are encouraged.*

3.3.6 *Acceptable materials for signs are: wood (carved or sandblasted panels, three dimensional wooden letters, etc.), paint (on sign boards or directly on the building facade or glass), metal (hangers, cut-out letters, cast letters, etc.), neon (for outlines, or window signage only), and similar.*

4.0 DESIGN GUIDELINES FOR STREET TREES (Map II)

4.1 Street and Boulevard Trees

4.1.1 *Recommended trees along the major neighbourhood streets are shown on Map II, "Street Tree Planting Scheme, and are differentiated within the neighbourhood by different species of trees (color, shape, foliage density). 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)*

4.1.2 *Recommended trees along the same street include a combination of species in order to provide bio-diversity, and promote tree health by lowering the impact of common pests and diseases. These should be referenced in approved Design Guidelines for single family areas.*

4.1.3 *Wherever possible, new development should retain and incorporate existing clusters of native trees.*

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

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

4.2 Trees in Front Yards

4.2.1 *To enhance the overall quality of the neighbourhood, new developments should retain and incorporate existing clusters of trees. The publication "Saving Native Trees in the Pacific Northwest" is recommended as a guideline.*

4.2.2 *Flowering trees in front yards (especially along 172 Street and along the perimeter collector road) are recommended to add colour and texture to the streetscape.*

4.2.3 A large deciduous tree is recommended in front of every residential unit (single family detached or townhouse unit) fronting the street, and should follow the planting pattern and be of the same species as the identified boulevard trees.

4.2.4 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).

4.2.5 Street planting along the street boulevards should consider two; preferably more, species of tree in order to promote tree health by lowering the impact of common pests and diseases (See Map II. "Street Tree Planting Scheme"). The Parks and Recreation Department should be consulted for specific suggestions.

5.0 DESIGN GUIDELINES FOR GREENWAYS, PEDESTRIAN/BIKE CORRIDORS AND SIDEWALKS (Map III)

The following guidelines are intended to facilitate an integrated network of pedestrian/bike corridors and greenways, including street sidewalks, that allows direct and easy access to most activity nodes within the Village. This integrated system extends throughout the neighborhood and offers passive and active recreational opportunities to the local residents.

5.1 General Design Guidelines

5.1.1 Design of multi-use corridors should meet the guidelines on gradients and physical design in Section B.1 of the "City of Surrey Bicycle Blue Print".

5.1.2 Lighting along the bike/pedestrian corridors should consider their use by bikes and pedestrians. Lighting should meet the recommendations contained in the "Bikeway Design Supplement to the Urban Geometric Design Guide for Canadian Roads".

5.1.3 Clear visual continuity of the path should be maintained by careful alignment of the pedestrian/bike corridors and local streets.

5.1.4 Sudden changes in alignment or interruptions of the pedestrian path should be avoided

5.1.5 Path pavement should provide a smooth surface finish; consideration should be given to its potential use by joggers, and wheelchairs.

5.1.6 Surface material of the pedestrian/bike paths should be consistent throughout the entire network. The use of asphalt with a contrasting paving material at the edge of the path (including colour and texture differentiation), is recommended.

5.2 Guidelines for Greenways along Linear Open Space

5.2.1 Major multi-use (bike/pedestrian) corridors should be integrated as part of the neighbourhood open space system which traverses the Village from southwest to northeast. The greenway links major park areas, provides access to the school and commercial area, and is part of a the various pedestrian/bike trails which provide passive recreational opportunities within the Village of Douglas.

5.2.2 Minimum width of the pedestrian/bike path surface to be 4.0 m. within the variable width of the green corridor/linear park.

5.2.3 The alignment and landscaping of the bike/pedestrian path should reinforce the natural character of the linear park.

5.2.4 If bicycle baffles are required, they should be installed along the 7.5 m. setback line from the front yard, at the approach of the path to a street.

5.2.5 If appropriate, low lighting and lamposts should be placed at short intervals. Lighting along the corridor should consider use by cyclists and pedestrians.

5.2.6 Wall mounted lighting in units abutting the corridors may help to increase the user's perception of safety (CPTED). The provision of arbours, gates and sidewalks from individual townhouse units to the Greenway path is recommended.

5.3 Guidelines for Neighbourhood Linkages

The following guidelines are intended to guide the development of multi-use corridors which provide access from residential areas to Greenways, the school/park site, and the commercial core:

5.3.1 Width of the path surface to be a minimum of 4.0 m within a 8.00 m. wide corridor.

5.3.2 Path pavement should provide a smooth surface finish. The alignment of multi-use corridors should offer wide views and avoid a corridor effect.

5.3.3 Landscaping within the corridor should add to the attractiveness of surrounding development, and include low shrubs and plants only. Trees are recommended on the yards of the abutting lots, at various set backs from the path to avoid a corridor effect.

5.3.4 Fences along the corridor, if required, should be preferably transparent and be combined with landscaping on both sides of the fence.

5.3.5 The height of the fence along that portion of the corridor that extend within the area of the front yard setback of a lot should be transparent and not higher than 1.20 m .

5.4 Guidelines for Street Linkages

These are minor connections between local streets in single family residential areas. These linkages will complete the overall pedestrian/bike network that, in combination with local streets, will provide easy and direct access to various destination points within the Village. They will also help to expand the various pedestrian loops throughout the Village which provide another opportunity for passive recreation.

5.4.1 Width of the path surface to be a minimum of 4.0 m. within a 5.00 m. wide corridor.

5.4.2 The full width of the corridor is to be paved with a smooth surface finish to respond to its use by pedestrians, joggers, bicycles and wheelchairs.

5.4.3 Side yard fences (generally 1.8 m. high) of single family lots abutting pedestrian linkages should not extend within the required front yard area (7.5 m from the front property line). Any portion of fencing within the front yard area should not be higher than 1.20 m.

5.4.4 No landscaping is recommended on these pedestrian linkages for reasons of maintenance and perception of safety by its users.

6.0 DESIGN GUIDELINES FOR AGRICULTURAL BUFFER AREAS

Refer to Schedule C of the Official Community Plan, 1996, Section "B", which provides guidelines intended to regulate development along the Urban-Agricultural interface. Suburban-designated properties along the south side of 4 Avenue will be required to comply with these guidelines, including the provision of continuous landscaping buffers and increased building setbacks from the Agricultural boundary.

Wide sidewalks and a combination of retail and residential units along the commercial area.

Retention of existing trees help to reinforce the semi - rural character of the neighbourhood.

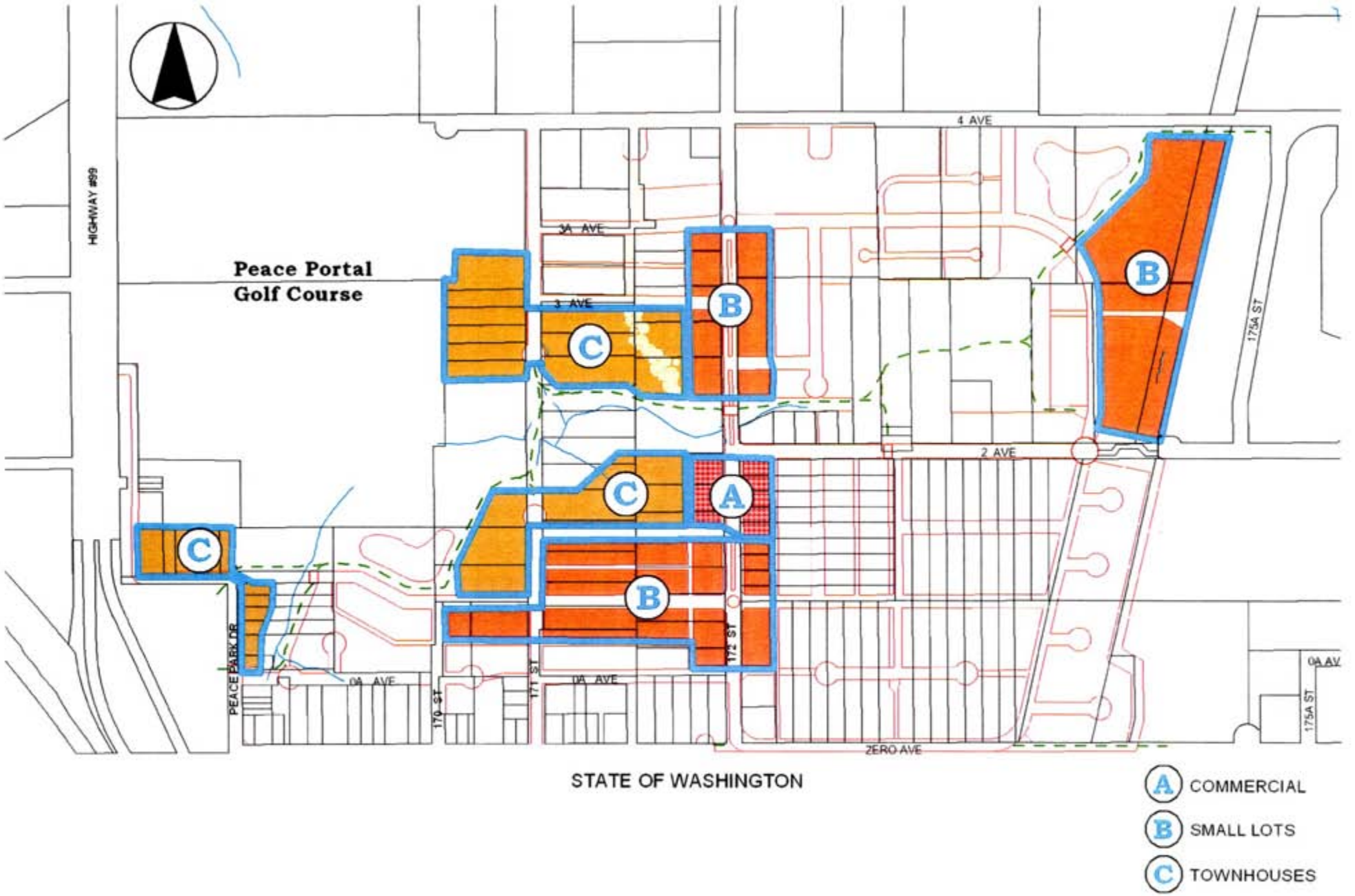
Traffic circle and other traffic calming devices include landscaping.

Horizontal siding contrasting strong colours and wide trim.

Pedestrian / low scale of the commercial buildings provide a village atmosphere.

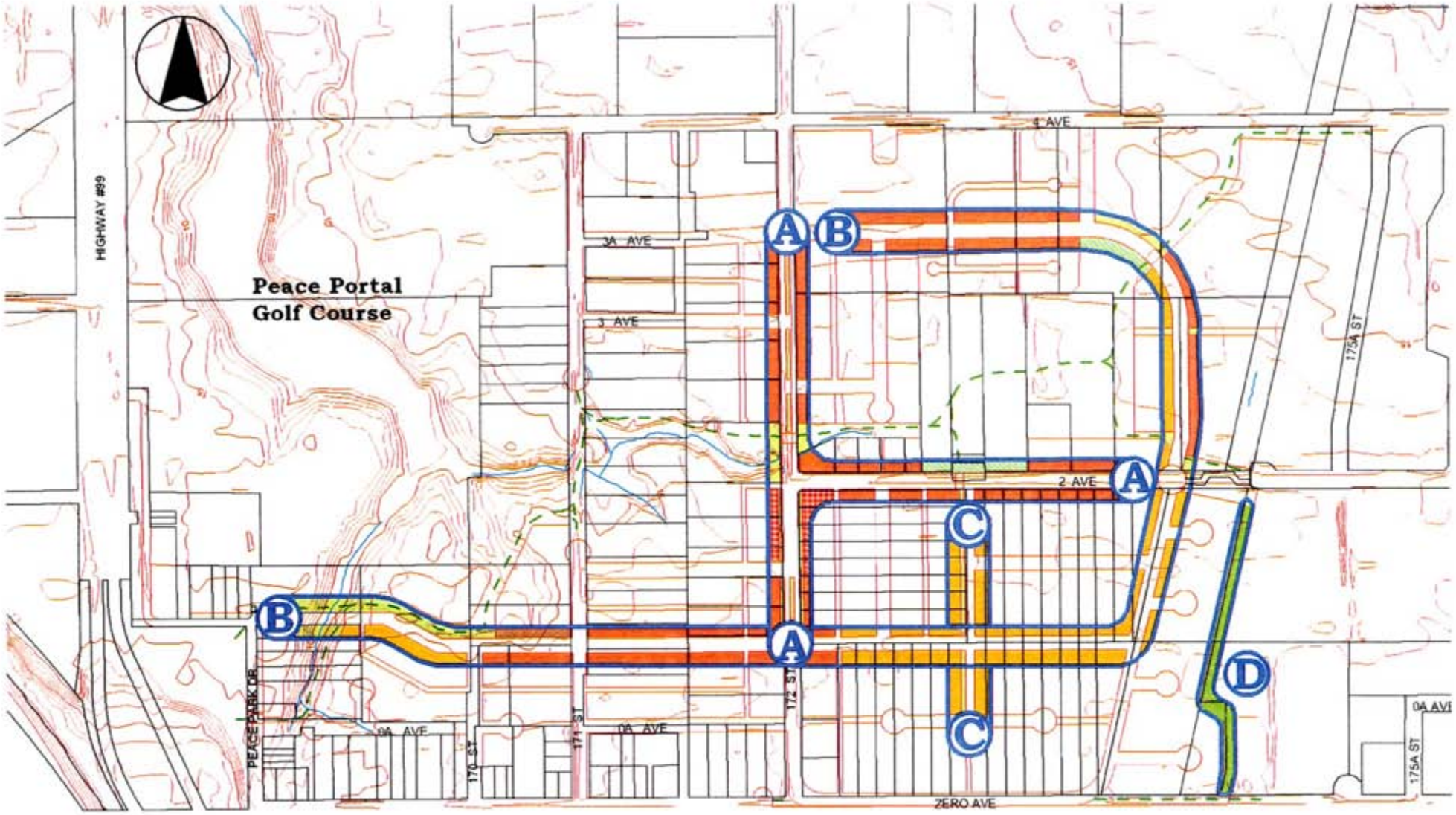
Use of street trees to differentiate the quality of residential streets.

Lanes at the back of commercial areas landscaped with a pedestrian character. Strong depiction of parking areas.



Douglas Neighbourhood Concept Plan

AREA SUBJECT
TO DESIGN GUIDELINES MAP I



STATE OF WASHINGTON

A Columnar Pin Oak
Golden Sunburst Locust
Katsura Tree

B Katsura Tree
Worpleston Sweetgum
Raywood Flowering Ash

C Raywood Flowering Ash
Shademaster Locust

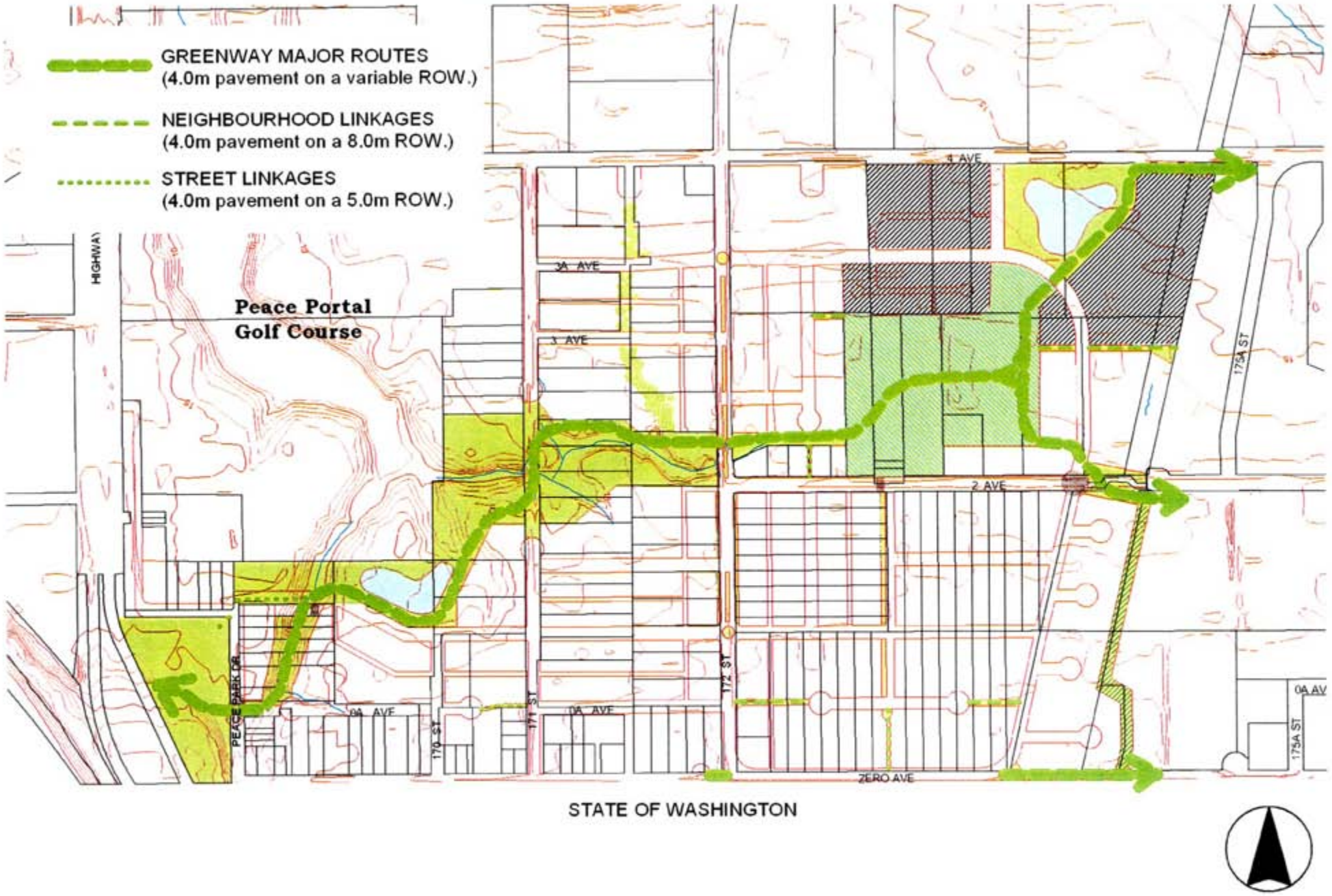
D Coniferous:
Pinus Nigra (Austrian Pine)
Picea Pungens (Colorado Spruce)

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

Douglas Neighbourhood Concept Plan

STREET TREE PLANTING SCHEME

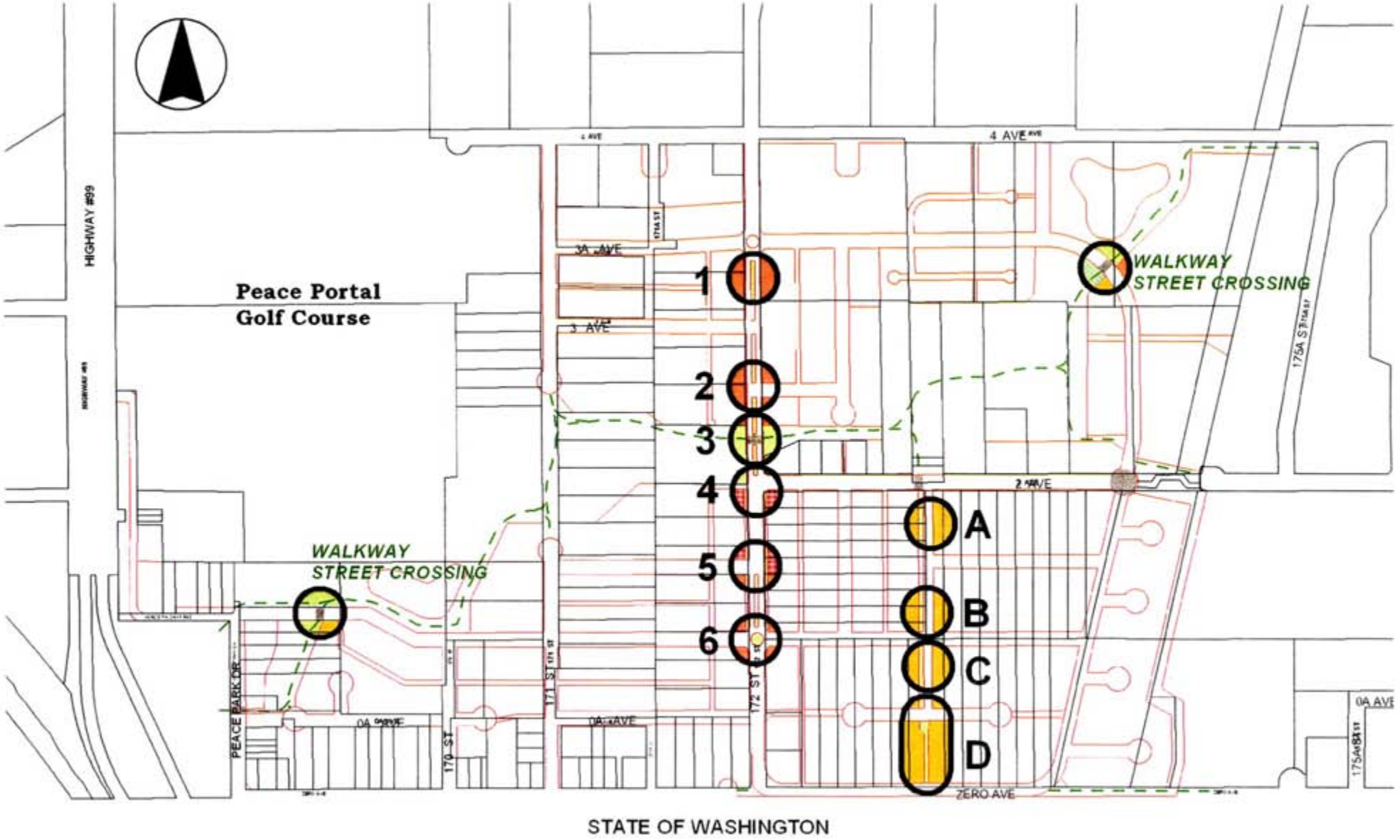
MAP II



Douglas Neighbourhood Concept Plan

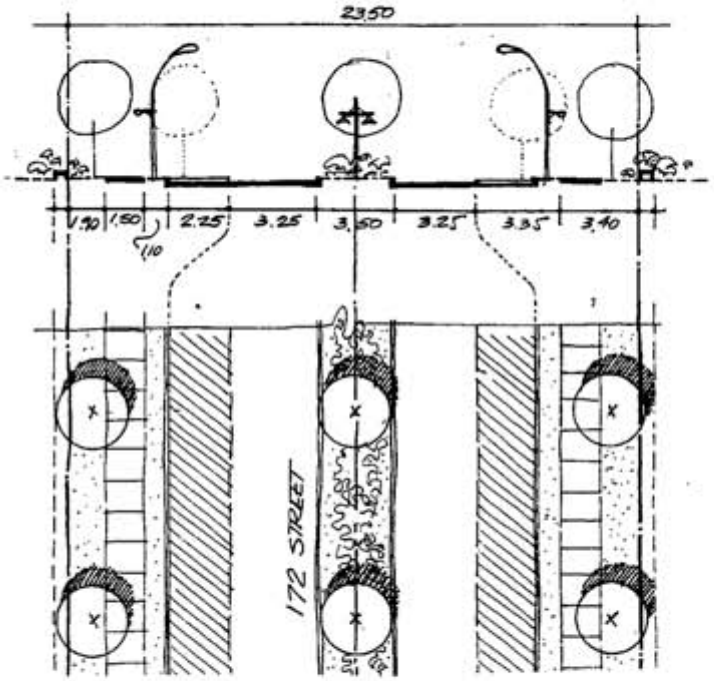
INTEGRATED OPEN SPACE SYSTEM -
NEIGHBOURHOOD PEDESTRIAN /
BIKE ROUTES - LINEAR PARK

MAP III



Douglas Neighbourhood Concept Plan

STREET TREATMENT,
PAVERS AND CROSSINGS. MAP IV
(See Details - Figures I - VI)



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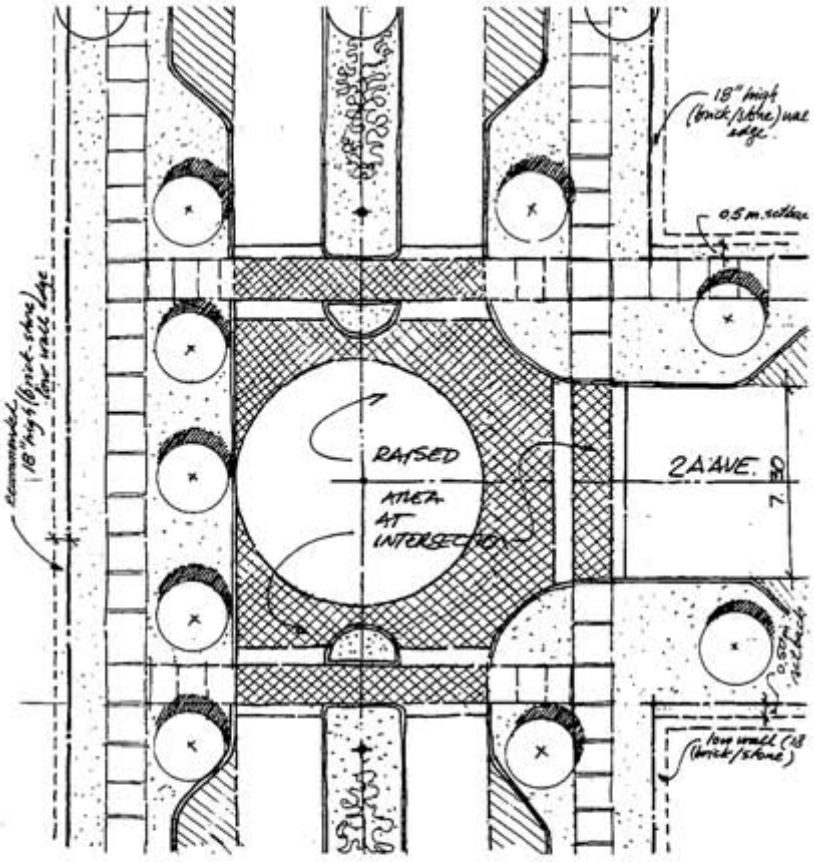
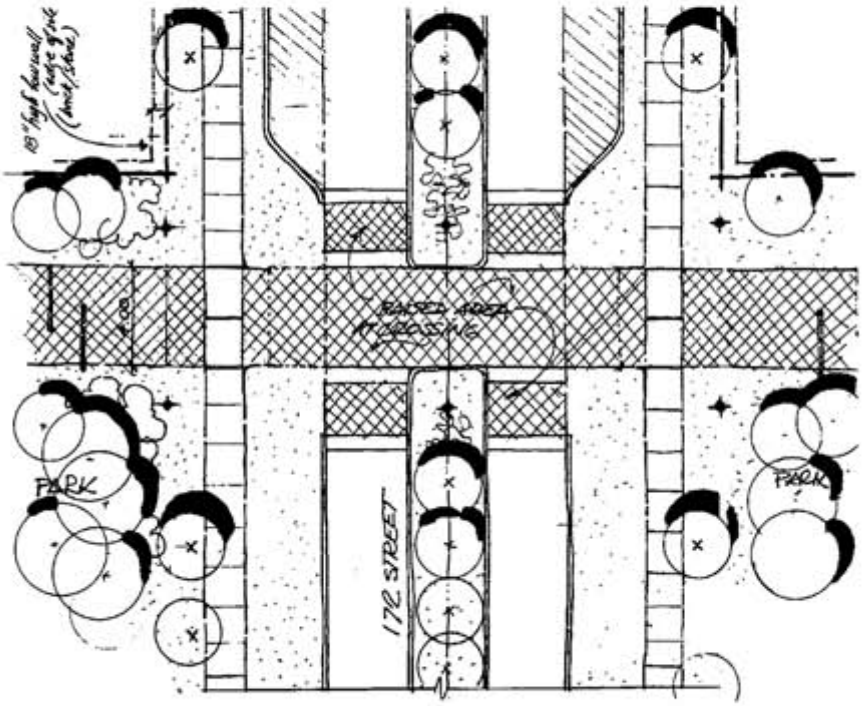


2

MAIN STREET
(172 STREET)
NOT TO SCALE
(See Map IV for Lacation)

Douglas Neighbourhood Concept Plan

FIGURE I



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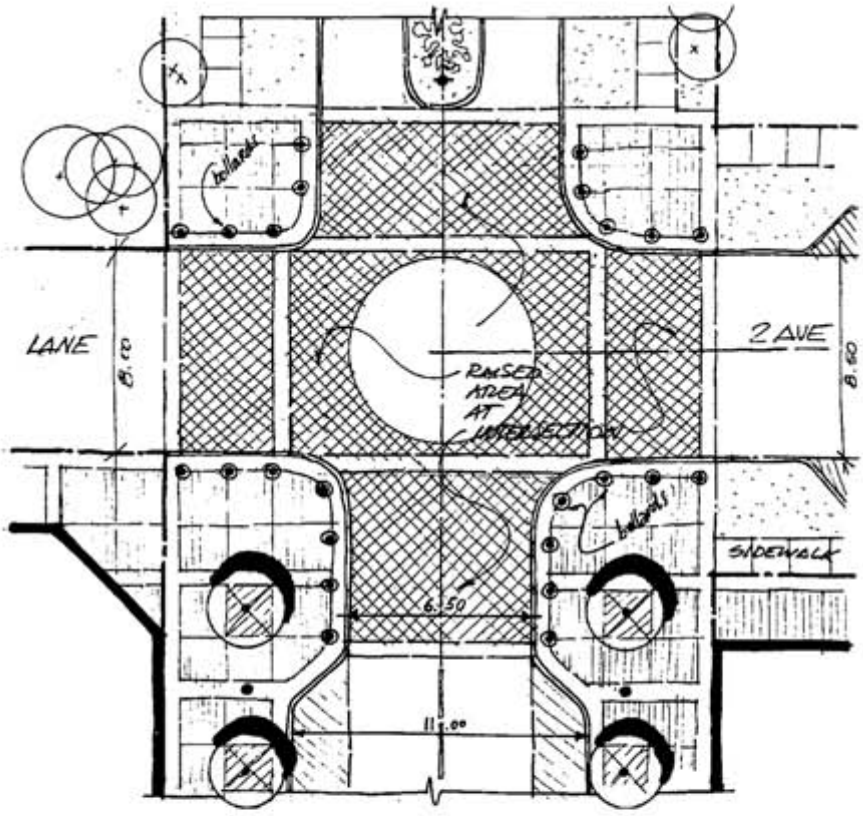
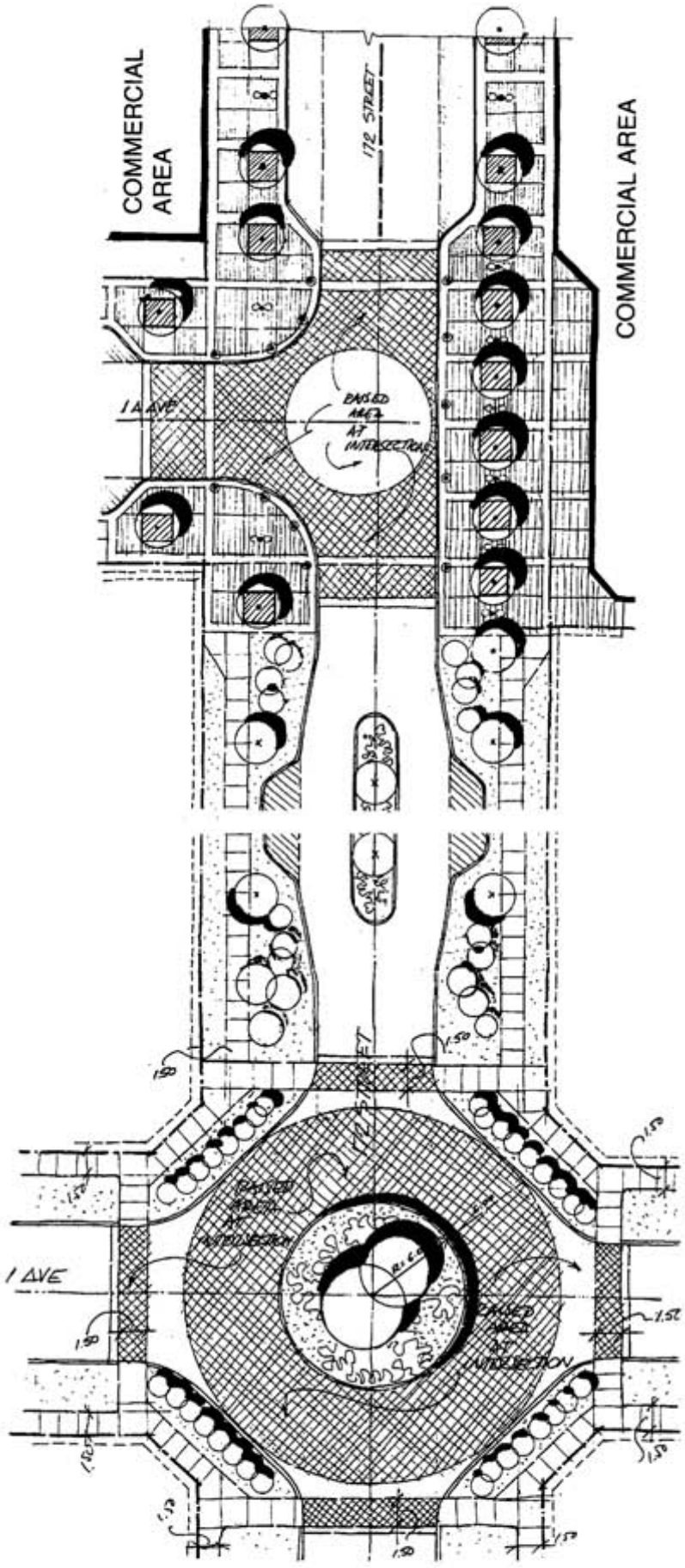


4

MAIN STREET
(172 STREET)
NOT TO SCALE
(See Map IV for Location)

Douglas Neighbourhood Concept Plan

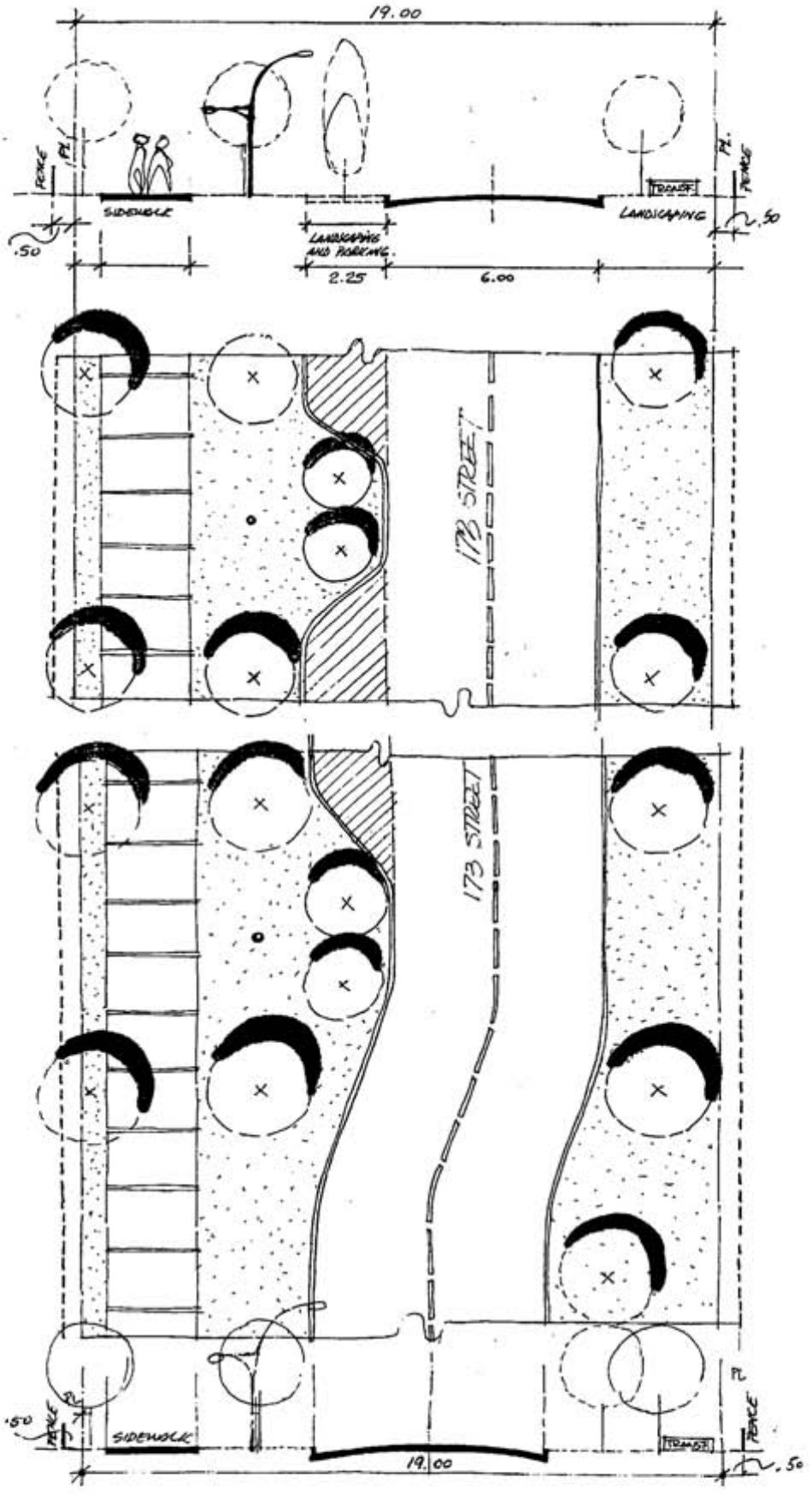
FIGURE II



MAIN STREET
(172 STREET)
NOT TO SCALE
(See Map IV for Location)

Douglas Neighbourhood Concept Plan

FGURE III



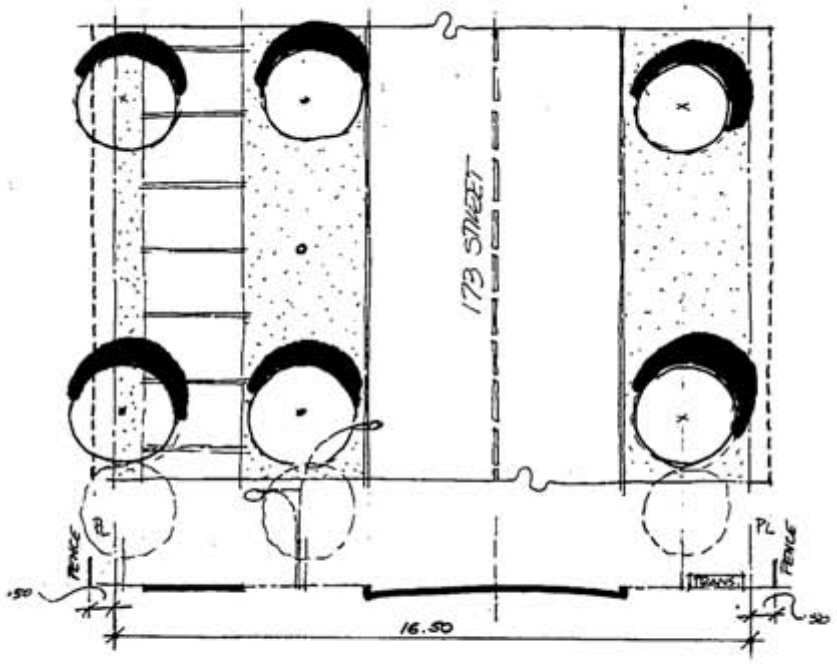
A

B

(173 STREET BOULEVARD)
NOT TO SCLAE
(See Map IV for Location)

Douglas Neighbourhood Concept Plan

FIGURE IV



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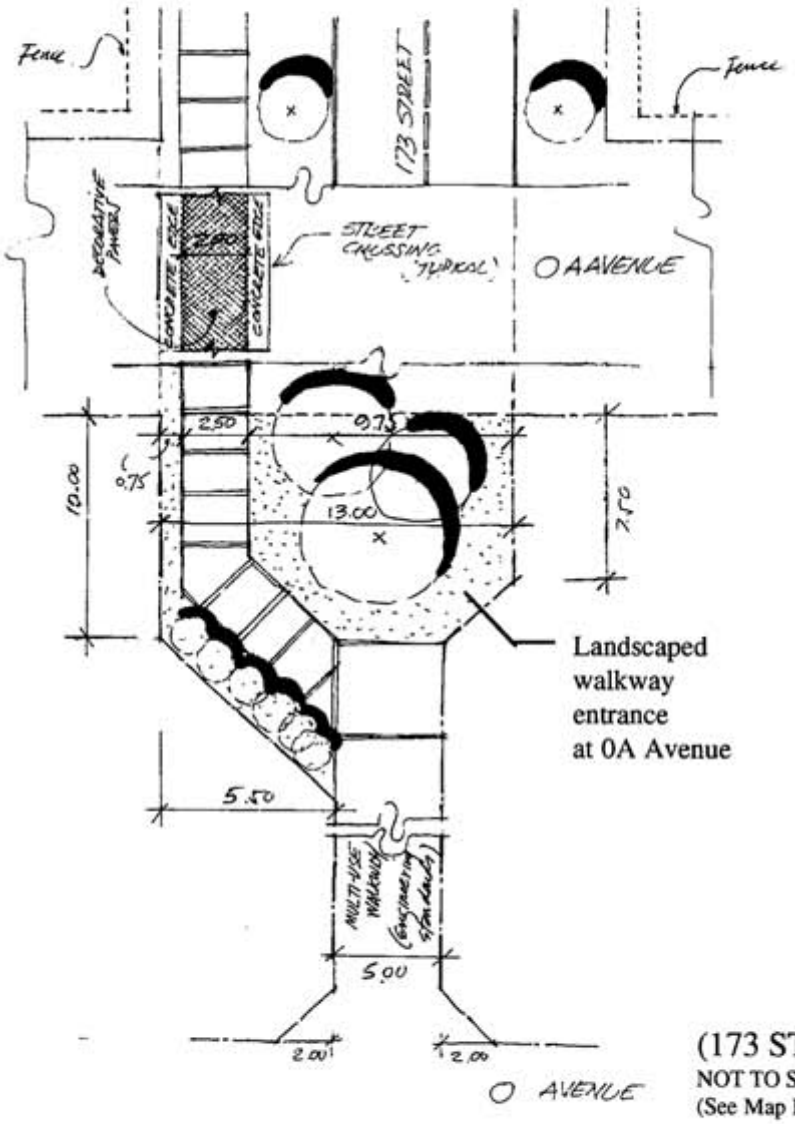
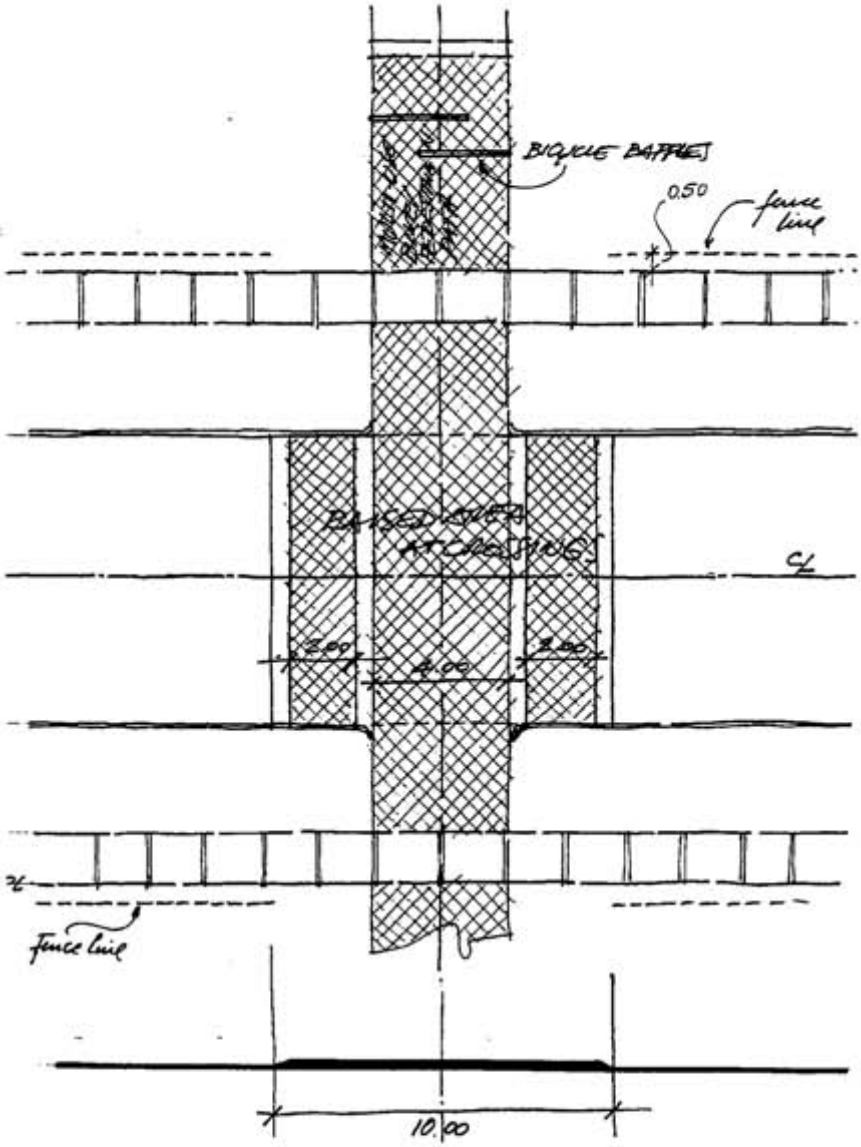


D

(173 STREET BOULEVARD)
NOT TO SCALE
(See Map IV for Location)

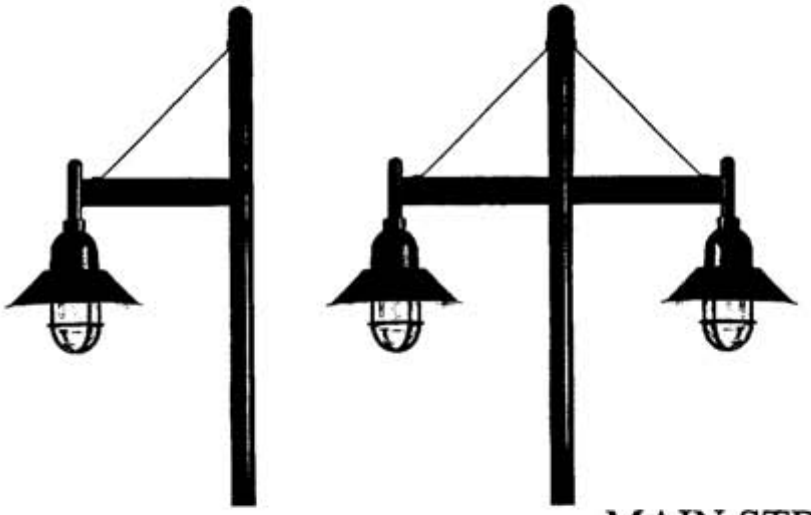
Douglas Neighbourhood Concept Plan

FIGURE V



WALKWAY STREET CROSSING (PAVERS)

NOT TO SCALE
(See Map IV for Location)



MAIN STREET LAMP POSTS

Douglas Neighbourhood Concept Plan

FIGURE VI

Douglas Neighbourhood Concept Plan

MULTI - USE
CORRIDOR IMAGES

SURREY
CITY OF PARKS

Corporate Report

DEPARTMENT
NO: C429.1
COUNCIL DATE: July 12/99

COUNCIL-IN-COMMITTEE

TO:	**Mayor & Council**	DATE:	**July 7, 1999**
FROM:	**Manager, Utilities & Construction Engineering Department**	FILE:	**2350-008**
SUBJECT:	**Douglas Neighbourhood Concept Plan Stage 2 Report**		

RECOMMENDATION

That Council adopt the engineering servicing and financial strategies as outlined in this report and as specified in the Douglas Neighbourhood Concept Plan Stage 2 Report, Part II - Servicing and Financial Details as the means of managing engineering services for this neighbourhood, subject to:

1. Full payment of Drainage DCC's at the time of Servicing Agreement.
2. Use of levies outlined in this report to assist in funding drainage and major collector road improvements.

INTENT

The purpose of this report is:

1. To provide Council with an overview of the engineering servicing and financial strategy for the Douglas Neighbourhood Concept Plan (NCP) Study Area;
2. To provide Council with the comprehensive engineering study as prepared by McElhanney Consulting Services Ltd.;
3. To inform Council of the resolution of the significant engineering issues raised at Stage 1 of the NCP process.

BACKGROUND

Council approved in principle the Proposed Land Use Concept Plan for the Douglas (Stage 1 NCP) Study Area on July 31, 1996, and authorized staff to proceed with the Stage 2 NCP process. A number of engineering and financial issues were to be resolved

as part of the Stage 2 report. The engineering Stage 2 analysis has now been completed based on the land use plan contained within a separate report from the Planning & Development Department, which will be considered by Council concurrently with this report.

DISCUSSION

McElhanney Consulting Services Ltd. have completed an engineering servicing and financial plan for the Douglas Study Area. This report includes a staging plan and financial analysis and is available in the Engineering Department.

The engineering services discussed in the report relate to major infrastructure. Only those works which could be added to the Development Cost Charge (DCC) program. such as major trunk sewers and water grid mains, major collector and arterial roads and major storm water management infrastructure (trunk storm sewers and detention ponds). are discussed in detail in the report. Localized site servicing requirements of individual developments are not analyzed in the report.

Sanitary Sewer

The existing sanitary sewer system was installed in 1977 to service the neighbourhood because septic method of sewage disposal had generally failed in the area. Sewage from the Douglas area is collected at a pump station and conveyed by a forcemain to a gravity system at 8 Avenue and 165A Street. The existing system was designed on the basis of the Planning projections of suburban residential development in the area. Nevertheless there is some additional capacity within the existing system for flows from increased density within the Douglas NCP. Therefore, available capacity within local sewer mains will need to be reviewed at the time of each development application.

Furthermore, the existing sewage pump station will need to be upgraded to service the ultimate growth within the catchment area. The cost of the first phase of the upgrade necessary to support growth within the 10 Year horizon is estimated to be around $800,000. None of the additional sewer system mains necessary for growth within Douglas can be classified as a trunk element; therefore, all new sewer extensions will need to be financed directly by developers as part of their site servicing.

Due to topography and geotechnical constraints, the northeast area of the study area will not be serviceable by gravity sewers. This area is, therefore, planned to be developed as legal strata lots fronting a City sewer and the owners of such lots will need to provide a private pump station owned, operated and maintained in perpetuity by strata development owners. Figure 1 shows the proposed sanitary sewer system for Douglas.

Water

The existing water distribution system consists of pipes that were installed over twenty years ago, in sizes that were adequate for the type of development envisaged at that time but not adequate for the proposed land use in the NCP. Therefore, some replacements

and upgrading to 300mm diameter grid mains together with new 200mm diameter extensions by developers on new road allowances will adequately service the NCP proposed land use.

In the short term, the Douglas area will have to continue to rely on a single source of water supply by way of the feeder main from the Sunnyside reservoir. An agreement between the City of Surrey and the City of Blaine is under consideration whereby a proposed cross-border connection will be reinstated to ensure adequate emergency supply only in the event of a failure in the existing supply source. The total estimated cost of the DCC eligible works amounts to $1,393,000. Figure 2 shows the proposed water servicing scheme for Douglas.

Transportation

The proposed classification of the roadways within the Douglas area has been defined. Development in the NCP will require the road and traffic systems to address issues related to the border crossing.

The key functional improvements necessary for the orderly development of the Douglas NCP include designation of 172 Street as the primary access to the Douglas area, and signalization of 172 Street / 8 Avenue and 176 Street / 4 Avenue, construction of 175A Street from 4 Avenue to 0 Avenue to provide access to adjacent properties, the continuing closure of 0 Avenue to prevent connection to 175A and 176 Streets.

In addition, the MOTH is reviewing the widening of 8 Avenue to four lanes; however, the timing of the improvements by the MoTH has not been defined. The cost of DCC related items within the Douglas NCP amounts to $1,432,000. Figure 3 shows the conceptual road network and hierarchy.

Storm water

The NCP is within the Campbell River watershed. The southwest portion of the area drains to a system of ravines to a tributary of the Campbell River flowing through the Peace Portal Golf Course. The northeast portion drains to the Campbell River along 176 Street.

The outlet through the Peace Portal Golf Course is no longer a natural creek and has been filled in and replaced with a private storm sewer. The Golf Course is concerned the proposed development will lead to a worsening of current drainage conditions. The proposed drainage system addresses this with a diversion of minor flows to the northeast catchment, routing of flows to a detention pond located south of the Golf Course property, and a proposed upgrade of the storm sewer through the Golf Course within a City right-of-way.

The southwest portion will be serviced by a detention pond to be located immediately south of 4 Avenue with storm sewer upgrading downstream to the Campbell River. The estimated cost of the storm water DCC related infrastructure is $2,550,000. Figure 4 shows the proposed drainage system for Douglas.

Development Phasing

The servicing report describes a logical phasing plan taking into account servicing constraints, current development applications, land assembly requirements, and the need to up-front servicing costs for drainage. Although the development market will ultimately decide on the sequence of servicing, it is expected that development will begin in the north east catchment before proceeding in the southeast. This will ensure an adequate cost recovery to developers up-fronting the cost of the northeast detention pond and allow time to finalize drainage issues with the Peace Portal Golf Course.

Due to relatively significant upfront costs required for drainage, particularly the two main detention ponds, a large land holder, or group of land holders, will be needed to arrange the necessary financing for development to proceed in this NCP area.

In accordance with Council approved practice for NCP areas, development cannot take place in either the northeast or southeast catchments until the land required for the required detention facility is either acquired or secured by developers. The City can agree to enter into a DCC frontenders agreement with the initial developer to assist in recovering costs from DCCs collected from developments in the benefiting area.

Financing

A comprehensive financial analysis is included in the NCP engineering report. The details of all the necessary DCC infrastructure has been identified and the costs are included.

The following table summarizes the projected DCC revenues and construction costs for each engineering service. The revenues are based on the current DCC by-law as well as the growth projections based on the densities proposed in the Stage 2 NCP plan.

Projected DCC Revenues and Expenditures at Buildout (1)

	Projected DCC Revenues	Projected DCC Expenditures	Surplus Balance (Deficit Balance)
Sanitary Sewer	$914,220	$792,000	$122,220
Storm water	$1,891,000	$2,543,000	($651,000)
Water	$981,000	$547,000	$434,000
Major Collector Road	$1,198,000	$1,462,000	($264,000)

(1) Note: It is recognized that the City of Surrey collects DCC's on a community basis not on a NCP or areas basis. This table is presented only to show that the NCP can be self-financed and does not reflect trunk servicing needs external to the NCP.

As shown in the table above, a levy will be required to finance the expected deficit in major collectors and drainage. It is expected the levy will amount to an average of $375 per unit above existing DCC rates. This type of levy has been used in other NCP areas. The Appendix summarizes the proposed changes to the current 10 Year servicing plan.

The financial information, including the proposed levy, was presented to the public at the April 15, 1999, Open House and is in accordance with Council's policy respecting the developer-pay principle and requiring each NCP to be financially self-sufficient. Mechanisms used to facilitate the financing of servicing include the traditional latecomer agreements and the more recently used DCC Frontenders Agreements and Development Works Agreements including the latest provisions for interest recovery. These mechanisms will be available for initial development proponents to recover frontended costs from subsequent development.

CONCLUSION

The Douglas Neighbourhood Concept Engineering Plan report provides the comprehensive servicing, phasing and financial plan for the area. The report provides a funding strategy such that the major servicing costs are not borne by the existing taxpayers. The engineering plan has been presented to the public and received general support.

As outlined previously, there are significant upfront drainage works before this area can develop. Most likely a group of land owners/developers will need to work together to arrange the necessary financing for these drainage works to proceed.

Paul Ham, P. Eng.
Manager, Utilities & Construction

PH/EE:brb

g:\1999\utilitys\drainage\06220944 ee
U 07/07/99 10:49 AM

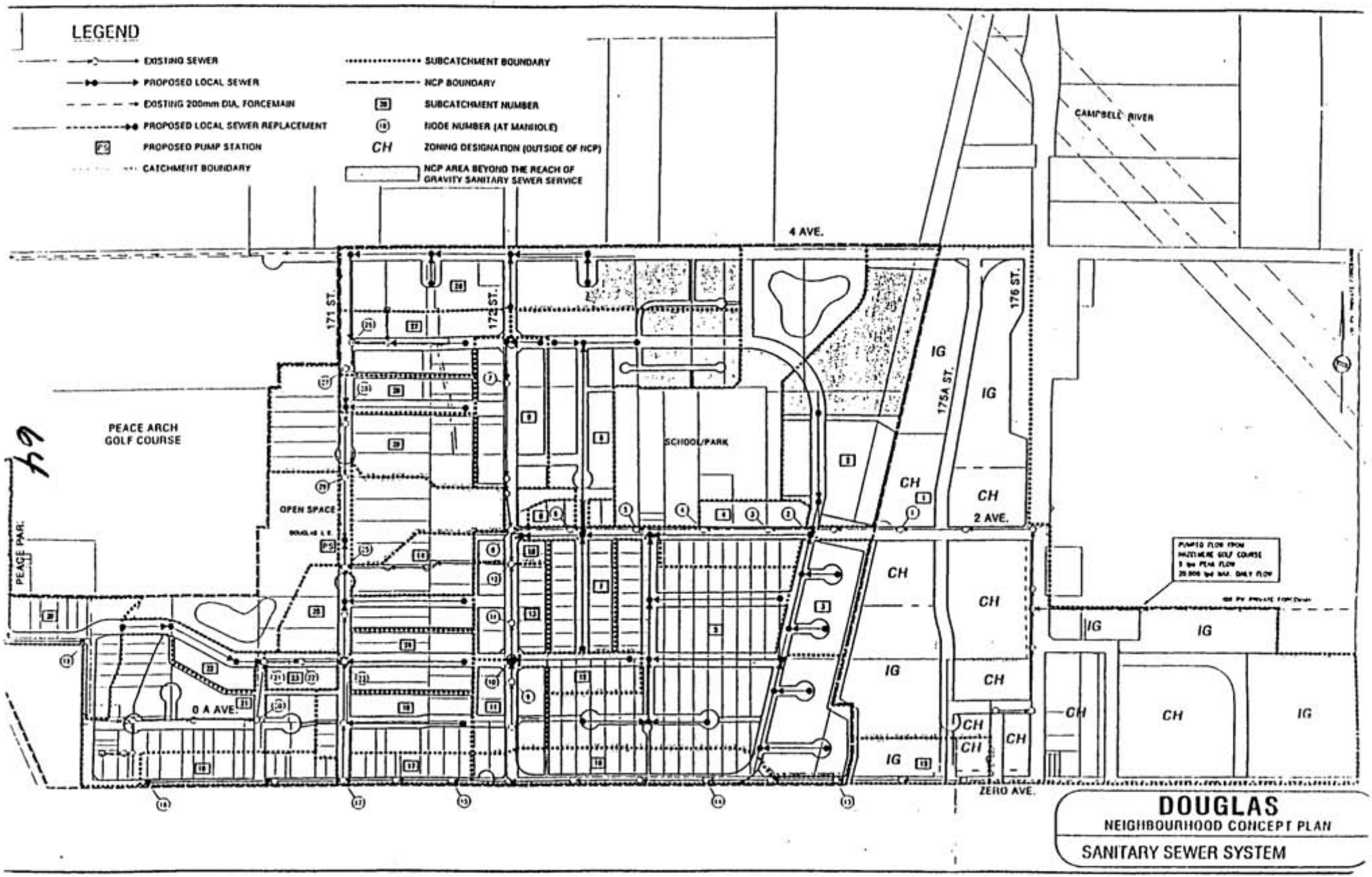

LEGEND
EXISTING SEWER
PROPOSED LOCAL SEWER
EXISTING 200mm DIA. FORCEMAIN
PROPOSED LOCAL SEWER REPLACEMENT
PROPOSED PUMP STATION
CATCHMENT BOUNDARY
SUBCATCHMENT BOUNDARY
NCP BOUNDARY
SUBCATCHMENT NUMBER
NODE NUMBER (AT MANHOLE)
ZONING DESIGNATION (OUTSIDE OF NCP)
NCP AREA BEYOND THE REACH OF GRAVITY SANITARY SEWER SERVICE
CAMPBELL RIVER
4 AVE.
171 ST.
172 ST.
175A ST.
176 ST.
PEACE ARCH GOLF COURSE
SCHOOL/PARK
OPEN SPACE
PEACE PAR
0 A AVE.
2 AVE.
ZERO AVE.
IG
CH
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
SANITARY SEWER SYSTEM

Figure 1

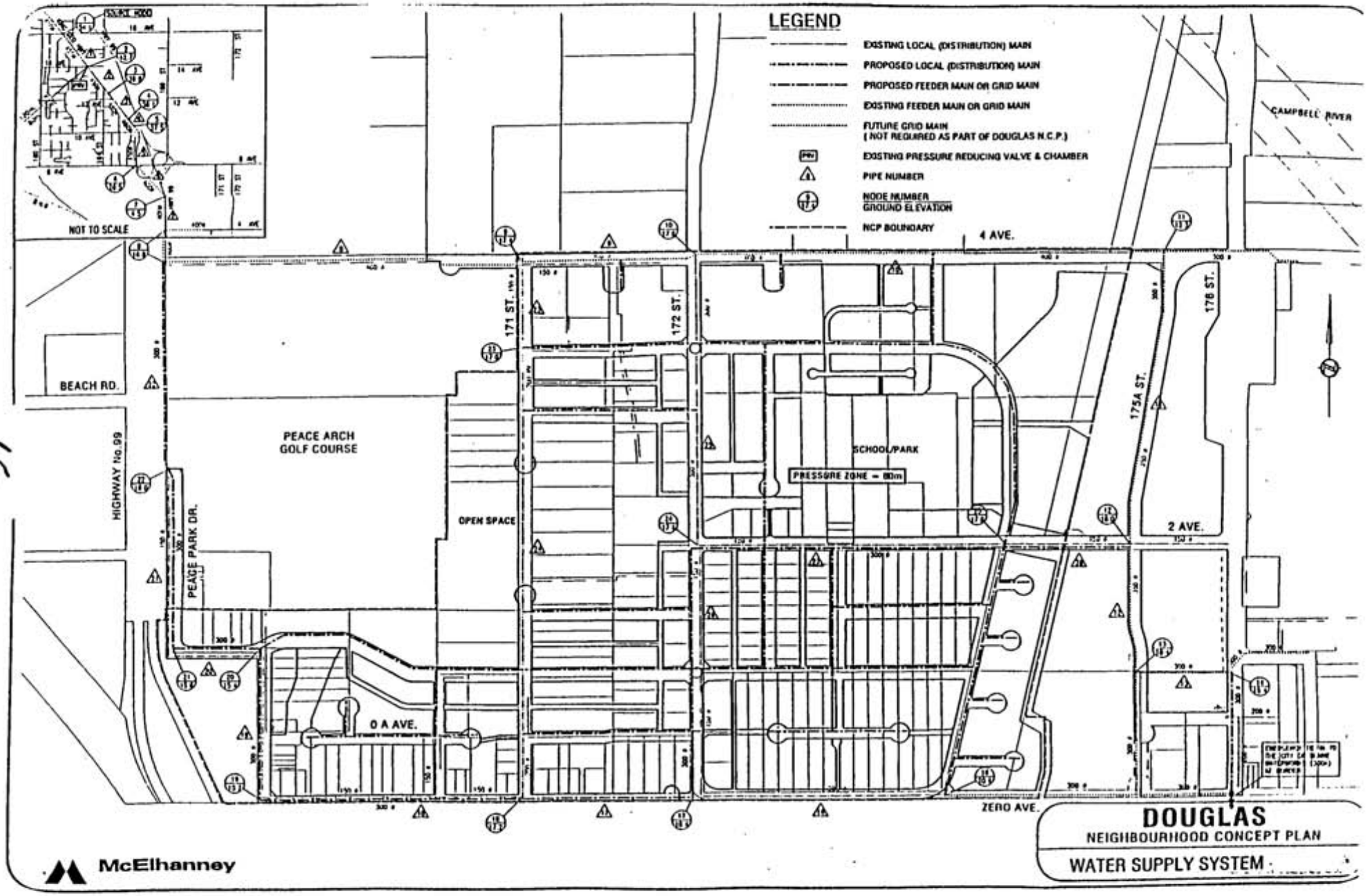
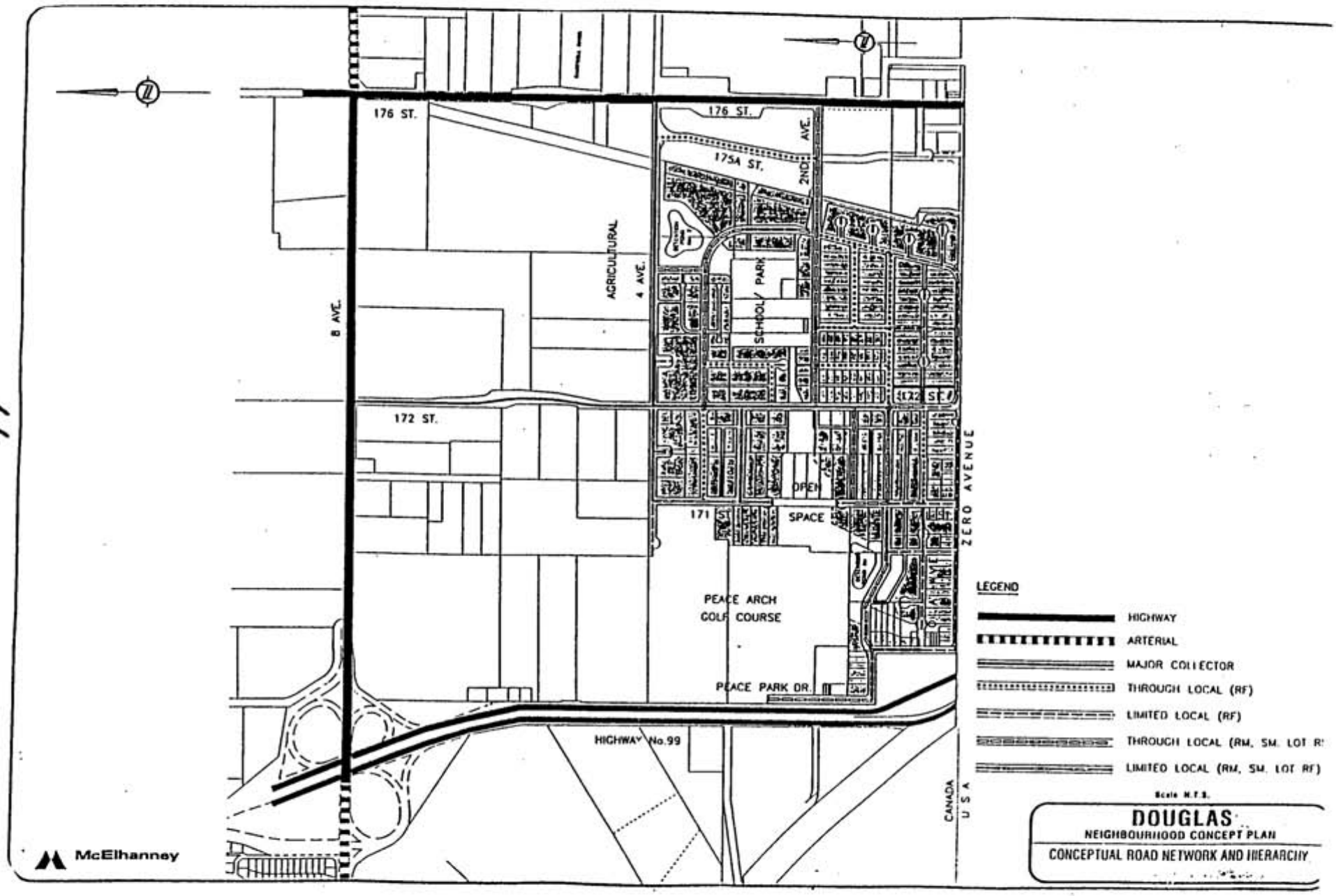

LEGEND
EXISTING LOCAL (DISTRIBUTION) MAIN
PROPOSED LOCAL (DISTRIBUTION) MAIN
PROPOSED FEEDER MAIN OR GRID MAIN
EXISTING FEEDER MAIN OR GRID MAIN
FUTURE GRID MAIN
(NOT REQUIRED AS PART OF DOUGLAS N.C.P.)
EXISTING PRESSURE REDUCING VALVE & CHAMBER
PIPE NUMBER
NODE NUMBER
GROUND ELEVATION
NCP BOUNDARY
NOT TO SCALE
CAMPBELL RIVER
4 AVE.
171 ST.
172 ST.
178 ST.
175A ST.
BEACH RD.
HIGHWAY No.99
PEACE ARCH
GOLF COURSE
PEACE PARK DR.
OPEN SPACE
SCHOOL/PARK
PRESSURE ZONE – 80m
2 AVE.
0 A AVE.
ZERO AVE.
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
WATER SUPPLY SYSTEM
McElhanney

Figure 2


176 ST.
176 ST.
175A ST.
2ND AVE.
8 AVE.
AGRICULTURAL
4 AVE.
SCHOOL/ PARK
172 ST.
OPEN SPACE
171
ZERO AVENUE
PEACE ARCH GOLF COURSE
PEACE PARK DR.
HIGHWAY No.99
CANADA
U.S.A.
LEGEND
HIGHWAY
ARTERIAL
MAJOR COLLECTOR
THROUGH LOCAL (RF)
LIMITED LOCAL (RF)
THROUGH LOCAL (RM, SM, LOT R
LIMITED LOCAL (RM, SM, LOT RF)
Scale N.T.S.
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
CONCEPTUAL ROAD NETWORK AND HIERARCHY
McElhanney

Figure

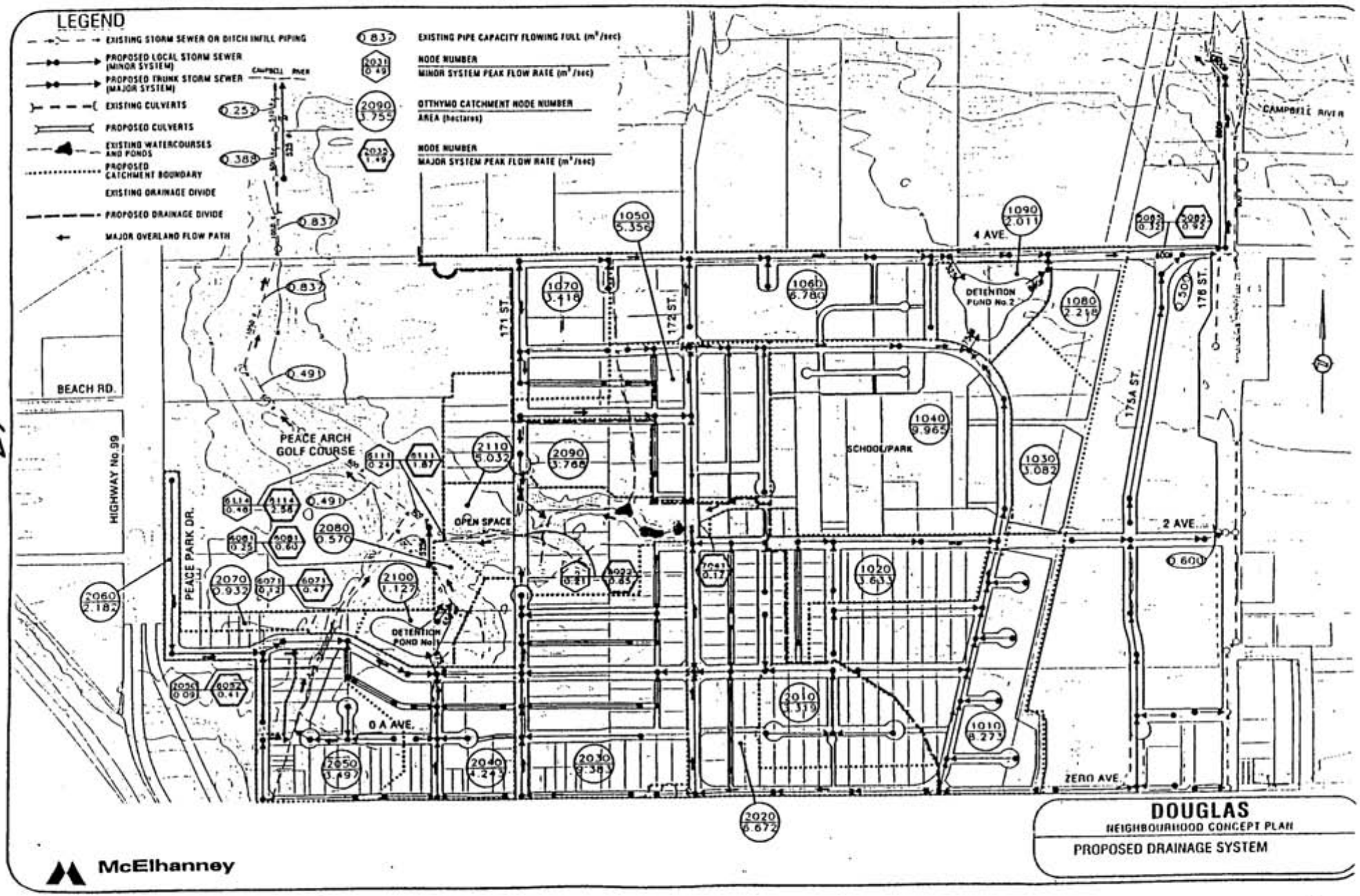
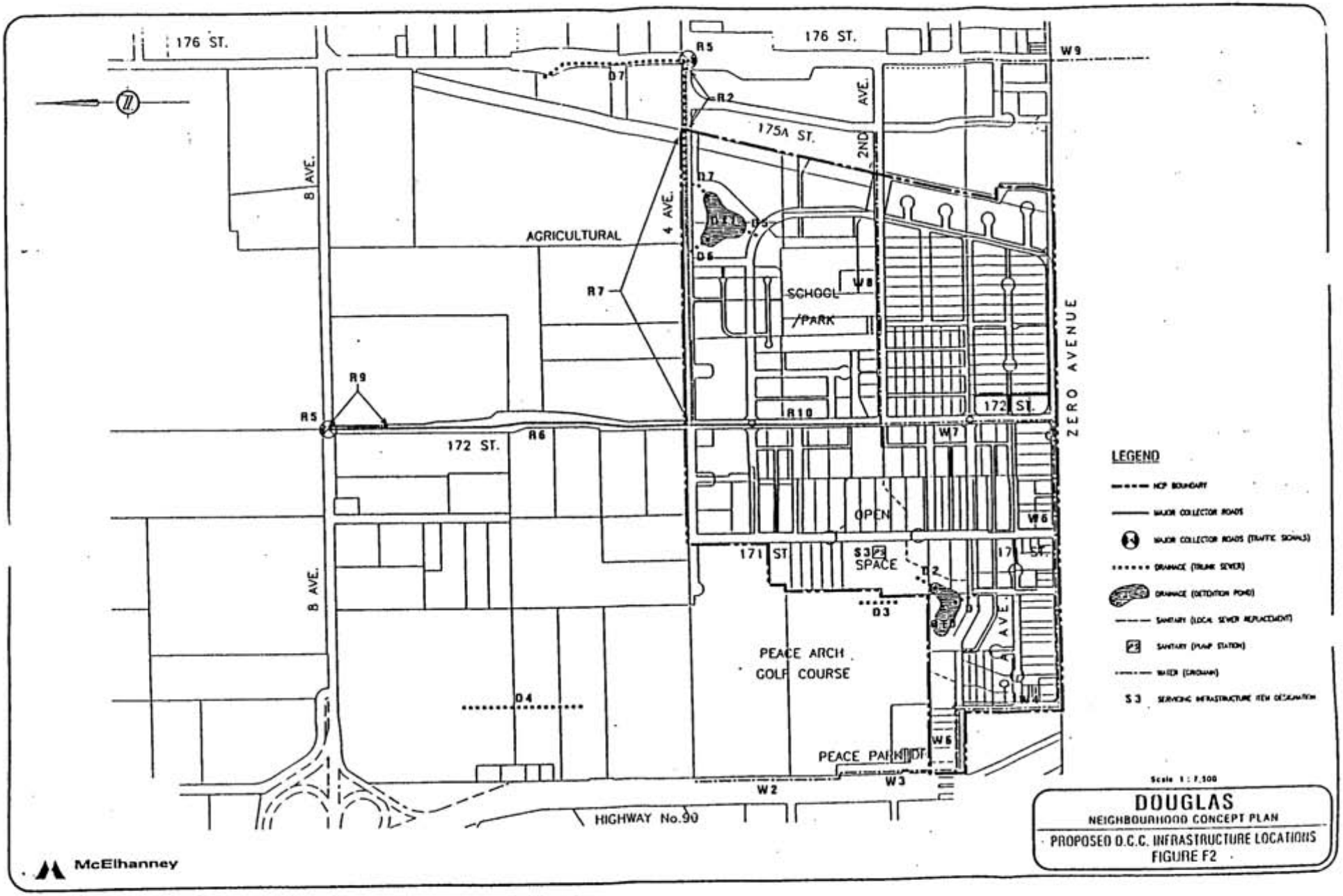

LEGEND
EXISTING STORM SEWER OR DITCH INFILL PIPING
PROPOSED LOCAL STORM SEWER (MINOR SYSTEM)
PROPOSED TRUNK STORM SEWER (MAJOR SYSTEM)
EXISTING CULVERTS
PROPOSED CULVERTS
EXISTING WATERCOURSES AND PONDS
PROPOSED CATCHMENT BOUNDARY
EXISTING DRAINAGE DIVIDE
PROPOSED DRAINAGE DIVIDE
MAJOR OVERLAND FLOW PATH
EXISTING PIPE CAPACITY FLOWING FULL (m³/sec)
NODE NUMBER
MINOR SYSTEM PEAK FLOW RATE (m³/sec)
OTTHYMO CATCHMENT NODE NUMBER
AREA (hectares)
NODE NUMBER
MAJOR SYSTEM PEAK FLOW RATE (m³/sec)
CAMPBELL RIVER
BEACH RD.
HIGHWAY No.99
PEACE PARK DR.
PEACE ARCH GOLF COURSE
OPEN SPACE
DETENTION POND No.1
DETENTION POND No.2
SCHOOL/PARK
4 AVE.
2 AVE.
0 A AVE.
ZERO AVE.
171 ST.
172 ST.
173A ST.
176 ST.
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
PROPOSED DRAINAGE SYSTEM
McElhanney

Figure 4

Appendix
Douglas NCP Stage 2 Report
Proposed 10 Year Servicing Plan Adjustments


176 ST.
176 ST.
R5
W9
D7
R2
AVE.
175A ST.
2ND
8 AVE.
4 AVE.
D7
D5
D6
AGRICULTURAL
R7
SCHOOL
/PARK
W8
R9
R5
R10
172 ST.
ZERO AVENUE
172 ST.
R6
W7
OPEN
W6
171 ST
S3
SPACE
D2
D3
8 AVE.
PEACE ARCH
GOLF COURSE
D4
W5
PEACE PARK
W2
W3
HIGHWAY No.90
LEGEND
MAJOR COLLECTOR ROADS
MAJOR COLLECTOR ROADS (TRAFFIC SIGNALS)
DRAINAGE (TRUNK SEWER)
SANITARY (PUMP STATION)
S3
Scale 1 : 7,500
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
PROPOSED D.C.C. INFRASTRUCTURE LOCATIONS
FIGURE F2
McElhanney

69

INFRASTRUCTURE FINANCING AND FUNDING

ROADS AND TRANSPORTATION

Item No.	Location and Total Cost Estimate	Type / Size of Works	Current (1997) or Addition to 10 YSP	Project ID # In Current (1997) 10 YSP	Amount In Current (1997) 10 YSP	Amount Additional to 10 YSP Program	Eligible for DCC Program (Y/N)	Refinement of DCC Program (Y/N)	Addition to DCC Program (Y/N)	Type of Funding Method [1]		Construction by (Surrey / Developer / MOTH)	Year Requested
										Existing [1]	Proposed [1]		
R2	4 Ave: 176 St - 175A St ($124,500)	Upgrading	Addition	-	-	$124,500	Y	Y	Y	-	DCCR	Developer	2000
R3	176 St / 4 Ave: ($120,000)	Traffic Signals	Addition	-	-	$60,000	Y	N	Y	-	DCCR / MOTH	MOTH	2002
R5	172 St / 8 Ave: ($120,000)	Traffic Signals	Addition	-	-	$60,000	Y	N	Y	-	DCCR / MOTH	MOTH	2002
R6	172 St: 4 Ave - 8 Ave ($163,000)	Bicycle Lanes	Addition	-	-	$163,000	Y	N	Y	-	CAP	Surrey	2004
R7	4 Ave: 172 St - 175A St ($429,000)	Upgrading	Addition	-	-	$429,000	Y	N	Y	-	DCCR	Developer	2000 & 2003
R8	172 St: 4 Ave - 1 Ave ($588,000)	Upgrading	Addition	-	-	$588,000	Y	N	Y	-	DCCR	Developer	2004 & 2007
R9	172 St: South of 8 Ave. ($37,500)	LT & RT turn lanes	Addition	-	-	$37,500	Y	N	Y	-	CAP	Surrey	2002

Notes: [1] Funding Methods (Current):

- Surrey Capital Construction Program — CAP
- DCC Rebate Program — DCCR
- Development Coordination Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary/ 40% of estimate) — UPS
- Frontage Latecomer Agreement — FLAT
- Area Latecomer Agreement — ALAT
- Contribution to Surrey — CONTR
- Development Works Agreement — DWA

[2] Estimates are based on unit costs provided by Surrey. All estimates include a 50% estimating factor as required by Surrey.

TABLE F1.0

INFRASTRUCTURE FINANCING AND FUNDING

SANITARY

Item No.	Location and Total Cost Estimate [2]	Type / Size of Works	Current (1997) or Addition to 10 YSP	Project ID # In Current (1997) 10 YSP	Amount In Current (1997) 10 YSP	Amount Additional to 10 YSP Program	Eligible for DCC Program (Y/N)	Refinement of DCC Program (Y/N)	Addition to DCC Program (Y/N)	Type of Funding Method [1]		Construction by (Surrey / Developer)	Y Required
										Existing [1]	Proposed [1]		
S1	Sewer Replacement: 171 St, node 25 - S.P.S. ($39,900)	Upgrading 375mm	-	-	-	-	N	N	N	-	-	Developer	2007
S2	Relief Sewer: 2 Ave, node2 - node 8 ($158,700)	Upgrading 200mm	Current	2003	$11,000	-	N	Y	N	DCCR	-	Developer	2002
S3	Pump Station Replacement: 171 St - 2 Ave ($792,000)	New Pump Station	Current	4760	$870,000	-	Y	N	N	DCCR	DCCR	Developer	2007

Notes: [1] Funding Methods (Current):

- Surrey Capital Construction Program — CAP
- DCC Rebate Program — DCCR
- Development Coordination Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary/ 40% of estimate) — UPS
- Frontage Latecomer Agreement — FLAT
- Area Latecomer Agreement — ALAT
- Contribution to Surrey — CONTR
- Development Works Agreement — DWA

[2] Estimates are based on unit costs provided by Surrey. All estimates include a 50% estimating factor as required by Surrey.

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TABLE F2.0

INFRASTRUCTURE FINANCING AND FUNDING

DRAINAGE

Item No.	Location and Total Cost Estimate	Type / Size of Works	Current (1997) or Addition to 10 YSP	Project ID # In Current (1997) 10 YSP	Amount In Current (1997) 10 YSP	Amount Additional to 10 YSP Program	Eligible for DCC Program (Y/N)	Refinement of DCC Program (Y/N)	Addition to DCC Program (Y/N)	Type of Funding Method [1]		Construction by (Surrey / Developer)	Year Requested
										Existing [1]	Proposed [1]		
D1	D. Pond No. 1 South Inlet: 170 St / 1 Ave ($25,200)	Trunk Sewer 675mm	Current	11036	$70,000	-	Y	Y	N	DCCR	DCCR	Developer	2005
D2	D. Pond No. 1 North Outlet: 170 St / 1 Ave ($19,200)	Trunk Sewer 450mm	Addition	-	-	$19,200	Y	N	Y	-	DCCR	Developer	2005
D3	Replacement of 200mm S.E. Inlet Sewer to PPGC System ($30,600)	Trunk Sewer Upgrade 525mm	Addition	-	-	$30,600	Y	N	Y	-	DCCR	Developer	2005
D4	Upgrading of PPGC System Outlet Sewer to Campbell River ($183,600)	Trunk Sewer Upgrade 525mm	Addition	-	-	$183,600	Y	N	Y	-	DCCR	Developer	2005
D5	D. Pond No. 2 South Inlet from 3A Ave ($22,950)	Trunk Sewer 750mm	Current	11038	$28,400 [4]	-	Y	Y	N	DCCR	DCCR	Developer	2001
D6	D. Pond No. 2 N.W. Inlet from 4 Ave ($25,500)	Trunk Sewer 525mm	Current	11038	$31,600 [4]	-	Y	Y	N	DCCR	DCCR	Developer	2001
D7	D. Pond No. 2 Outlet along 4 Ave & 176 St to Campbell River ($364,800)	Trunk Sewer 600mm	Current	11035 11037	$170,000 $430,000	- -	Y Y	Y Y	N N	DCCR DCCR	DCCR DCCR	Developer Developer	2001 2001

TABLE F3.0

INFRASTRUCTURE FINANCING AND FUNDING

DRAINAGE (cont.)

Item No.	Location and Total Cost Estimate	Type / Size of Works	Current (1997) or Addition to 10 YSP	Project ID # In Current (1997) 10 YSP	Amount In Current (1997) 10 YSP	Amount Additional to 10 YSP Program	Eligible for DCC Program (Y/N)	Refinement of DCC Program (Y/N)	Addition to DCC Program (Y/N)	Type of Funding Method [1]		Construction by (Surrey / Developer)	Year Requested
										Existing [1]	Proposed [1]		
D8	South Inlet to PPGC System ($4,500)	Upgrade Headwall 300mm	-	-	-	-	N	N	N	N/A	N/A [5]	Developer	20
D9	East Inlet to PPGC System ($3,000)	Cleanup & Clearing at Trash Rock	-	-	-	-	N	N	N	N/A	N/A [5]	Developer	2005
D10	D. Pond No. 1: 1 Ave / 170A St ($621,000) [3]	Detention	Addition	-	-	$621,000	Y	N	Y	-	DCCR	Developer	2005
D11	D. Pond No. 2: 4 Ave / 174 St ($1,249,500) [3]	Detention	Current	11039	$1,000,000	-	Y	Y	N	DCCR	DCCR	Developer	2001

Notes: [1] Funding Methods (Current):

- Surrey Capital Construction Program — CAP
- DCC Rebate Program — DCCR
- Development Coordination Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary/ 40% of estimate) — UPS
- Frontage Latecomer Agreement — FLAT
- Area Latecomer Agreement — ALAT
- Contribution to Surrey — CONTR
- Development Works Agreement — DWA

[2] Estimates are based on unit costs provided by Surrey. All estimates include a 50% estimating factor as required by Surrey.

[3] Land costs are based on unit area and / or existing dwelling improvement costs, provided by the City.

[4] 10 YSP # 2437 prorated in length.

[5] Does not classify as a DCC item.

INFRASTRUCTURE FINANCING AND FUNDING

WATER

Item No.	Location and Total Cost Estimate [3]	Type / Size of Works	Current (1997) or Addition to 10 YSP	Project ID # In Current (1997) 10 YSP	Amount In Current (1997) 10 YSP	Amount Additional to 10 YSP Program	Eligible [3] for DCC Program (Y/N)	Refinement of DCC Program (Y/N)	Addition to DCC Program (Y/N)	Type of Funding Method [1] Existing [1]	Type of Funding Method [1] Proposed [1]	Construction by Surrey / Developer	Year Requested
W1	K. G. Hwy: N. of 10 Ave [2] ($26,250)	Feeder Main 450mm	Current	1982	$54,000	-	Y	Y	N	DCCR	DCCR	Surrey	1999
W2	Hwy 99: Peace Park Dr - 4 Ave ($130,200)	Grid Main 300mm	Current	2437	$50,000 [4]	$2,000	Y	Y	N	DCCR	DCCR	Developer	20
W3	Peace Park Dr: 1 Ave - 2A Ave ($121,800)	Grid Main 300mm	Current	2437	$47,000 [4]	$2,000	Y	Y	N	DCCR	DCCR	Developer	2003
W4	Peace Park Dr: 0 Ave - 1 Ave ($92,400)	Grid Main 300mm	Current	10875	$37,000	-	Y	Y	N	DCCR	DCCR	Developer	2003
W5	1 Ave: Bel'n Peace Park Dr ($54,600)	Grid Main 300mm	Current	10874	$27,000	-	Y	Y	N	DCCR	DCCR	Developer	2001
W6	0 Ave: Peace Park Dr - 172 St ($273,000)	Grid Main 300mm	Current	2438	$109,000	-	Y	Y	N	DCCR	DCCR	Developer	2003
W7	172 St: 0 Ave - 2 Ave ($163,800)	Grid Main 300mm	Current	2439	$68,000	-	Y	Y	N	DCCR	DCCR	Developer	2003
W8	2 Ave: 172 St - 175A St ($277,200)	Grid Main 300mm	Addition	-	-	$111,000	Y	-	N	-	DCCR	Developer	2003
W9	176 St: N & S of Border ($253,500)	Grid Main 300mm	Current	998	$35,000	$67,000	Y	Y	Y [5]	DCCR	DCCR	Surrey	2000

Notes: [1] Funding Methods (Current):

- Upsizing (Water, Sanitary/ 40% of estimate) — UPS
- Frontage Latecomer Agreement — FLAT
- Area Latecomer Agreement — ALAT
- Surrey Capital Construction Program — CAP
- Development Works Agreement — DWA
- Contribution to Surrey — CONTR
- DCC Rebate Program — DCCR
- Development Coordination Works (Drainage, Arterial, Non-Arterial) — DCW

[2] Estimates are based on unit costs provided by Surrey. All estimates include a 50% estimating factor as required by Surrey.

[3] Water mains are cost shared only. Upsizing amounts eligible for funding include 40% of total capital cost.

[4] 10 YSP # 2437 prorated in length.

[5] Extension south of the border is additional.

TABLE F4.0

DOUGLAS

NEIGHBOURHOOD CONCEPT PLAN

Stage Two Report

PART II

Servicing and Financial Details

Prepared for:
THE CITY OF SURREY

Prepared by:
McELHANNEY CONSULTING SERVICES LTD.

April 1999

McElhanney

26 April 1999
Our File: 2111 01233-0

City of Surrey
14245 - 56 Avenue
Surrey BC V3X 3A2

Attention: Eric Emery, P.Eng.
NCP Project Manager

Dear Sir:

Stage 2 Report: Douglas NCP

Enclosed please find two (2) bound copies and one (1) unbound reproducible copy of our final Douglas NCP Stage 2 Report. Your marked-up copy of the report is also enclosed.

We trust that all the material is in order.

Yours very truly,

McELHANNEY CONSULTING SERVICES LTD.

H.J. Vytasek, P.Eng.
Vancouver Region Engineering

email: hvytasek@mcelhanney.com
HJV:jes

Enclosures

THIRD PARTY DISCLAIMER

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2111\JOB\01233-0\REPORT\042599L1

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Surrey BC
Canada V3W 3K3

Tel 604 596 0391
Fax 604 596 8853

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- Traffic Impact Study (with attachments)

APPENDIX B SANITARY SEWER
- Sanitary Sewer System Analysis – Calculation Sheet
- Sanitary Pump Station Detailed Cost Estimate

APPENDIX C DRAINAGE
- Stormwater Report (with attachments)

APPENDIX D WATER SUPPLY SYSTEM
- Secondary Feeder Main Water Supply Report
- Water Supply System Assumptions
- Results of Water Supply and Distribution Network Modelling Simulation

APPENDIX E ENVIRONMENTAL
- Review of Draft Stormwater Drainage Report (Letter from ECL Envirowest Consultants Ltd., dated 5 January 1999).
- An Environmental Assessment of the Douglas Local Area, Surrey, B.C. (ECL Envirowest Report).
- ECL Envirowest Drawing "Watercourses and Vegetation Communities".
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APPENDIX F FINANCIAL
- Definitions of City of Surrey's Current Funding Methods.

1.0 INTRODUCTORY STATEMENT

To the Readers of this report:

The Engineering servicing plans included within this document are conceptual in nature reflecting McElhanney's best judgment 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 additional or subsequent 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 report 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.

2.0 SERVICING INFRASTRUCTURE

2.01 PREAMBLE

The servicing infrastructure component of the Douglas NCP was prepared by McElhanney Consulting Services Ltd. on behalf of the City of Surrey. Throughout the course of the NCP study, staff from the City's Planning and Development Services and Engineering Departments have provided ongoing input and review of technical analysis and plan options.

The Stage 1 NCP Report, submitted on 18 July 1996, addressed engineering servicing on a preliminary basis. The following section is intended to supplement the information presented in the Stage 1 NCP Report.

The provision of infrastructure services for the community is consistent with Surrey's long-range plans and further clarifies both property owner / developer and City responsibilities. It is important to note that, due to the extent and cost of the major servicing required in this neighbourhood, funding for the servicing will have to come from the property owners / developers. The City of Surrey is not in a position to front-end any engineering infrastructure.

The servicing concepts within the report are only indicative of the general servicing needs and are not in any way deemed to represent detailed and accurate requirements of the City's subdivision and rezoning approval process for individual applications in this NCP area. Changes to the servicing concepts 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.

2.02 INTRODUCTION

This section addresses the provision of major infrastructure services for the Douglas NCP area. Concepts for the road network including internal and external roads, pedestrian movement and bike routing; and water supply, sanitary sewer, and storm drainage systems are provided.

The Douglas NCP is an area which, in terms of the servicing infrastructure, is somewhat isolated from the rest of the City. Basic services including roads, water and sanitary sewer systems are in place. Storm sewers and detention facilities are for all practical purposes non-existent. All services will require some form of upgrading as well as system extensions to service the NCP area up to its boundaries.

The following sections discuss the proposed servicing infrastructure in more detail.

2.1 TRANSPORTATION AND ROADS

2.1.1 Existing Roadway System

The Douglas NCP area is uniquely located along the U.S. border between the Peace Arch and Douglas border crossings. Access to the Douglas NCP area will be from 8 Avenue via 172 Street, and from 176 Street (Route 15) via 4 Avenue and 2 Avenue. Direct access to Highway 99 is possible from Peace Arch Drive, but this access is limited to right-in, right-out.

The existing functional classification of roadways is defined in the City's Major Road Network R-91 Plan. Classification of each existing roadway within the Douglas area as well as its proposed re-classification is listed below.

Roadway	Existing Classification	Proposed Classification
Highway 99	Highway	Highway
Highway 15 (176 St.)	Highway	Highway
172 Street	Major Collector	Major Collector – N. of 1 Ave. Through Local – 0A Ave. - 1 Ave. Limited Local – 0 Ave. – 0A Ave.
8 Avenue	Highway	Highway
4 Avenue	Major Collector	Major Collector – E. of 172 St. Limited Local – W. of 172 St.
2 Avenue	Local	Through Local
0 Avenue	Major Collector	Limited Local
Peace Park Drive	Major Collector	Through Local

2.1.2 Key Features of the Proposed Roadway System

Development of the Douglas NCP area requires that its road needs and traffic issues are addressed in the context of its inter-relationship with the unique patterns and operations associated with the border crossings. These issues are addressed in detail in the Traffic Impact Study attached as Appendix B, and include the following considerations:

- Reduction of the potential for short-cutting through the Douglas neighbourhoods by drivers accessing border crossings;
- Customs and duty-free store traffic operations requirements;
- Weigh scale plans and access requirements on Highway 15;
- Potential separation of truck and private traffic at Douglas crossing;
- Safety concerns at 172 Street / 8 Avenue intersection;
- Impact on Highway 99 / 8 Avenue operations;
- Traffic calming / short-cutting measures.

Key functional improvement and upgrading features necessary for a timely and orderly development of the Douglas NCP area include:

- Four laning of 8 Avenue between Highway 99 and 176 Street. The Ministry of Transportation and Highways (MoTH) has indicated future plans to upgrade this section of 8 Avenue to four lanes, but has provided no definite horizon period.

- Construction of 175A Street from 4 Avenue to 0A Avenue or possibly right up to 0 Avenue. It had originally been suggested that this road be developed to divert southbound truck traffic away from 176 Street but MoTH has since rejected this idea. 175A Street will provide access for local traffic to the industrial / highway commercial properties. 175A Street is to be classified as a Through Local between 2 Avenue and 4 Avenue and as a Limited Local between 0A Avenue and 2 Avenue. However, this matter is again being reviewed (April 1999). Finding solutions to the access and traffic issues at the border crossing area is made extremely complex and difficult due to the multi-level and international jurisdictions and competing interests involved.

- Closure of 0 Avenue. 0 Avenue will not connect to 175A Street or 176 Street, and will be declassified from Major Collector to Limited Local road status.

- Designation of 172 Street as a primary access to the Douglas NCP area. 4 Avenue will function as a secondary access and will also serve as an alternate emergency access in case 172 Street becomes blocked.

- Signalization of the intersection of 172 Street / 8 Avenue and 176 Street / 4 Avenue.

- Reconfiguration of the U.S. Customs Douglas crossing, presently under way.

2.1.3 Proposed Roadway System

The proposed Douglas NCP internal road network as well as the external road network within the Local Area Plan is illustrated in Figure R1 – Conceptual Road Network and Hierarchy.

2.1.3.1 Roadway Standards

Details regarding roadway features applicable to 176 Street and 8 Avenue shall be in accordance with MoTH standards and specifications. Details regarding municipal roadway features shall be in accordance with Schedule 'A' of the City's Subdivision and Development Bylaw No. 8830. However, some of the existing roads have unique

features, which are not conducive to their reconstruction in strict adherence to the Subdivision and Development Bylaw in terms of their cross-sectional requirements. Thus, they will require a Development Variance Permit (DVP). These features include:

- Very narrow existing road rights-of-way (0 Avenue, Peace Park Drive);
- One-sided pattern of residential development (0 Avenue, a section of 1 Avenue, and Peace Park Drive);
- Non-conforming (reduced) building set-backs for many older dwellings (0 Avenue, Peace Park Drive);
- No possibility for a two-sided widening of the existing right-of-way due to the international border (0 Avenue);
- Need for the roadway and the servicing infrastructure to service only one side of the road (0 Avenue, a section of 1 Avenue, Peace Park Drive, 4 Avenue);
- Location of the road on a transition between rural (ALR) and urban areas (4 Avenue);
- Existing utilities located in non-standard corridors (offset locations).

Additional road right-of-way dedication, where required, will be achieved through the rezoning and/or subdivision applications for the affected properties. It is acknowledged, however, that dedication may not be immediately possible on some properties where there are existing dwellings. In such cases, rights-of-way will be required instead through the subdivision approval process to protect the future dedication, and restrictive covenants will be registered to ensure future dedication will occur once existing dwellings are removed. Reduced building set-backs for some of the existing dwellings may also be required, as a temporary measure. Properties, whose owners choose not to develop, will not be subjected to any changes along their frontages.

Typical cross-sections showing suggested road and rights-of-way widths for various classifications of roads within the Douglas NCP area are shown in Figures R2 through R7. It is recognized that offsets of certain existing utilities may vary within a distance of several blocks. This may have an impact upon the proposed road cross-sections. Consequently, fine tuning of the proposed cross-sections and/or relocation of certain utilities may be necessary during the detailed design.

2.1.3.2 Detailed Description

The following is a detailed description of required road upgrading, new roadworks, traffic controls, laning, etc., required to support the development of Douglas NCP area:

0 Avenue

Despite the increase in residential density in the Douglas neighbourhood, traffic volumes on 0 Avenue are expected to remain low due to the proposed road network discontinuity on 0 Avenue within the Douglas area (see Figure R1). As a result, it is recommended that 0 Avenue will be declassified from Major Collector to Local Road status. Reducing the traffic volume on 0 Avenue is considered a desirable feature due to its narrow existing right-of-way (10.0 metres) with limited potential for widening compounded by the proximity of the border to the south and the minimum set-back of existing homes to the north. Due to the immediate proximity to the border, it is proposed that the proposed cross-section consists of a gravel shoulder with a drainage swale on the south side and sidewalk on the north side.

2 Avenue

Initially, it had been envisaged that 2 Avenue would be closed between 175A Street and the Douglas NCP. However, further to concerns expressed by surrounding property owners, it has been decided to keep 2 Avenue open with some form of traffic calming to prevent or minimize short-cutting. Nevertheless, the effectiveness of the proposed traffic calming will be monitored on an ongoing basis and should these measures prove to be not entirely satisfactory, the option of closing 2 Avenue is still available.

It is proposed that traffic calming in the form of speed humps and a chicane be installed on 2 Avenue. A tentative chicane design is illustrated in Figure R10. Utilizing a curvilinear geometric design and placement of bollards, the chicane can be constructed to allow passenger vehicles to negotiate a turn through it in both directions, but commercial traffic will find it very difficult, if not impossible, to travel through it. The chicane design shown in Figure R9 only permits travel in one direction at a time.

Traffic volumes through this section of 2 Avenue will be low as only motorists accessing the Tudor Pub, and employees of the Pub and the Duty Free Store (and emergency vehicles) should be using 2 Avenue. The chicane design will permit access from the Douglas NCP area to the commercial establishments along 176 Street, but will discourage all other traffic. Installation of the chicane should be deferred until such time as sufficient portions of the internal road network and 175A Street have been constructed. The northbound left turn movement from 2 Avenue onto 176 Street may be prohibited should this particular movement cause unacceptable levels of delay in the future.

4 Avenue

Due to the urban to rural transition on 4 Avenue, it is proposed that the cross-section consist of curb and gutter on the south side and gravel shoulders on the north side.

Development of Douglas NCP and of the commercial / industrial strip between 176 Street and future 175A Street will trigger the need for 4 Avenue / 175A Street / 176 Street road and intersection reconfiguration. The detail of the proposed reconfiguration is shown in Figure R8.

4 Avenue will remain classified as Major Collector east of 172 Street, and will be declassified to a Through Local west of 172 Street.

8 Avenue

During the summer p.m. peak hour, the Level of Service (LOS) on 8 Avenue reaches 'D/E' – a condition which is just barely acceptable. Considering the function of 8 Avenue, existing traffic volumes and the relatively high proportion of heavy vehicles, it is recommended that 8 Avenue be widened to four lanes between Highway 99 and 176 Street as soon as possible. The Ministry of Transportation and Highways (MoTH) has indicated that it would like to widen 8 Avenue, from Highway 99 to 176 Street, to four lanes with left turn bays. The Ministry would require a minimum right-of-way of 30.5 m and 34.8 m at channelized intersections with left turn bays. This would entail significant right-of-way acquisition from the ALR (i.e. 5.25 m and 7.40 m, respectively) on each side of the road.

Peace Park Drive / 1 Avenue

The Ministry has indicated that keeping Peace Park Drive open at Highway 99 will be acceptable as the desire for short-cut traffic via Peace Park Drive will be eliminated with the proposed intersection configuration on 4 Avenue between 175A Street and 176 Street.

Peace Park Drive will remain right-in, right-out at Highway 99, but will be declassified from Major Collector to Through Local status.

172 Street

172 Street will continue to be designated as a Major Collector between 8 Avenue and 1 Avenue.

North of 4 Avenue, 172 Street will be constructed to a two lane Major Collector standard with a rural cross-section, including paved shoulders, as this area lies within the ALR. At 8 Avenue, 172 Street will be channelized with separate northbound left and right turn lanes and it will require signalization. Additional road dedication will be required for the channelization (12.20 m wide pavement for the first 120 metres south of 8 Avenue), and for the corner trunkations (5 m x 5 m at 8 Avenue).

Between 1 Avenue and 3A Avenue, 172 Street will be constructed to a Major Collector standard with a 3 metre wide landscaped median. Traffic circles, proposed on 172 Street (at 1 Avenue and 3A Avenue) and shown in Figure R13, will contribute to a

reduction in traffic speeds through the neighbourhood. Additional road dedication is required for the median and the traffic circles.

Between 4 Avenue and 3A Avenue, and between 1A Avenue and 2A Avenue (commercial area frontage), 172 Street will be constructed to a Major Collector standard without a 3 metre wide landscaped median.

172 Street will be declassified to Through Local status between 1 Avenue and 0A Avenue, and to Limited Local status between 0A Avenue and 0 Avenue.

175A Street

The future roadway system will include construction of 175A Street from 4 Avenue to 0A Avenue or possible right up to 0 Avenue. MoTH currently has no plans to divert southbound truck traffic from 176 Street to 175A Street. It is proposed that the intersection of 4 Avenue / 175A Street be channelized to restrict eastbound right turn manoeuvres, thus eliminating the tendency for cross-border traffic to short-cut through the Douglas area.

The need for construction of 175A Street will likely be triggered by the current development applications for the commercial / industrial properties located between 176 Street and 175A Street. However, since the MoTH abandoned their plans to divert the truck traffic through 175A Street, construction of 175A Street is not essential for development of the Douglas NCP.

175A Street is classified as a Through Local between 4 Avenue and 2 Avenue, and as a Limited Local south of 2 Avenue. However, as mentioned in Section 2.1.2, the issue of using 175A Street for truck traffic diversion is again being reviewed (April 1999), and the road classification may change.

176 Street

From the point of view of queuing and general traffic operations, 176 Street is currently operating at an acceptable level. However, long queues occasionally develop on 176 Street which cause significant delays to commercial traffic, and conflict with motorists who abuse the truck lane.

The southbound truck lane currently begins on 176 Street at the south exit of the truck parking area and continues to the border crossing. This lane is signed for use by trucks and duty free and local traffic only. Rather than removing this lane, it is recommended that it be converted to either a general purpose lane or a pace lane – U.S. Customs has indicated their preference to convert this lane to a pace lane. This lane would continue with its function as an auxiliary lane for turning movements into the commercial / industrial area, and during periods of heavy border queuing, as a third southbound lane it would accommodate additional vehicle storage, thus reducing the length of queuing on 176 Street. Consideration should be given to extending this auxiliary lane to begin just south of 4 Avenue.

The intersection of 176 Street / 8 Avenue will require an extension of the eastbound right turn lane, and an additional northbound left turn bay.

The intersection of 176 Street / 4 Avenue will require channelization of the west leg of the intersection including southbound shared through / right turn lane, as shown in Figure R8.

4 Avenue at 176 Street and 175A Street Intersections

It is recommended that the intersections of 4 Avenue / 176 Street and 4 Avenue / 175A Street be channelized to restrict eastbound to southbound right turn manoeuvres, thus eliminating the tendency for cross-border traffic to short-cut through the Douglas area. The intersection of 4 Avenue / 176 Street will require signalization. The Ministry has indicated that an eastbound through movement will be required from 4 Avenue to the north access of the weigh scale site. A sketch of the proposed intersection configuration on 4 Avenue, between 175A Street and 176 Street, is shown in Figure R8. This will require some modification to improve the alignment of the north access with the signalized 4 Avenue / 176 Street intersection. An additional dedication will be required to implement the proposed roadworks.

2.1.4 Traffic Control

Traffic control measures are shown in Figure R10 and described below:

Traffic volumes at intersections within the Douglas NCP area are not high enough to warrant provision of traffic signals. All intersections will have a two-way stop control and will operate at a good level of service. Stop signs will be oriented to assign priority to traffic on roadways with a high traffic volume classification. Outside of the Douglas NCP

area, however, traffic signalization will be required at the intersections of 172 Street / 8 Avenue and 176 Street / 4 Avenue.

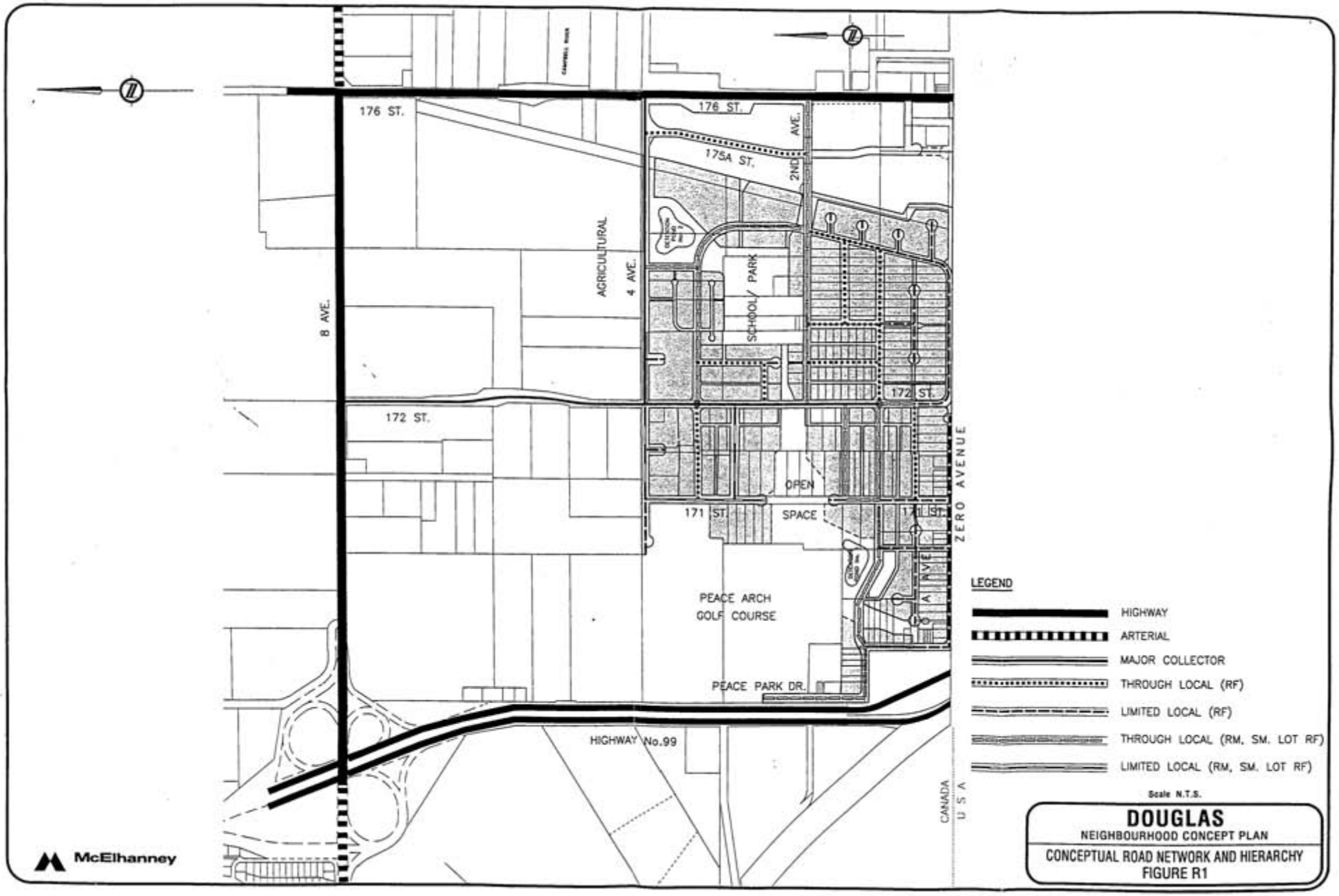
Channelization with turn bays are proposed at all signalized intersections, and at the intersection of 4 Avenue / 175A Street / 176 Street, as shown in Figure R8. Traffic calming in the form of speed humps and a chicane is proposed at 2 Avenue, west of 175A Street to reduce the traffic volume and prevent passage of commercial traffic, as shown in Figure R9. Speed humps are proposed on 174 Street, north and south of 2 Avenue to encourage lower speeds at the School / Park area, and are shown in Figure R12. Typical Speed Hump Detail is shown in Figure R14.

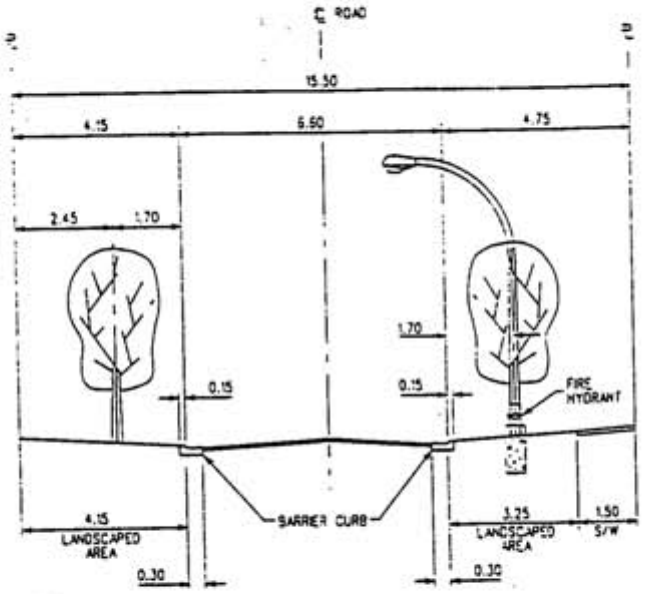
In order to encourage lower speeds, traffic circles are proposed at intersections of 172 Street / 1 Avenue and 172 Street / 3A Avenue. A Conceptual Traffic Circle Layout is shown in Figure R13.

Raised crosswalks are proposed where the proposed Multi-Use Corridors cross roadways, and are shown in Figure R12. Typical Raised Crosswalk Detail is shown in Figure R15.

2.1.5 Access and Circulation

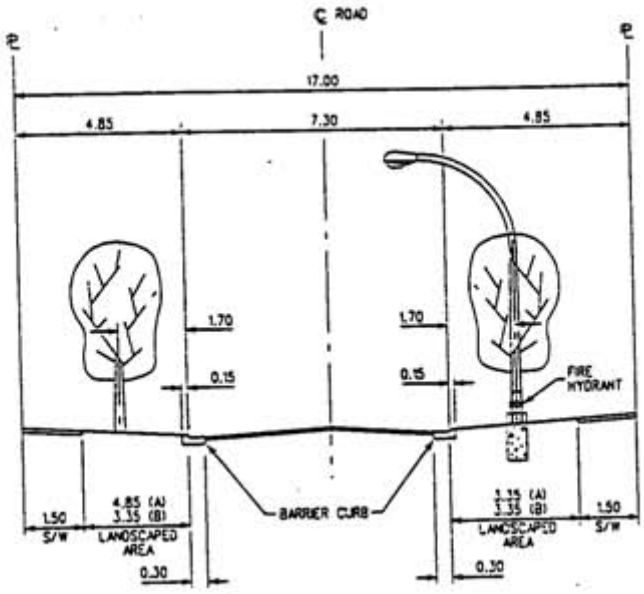
All driveway accesses should be located in accordance with the City's Subdivision and Development Bylaw, and the Traffic Bylaw. In particular, this is important for commercial, institutional and multi-family residential developments where the following guidelines should be considered in the development of their site plans:


176 ST.
176 ST.
175A ST.
2ND AVE.
8 AVE.
AGRICULTURAL
4 AVE.
SCHOOL / PARK
172 ST.
172 ST.
OPEN
SPACE
171 ST.
171 ST.
ZERO AVENUE
A AVE
PEACE ARCH
GOLF COURSE
PEACE PARK DR.
HIGHWAY No.99
CANADA
U S A
LEGEND
HIGHWAY
ARTERIAL
MAJOR COLLECTOR
THROUGH LOCAL (RF)
LIMITED LOCAL (RF)
THROUGH LOCAL (RM, SM. LOT RF)
LIMITED LOCAL (RM, SM. LOT RF)
Scale N.T.S.
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
CONCEPTUAL ROAD NETWORK AND HIERARCHY
FIGURE R1
McElhanney



NOTES:
(A) SIDEWALK ONE SIDE (ON SIDE WITHOUT HYDRO/TEL), ONLY
* BASED ON CITY STD. SSD-R.4.1

LIMITED LOCAL (RF)*
NON-SPECIFIC LOCATION
N.T.S.



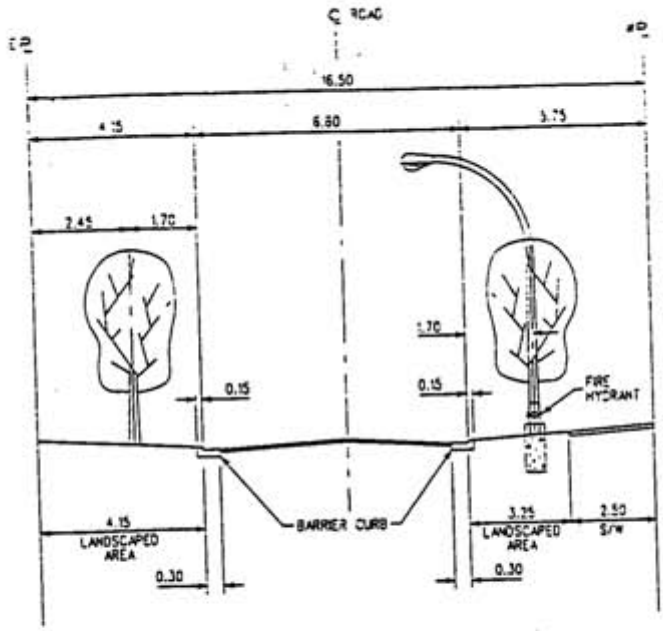
NOTES:
(A) SIDEWALK ONE SIDE, ON SIDE WITHOUT HYDRO/TEL
(B) SIDEWALKS BOTH SIDES
* BASED ON CITY STD. SSD-R.4.2

LIMITED LOCAL (RM/SMALL LOT RF)*
NON-SPECIFIC LOCATION
N.T.S.

DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN

TYPICAL CROSS SECTIONS
FIGURE R2

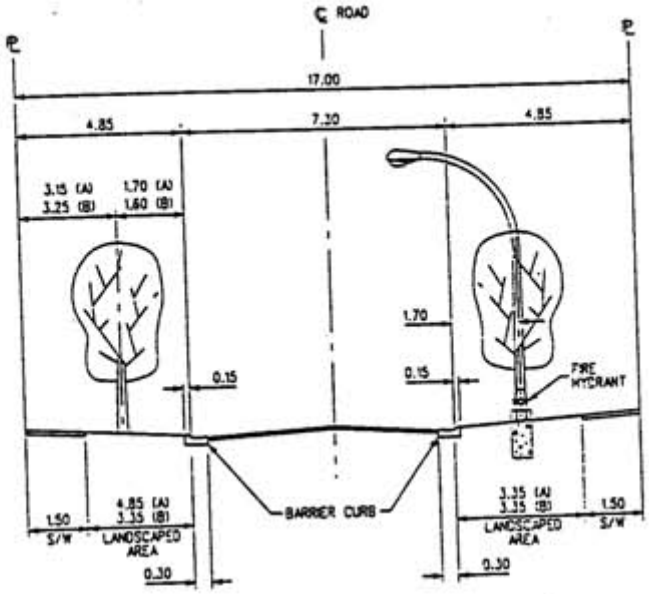
McElhanney



NOTES:
(A) SIDEWALK ON WEST SIDE (WITHOUT HYDRO/TEL) ONLY
* BASED ON CITY STD. SSD-R.4.1

LIMITED LOCAL (RF)*
173 STREET SOUTH OF 1 AVENUE

N.T.S.



NOTES:
(A) SIDEWALK ONE SIDE, ON SIDE WITHOUT HYDRO/TEL
(B) SIDEWALKS BOTH SIDES
* BASED ON CITY STD. SSD-R.4.1

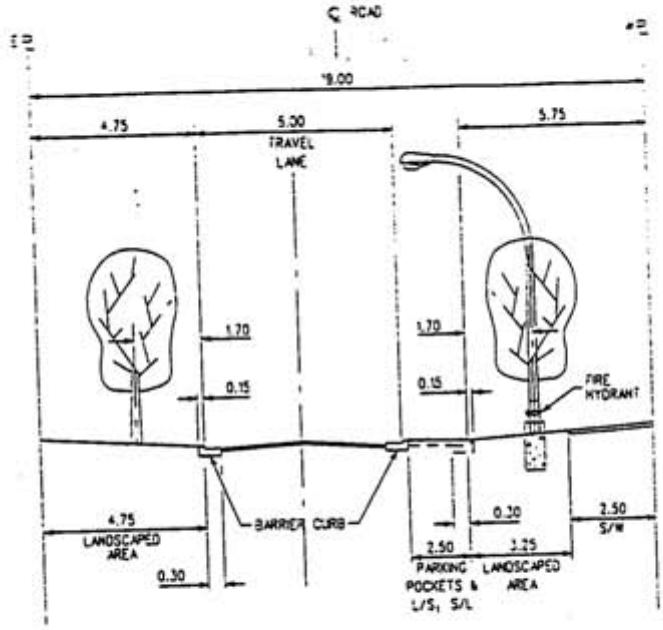
THROUGH LOCAL (RF)*
NON-SPECIFIC LOCATION

N.T.S.

DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN

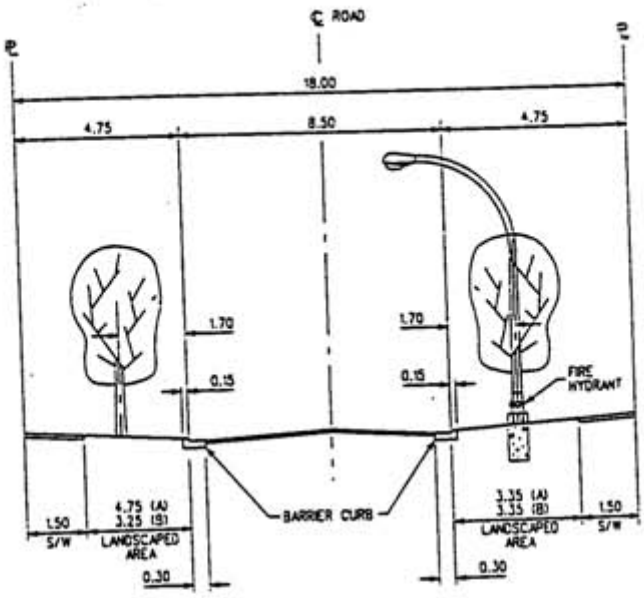
TYPICAL CROSS SECTIONS
FIGURE R3

McElhanney



NOTES:
(A) SIDEWALK ON WEST SIDE (WITHOUT HYDRO/TEL) ONLY
(B) ONE SIDE PARKING (ON WEST SIDE) ONLY
* BASED ON CITY STD. SSD-R.4.5

THROUGH LOCAL (RF)*
173 STREET NORTH OF 1 AVENUE
N.T.S.



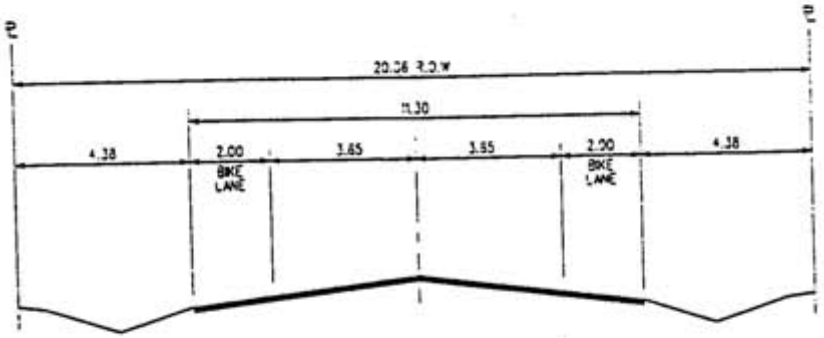
NOTES:
(A) SIDEWALK ONE SIDE, ON SIDE WITHOUT HYDRO/TEL
(B) SIDEWALKS BOTH SIDES
* BASED ON CITY STD. SSD-R.4.2

THROUGH LOCAL (RM, SMALL LOT RF)*
NON-SPECIFIC LOCATION
N.T.S.

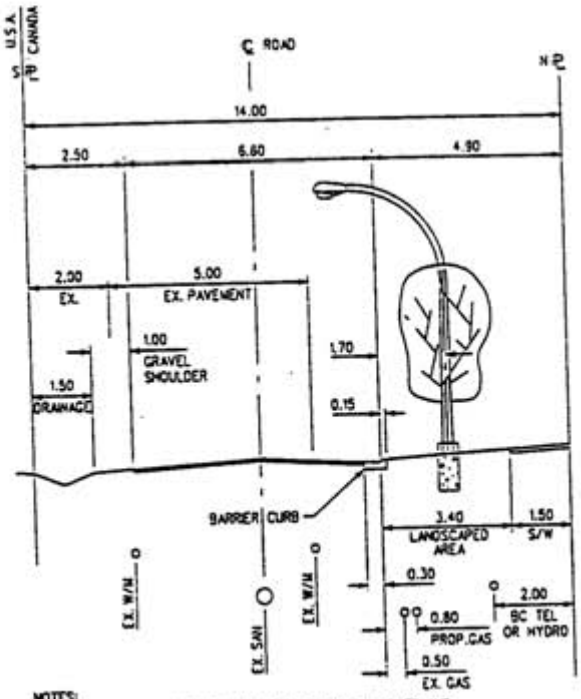
McElhanney

DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN

TYPICAL CROSS SECTIONS
FIGURE R4

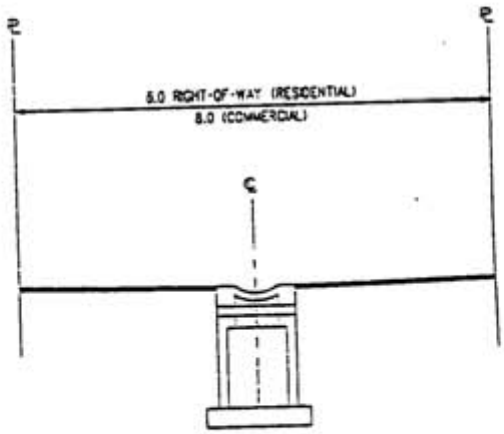


MAJOR COLLECTOR
172 STREET FROM 4 AVENUE TO 8 AVENUE



NOTES:
(1) EXISTING AND/OR PROP. SANITARY SEWER, STORM SEWER AND WATERMAIN TO BE LOCATED WITHIN THE ROADWAY
* BASED ON CITY STD. SSD-R.4.1

LIMITED LOCAL RF*
0 AVENUE
N.T.S.



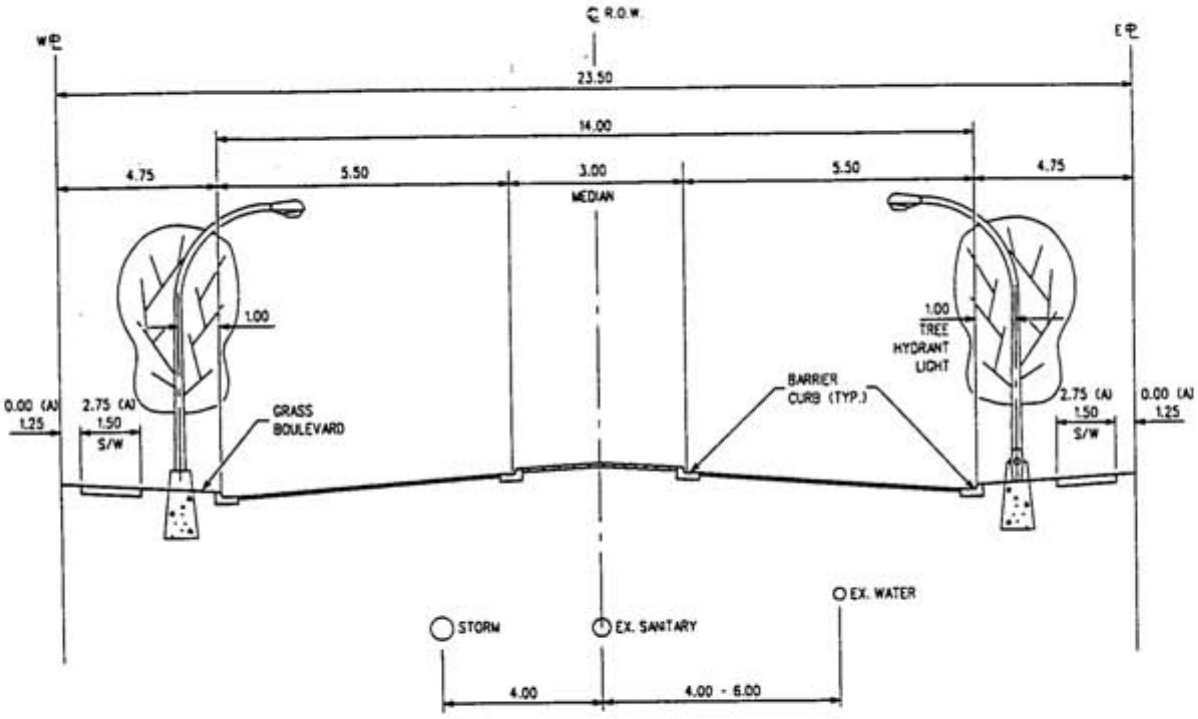
NOTES:
* BASED ON CITY STD. SSD-R.12.1

LANES*
N.T.S.

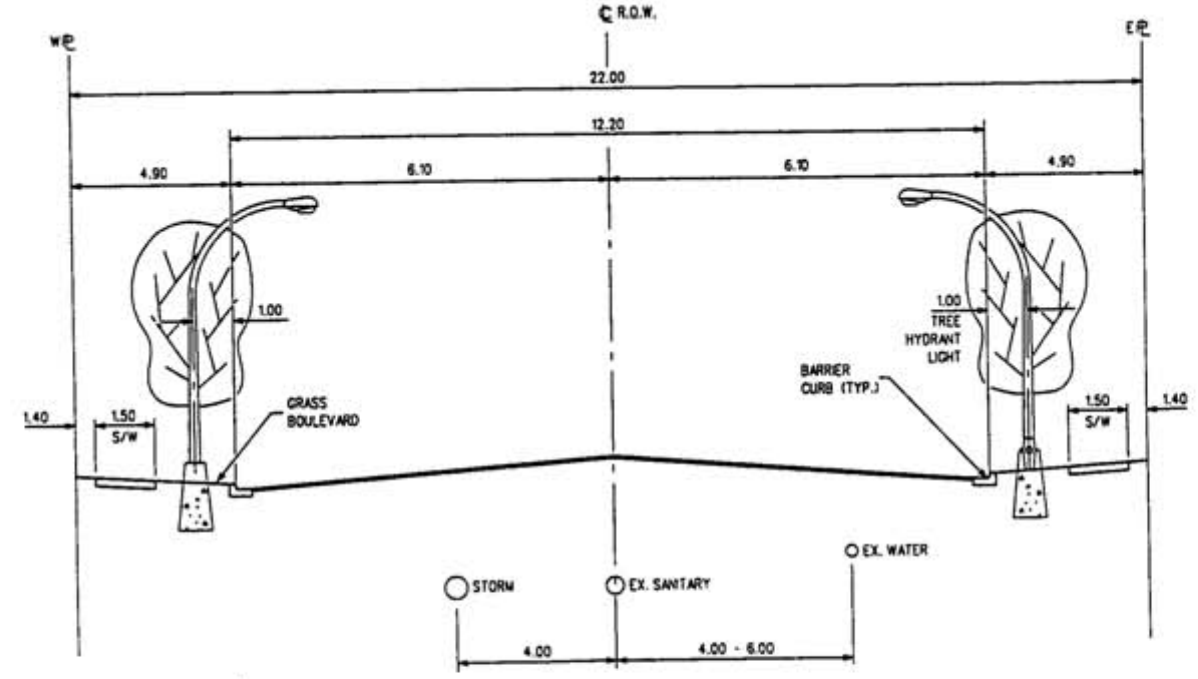
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN

TYPICAL CROSS SECTIONS
FIGURE R5

McElhanney



DIVIDED MAJOR COLLECTOR
172 STREET (1 AVENUE – 3A AVENUE)
N.T.S.

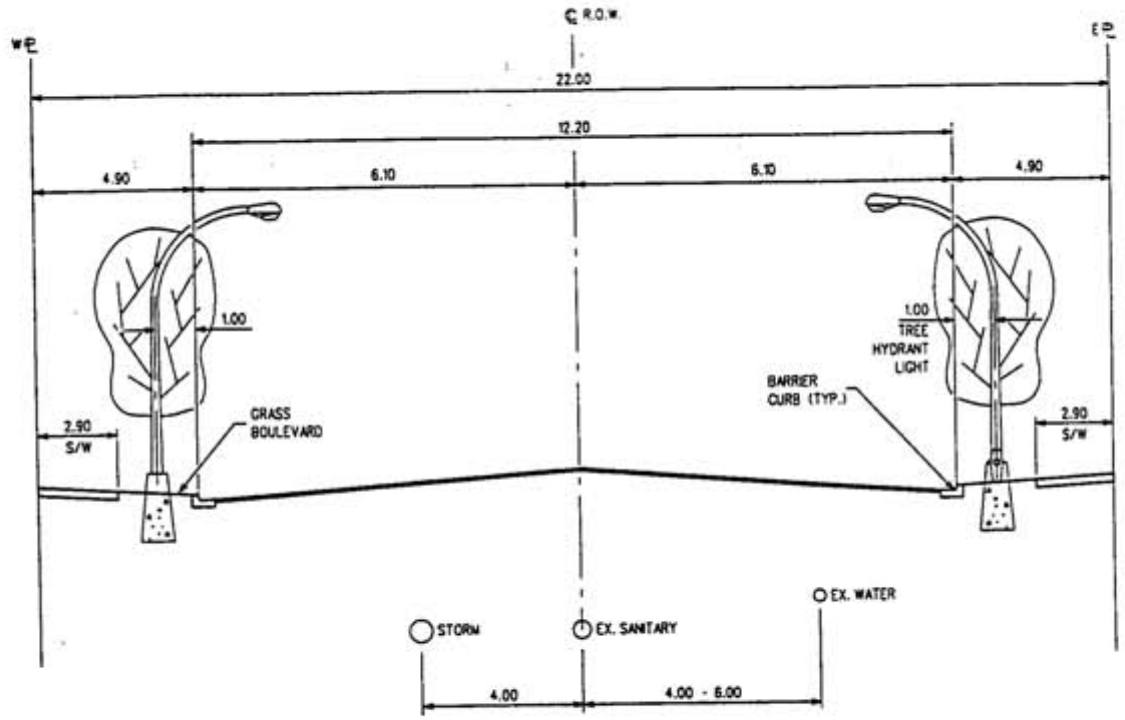


MAJOR COLLECTOR
172 STREET (3A AVENUE – 4 AVENUE)
N.T.S.

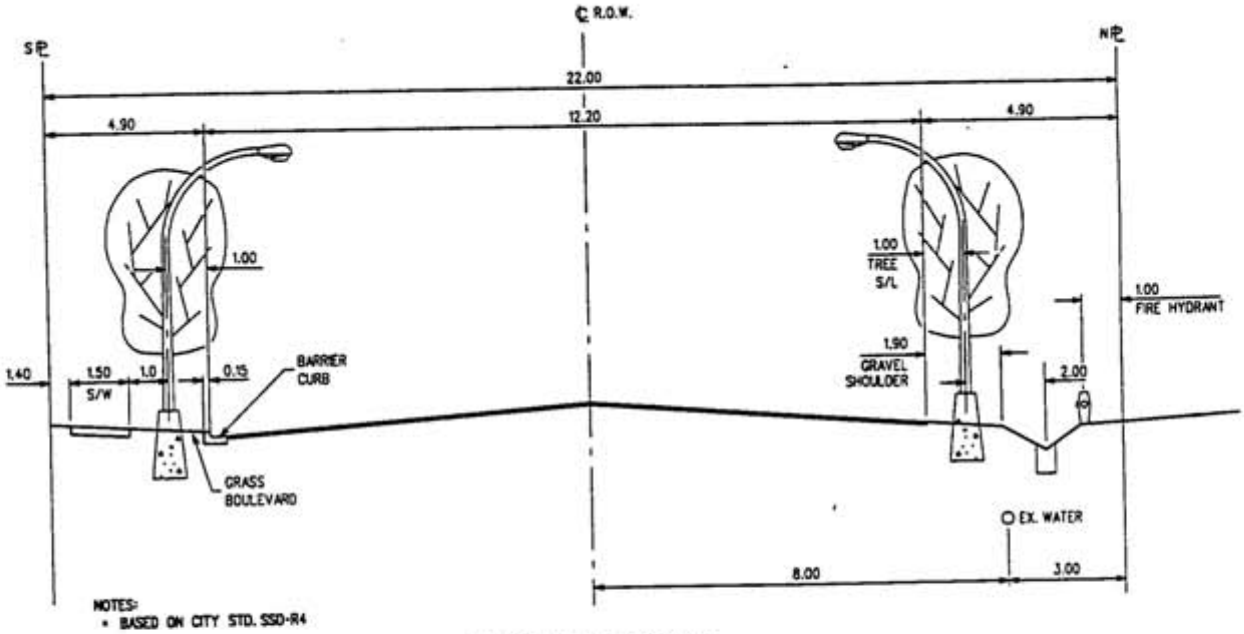
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN

TYPICAL CROSS SECTIONS
FIGURE R6

McElhanney



MAJOR COLLECTOR
172 STREET (COMMERCIAL AREA FRONTAGE)
N.T.S.



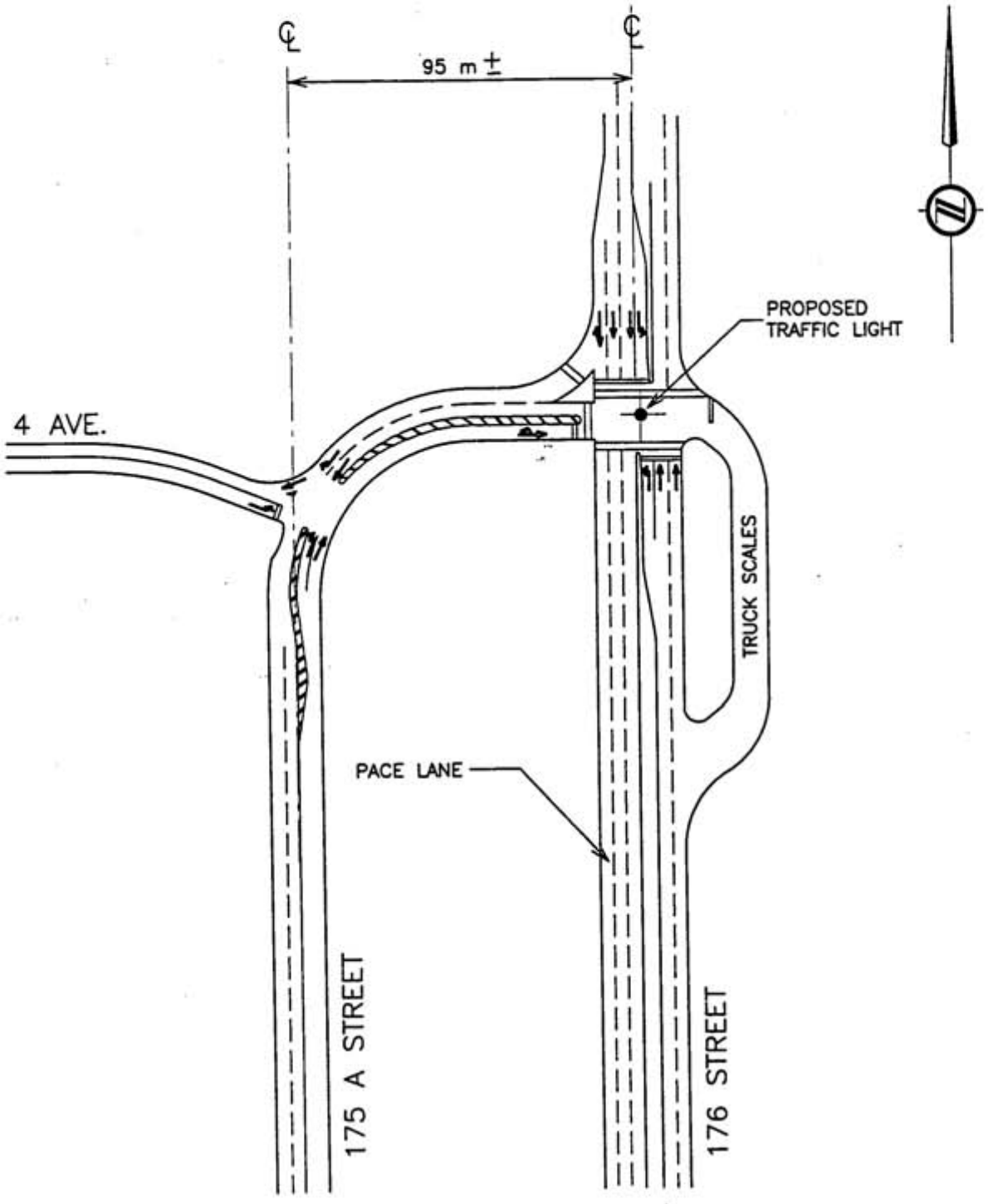
NOTES:
* BASED ON CITY STD. SSD-R4

MAJOR COLLECTOR *
4 AVENUE EAST OF 172 STREET
N.T.S.

DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN

TYPICAL CROSS SECTIONS
FIGURE R7

McElhanney



Scale N.T.S.

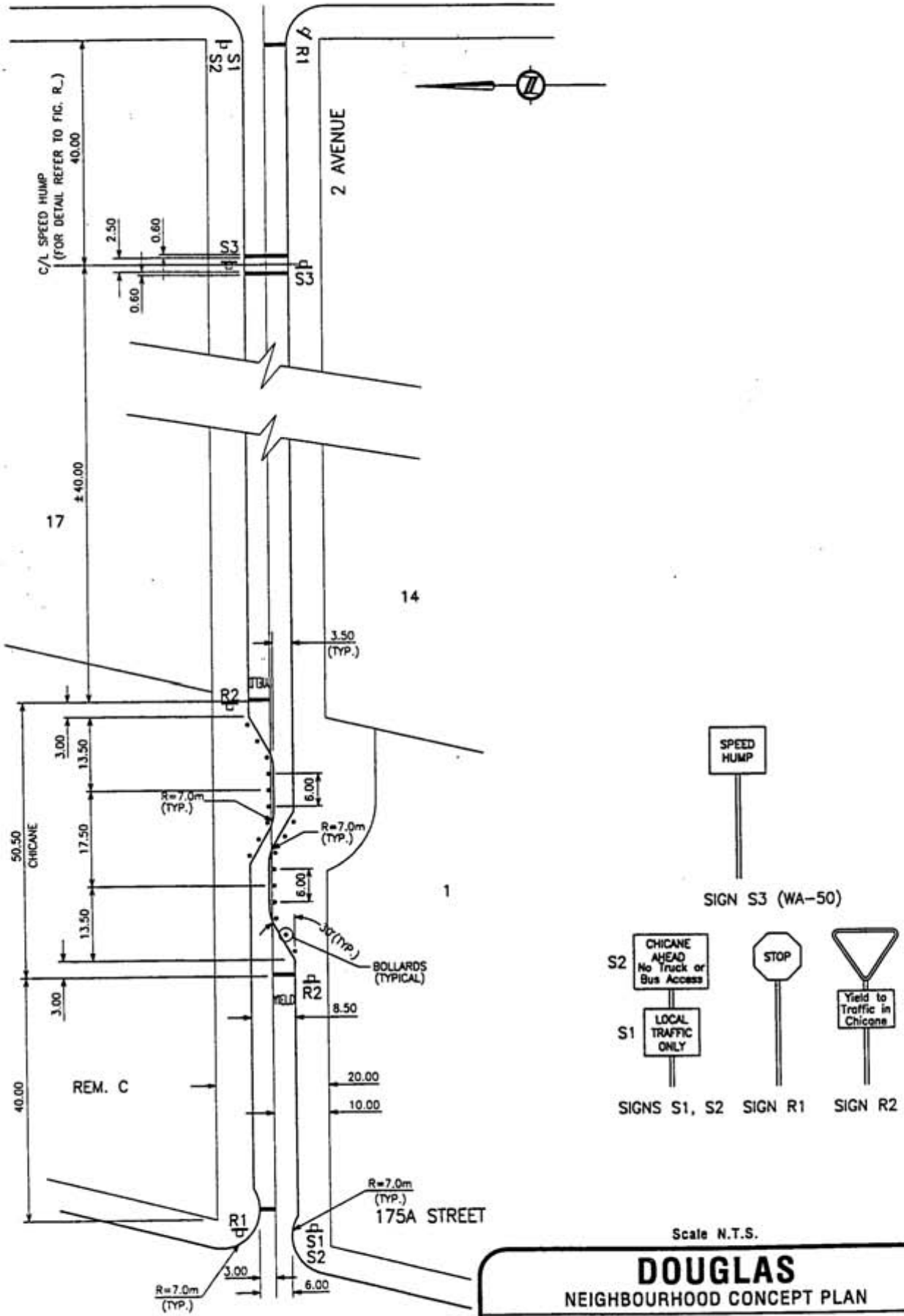
DOUGLAS

NEIGHBOURHOOD CONCEPT PLAN

PROPOSED ROAD & INTERSECTION CONFIGURATION
ON 4th AVENUE BETWEEN 175A AND 176 STREETS
FIGURE R8

McElhanney

dgn\01233\roads\rdfig-r4.dgn



Scale N.T.S.

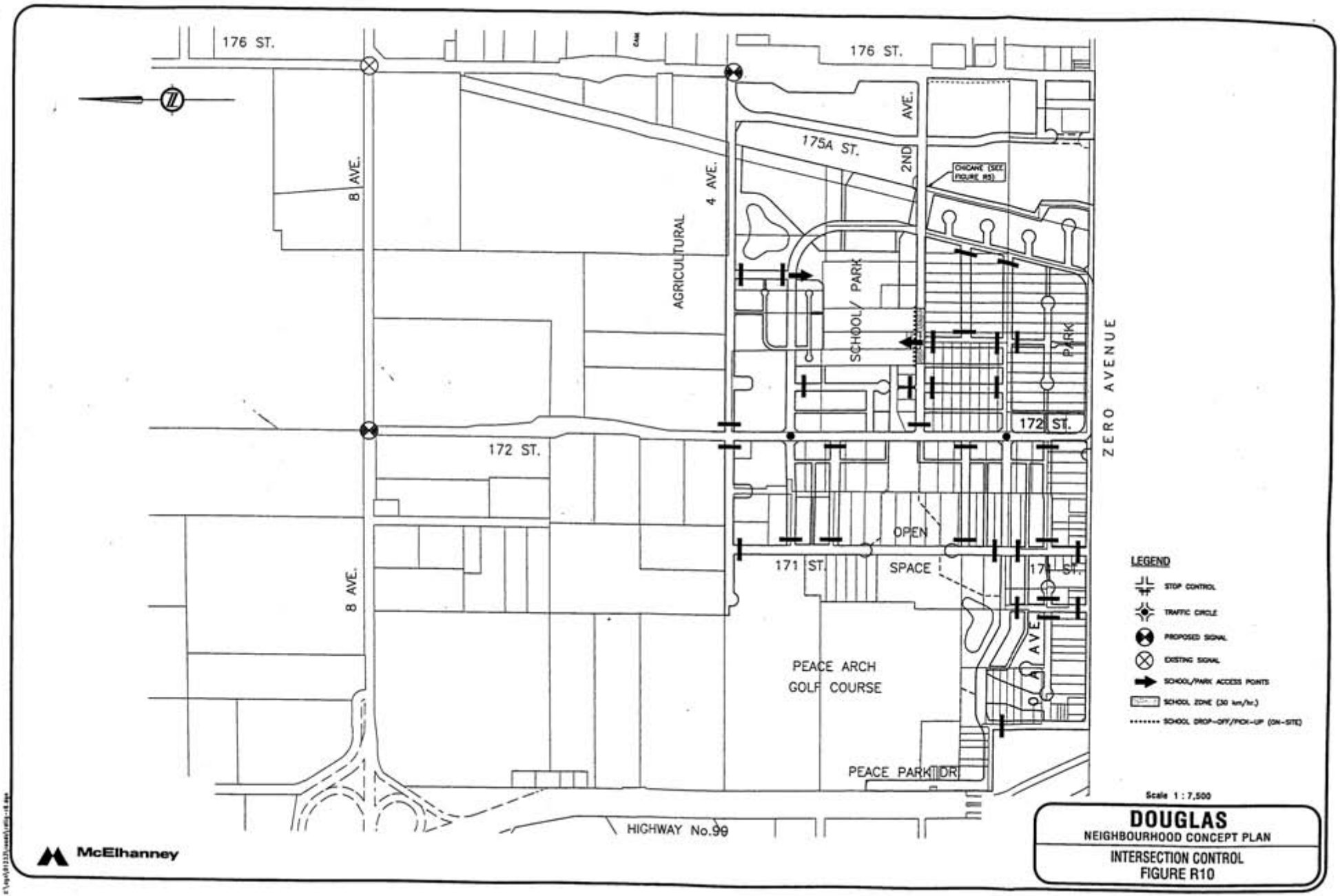
DOUGLAS

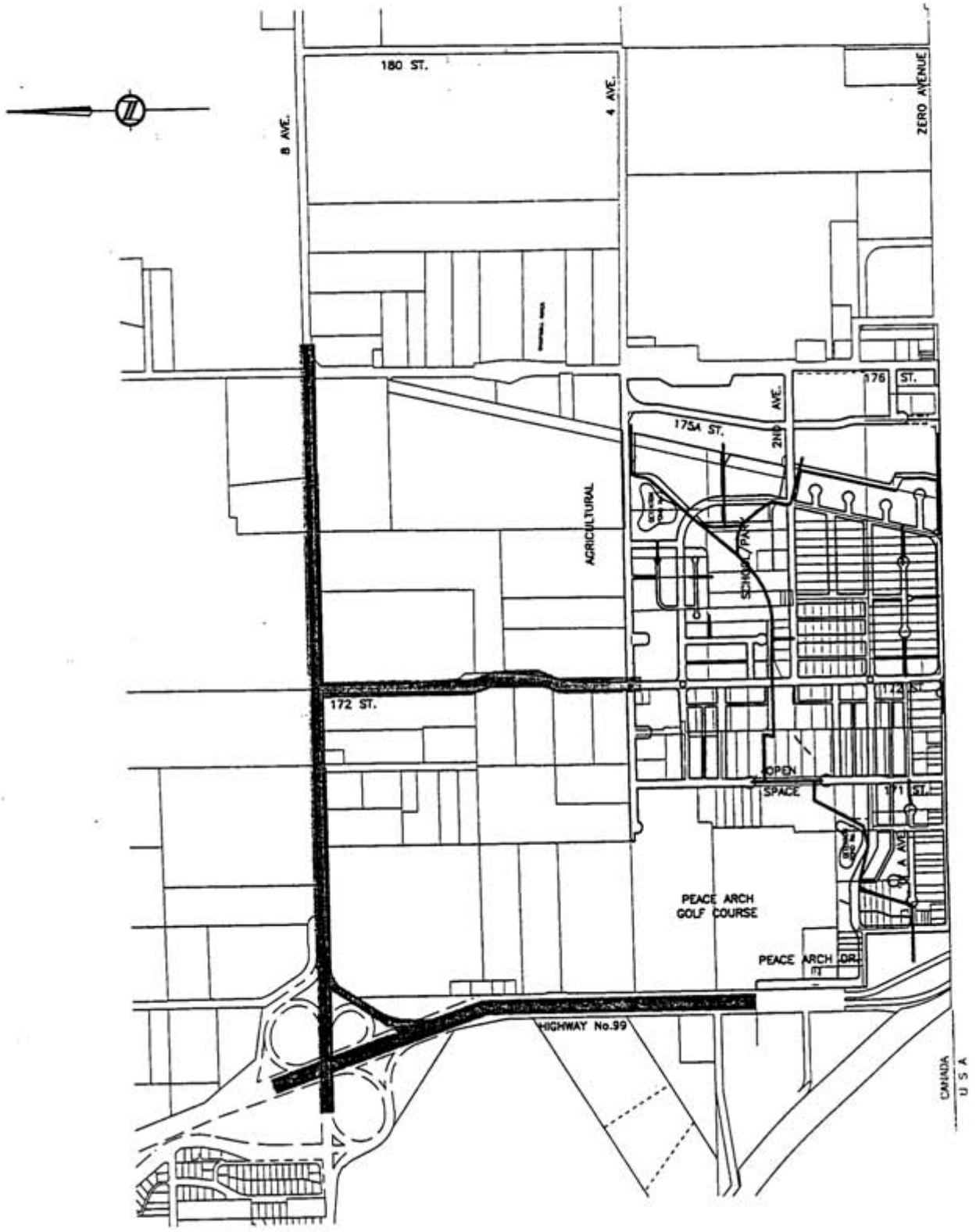
NEIGHBOURHOOD CONCEPT PLAN

2nd AVENUE TRAFFIC CALMING

FIGURE R9

McElhanney


176 ST.
176 ST.
8 AVE.
4 AVE.
AGRICULTURAL
175A ST.
2ND AVE.
CHICANE (SEE FIGURE R5)
SCHOOL/ PARK
PARK
ZERO AVENUE
172 ST.
172 ST.
OPEN SPACE
171 ST.
171 ST.
8 AVE.
PEACE ARCH GOLF COURSE
PEACE PARK DR
HIGHWAY No.99
LEGEND
STOP CONTROL
TRAFFIC CIRCLE
PROPOSED SIGNAL
EXISTING SIGNAL
SCHOOL/PARK ACCESS POINTS
SCHOOL ZONE (30 km/hr.)
SCHOOL DROP-OFF/PICK-UP (ON-SITE)
Scale 1 : 7,500
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
INTERSECTION CONTROL
FIGURE R10
McElhanney



LEGEND

COLLECTOR/HIGHWAY WITH PAVED SHOULDERS OR WIDE LANES FOR CYCLISTS

MULTI-USE CORRIDORS

Scale 1 : 15,000

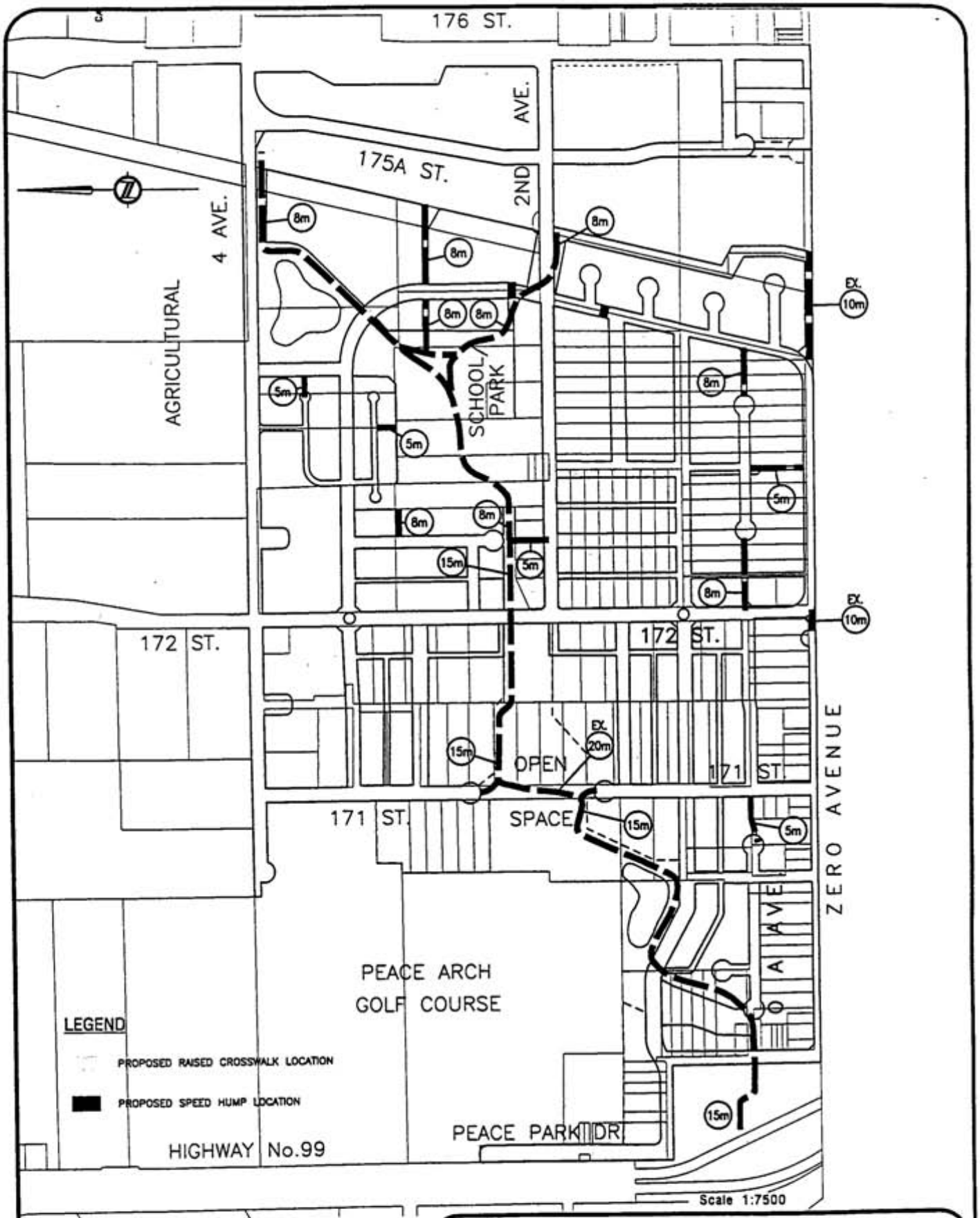
DOUGLAS

NEIGHBOURHOOD CONCEPT PLAN

BICYCLE PATHWAYS AND MULTI-USE CORRIDORS
FIGURE R11

McElhanney

d:\dgn\01233\roads\rdfig-r7.dgn

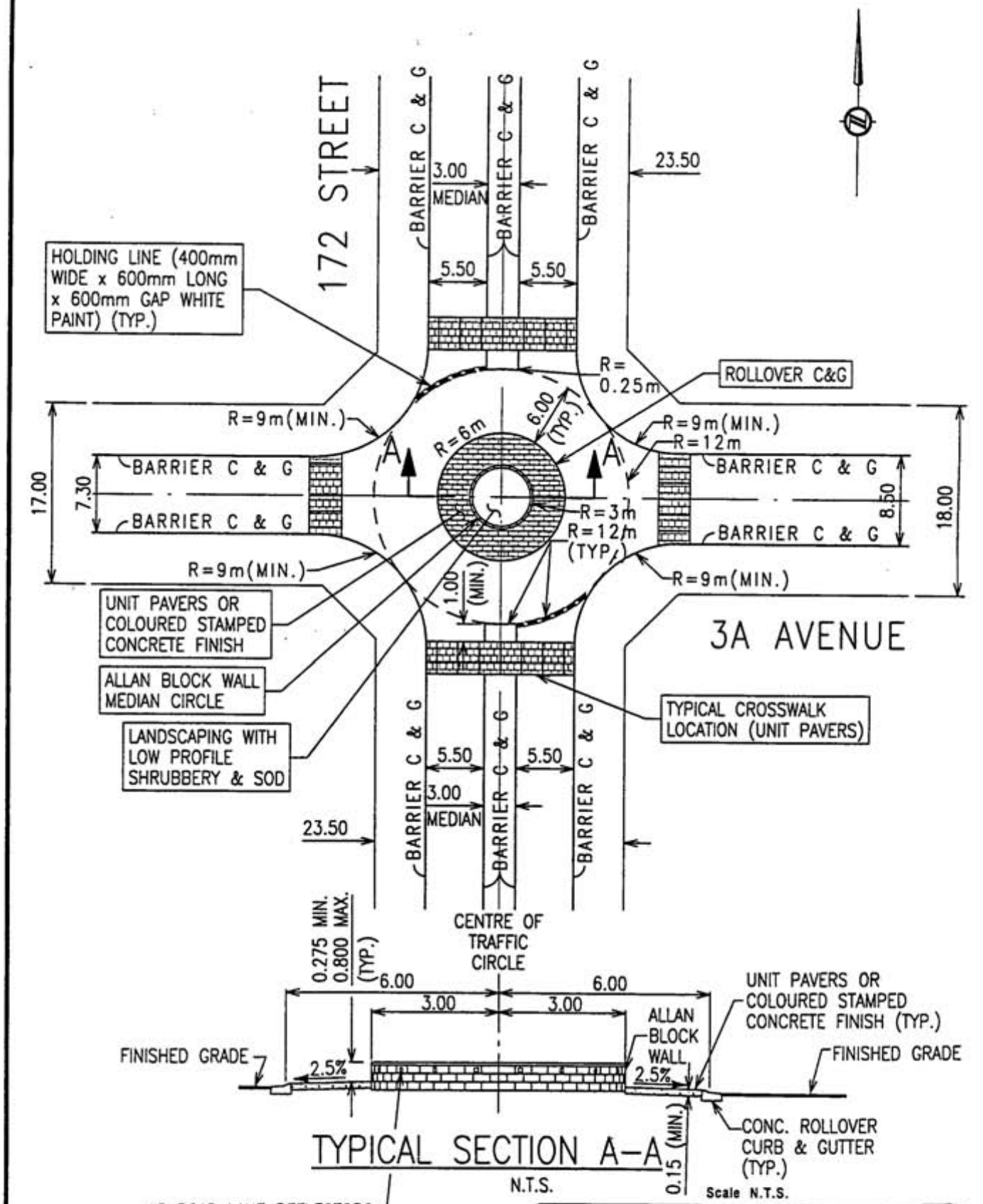


DOUGLAS

NEIGHBOURHOOD CONCEPT PLAN

MULTI-USE CORRIDORS (LOCATIONS AND WIDTHS)
FIGURE R12

McElhanney



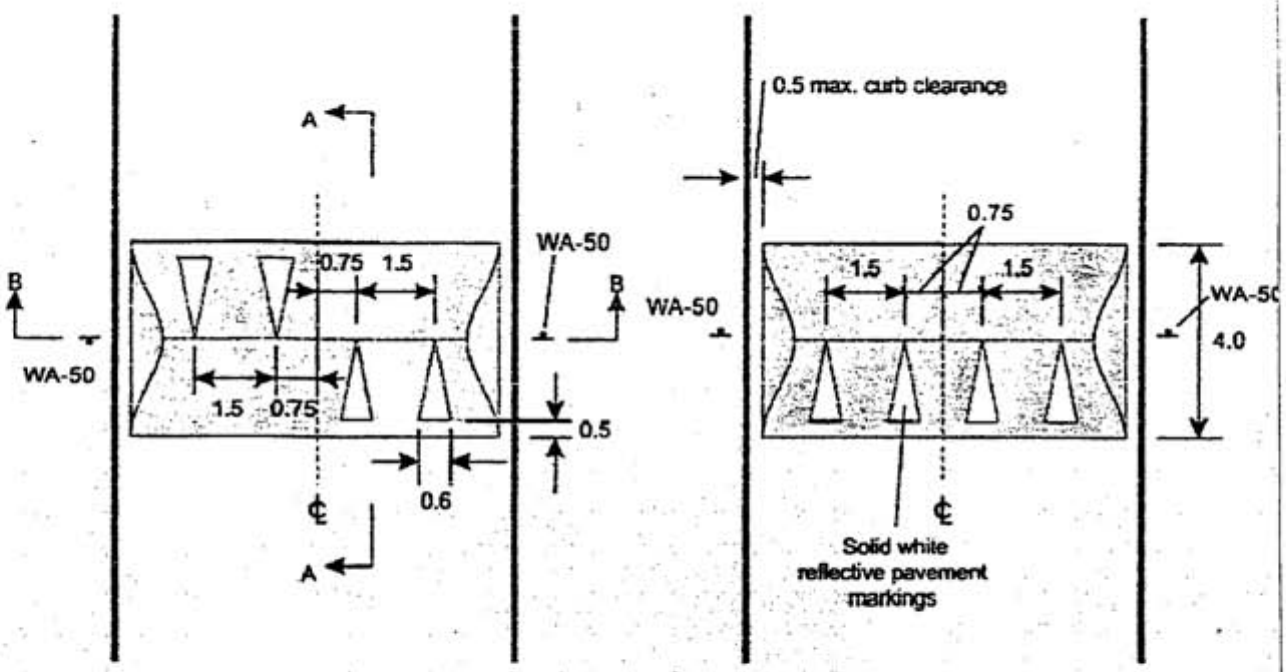
McElhanney

DOUGLAS

NEIGHBOURHOOD CONCEPT PLAN

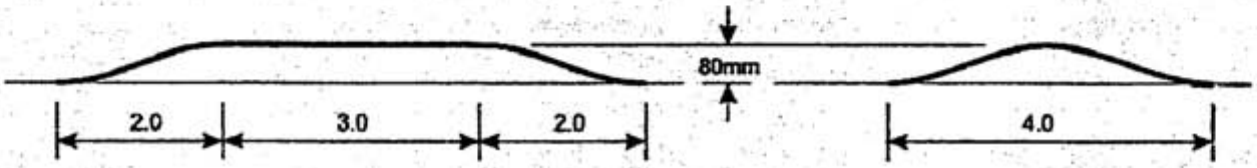
CONCEPTUAL TRAFFIC CIRCLE LAYOUT

FIGURE R13



TWO-WAY STREET

ONE-WAY STREET



Section A-A
Collector Street

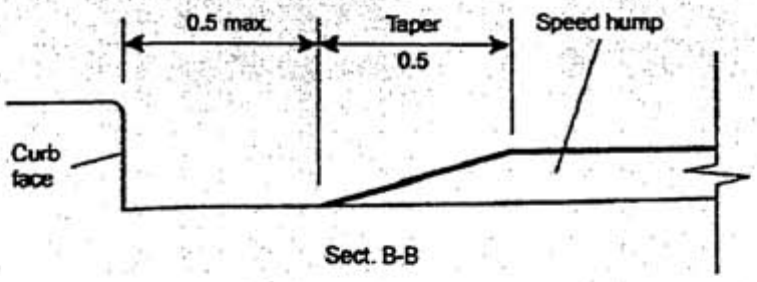
Section A-A
Local Street

Sinusoidal Speed Hump Development

Distance (m)	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875	1.000	1.125	1.250	1.375	1.500	1.625	1.750	1.875	2.000
Finished Height (mm)	0	1	3	7	12	18	25	32	40	48	55	62	68	73	77	79	80

Sign Descriptions:

WA-50 Speed Hump



Sect. B-B

All dimensions are in metres unless otherwise noted.

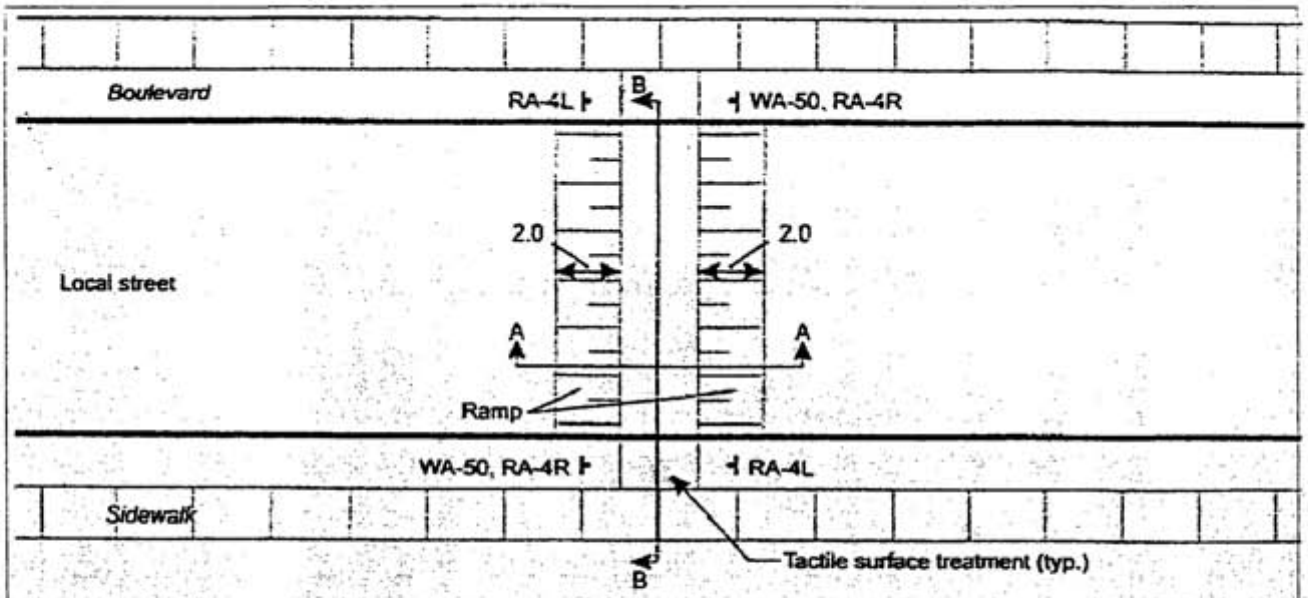
Scale N.T.S.

DOUGLAS

NEIGHBOURHOOD CONCEPT PLAN

TYPICAL SPEED HUMP DETAIL
FIGURE R14

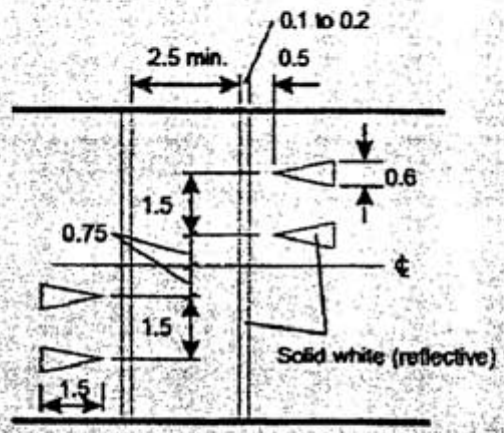
McElhanney



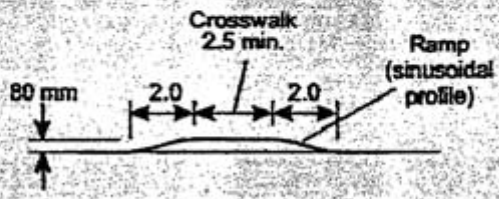
Sign Descriptions:

RA-4	Pedestrian Crosswalk
WA-50	Speed Hump

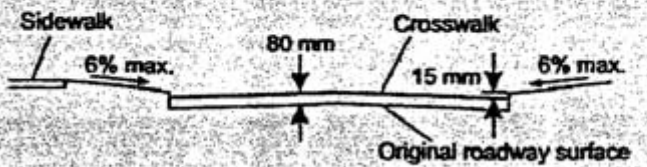
- Catch basins are required on the uphill side of a raised crosswalk.



Pavement Markings
(two-way street)



Section A-A



Section B-B

Ramp Height Development

Crosswalk profile parallel to roadway surface.

Distance (m)	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875	1.000	1.125	1.250	1.375	1.500	1.625	1.750	1.875	2.000
Finished Height (mm)	0	1	3	7	12	18	25	32	40	48	55	62	68	73	77	79	80

All dimensions are in metres unless otherwise noted

Scale N.T.S.

DOUGLAS

NEIGHBOURHOOD CONCEPT PLAN

TYPICAL RAISED CROSSWALK DETAIL
FIGURE R15

McElhanney

- For the multi-family sites, the number of driveway accesses should be minimized. Reciprocal access agreements may be required for the multi-family sites.
- Driveways for the multi-family site accesses should be located a minimum of 50 metres from an adjacent intersection.
- Proposed access locations for the school / park site are shown in Figure R10.
- Student drop-off / pick-up zone is to be located on site as part of the overall school design.

2.1.6 Bicycle and Pedestrian Facilities

A network of bicycle and pedestrian routes has been incorporated into the NCP to provide a comprehensive circulation system connecting all major park and school sites, open / green spaces, commercial centres, and external road corridors. These routes are illustrated in Figure R11.

A bicycle route network has been proposed which will link the Douglas NCP area to the main external road corridors of Highway 99, 8 Avenue and Highway 15. Cyclists travelling on 172 Street, north of 4 Avenue will be accommodated on 2.0 metre wide paved shoulders.

An external bicycle link is provided on Highway 99 northbound, which is signed for bicycles. This bicycle route begins along the shoulder on Highway 99 and then takes a jog into an abandoned paved roadway fronting the highway until just before the

8 Avenue interchange. As it is MoTH's policy to accommodate cyclists on all new facilities or upgrades, future widening of 8 Avenue would include provision for bicycles.

176 Street has not been constructed to accommodate cyclists and no improvements are scheduled in the foreseeable future. However, the west side of 176 Street includes a wide sidewalk between 4 Avenue and 8 Avenue which may be, if suitably signed, shared by pedestrians and cyclists.

Within the Douglas NCP area, cyclists will be accommodated within the road network with no need for special treatment or standards.

The bicycle route network should be complemented with end-of-trip bicycle facilities to encourage the use of bicycles. Without the end-of-trip facilities, many people will not consider cycling an attractive or even possible alternative mode of transportation. The end-of-trip facilities shall be provided in accordance with the City's Bicycle Blueprint guidelines, and in general terms should include the following:

- Bicycle racks for short-term convenience parking with typical locations outside schools, community centres, retail stores, banks, parks, multiple-family dwellings, etc.
- Secure parking / storage for an extended period of time with protection against theft and inclement weather typically located at schools, community centres, commercial centres, multi-family dwellings, etc.

Shower, change-room and locker amenities are typically located only at major places of employment. As such, they may be provided by the border crossing and related operations, just outside of the NCP area.

A pedestrian pathway network has also been incorporated into the NCP. It consists of sidewalks along proposed roadways, dedicated walkways between roadways (often facilitating servicing corridors), and pathways through or with links to parks and open / green spaces. Proposed Bicycle Pathways and Multi-Use Corridors are shown in Figure R11. A strong pedestrian / cyclist link to the border crossings should be developed. A pedestrian activated signal and/or pavement crossing treatment across 176 Street at 2 Avenue to facilitate the movement of cyclists and pedestrians (outside of the NCP area) should also be considered. Sidewalks will be provided in accordance with the City's Subdivision and Development Bylaw. Locations and width of the proposed Multi-Use Corridors are shown in Figure R12.

2.1.7 Public Transit Service

Transit service will not be provided to service the Douglas NCP area within its build-out horizon. BC Transit concluded that the total population will remain below levels that would support direct bus service. As well, due to the relative isolation of the Douglas area from the rest of the City, buses would have to cross ALR lands with little potential for ridership and revenues. In the meantime, BC Transit provides the Douglas NCP area with service via the Park-and-Ride facility in South Surrey.

2.1.8 Summary of Required Major Works

A summary of the proposed major works is shown in the following table:

Item No.	Location	Description of Works	In Current 10 YSP (Yes/No)	DCC Eligible (Yes/No)	Estimated Cost
R1	8 Avenue (#99 – 176 St.)	Widening to 4 lanes.	No	No	N/A*
R2	4 Avenue (175A St–176 St)	Reconstruction of 4 Ave./ 176 St./175A St. Intersection	No	Yes	$124,500.
R3	176 St. / 4 Ave.	Intersection signalization	No	Yes (50%)	$60,000 **
R4.	176 St. / 8 Ave.	Introduction of NB left turn phase signalization.	No	No	N/A*
		Extension of EB right turn lane length.	No	No	N/A*
		Construction of dual NB left turn lane.	No	No	N/A*
		Introduction of EB left turn phase signalization.	No	No	N/A*
R5	172 St. / 8 Ave.	Intersection signalization.	No	Yes (50%)	$60,000.**
R6.	172 Street (4 Ave – 8 Ave)	Widening of both sides to accommodate bicycle lanes.	No	Yes	$163,000.
R7	4 Avenue (172 St/175A St)	Reconstruction of 4 Avenue to urban / rural major collector standard.	No	Yes	$429,000.
R8	172 Street (4 Ave. – 1 Ave.)	Reconstruction of 172 Street to divided major collector standard.	No	Yes	$558,000
R9	172 Street (South of 8 Ave.)	Channelization for northbound LT & RT turn lanes.	No	Yes	$37,500
TOTAL ESTIMATED COST					**$1,432,000**

* MoTH highway system.
** MoTH highway system, 50% cost sharing with MoTH.

Phasing of these major works, and their financing are presented in Section 4.

2.2 SANITARY SEWER SYSTEM

Sewage from the Douglas NCP area is collected at the Douglas Pump Station installed in 1979, located on 171 Avenue approximately at the projection of 2 Avenue. Therefrom, the sewage is conveyed via a forcemain discharging into the City's gravity system at 8 Avenue and 165A Street leading to the Semiahmoo Pump Station. Sewage from the Semiahmoo Pump Station is conveyed via a forcemain further to the GVRD trunk sewer at 152 Street and 16 Avenue. The Semiahmoo Pump Station is currently surcharged and costly relief works are required to accept additional sewage including that from the Douglas NCP area. Until the relief works are fully operational, the Semiahmoo Pump Station will remain unable to accommodate additional sewage from new growth including that from new developments within the Douglas NCP area. However, it is anticipated that this constraint will be resolved in the very near future upon completion of the relief works that are being undertaken by the City.

2.2.1 Existing Sanitary Sewer System

Currently, the City's sanitary sewer system services approximately half of the NCP area, mostly in the more developed southwest. There are existing sewers on 0 Avenue, 0A Avenue, 2 Avenue, Peace Park Drive, 171 Street, 172 Street and within a few connecting rights-of-way. The area north of 2 Avenue and east of 172 Street is not presently serviced by sanitary sewers. Some properties in this area are currently operating private septic field disposal systems for their sewage disposal. There are also commercial and industrial areas outside the NCP, as well as the Hazelmere Golf Course, which contribute flows to the sanitary sewer system. The existing and proposed sewer collection system layouts are shown in Figure S1.

Although the existing sanitary sewer system can accommodate increased sanitary flows from most of the NCP area, the remaining capacity could be taken up by preceding developments within the service area that are outside the NCP boundary. Depending on the capacity existing at the time of each development application, some improvements may be required. Thus, the remaining sewer capacity is to be reviewed at the time of each development application. Improvements are required nevertheless for full development of the service area.

The Douglas Pump Station has a capacity to service the initial phases of development in the Douglas neighbourhood, both within and outside of the NCP area. The pump station's single pump discharge has been field tested by the City at 42 lps. Since the calculated theoretical discharge is approximately 59 lps, which is substantially more than indicated by the test, it is recommended that the test be reconfirmed before the discharge reaches 42 lps. The remaining capacity of the pump station is also to be reviewed at the time of each development application. Once the pump station capacity is reached, a new pump station adequate to service the ultimate catchment and zoning requirements, will be required to replace the existing one. Upgrading of the existing pump station, which would have to comply with the current, more stringent design criteria requirements, was also considered. However, upon consultations with equipment suppliers, contractors and the City, it was concluded it would not be cost-effective, and due to site and pump station conditions it would be almost impossible to achieve.

2.2.2 Proposed Sanitary Sewer System

The proposed sewer system includes sewer extensions into road allowances to adequately service future land uses proposed by the NCP.

Depending on the remaining capacity of the downstream sewer system at the time of each development application, an upgrading to the ultimate system capacity may be required as follows:

- Sewer replacement on 171 Street from node 25 to pump station;
- Relief sewer on 2 Avenue between nodes 2 and 8 to supplement capacity of the existing, rather deep sewer.

This upgrading is shown in Figure S1. None of the sewers analyzed under the ultimate development conditions generated a 40 lps peak flow necessary to be qualified as a trunk sewer and thus eligible for a DCC rebate.

Due to a combination of topographic and geotechnical constraints, it is not possible to extend gravity sanitary sewers to the extreme northeast limit of the NCP area. Areas which are not serviceable are shown shaded in Figure S1.

The topographic constraint relates to the gradually falling ground elevations towards the northeast. Unless the sewers were extended starting at the same depth as the existing sewers at the point of tie-in, which would be up to 7 metres, the gravity sewer system could not be extended too far. However, deep sewers are considered undesirable by the City's Operations Department because of serviceability concerns. Repairs of deep broken pipes can be onerous and expensive.

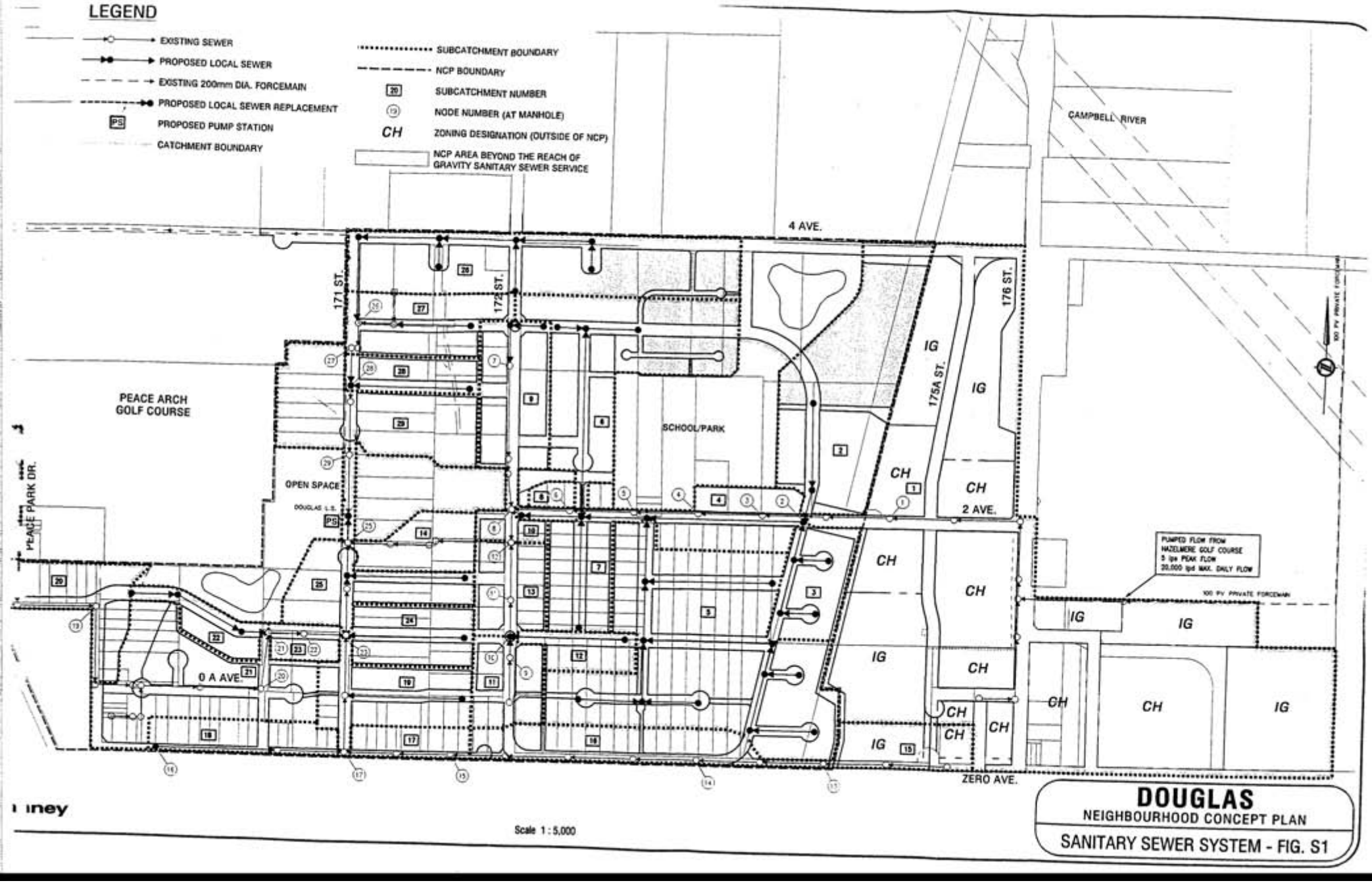
The geotechnical constraint arises from a concern about "running sand" encountered during the installation of the existing sewer system. This would introduce a factor of

uncertainty and concern regarding the constructibility of several sections of sanitary sewers, related construction methods and costs.

Upon a thorough review of the above constraints and discussions with the City's Operations Department, the maximum allowable depth was established as 4.0 metres. This is marginally deeper than allowed by the City's standard design criteria.

Despite this measure, i.e. sewers up to 4 metres deep, it is not possible to extend gravity sanitary sewers fully to the extreme northeast limit of the NCP area. The areas beyond the reach of a gravity collection system will have to form one legal property and will have to front or abut, at least partially, terminal sections of the sanitary sewer system. On-site private pump stations will be required to service these areas. This servicing constraint has been overcome by designating these properties as strata development sites.

Certain sections of existing sanitary sewers are currently located within rights-of-way along side yards or back yards of existing lots. Upon implementation of the proposed NCP road/lot layout, some of these sections will become located within new road allowances while other sections will remain located within rights-of-way. Where the existing sewers remain located along side yards or back yards of individual lots and where there are manholes, a pedestrian walkway within a dedicated right-of-way will have to be constructed to provide access for maintenance. It may be possible, however, during the subdivision application process, for individual developments to redirect or relocate short sections of sanitary sewers in order to avoid this type of sewer routing. Each affected applicant will be required to resolve this issue with the City as part of the approval process. Where it is possible to re-route those sewers, the applicant will be required to demonstrate to the City that there are no detrimental impacts to the sewer system resulting from such re-routing.


LEGEND
EXISTING SEWER
PROPOSED LOCAL SEWER
EXISTING 200mm DIA. FORCEMAIN
PROPOSED LOCAL SEWER REPLACEMENT
PS PROPOSED PUMP STATION
CATCHMENT BOUNDARY
SUBCATCHMENT BOUNDARY
NCP BOUNDARY
20 SUBCATCHMENT NUMBER
19 NODE NUMBER (AT MANHOLE)
CH ZONING DESIGNATION (OUTSIDE OF NCP)
NCP AREA BEYOND THE REACH OF GRAVITY SANITARY SEWER SERVICE
CAMPBELL RIVER
4 AVE.
171 ST.
172 ST.
175A ST.
176 ST.
PEACE ARCH GOLF COURSE
PEACE PARK DR.
SCHOOL/PARK
OPEN SPACE
DOUGLAS L.S.
PS
2 AVE.
0 A AVE.
ZERO AVE.
IG
CH
PUMPED FLOW FROM HAZELMERE GOLF COURSE
5 lps PEAK FLOW
20,000 lpd MAX. DAILY FLOW
100 PV PRIVATE FORCEMAIN
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
SANITARY SEWER SYSTEM - FIG. S1
Scale 1 : 5,000

A sanitary sewer system design sheet depicting the existing and proposed system is enclosed in Appendix B.

The proposed pump station to service the ultimate catchment and zoning requirements will replace the existing pump station at the same general location. A property acquisition of approximately 15 m x 10 m will be required in a plateau area immediately west of the existing pump station to accommodate emergency underground storage tankage.

The pump station shall be designed to meet or exceed the ultimate maximum design flow of 79.64 lps. An estimated cost for the proposed pump station is $792,000.

The existing 250 mm dia. forcemain was found to have an adequate capacity to convey the ultimate maximum design flow.

2.2.3 Summary of Required Major Works

A summary of proposed major works is shown in the following table:

Item No.	Location	Description of Works	In Current 10YSP (Yes/No)	DCC Eligible (Yes/No)	Estimated Cost
S1	171 Street (Node 25–S.P.S.)	Sewer Replacement (375 mm diameter)	No	No	$39,900.
S2	2 Avenue (Node 2-8)	Relief Sewer Construction (200 mm diameter)	Yes	No	$158,700.
S3	171 Street/ approx. 2 Avenue	Replacement of Douglas Pump Station	Yes	Yes (Only interim upgrading in 10YSP)	$792,000.
TOTAL ESTIMATED COST					$990,600.

Phasing of these major works, and their financing are presented in Section 4.

2.3 DRAINAGE

The objective of this section is to summarize the effects of the proposed development on existing downstream drainage systems and to present the conceptual design for the required drainage and stormwater management infrastructure. The detailed Stormwater Drainage Report is attached as Appendix C.

2.3.1 Existing Drainage System

The NCP area lies within the Campbell River drainage subbasin. Existing topography divides the area into two drainage subbasins (southwest and northeast), both draining to the Campbell River, but at two different locations. The natural drainage divide runs through the NCP area more or less diagonally along the line connecting 4 Avenue/ 171 Street and 0 Avenue/175A Street.

The total drainage area covered by the NCP is just over 85 ha: 26.8 ha. in the northeast subbasin and 58.7 ha. in the southwest subbasin.

2.3.1.1 Southwest Drainage Subbasin

The southwest drainage subbasin is bounded by 0 Avenue to the south, the drainage divide, the Peace Portal Golf Course property line to the northwest, and Peace Park Drive to the west. Some drainage run-off originates south of 0 Avenue, in the State of Washington. The subbasin drains generally in a northwest direction overland and through roadside ditches into three major gullies conveying the run-off towards the southeast corner of the Peach Portal Golf Course property. Historically, these gullies merged into one, forming a small tributary which conveyed the run-off through the golf course into the Campbell River. Through the development of the golf course these gullies were filled in and regraded to create a usable playing area which in effect dammed the gullies at the property lines. The resulting ponding in the gullies was relieved through a piped conveyance system within the golf course property. This conveyance system eventually discharges into the Campbell River.

Some years ago, a ridge was constructed in an east-west direction across the golf course at the 4 Avenue alignment. This ridge served as a route for underground municipal services. The construction of the ridge, which is some 3.5 to 4 m high, formed an obstacle to the natural surface flow path to Campbell River. In order to drain the area south of the ridge, a system of drains and pipes flowing north to the Campbell River was installed. However, this system did not have sufficient capacity and led to frequent flooding on the golf course. It was supplemented and partially replaced with a much larger storm sewer in the mid 1980s. Frequent flooding of the area south of the ridge,

nevertheless, continues to be a problem as even the improved system is severely undersized.

It appears that a combination of high tide and critical rainfall events amplify the current flooding problems south of the ridge. The primary cause of flooding is the enclosure of the natural creek/ravine system. The inadequate capacity of the existing drainage system through the golf course results not only in localized flooding within the golf course but also upstream of the inlets to this system on adjoining properties and environmentally sensitive ravines. As indicated on Figure D4, the drainage system capacity ranges from 0.837 m^3/s along sections of 1,050 mm diameter pipe to 0.252 m^3/s near the system's outfall into the Campbell River where the pipe is only 510 mm in diameter.

The Campbell River's floodplain is frequently flooded in the area between 176 Street and its outfall into Boundary Bay. Since the Douglas area is near the ocean, this naturally active floodplain is also affected by high tides. The Campbell River has a total drainage area of approximately 63 km^2 at Peace Portal Golf Course. Run-off originated from Douglas area (77 ha. or 1.3%) has a negligible impact on the Campbell River floodplain levels due to its location near the downstream limit of the watershed and to its relatively small contributing area.

2.3.1.2 Northeast Drainage Subbasin

The northeast drainage subbasin is bounded by 0 Avenue, the drainage divide, 4 Avenue and 176 Street. Again, some drainage run-off originates south of 0 Avenue. The subbasin drains generally in a northeast direction, mostly overland and through roadside ditches, directing the run-off towards the 4 Avenue/176 Street intersection. At

this point the run-off enters a 900 mm diameter MoTH major storm sewer system which starts at the Pacific border crossing, runs north on 176 Street and eventually discharges into the Campbell River.

It should be noted that the catchment immediately to the west of 176 Street, straddling 175A Street has not been modelled since it is not part of the study area. Applications for commercial/industrial developments are currently being considered for these areas and the City of Surrey confirmed that stormwater management issues related to these developments will be addressed by the individual proponents.

2.3.2 Proposed Drainage System

Several stormwater management strategies were examined and two options emerged worth more detailed consideration. Hydrologic models were developed for both options to evaluate their opportunities and constraints in detail. Each option required stormwater detention facilities at both the northeast and southwest extremities of the NCP area to mitigate the effects of land use changes on run-off characteristics.

The first option (Option 1) was based on a conventional approach of maintaining the existing drainage divide separating the northeast and southwest subbasins, and upgrading the existing on-site drainage system within the PPGC to convey the anticipated increase in run-off.

The second option (Option 2) was developed in response to many constraints and problems presented by the results of modelling of the first option, including:

- Substantial volume of required detention storage in the southwest drainage subbasin (7,480 m^3) and hence the need for a large and costly land area where the detention facility could be located.

- Lack of suitable area for the southwest subbasin detention facility due to environmental and topographical constraints.

- Concerns about downstream drainage problems within PPGC, and some increase in post-development flows under Option 1, which inspired a search for alternatives to reduce or eliminate the impact on PPGC drainage system;

In order to overcome these constraints and problems, Option 2 proposed to redirect a portion of the southwest subbasin's surface drainage into the northeast subbasin. This resulted in a reduction of peak flows and detention volume / area requirements in the southwest subbasin. The NCP area near the catchment divide is flat. The drainage divide between the two subbasins is, consequently, not well defined. While this results in a constraint to effective drainage, it also presented an opportunity to adjust the drainage boundary delineation, where this may be advantageous. Option 2 makes use of this opportunity.

Following a detailed review of both options and discussions with the City's planning and engineering staff, Option 2 (Modified Drainage Divide) was selected as a stormwater management strategy for the Douglas NCP. Therefore, the proposed drainage infrastructure described further in this section is that required for Option 2 only, and is shown in Figure D4.

2.3.2.1 "Modified Drainage Divide" Proposed Drainage System

The proposed drainage system calls for storm sewers to convey minor flows and for overland routes to convey major flows. Hence, the entire proposed northeast subbasin drains to the northeast for conditions up to and including 1:5 year storm events. For more severe storm events run-off originating from the area between the natural drainage divide and the proposed drainage divide, that exceeds the storm sewer capacity, will drain as overland flow to the southwest, while run-off from the remaining areas will drain northeast along 176 Street to Campbell River.

The proposed drainage system for the southwest subbasin calls for storm sewers to convey minor flows and for overland routes to convey major flows. A number of the subcatchments have been rearranged to route the run-off to the ravine system through the detention pond. Under major storm events, only run-off which can be conveyed through the minor storm sewer system will reach the proposed detention pond. Run-off in excess of 1:5 year storm flows will make its way through overland routes, such as roadways, into the ravines which have sufficient capacity to accommodate the anticipated flows.

2.3.2.2 Minor Drainage System

Currently, the study area is serviced by a combination of ditches, culverts and minor storm sewers. The topography of the NCP area is, except for the ravines, very flat, making an effective drainage system difficult and costly. For example, the average road grade on 172 Street is only 0.12%. With future development, the existing drainage system will be replaced with a storm sewer system conveying run-off for up to 1:5 year storm events, in accordance with the City's design criteria.

The conceptual servicing plan is shown in Figure D4, which identifies both local and trunk storm sewers. Trunk sewers are defined by the City as sewers servicing an area of 20 hectares or more. Due to the size and configuration of drainage subcatchments, the total length of sewers which can be classified as trunk sewers within the NCP area itself is rather small. However, other trunk sewers are located outside of the NCP area. The following is a list of all minor system trunk sewers and improvements:

1. Detention Pond No. 1 south inlet storm sewer, from 1 Avenue (675 mm diameter).
2. Detention Pond No. 1 north outlet storm sewer, to the southeast ravine (450 mm diameter).
3. Storm sewer, including an inlet headwall and trash rack, along the east property line of PPGC replacing an undersized 200 mm diameter southeast inlet to PPGC storm sewer system (525 mm diameter).
4. Storm sewer paralleling an undersized 510 mm diameter storm sewer within PPGC, between Campbell River up to the 1,050 mm diameter storm sewer (525 mm diameter).
5. Detention Pond No. 2 south inlet, from 3A Avenue (750 mm diameter).
6. Detention Pond No. 2 northwest inlet, from 4 Avenue (525 mm diameter).
7. Detention Pond No. 2 outlet to 4 Avenue, along 4 Avenue, along 176 Street up to Campbell River (600 mm diameter).
8. Headwall and trash rack at the 300 mm diameter south inlet to PPGC drainage system, at PPGC's south property line.
9. Trash rack and minor clearing/clean-up at the 600 mm diameter east inlet to PPGC drainage system, at PPGC's east property line.

Should developers wish to accommodate construction of full inground basement homes, the storm sewer system will have to be designed for a 1:100 year storm event or through other means ensure that the 100 year hydraulic gradeline is kept adequately below any proposed or existing basements. This issue would need to be examined by its proponents in conjunction with the initial development application. Costs associated with such system upgrading would be borne by the proponents. Should this option be selected, this NCP report will have to be updated and costs / design parameters reviewed.

There have been no fisheries sensitive habitats identified within the study area except for the Campbell River. While the ravine and ditch systems do not support fish directly, they do provide valuable fish nutrients. Therefore, all ravines and one ditch (running north to south, west of 171 Street) are designated in the Environmental Report for protection through dedication. The top of bank will need to be determined by individual development applications as recommended from field survey by a fishery biologist (environmental consultant). Base flows in the ravine systems are to be maintained through careful location of minor system discharge points (at 172 Street and 171 Street).

2.3.2.3 Major Drainage System

The major drainage system is to convey, in accordance with the City's design criteria, run-off generated by storms in excess of the 1:5 year return period. Major flow paths are to be sized to convey the 1:100 year storm event run-off.

Major flows are generally conveyed within the road system, either piped or on the surface, and are released through the ravine systems, detention ponds, PPGC's gradually graded and wide flow path (playing) areas into the Campbell River. Where

these flows are contained within the roadway, the maximum depth of flooding should not exceed the lesser of 200 mm or the design ground elevation at the roadway right-of-way boundary. Arterial roads (i.e. Pacific Highway) may be permitted to flood to depths equal to, but not exceeding the road crown.

The existing culverts at 171Street and 172 Street across the east ravine are capable of conveying the major flows without excessive headwater pool levels. It is expected that some armouring and bank protection will be required at 172 Street associated with the extension of the culvert.

Due to the generally flat topography, many road intersections may permit surface flow to split in two directions. Pavement crossfall adjustments or alternative methods will be necessary to ensure that major flow paths are consistent with those shown in Figure D4 Most notably this applies to 171, 172 and 176 Streets.

The northeast subbasin's major flow path must convey approximately 0.90 m^3/s (1.20 – 0.32 m^3/s) as surface flow. The flow path will be within the 176 Street right-of-way. Roadway design will need to incorporate this requirement along 4 Avenue.

The southwest subbasin's major flow path has been severely obstructed due to past backfilling of the natural ravine channel and its replacement with an inadequate storm sewer system on the Peace Portal Golf Course property. The proposed stormwater management strategy will control the future major flows such that the development of the NCP area will not exacerbate the existing flooding problems in the Peace Portal Golf Course. It is noted, however, that the existing storm sewer system within the golf course would have to be upgraded to adequately convey the existing expected range of major flows. No upgrading of the existing storm sewer system to the level of a major drainage

system is proposed as part of the Douglas NCP. Potential solutions that the Golf Course could pursue to overcome the existing flooding problems may include further upgrading of the storm sewer system, additional detention facility within the golf course, or a combination of both. These measures, however, should be dealt with outside of the Douglas NCP process. The City should eventually obtain a right-of-way for maintenance and access purposes for the storm drainage system through the golf course.

For more details on the impact of the Douglas NCP on existing flooding problems within PPGC refer to the Stormwater Drainage Report in Appendix C.

2.3.2.4 Detention Facilities

In order to minimize potential downstream impacts resulting from the land use changes proposed in the NCP, two community detention facilities will be required within the study area. One will serve the northeast subbasin (Detention Pond No. 2) and the other will serve the southwest subbasin (Detention Pond No. 1). The required active storage volumes are 8800 m^3 and 2750 m^3 for the northeast and southwest detention ponds, respectively. Both these ponds are proposed to be wet detention ponds.

Once the land requirements for the detention ponds have been finalized, lands required for the ultimate detention ponds will need to be acquired by the developers on behalf of the City in order to ensure orderly development and the completion of the Stormwater Management Plan on which this NCP will depend. This is in keeping with Council-approved policy.

Should developers wish to proceed with development prior to construction of the community detention pond in one of the two subbasins, each development application will be required to construct interim detention ponds, each servicing a minimum of 2.0 hectares of land, to restrict peak flows to predevelopment levels. The size, release rate and location of these temporary ponds will need to be determined by the proponents at their cost. No DCC rebates will apply to interim works. Once the community pond is in place, the interim ponds should be reinstated as developable land. The ownership, operation and maintenance of the interim ponds will be the responsibility of the proponent.

2.3.3 Stormwater Quality Strategies

In addition to constructing storm sewers and detention facilities, a number of other mitigative measures and Best Management Practices (BMPs) should be implemented to ensure stormwater quality is controlled prior to discharging stormwater into the ravine systems and the Campbell River. The following is a list of BMPs selected for the Douglas NCP area. Some of these measures were already utilized through the NCP planning process, while most of them require implementation during the design and construction under the individual development applications:

- Avoidance of environmentally sensitive areas through community planning, including incorporation of leave strip protection into the land use plan;

- Preservation of highly sensitive riparian forests along the perimeter of ravines;

- Incorporation of vegetated filter strips or biofiltration swales into the design of the commercial and multi-family developments;

- Sediment control – developer responsibilities during offsite servicing
  - sediment control pond for each development
  - silt fencing to assist in erosion control
  - fencing or other protection of leave strip areas
  - surface erosion protection (grass, hydroseeding, mulching)
  - interceptor ditching;
- Sediment control – residential home builder responsibilities
  - gravel access pads
  - silt fencing of stockpiled soils
  - interceptor ditches and sediment traps
  - preservation of topsoil and vegetative cover as much as possible;

- Disconnection of roof leaders from the storm sewer system;

- Incorporation of oil-water separator structures in commercial and high density residential parking areas.

- Catchbasin cleaning and street sweeping.

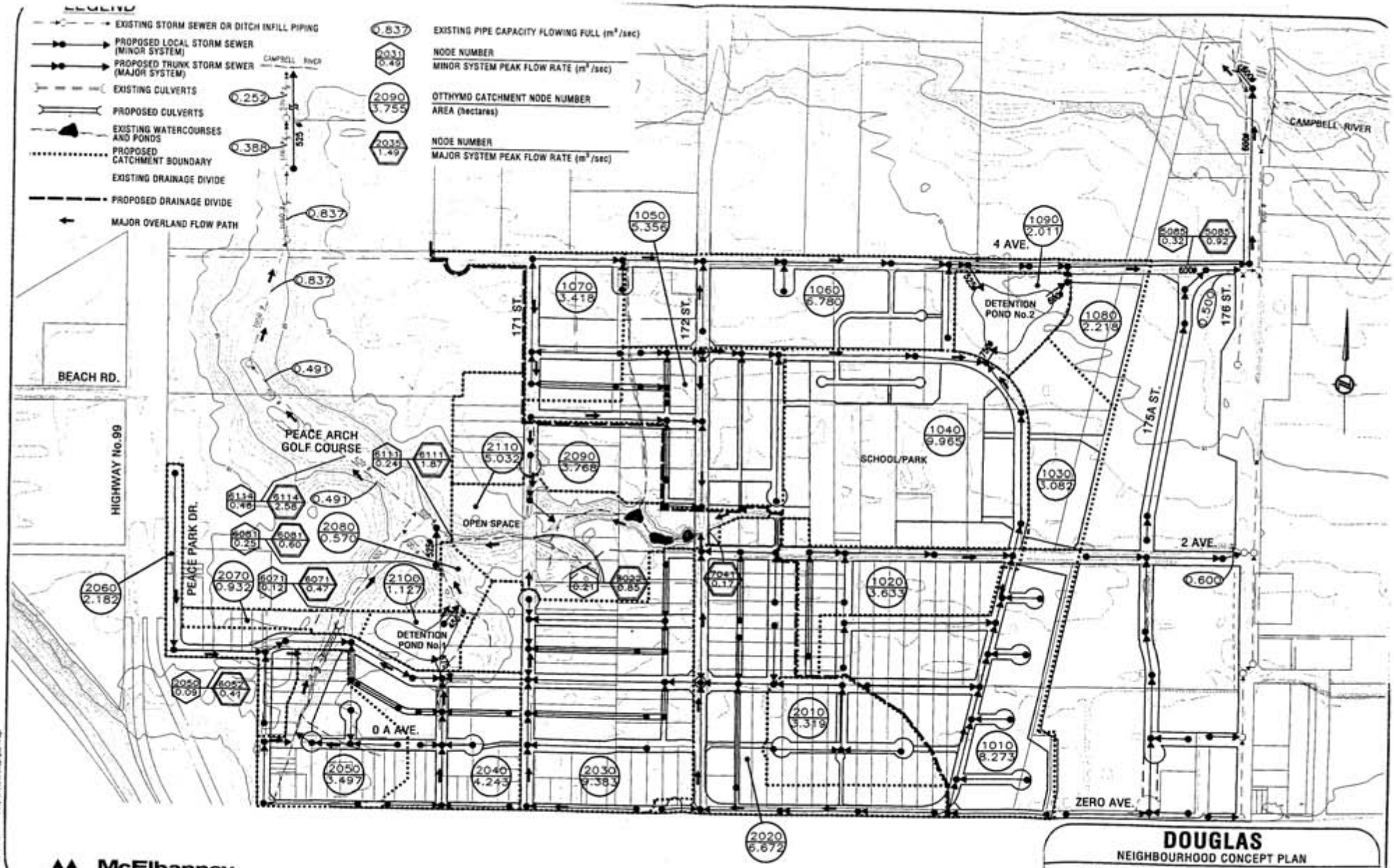
Active participation in the implementation and ongoing monitoring of stormwater quality measures to protect fish and wildlife habitat, by both the development community and the City, will be necessary to achieve these water quality objectives.

2.3.4 Summary of Required Major Works

A summary of proposed major works is shown in the following table:

Item No.	Location	Description of Works	In Current 10 YSP (Yes/No)	DCC Eligible (Yes/No)	Estimated Cost
D1	Detention Pond No. 1	D.P. No. 1 South Inlet Storm Sewer from 1 Ave (675 mm dia.)	Yes	Yes	$25,200
D2	Detention Pond No. 1	D.P. No.1 North Outlet Storm Sewer to the Southwest Ravine (450 mm dia.)	No	Yes	$19,200
D3	East side of PPGC (within PPGC)	Storm Sewer Replacement for 200 mm dia. Southeast Inlet to PPGC (525 mm dia.)	No	Yes	$30,600
D4	South of Campbell River (within PPGC)	Storm Sewer Upgrading of 600 mm dia. & 510 mm dia. PPGC Outlet Sewer to Campbell River (525 mm dia.)	No	Yes	$183,600
D5	Detention Pond No. 2	D.P. No. 2 South Inlet, from 3A Avenue (750 mm dia.)	Yes	Yes	$22,950
D6	Detention Pond No. 2	D.P. No. 2 Northwest Inlet, from 4 Ave. (525 mm dia.)	Yes	Yes	$25,500
D7	Detention Pond No. 2 4 Ave., 176 St.	D.P. No. 2 Outlet to 4 Ave., along 4 Ave. and 176 St. to Campbell River (600 mm dia.)	Yes	Yes	$364,800
D8	South Inlet to PPGC Storm System	Headwall & Trash Rack at 300 mm dia. South Inlet to PPGC	No	No (Servicing Area < 20 ha)	$4,500
D9	East Inlet to PPGC Storm System	Trash Rack and Minor Clearing/Cleanup at 600 mm East Inlet to PPGC	No	No (Servicing area < 20 ha)	$3,000
D10	1 Ave./170A St.	Detention Pond No. 1	No	Yes	$621,000
D11	4 Ave./174 St.	Detention Pond No. 2	Yes	Yes	$1,249,500
TOTAL ESTIMATED COST					**$2,549,850**

Phasing of these major works, and their financing, are presented in Section 4.


LEGEND
EXISTING STORM SEWER OR DITCH INFILL PIPING
PROPOSED LOCAL STORM SEWER (MINOR SYSTEM)
PROPOSED TRUNK STORM SEWER (MAJOR SYSTEM)
EXISTING CULVERTS
PROPOSED CULVERTS
EXISTING WATERCOURSES AND PONDS
PROPOSED CATCHMENT BOUNDARY
EXISTING DRAINAGE DIVIDE
PROPOSED DRAINAGE DIVIDE
MAJOR OVERLAND FLOW PATH
EXISTING PIPE CAPACITY FLOWING FULL (m³/sec)
NODE NUMBER
MINOR SYSTEM PEAK FLOW RATE (m³/sec)
OTTHYMO CATCHMENT NODE NUMBER
AREA (hectares)
NODE NUMBER
MAJOR SYSTEM PEAK FLOW RATE (m³/sec)
CAMPBELL RIVER
BEACH RD.
HIGHWAY No.99
PEACE PARK DR.
PEACE ARCH GOLF COURSE
OPEN SPACE
SCHOOL/PARK
DETENTION POND No.1
DETENTION POND No.2
171 ST.
172 ST.
175A ST.
176 ST.
0 A AVE.
2 AVE.
4 AVE.
ZERO AVE.
SCALE 1:5000
McElhanney
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
PROPOSED DRAINAGE SYSTEM - FIG. D4
OPTION 2

2.4 WATER SUPPLY SYSTEM

The entire NCP area is presently supplied with water from the Sunnyside Reservoir located at 146 Street and 22 Avenue in South Surrey. At this time, water supply from the GVRD regional facilities to South Surrey is limited due to constraints within their transmission main system. The GVRD assured the City in 1997 that construction of their first stage of relief works was about to commence. They also assured the City that they will monitor actual water consumption in South Surrey and accelerate further scheduled remedial works, if necessary, to meet actual water demands. Some of these remedial works have since been completed. Therefore, it is anticipated that this constraint will be alleviated in the very near future. Nevertheless, development applications should be assessed individually to ensure they fall within the updated incremental servicing limits.

2.4.1 Existing Water Supply System

The NCP area is supplied with water through a single 400 mm diameter feeder main connected to the water distribution system in the Semiahmoo area at 8 Avenue and King George Highway. This feeder main in turn relies on a grid main on King George Highway, which is being upgraded into a feeder main. The routing of the 400 mm diameter feeder main follows Highway 99 due south until it turns east across the Peace Arch Golf Course and continues further along 4 Avenue to 175A Street. From this point, grid mains extend up to the Douglas border crossing area which forms the extreme end of this water supply system. The NCP area itself is currently serviced by 150 mm diameter and 200 mm diameter distribution mains on 0 Avenue, 2 Avenue, Peace Arch Drive, 171 Street and 172 Street. The layout of the existing and proposed water supply system is shown in Figure W1.

The existing water supply system is not sufficiently sized to provide adequate domestic and required fire flow demands for the proposed NCP land uses. Upgrading will be required both within and outside of the NCP area.

2.4.2 Proposed Water Supply System

The proposed water supply system is shown in Figure W1.

One section of the King George Highway grid main (pipe no. 4), which is on the City's 1998 Capital Works Program, remains to be upgraded to complete its conversion into a 450 mm diameter feeder main. A major pressure reducing station was recently installed at 14 Avenue where the feeder main crosses from the Ocean Park pressure zone (120 m) to the Semiahmoo pressure zone (80 m).

Some of the existing 150 mm diameter distribution mains within the NCP area require to be replaced with 300 mm diameter grid mains. This includes:

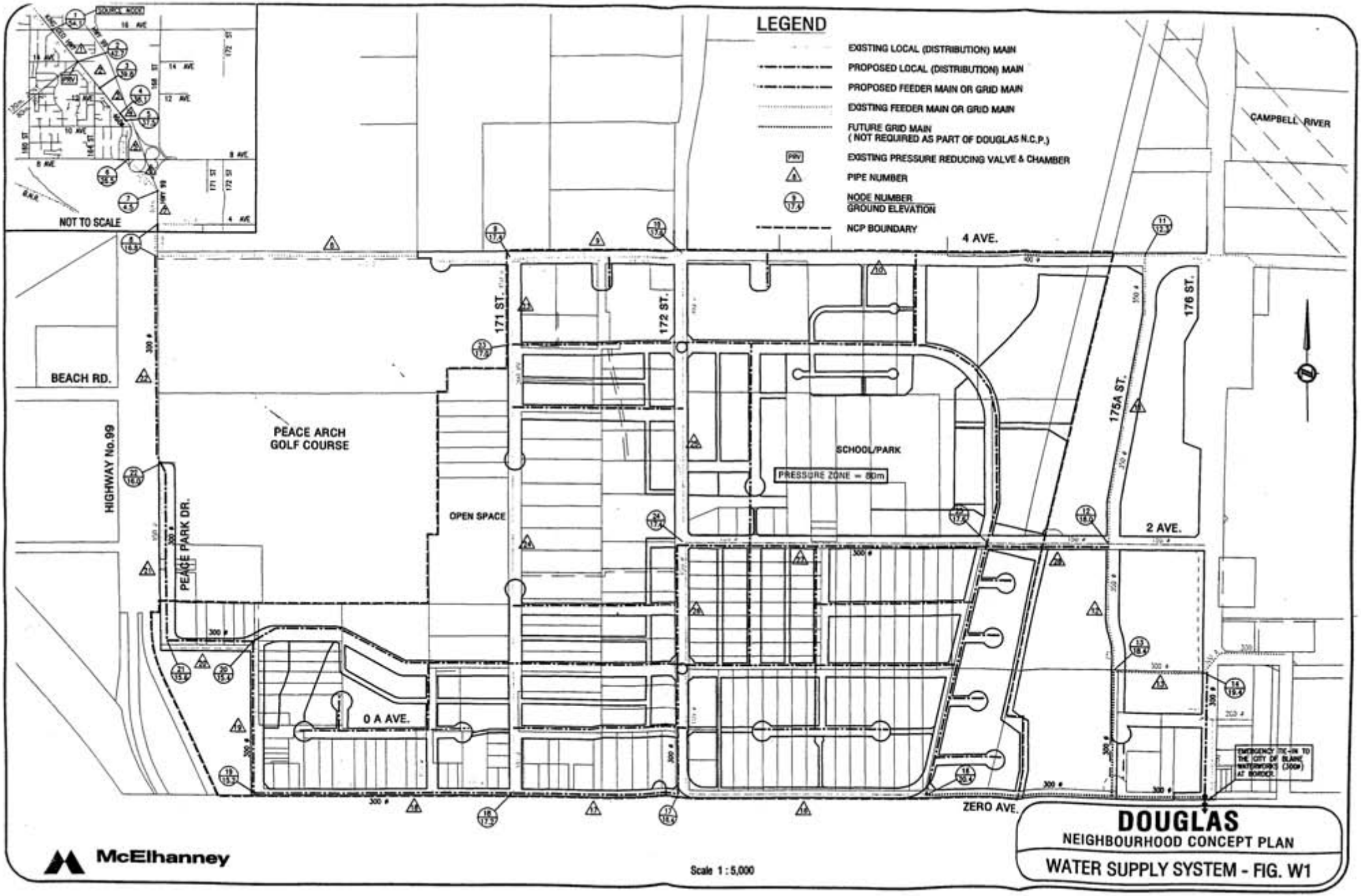
- Peace Park Drive between 0 Avenue and 2A Avenue;
- 1 Avenue between the offset segments of Peace Park Drive;
- 0 Avenue between Peace Park Drive and 172 Street;
- 172 Street between 0 Avenue and 2 Avenue; and
- 2 Avenue from 172 Street to 175A Street.

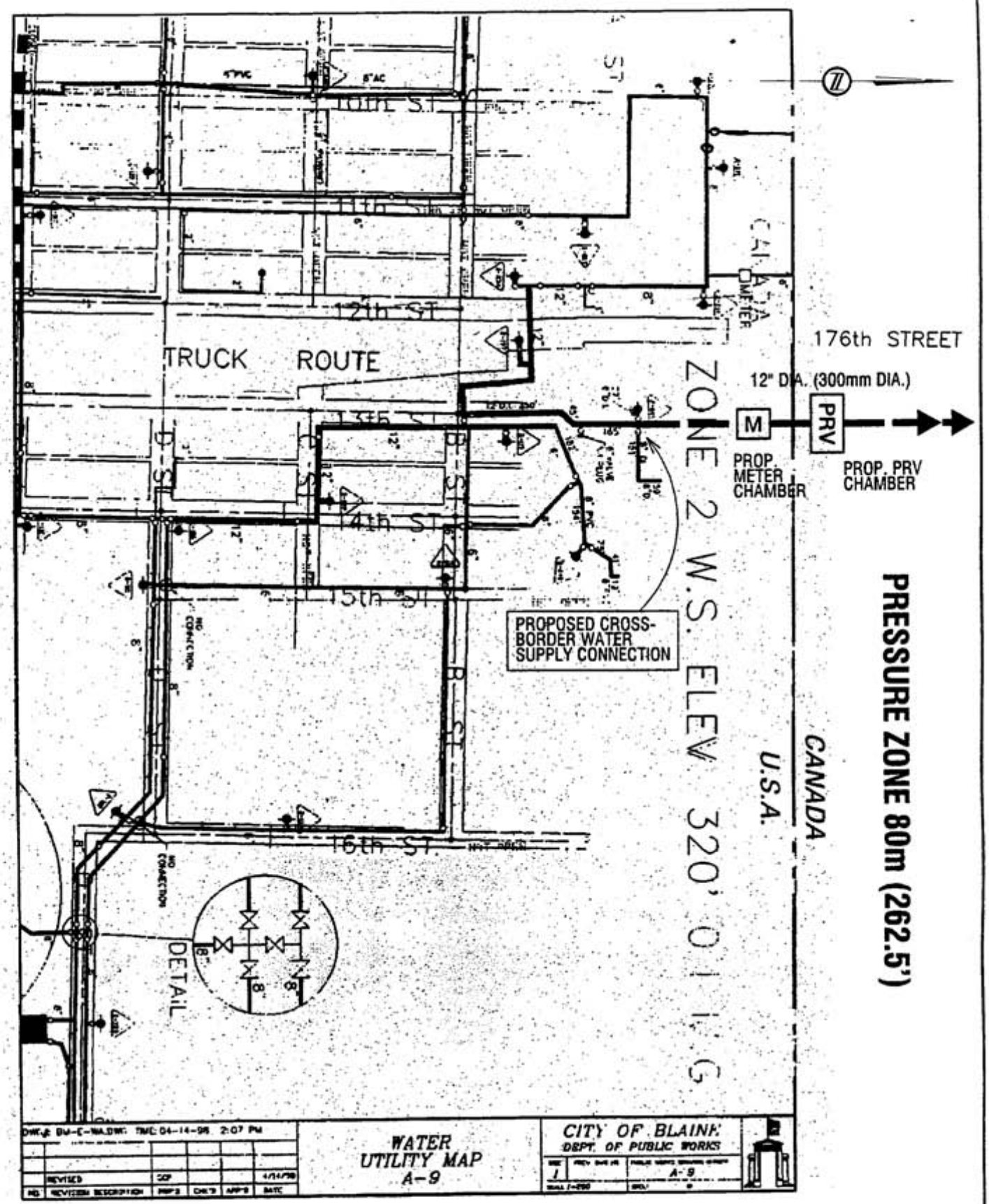
A new 300 mm diameter grid main link is required on Highway 99 between 2A Avenue and 4 Avenue. The ultimate distribution system will consist of existing watermains or

replacement watermains noted above supplemented with 200 mm diameter distribution main extensions into new road allowances proposed by the NCP to adequately service future land uses. The greatest water demand will be generated by the fire protection requirements at the two border crossings and at the proposed school site. These locations will be serviced by the larger grid mains. The proposed ultimate distribution system will, when fully constructed, provide sufficient water for domestic purposes at maximum day demand flow rate with a fire assumed at any one location within the NCP area.

However, as individual developments construct or upgrade portions of the ultimate distribution system, the size of the mains required to service these developments may be larger than those indicated in this report. This may result from development proceeding somewhat differently than outlined in the phasing plan. Each individual development will be required to confirm that the proposed watermain sizes provide an adequate water supply for its needs. Should oversizing of the ultimate distribution system be required to service the individual development's needs due to not proceeding as per the phasing plan, the cost of such oversizing will have to be borne by the development driving the need. Reduced, interim fire flow requirements may be acceptable, at the City's discretion, to minimize or eliminate the extent of oversizing, where applicable.

Although fire flows are to be provided in compliance with the City's Design Criteria, individual applicants for multi-family sites may find that the City's Building Division and Fire Department requirements for on-site fire protection exceed the design capacity of watermains installed before the types of individual building structures (and thus their fire resistancy) are known. Prior to submission for the 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,


LEGEND
EXISTING LOCAL (DISTRIBUTION) MAIN
PROPOSED LOCAL (DISTRIBUTION) MAIN
PROPOSED FEEDER MAIN OR GRID MAIN
EXISTING FEEDER MAIN OR GRID MAIN
FUTURE GRID MAIN
(NOT REQUIRED AS PART OF DOUGLAS N.C.P.)
EXISTING PRESSURE REDUCING VALVE & CHAMBER
PIPE NUMBER
NODE NUMBER
GROUND ELEVATION
NCP BOUNDARY
NOT TO SCALE
BEACH RD.
HIGHWAY No.99
PEACE ARCH GOLF COURSE
PEACE PARK DR.
OPEN SPACE
SCHOOL/PARK
PRESSURE ZONE = 80m
4 AVE.
2 AVE.
0 A AVE.
ZERO AVE.
171 ST.
172 ST.
175A ST.
176 ST.
CAMPBELL RIVER
EMERGENCY TIE-IN TO THE CITY OF BLAINE WATERWORKS (300ø) AT BORDER
McElhanney
Scale 1 : 5,000
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
WATER SUPPLY SYSTEM - FIG. W1



Scale N.T.S.

DOUGLAS

NEIGHBOURHOOD CONCEPT PLAN

CROSS-BORDER WATER SUPPLY CONNECTION
FIGURE W2

McElhanney

materials, or secondary on-site fire suppression systems (i.e. building sprinklers) that the proposed development will conform to these guidelines.

The proposed ultimate distribution system will also provide sufficient looping for improved flow/pressure balancing and elimination of stagnant water problems.

With all the above described upgrading completed, the NCP area will still rely on a single source of water supply, the feeder main from the Sunnyside Reservoir.

The risks of proceeding with redevelopment of Douglas area in accordance with the NCP with only a single water supply source was assessed in a report submitted to the City. A copy of the report, entitled "Servicing Infrastructure for Douglas Neighbourhood Concept Plan (Secondary Feeder Main Water Supply)", is enclosed in Appendix D. The City has chosen to pursue Option 2 of the report which calls for a new cross-border connection to the City of Blaine Waterworks. An agreement to do so was subsequently reached between the City and the City of Blaine. The proposed cross-border connection will be located on the alignment of 176 Street. It will include approximately 100 m of 300 diameter watermain with a meter chamber on the U.S. side of the border. On the Canadian side of the border, it will be extended to tie into the existing 300 mm diameter grid main at 1 Avenue. Since the pressure zone on the U.S. side of the border is 97.54 m (320 feet), a pressure reducing station, most likely on the Canadian side of the border, will also be required. Further details of the cross-border connection will be worked out as part of the design and approval process involving both cities. Schematic layout of the proposed cross-border connection is shown in Figure W2.

The results of the water supply and distribution network modelling are presented in Appendix D.

2.4.3 Summary of Required Major Works

A summary of the proposed major works is shown in the following table:

Item No.	Location	Description of Works	In Current 10YSP (Yes/No)	DCC Eligible (Yes/No)	Estimated Cost
W1	King George Hwy North of 10 Ave.	Remaining section of King George Highway feeder main (450 mm dia.)	Yes	Yes	$26,250.
W2	Highway 99 N. end of Peace Park Dr. - 4 Ave.	Grid main link (300 mm dia.)	Yes	Yes	$130,200.
W3	Peace Park Dr. (1 Ave. – 2A Ave.)	Grid main (300 mm dia.)	Yes (partially)	Yes	$121,800.
W4	Peace Park Dr. (0 Ave – 1 Ave.)	Grid main (300 mm dia.)	Yes	Yes	$92,400.
W5	1 Ave. (between 2 off-set segments of Peace Park Dr.)	Grid main (300 mm dia.)	Yes	Yes	$54,600.
W6	0 Ave. (Peace Park Dr. – 172 St.)	Grid main (300 mm dia.)	Yes	Yes	$273,000
W7	172 St. (0 Ave. – 2 Ave.)	Grid main (300 mm dia.)	Yes	Yes	$163,800.
W8	Ave (172 St. - 175A St.)	Grid main (300 mm dia.)	No	Yes	$277,200.
W9	176 St. (N. & S. of the border)	Cross-border emergency supply connection (300 mm dia.)	Yes (partially)	Yes	$253,500.
TOTAL ESTIMATED COST					**$1,392,750.**

Phasing of these capital major works, and their financing are presented in Section 4.

2.5 HYDRO, TELEPHONE, CABLE AND GAS UTILITY SERVICES

All extensions of the utility services within the Douglas NCP area will be located underground with exceptions as noted in the City's Subdivision and Development Bylaw No. 8830.

We have reviewed the proposed servicing corridors for compliance with the City's current standards. We believe that underground servicing can be accommodated within the NCP area. However, we wish to note that certain current City's road cross-sections assume narrower hydro/telephone and gas servicing corridors than currently supported by these utility companies. This is an ongoing issue between the City and the utility companies that, we understand, has not yet been fully resolved.

Hydro, telephone and cable servicing which exists in the present road dedications is presently located overhead on poles. The existing overhead wiring will be relocated underground as development proceeds. All new hydro, telephone and cable wiring will be located underground. The existing gas distribution system within the NCP area will be improved and expanded as development proceeds to the limits of the NCP area.

3.0 DEVELOPMENT PHASING

Phasing of development is primarily dictated by servicing considerations which are largely dependent on topography, location of existing services and their available capacities. A secondary, but often overwhelming criteria is the availability of funds for the required servicing infrastructure. It is not feasible to finance the servicing infrastructure costs all in one phase. Therefore, a Phasing Plan is needed to demonstrate the most cost-effective means to implement the development servicing. The Phasing Plan for Douglas NCP attempts to balance progressive provision of servicing infrastructure with accumulated DCC revenues necessary to fund it in order to achieve a positive cash flow.

In order to estimate the total DCC revenues generated in the NCP, assumptions were made regarding the number and type of land use units likely to be developed each year. This absorption rate is contingent on many unknowns including future marketing opportunities, current growth rates and the unique demand of the Douglas neighbourhood. After consultation with developers and the City's Planning and Development Department, it is estimated that the absorption rate will be between 50 and 95 units per year, spread over 12 years to build-out stage. It is also assumed that about eight months will be required for zoning and development approvals. Therefore, the commencement of development was set to start at year 2000. The School District has indicated that an elementary school will be required once the development reaches about 350 dwelling units.

Several phasing scenarios were considered in an effort to avoid major cash flow problems for developers. However, due to high servicing costs neither one was able to achieve a positive annual cash flow.

The following considerations and assumptions were taken into account in the process of selecting the phasing plan:

- There is an interest in development in the southeast quadrant of the NCP area demonstrated by a current development application.

- There is considerable interest in development of the commercial / industrial zoned area adjacent to the NCP to the east up to 176 Street, actively demonstrated by a number of development applications in this area.

- The area between 171 Street and 172 Street, south of 2 Avenue, will require land consolidation, property owner agreements and joint rezoning approval before development can proceed. This is due to lot lines of existing properties which are not "continuous" and thus create a problem to achieve an equitable sharing of road dedication and construction costs amongst properties. It is expected that this constraint may slow down development in this area.

- The area south of the Peace Portal Golf Course (PPGC) and west of 171 Street has the greatest concentration of existing homes on small lots. Some of them, particularly those along 0 Avenue, have been recently upgraded. It is perceived that this area may take longer to develop as most of the area is already built out.

- Existing drainage problems within the PPGC and the proposed improvement works may require some time before an agreement to construct these works is reached. An agreement could possibly be reached which includes works different from, or in excess of, those identified in this report.

- City policy requiring property owners / developers to secure the land acquisition requirements for ultimate detention facilities prior to proceeding with development in the NCP.

- A new school will be required in the early stages of development which will, among other infrastructure services, require construction of Detention Pond No. 2 and the outlet storm sewer up to the Campbell River.

Scheduling of major capital works required for the implementation of the Douglas NCP also depends on funding and construction of works outside of the NCP area by other than NCP proponents. This includes the following works:

- Widening of 8 Avenue between Highway No. 99 and 176 Street. MoTH staff have indicated that this work is scheduled soon; however, the timing needs to be confirmed. The Traffic Study established that this work is required right at the start of the Douglas NCP development.

- Traffic signalization (or its upgrading), channelization and turn bays at the intersections of 8 Avenue / 176 Street, 8 Avenue / 172 Street, and 4 Avenue / 176 Street. Most of these works are funded by the MoTH except where the City cost-shares the traffic signalization. Timing of these works is not as critical as in the item above. Nevertheless, it requires scheduling and confirmation at an appropriate future date.

- Construction of 175A Street (4 Avenue to 0A Avenue) and 0A Avenue (175A Street to 176 Street). It is anticipated that these works will be constructed by developers of properties adjacent to the east of the NCP area, up to 176 Street. Development applications for most, if not all, of these properties are presently processed. It is expected that these works will be completed ahead of, or concurrently with, the commencement of development within the NCP area.

It is important to note that the construction of the above noted works has a profound effect on the scheduling of development in the NCP area, and could result in delays.

As part of the phasing strategy, consideration was given to the following measures in an effort to minimize the financial constraints:

- Maximizing utilization of available capacity of existing services to delay upgrading costs; and
- Deferment of construction of major capital works as long as possible.

Based on all above considerations, development should start from the northeast, within the northeast drainage subbasin. The rational behind this conclusion is as follows:

A major determining factor as to where the development should start is a delineation of the NCP area into two distinct drainage subbasins. Due to considerable cost of major drainage infrastructure required in each subbasin, it is not feasible to start development in both subbasins. While the drainage infrastructure of the southwest subbasin is less expensive, the population growth generated there would very soon require support by infrastructure in the northeast subbasin.

Traffic Impact Study calls for a reconstruction of the 4 Avenue / 175A Street / 176 Street intersection (year 3) required to serve as a major access link for the NCP area, and to provide diversion of the border traffic and substantially minimize short-cutting through the residential neighbourhood. The generated population growth will also soon require opening of the school (year 3-4) which, in turn, will trigger a requirement for the drainage infrastructure in the other (northeast) subbasin. These two requirements alone dictate that development should start within the northeast subbasin. Furthermore, there is an interest in development in the southeast quadrant of NCP area (within the northeast subbasin). The northeast subbasin consists of sparsely developed larger parcels of land, which is relatively conducive to redevelopment.

On the other hand, constraints to development exist within the southwest subbasin. These include a concentration of existing homes on small lots, many of them recently renovated, which will likely slow down redevelopment. There is also a requirement for property owner agreements and joint rezoning in the area between 171 Street and 172 Street, south of 2 Avenue. Finally, the drainage improvements required within the PPGC property may require some time before an agreement to construct these works is reached.

It is noted that construction of the drainage infrastructure in the northeast subbasin in needed in year 2 and could be possible postponed to year 3. This effectively improves the cash flow by deferring the expenditures in the initial years of development.

The Phasing Plan (Figure F1) shows the start of development in year 1 (year 2000) at the extreme northeast corner of the Douglas NCP area. Development in subsequent years progressively extends the required servicing infrastructure south and then west

within the northeast subbasin. Upon the build-out in the northeast subbasin, development will proceed in the southwest subbasin, as shown in the Phasing Plan.

Scheduling of the required servicing infrastructure, on an annual basis, is shown in Tables F1.0, F2.0, F3.0 and F4.0, along with funding details. Locations of the various items of required servicing infrastructure is graphically presented in Figure F1.

It is recognized that the phasing of development may change as a function of landowner / developer interests, market considerations, and other factors. However, as long as a development proposal adequately deals with and/or front-ends the provision of required infrastructure, it should be allowed to proceed. The proposed Phasing Plan does not preclude development out of the phasing sequence. The proposed Phasing Plan represents only one option which allows the NCP area to pay its infrastructure requirements as it develops. The City may consider revisions to the Phasing Plan.

4.0 INFRASTRUCTURE FINANCING AND FUNDING

Section 2.0 of this report described the capital works which are required to service the NCP area. This section identifies the financial implications to construct these works.

The City of Surrey has taken the following policy approach to infrastructure funding in the NCP areas:

1. The long term DCC revenues and expenditures for major collector roads, water, sanitary and drainage works will likely balance or show a positive cash flow at build-out stage. If the NCP's total DCCs to be collected are less than the required NCP expenditures, the NCP may still go ahead but the costs in excess of the revenues generated through the NCP DCCs will only be provided by the City when and if the works become a City priority.

2. If the property owners / developers wish to have the development proceed ahead of the City's budgeting priorities for the required works, then the property owners / developers within the NCP must address the short term cash flow problem.

3. City Council has stated that sequencing of the various NCPs will not be supported at this time.

4. DCC revenues cannot be used to finance interim works.

5. The City-wide based DCC collection and expenditure program is the basis of all DCC capital works. Current City practices under this program include the DCC Rebate Policy and the DCC Reimbursement Agreements.

   If the works to be constructed are DCC works, a DCC Front-ending Agreement may be entered into to refund to the developer the DCCs collected by the Municipality for the benefitting area.

6. The City may enter into a Development Works Agreement with the developers to construct works under Section 937 of the Municipal Act. Under such agreement the developers will provide the funds to front-end the servicing infrastructure. A formula to repay the debt is specified in the agreement. The debt can be imposed on the owners of benefitting real property, in this case the property owners in the NCP area. Council must enter into this agreement by bylaw, which must meet certain conditions. The conditions are similar to those necessary to establish a specified area levy.

7. A Development Works Agreement and a DCC Front-ending Agreement may be used together if the projected DCCs for the benefitting NCP lands do not provide sufficient funds to permit construction of the works. The Development Works Agreement may be used to fund the shortfall between the construction cost and projected DCCs to be collected from the benefitting lands.

In conclusion, development in the NCP area will require approximately $5.7 million of expenditure to support the proposed land use. Given the financial position of the City, this major expenditure will have to be funded by the property owners / developers

through DCC Front-ending Agreements and Development Works Agreements (additional surcharge / levy).

4.1 DCC ELEMENTS

This section of the report describes the servicing infrastructure required, its eligibility for inclusion in the 10 Year Servicing Plan as DCC items, DCC revenues and projected expenditures, financial options and cash flow analysis. Appendix F defines the current funding methods available in the City of Surrey.

The City of Surrey's current (1997) 10 Year Servicing Plan includes engineering works which are required for both the existing and future needs of the community. Typically, the existing needs are funded from general revenue monies or grants, and infrastructure required for growth is principally (95% or more) funded by developers through Development Cost Charges (DCCs).

The City will only fund works which are included in the 10 Year Servicing Plan and DCC program. DCC works can either be built by the City or developers. It is noted that collections from the DCC program for developments within the NCP area will only take place after the actual Servicing Agreements are completed. Given the significant size of the City's DCC program and the time requirements for infrastructure to be built, developers typically build many DCC works and receive DCC rebates / credits for the works they build.

The City has specific criteria for a work to be included as a DCC element in their program. Tables F1.0 through F4.0 show the Capital Works items required by the NCP

for each infrastructure category, and its eligibility for inclusion in the DCC program. Each Capital Works item is broken down to show the estimated total cost, type of proposed funding, eligibility for inclusion / refinement as a DCC item and its eligible cost, suggested method of construction (by Surrey, NCP developers, MoTH, or developers outside of the NCP). The tables also note whether the item is an addition to the current 10 Year Servicing Plan or a substitution. Substitution generally means an item which was shown in the 10 Year Servicing Plan at one location but through refinement of the NCP servicing requirements the item was moved to another location. The purpose of the work would not have changed; only the alignment, length or scope of the work has been modified. All additional costs are noted. A description of how each item is proposed to be funded is listed in the tables. The year each item is required is included to identify when works are necessary, based on the phasing needs of the NCP area development.

Definition of the current funding methods noted in the tables appears in Appendix F.

It is noted that the proposed timing as shown is based on projected development needs. The actual timing of construction of works by the City may differ. Only those DCC elements in the current 10 Year Servicing Plan may receive DCC rebates / credits as per the current City policy. The proposed works in the NCP will be eligible if they are added to the 10 Year Servicing Plan. The City reviews the plan on a yearly basis.

4.2 DWELLING UNIT AND POPULATION ESTIMATES

The City's Planning and Development Department has provided the following table of estimated dwelling units and population statistics corresponding with the proposed Land Use Concept Plan.

Zoning (Approx.)	Density (Units/acre)	Acres (Approx.)	Units (Approx)	Estimated Persons Per Unit	Estimated Total Population
Suburban ½ acre Residential	(2 upa)	10.74	21	3.2	67
Single Family Residential	(6 upa)	67.80	407	3.2	1302
Compact Housing	(10 upa)	22.40	224	2.8	627
Townhouses	(15 upa)	18.10	272	2.8	762
Commercial / Residential (Residential Units Above)		1.72	30	2.0	60
School / Park		13.19			
Open Space		13.09			
Detention Ponds		3.41			
Total			**954**		**2,818**

These statistics have been used in subsequent financial calculations. The projected new growth for the NCP area was estimated to vary between 50 and 95 units annually, and spread over 12 or more years.

4.3 DCC REVENUES AND EXPENDITURES

DCC Revenues are based on Bylaw 13476 adopted on 28 July 1998. The unit DCC rates used for each servicing infrastructure are shown below based on dollars per unit. The parkland acquisition rate is not shown. The townhouse DCC rates are based on a total maximum of $17,500/unit.

Infrastructure Component	Land Use Designation / DCC Rates ($/Unit)					
	Suburban S.F.	Urban S.F.	Small Lots S.F.	Townhouses	Commercial/ Residential	Public Schools
Sanitary	950	950	950	935	600	300
Water	1,020	1,020	1,020	1,003	640	320
Drainage	4,740	2,370	1,400	1,565	590	930
Major Collector Roads	1,370	1,370	1,370	1,037	770	-
Arterial Roads	5,620	5,620	5,620	4,269	3,150	-
Total	**13,700/lot**	**11,330/lot**	**10,360/lot**	**8,809/unit**	**5,750/unit**	**1,550/1000 ft^2**

The following table summarizes the projected DCC revenues and construction costs for each servicing infrastructure. The revenues are based on the current DCC bylaw. Growth projections are based on the proposed zoning for the NCP area illustrated in Figure F1, at build-out stage. Both costs and revenues are in 1997 dollars. For compatibility with the (1997) 10 Year Servicing Plan, and acknowledging that construction costs remain virtually unchanged, the City has directed us to use 1997 dollars.

PROJECTED TOTAL DCC REVENUES AND EXPENDITURES AT BUILD-OUT STAGE

Infrastructure Component	Projected DCC Revenues	Projected DCC Expenditures	Balance / Surplus or (Deficit)
Sanitary	$914,220	$792,000	$122,220
Drainage	$1,890,860	$2,542,350	($651,490)
Water	$981,056	$546,600	$434,456
Major Collector Roads	$1,198,404	$1,462,000	($263,596)
Arterial Roads	$4,919,908	Nil	$4,919,908
Total	$9,904.448	$5,743,450	$4,561,498

The above table is presented only to show the financial impact of the NCP on the current 10 Year Servicing Plan. The table also shows the magnitude of construction costs required to service the NCP area for comparison with the (1997) 10 Year Servicing Plan. It is noted that there is no arterial road DCC infrastructure required by this NCP.

It is recognized that the City collects DCCs on a community-wide basis, not on an NCP basis. While there is a total surplus of $4,561,498, DCC revenues cannot be applied from one type of infrastructure component to another. Consequently, development of the Douglas NCP will result in a total deficit of $358,410 (Table F5.1) at build-out stage. This means that for the proposed land use to be self-sustaining, each unit will have to contribute approximately $375 in addition to their DCC rebates / credits to finance the required major infrastructure. Cash flow projections are discussed in the following section and options to finance the required infrastructure are discussed in Section 4.5.

4.4 CASH FLOW PROJECTIONS

The proposed Phasing Plan assumes an annual absorption rate between 50 and 95 units. The development of the NCP is staged into four phases: Phase A1 (year 1 – 3), Phase A2 (year 4 – 5), Phase B1 (year 6 – 9 and 11 – 12), Phase B2 (year 10 – 11). Scheduling of the required servicing infrastructure, on an annual basis, is shown in Tables F1.0, F2.0, F3.0 and F4.0.

The cash flow model of the proposed Phasing Plan shows the following results:

- **Water** – The short term cash flow from the DCC revenues and required expenditures is initially negative in the year 2000 (up to $50,400). It is also negative in the years

2003 to 2005 (up to $216,600). In all other years the cash flow is positive, resulting in a total surplus of $434,456 (Table F4.1).

- **Sanitary** –The short term cash flow is consistently positive until year 2006, accumulating a surplus of $576,315. This is mostly due to deferment of the replacement of the Douglas Pump Station into the later years (2007) of development. The existing pump station has a capacity that can support many years of development, before its replacement is required. Construction of the pump station will then result in a small deficit between the years 2007 and 2008. A consistent positive cash flow in subsequent years results in a total surplus of $122,220 (Table F2.1).

- **Drainage** – Both the short and long term cash flow are negative except for the first year, which resulted in a small surplus of $70,000. This assumes the development starts in the most northeast corner of the NCP area (downstream of Detention Pond No. 2), which may not necessarily happen. The total deficit of $651,490 (Table F3.1) reflects the high cost of detention facilities and downstream drainage works, with Detention Pond No. 2 required in year 2 of development. This expenditure could be postponed through construction of interim detention facilities. The drawback to this alternative is that the interim works are not DCC rebatable. The City will also require that the land for the proposed ultimate detention facilities must be secured, prior to approval of interim works.

- **Major Collector Roads** – The cash flow is consistently negative in all years of development, with the greatest deficit in the year 2004 ($581,850). This reflects the requirement to construct 4 Avenue from 176 Street to 174 Street just west of

Detention Pond No. 2 and 172 Street from 4 Avenue to 2 Avenue. The total deficit at build-out is $263,596 (Table F1.1).

The cumulative long term cash flow from all of the above DCC component revenues and expenditures at the build-out stage results in a total deficit of $358,410 (Table F5.1. This means that an additional contribution of approximately $376 per unit is required to supplement the DCC generated revenue.

4.5 FINANCING OPTIONS

Three financial options, outlined below, were explored in view of short term cash flow problems. The pros and cons associated with each option are also identified.

4.5.1 Joint Venture Agreements

This is an overall joint venture agreement with all owners and developers in the neighbourhood. This could entail the establishment of an NCP levy in addition to DCCs and eliminate the need for individual developers to front-end major capital works. The individual developers would use the levy to construct the required works. Annual charges would be placed on each property. The charges must be broken down into subareas to ensure only benefitting properties will contribute to specific works.

Pros: - Eliminates the need for individual land owners / developers and the City to front-end services.

Cons: - Extremely difficult to get consensus on joint venture agreement.

- Difficulty distinguishing joint venture charges from DCC.

- Considerable administration and public consultation.

4.5.2 DCC Reimbursement Agreement

The DCC Reimbursement Agreement is an often used approach to assist the developers to front-end the required major items of servicing infrastructure. Council must enter into an agreement with the front-ending developers. The developers fund the cost of the design and construction. The City rebates the developer(s) their own DCCs for the particular category of service, and pays them the DCCs collected from other benefitting properties as they develop.

Pros: - Eliminates the need for individual landowners / developers and the City to front-end services.

Cons: - The City limits its use for rare cases where the cost of the services is very high, and where other methods of financing were unsuccessful.

- Considerable administration costs.

4.5.3 Development Works Agreement

The Development Works Agreement approach is advantageous in circumstances where DCCs collected from development on the benefiting properties are not adequate to fund the front-ended works, and must be supplemented by additional charges on the benefiting properties.

Section 937 of the Municipal Act allows developers to enter into agreement with the City to construct the servicing infrastructure. A formula to repay the debt to the City is

included in the agreement. The debt can be imposed on the owners of benefitting real property, in this case the owners / developers in the NCP. Council must enter into this agreement by bylaw which must meet certain conditions. These conditions are similar to those necessary to establish a specified area levy.

The difficulty in applying this method in the NCP area may be receiving enough support to proceed with the bylaw. A petition to Council by at least two-thirds of the landowners representing 50% of the assessed value of the lands in the benefiting area is required. Unless there is a good real estate market, it is uncertain that the residents will support the potential $376 per unit charged (in addition to their DCCs).

Pros: - Development would proceed in the short term rather than waiting for the City to provide services.

- No up-front expenditures by the City would be required.
- The Development Works Agreement can be used along with the DCC Reimbursement Agreement. The former can be used to fund the shortfall between the construction costs and the projected DCCs to be collected from the benefitting properties.

Cons: - Need for individual developers and landowners to become involved in front-ending the servicing infrastructure.

- Considerable administration and public consultation.
- Developers may be financing some infrastructure for extended periods of time.
- NCP area may not accept the additional charge.

4.5.4 City of Surrey Capital Construction

Under this option the NCP area would wait for the City to be in a financial position to front-end major services required for development to proceed. All cost recovery would be through the DCC program.

Pros: - No need for developers to front-end services.

Cons: - The time frame for the City to complete the works in the Douglas NCP area is not likely to be acceptable to landowners and developers.

4.6 FINANCIAL IMPLICATIONS – CONCLUSION

The financial strategy for required major capital works within the Douglas NCP is predicated on the following assumptions:

While various servicing infrastructure projects meet the DCC Rebate Policy criteria established by the City for DCC projects, the City is not in a financial position to front-end projects in the short term, which is necessary for development to proceed at this time. Within the NCP area, there are not enough DCC revenues generated for each infrastructure component to offset the cost of servicing infrastructure projects (i.e. DCC projects). Therefore, an additional charge or a special levy will have to be borne by the property owners / developers in the area to make up for the shortfall to finance the required servicing works.

In view of the extensive financial involvement by property owners /developers in front-ending the projects, the City's new Development Works Agreement Policy may be a possible solution.

For servicing infrastructure where a deficit is projected (major collector roads and drainage), an additional charge or special levy is established, pro-rated on the basis of existing DCC rates, as shown in the following table:

	Major Collector Roads		Drainage	
Land Use Classification	**Current DCC Rate**	**Surcharge/ Levy**	**Current DCC Rate**	**Surcharge/ Levy**
Townhouse	$1,037/Unit	**$228**	$1,565/Unit	**$540**
Small S.F. Lot	$1,370/Unit	**$302**	$1,400/Unit	**$483**
Urban S.F. Lot	$1,370/Unit	**$302**	$2,370/Unit	**$817**
Suburban ½ Acre Lot	$1,370/Unit	**$302**	$4,740/Unit	**$1,633**
Commercial/Residential	$770/Unit	**$170**	$590/Unit	**$204**
Public Schools	$0/Unit	**$0/Unit**	$930/$1,000 ft^2	**$320**

Note:

Adjustment Factor (Major Collector Roads) = Total Deficit / Total DCC Revenues = $263,596 / $1,198,404 = 0.22032

Adjustment Factor (Drainage) = Total Deficit / Total DCC Revenues = $651,490 / $1,890,860 = 0.34547

In summary, the strategy for the phasing of the development and meeting the financial constraints of the NCP are the following:

1. For development to proceed at this time, each proposed unit in the NCP Plan area should contribute approximately $376 to help pay for the necessary major servicing infrastructure, which does not include financing costs. This amount is in addition to the current DCCs which will be levied upon subdivision of land in the area. The levy can be created through a Development Works Agreement with the City.

2. The detention pond land acquisition must be secured prior to development proceeding. The land can be secured through obtaining a right-of-way in favour of the City. At subdivision, the land would be transferred to the City.

3. Scheduling of development is not contingent upon funding and construction of works outside of the NCP area by the MoTH (i.e. widening of 8 Avenue, and improvements at 172 Street / 8 Avenue, 176 Street / 8 Avenue and 176 Street / 4 Avenue intersections) as outlined in Section 3.0. However, the level of service with respect to access to the Douglas NCP area will gradually deteriorate should these works be postponed.

4. Variation to the proposed Phasing Plan and methods of financing the required works should be considered by the City on the clear understanding that the City of Surrey will not finance the required works.

INFRASTRUCTURE FINANCING AND FUNDING

ROADS AND TRANSPORTATION

Item No.	Location and Total Cost Estimate	Type / Size of Works	Current (1997) or Addition to 10 YSP	Project ID # In Current (1997) 10 YSP	Amount In Current (1997) 10 YSP	Amount Additional to 10 YSP Program	Eligible for DCC Program (Y/N)	Refinement of DCC Program (Y/N)	Addition to DCC Program (Y/N)	Type of Funding Method [1]		Construction by (Surrey / Developer / MOTH)	Year Requested
										Existing [1]	Proposed [1]		
R2	4 Ave: 176 St - 175A St ($124,500)	Upgrading	Addition	-	-	$124,500	Y	Y	Y	-	DCCR	Developer	2000
R3	176 St / 4 Ave: ($120,000)	Traffic Signals	Addition	-	-	$60,000	Y	N	Y	-	DCCR / MOTH	MOTH	2002
R5	172 St / 8 Ave: ($120,000)	Traffic Signals	Addition	-	-	$60,000	Y	N	Y	-	DCCR / MOTH	MOTH	2002
R6	172 St: 4 Ave - 8 Ave ($163,000)	Bicycle Lanes	Addition	-	-	$163,000	Y	N	Y	-	CAP	Surrey	2004
R7	4 Ave: 172 St - 175A St ($429,000)	Upgrading	Addition	-	-	$429,000	Y	N	Y	-	DCCR	Developer	2000 & 2003
R8	172 St: 4 Ave - 1 Ave ($588,000)	Upgrading	Addition	-	-	$588,000	Y	N	Y	-	DCCR	Developer	2004 & 2007
R9	172 St: South of 8 Ave. ($37,500)	LT & RT turn lanes	Addition	-	-	$37,500	Y	N	Y	-	CAP	Surrey	2002

Notes: [1] Funding Methods (Current):

- Surrey Capital Construction Program — CAP
- DCC Rebate Program — DCCR
- Development Coordination Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary/ 40% of estimate) — UPS
- Frontage Latecomer Agreement — FLAT
- Area Latecomer Agreement — ALAT
- Contribution to Surrey — CONTR
- Development Works Agreement — DWA

[2] Estimates are based on unit costs provided by Surrey. All estimates include a 50% estimating factor as required by Surrey.

TABLE F1.0

INFRASTRUCTURE FINANCING AND FUNDING

SANITARY

Item No.	Location and Total Cost Estimate [2]	Type / Size of Works	Current (1997) or Addition to 10 YSP	Project ID # In Current (1997) 10 YSP	Amount In Current (1997) 10 YSP	Amount Additional to 10 YSP Program	Eligible for DCC Program (Y/N)	Refinement of DCC Program (Y/N)	Addition to DCC Program (Y/N)	Type of Funding Method [1]		Construction by (Surrey / Developer)	Year Requested
										Existing [1]	Proposed [1]		
S1	Sewer Replacement: 171 St, node 25 - S.P.S. ($39,900)	Upgrading 375mm	-	-	-	-	N	N	N	-	-	Developer	2007
S2	Relief Sewer: 2 Ave, node2 - node 8 ($158,700)	Upgrading 200mm	Current	2803	$11,000	-	N	Y	N	DCCR	-	Developer	2002
S3	Pump Station Replacement: 171 St - 2 Ave ($792,000)	New Pump Station	Current	4760	$870,000	-	Y	N	N	DCCR	DCCR	Developer	2007

Notes: [1] Funding Methods (Current):

- Surrey Capital Construction Program — CAP
- DCC Rebate Program — DCCR
- Development Coordination Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary/ 40% of estimate) — UPS
- Frontage Latecomer Agreement — FLAT
- Area Latecomer Agreement — ALAT
- Contribution to Surrey — CONTR
- Development Works Agreement — DWA

[2] Estimates are based on unit costs provided by Surrey. All estimates include a 50% estimating factor as required by Surrey.

TABLE F2.0

INFRASTRUCTURE FINANCING AND FUNDING

DRAINAGE

Item No.	Location and Total Cost Estimate	Type / Size of Works	Current (1997) or Addition to 10 YSP	Project ID # In Current (1997) 10 YSP	Amount In Current (1997) 10 YSP	Amount Additional to 10 YSP Program	Eligible for DCC Program (Y/N)	Refinement of DCC Program (Y/N)	Addition to DCC Program (Y/N)	Type of Funding Method [1]		Construction by (Surrey / Developer)	Year Requested
										Existing [1]	Proposed [1]		
D1	D. Pond No. 1 South Inlet: 170 St / 1 Ave ($25,200)	Trunk Sewer 675mm	Current	11036	$70,000	-	Y	Y	N	DCCR	DCCR	Developer	2005
D2	D. Pond No. 1 North Outlet: 170 St / 1 Ave ($19,200)	Trunk Sewer 450mm	Addition	-	-	$19,200	Y	N	Y	-	DCCR	Developer	2005
D3	Replacement of 200mm S.E. Inlet Sewer to PPGC System ($30,600)	Trunk Sewer Upgrade 525mm	Addition	-	-	$30,600	Y	N	Y	-	DCCR	Developer	2005
D4	Upgrading of PPGC System Outlet Sewer to Campbell River ($183,600)	Trunk Sewer Upgrade 525mm	Addition	-	-	$183,600	Y	N	Y	-	DCCR	Developer	2005
D5	D. Pond No. 2 South Inlet from 3A Ave ($22,950)	Trunk Sewer 750mm	Current	11038	$28,400 [4]	-	Y	Y	N	DCCR	DCCR	Developer	2001
D6	D. Pond No. 2 N.W. Inlet from 4 Ave ($25,500)	Trunk Sewer 525mm	Current	11038	$31,600 [4]	-	Y	Y	N	DCCR	DCCR	Developer	2001
D7	D. Pond No. 2 Outlet along 4 Ave & 176 St to Campbell River ($364,800)	Trunk Sewer 600mm	Current	11035 11037	$170,000 $430,000	- -	Y Y	Y Y	N N	DCCR DCCR	DCCR DCCR	Developer Developer	2001 2001

TABLE F3.0

INFRASTRUCTURE FINANCING AND FUNDING

DRAINAGE (cont.)

Item No.	Location and Total Cost Estimate	Type / Size of Works	Current (1997) or Addition to 10 YSP	Project ID # in Current (1997) 10 YSP	Amount in Current (1997) 10 YSP	Amount Additional to 10 YSP Program	Eligible for DCC Program (Y/N)	Refinement of DCC Program (Y/N)	Addition to DCC Program (Y/N)	Type of Funding Method [1]		Construction by (Surrey / Developer)	Year Requested
										Existing [1]	Proposed [1]		
D8	South Inlet to PPGC System ($4,500)	Upgrade Headwall 300mm	-	-	-	-	N	N	N	N/A	N/A [5]	Developer	2005
D9	East Inlet to PPGC System ($3,000)	Cleanup & Clearing at Trash Rock	-	-	-	-	N	N	N	N/A	N/A [5]	Developer	2005
D10	D. Pond No. 1: 1 Ave / 170A St [3] ($621,000)	Detention	Addition	-	-	$621,000	Y	N	Y	-	DCCR	Developer	2005
D11	D. Pond No. 2: 4 Ave / 174 St [3] ($1,249,500)	Detention	Current	11039	$1,000,000	-	Y	Y	N	DCCR	DCCR	Developer	2001

Notes: [1] Funding Methods (Current):

- Surrey Capital Construction Program — CAP
- DCC Rebate Program — DCCR
- Development Coordination Works (Drainage, Arterial, Non-Arterial) — DCW
- Upsizing (Water, Sanitary/ 40% of estimate) — UPS
- Frontage Latecomer Agreement — FLAT
- Area Latecomer Agreement — ALAT
- Contribution to Surrey — CONTR
- Development Works Agreement — DWA

[2] Estimates are based on unit costs provided by Surrey. All estimates include a 50% estimating factor as required by Surrey.

[3] Land costs are based on unit area and / or existing dwelling improvement costs, provided by the City.

[4] 10 YSP # 2437 prorated in length.

[5] Does not classify as a DCC item.

INFRASTRUCTURE FINANCING AND FUNDING

WATER

Item No.	Location and Total Cost Estimate [3]	Type / Size of Works	Current (1997) or Addition to 10 YSP	Project ID # in Current (1997) 10 YSP	Amount in Current (1997) 10 YSP	Amount Additional to 10 YSP Program	Eligible [3] for DCC Program (Y/N)	Refinement of DCC Program (Y/N)	Addition to DCC Program (Y/N)	Type of Funding Method [1]		Construction by Surrey / Developer	Year Requested
										Existing [1]	Proposed [1]		
W1	K. G. Hwy: N. of 10 Ave ($26,250)	Feeder Main 450mm	Current	1982	$54,000	-	Y	Y	N	DCCR	DCCR	Surrey	1999
W2	Hwy 99: Peace Park Dr - 4 Ave ($130,200)	Grid Main 300mm	Current	2437	$50,000 [4]	$2,000	Y	Y	N	DCCR	DCCR	Developer	2003
W3	Peace Park Dr: 1 Ave - 2A Ave ($121,800)	Grid Main 300mm	Current	2437	$47,000 [4]	$2,000	Y	Y	N	DCCR	DCCR	Developer	2003
W4	Peace Park Dr: 0 Ave - 1 Ave ($92,400)	Grid Main 300mm	Current	10875	$37,000	-	Y	Y	N	DCCR	DCCR	Developer	2003
W5	1 Ave: Bet'n Peace Park Dr ($54,600)	Grid Main 300mm	Current	10874	$27,000	-	Y	Y	N	DCCR	DCCR	Developer	2003
W6	0 Ave: Peace Park Dr - 172 St ($273,000)	Grid Main 300mm	Current	2438	$109,000	-	Y	Y	N	DCCR	DCCR	Developer	2003
W7	172 St: 0 Ave - 2 Ave ($163,800)	Grid Main 300mm	Current	2439	$68,000	-	Y	Y	N	DCCR	DCCR	Developer	2003
W8	2 Ave: 172 St - 175A St ($277,200)	Grid Main 300mm	Addition	-	-	$111,000	Y	-	N	-	DCCR	Developer	2003
W9	176 St: N & S of Border ($253,500)	Grid Main 300mm	Current	998	$35,000	$67,000	Y	Y	Y [5]	DCCR	DCCR	Surrey	2000

Notes: [1] Funding Methods (Current):

- Upsizing (Water, Sanitary/ 40% of estimate) — UPS
- Frontage Latecomer Agreement — FLAT
- Area Latecomer Agreement — ALAT
- Surrey Capital Construction Program — CAP
- Development Works Agreement — DWA
- Contribution to Surrey — CONTR
- DCC Rebate Program — DCCR
- Development Coordination Works (Drainage, Arterial, Non-Arterial) — DCW

[2] Estimates are based on unit costs provided by Surrey. All estimates include a 50% estimating factor as required by Surrey.

[3] Water mains are cost shared only. Upsizing amounts eligible for funding include 40% of total capital cost.

[4] 10 YSP # 2437 prorated in length.

[5] Extension south of the border is additional.

TABLE F4.0

MAJOR COLLECTOR ROADS CASH FLOW PROJECTIONS

DCC Program Year	Phase	Land Use / Units / DCC Rates						Total Units	Projected DCC Cash Flow			
		Town-house [2] $1,037	Small S.F. Lot $1,370	Urban S.F. Lot $1,370	Suburban 1/2 Ac. Lot $1,370	Commercial Residential $770	Public Schools [1] $0 / 1,000 ft²		Revenues	Expenditures / Items	Annual Balance + (-)	Cumulative Balance + (-)
2000	1		50					50	$68,500	R 2 (A) ($318,500)	($250,000)	($250,000)
2001	1		37	33				70	$95,900		$95,900	($154,100)
2002	1			90				90	$123,300	R 3, 5, 9 ($157,500)	($34,200)	($188,300)
2003	2		6	72	12		75,000 ft²	90	$123,300	R 7 (B) ($235,000)	($111,700)	($300,000)
2004	2		49	37	9			95	$130,150	R 8 (C) ($412,000)	($281,850)	($581,850)
2005	3	79	10	6				95	$103,843		$103,843	($478,007)
2006	3	50	45					95	$113,500		$113,500	($364,507)
2007	3	30	27	3		30		90	$95,310	R 8 (D) ($176,000)	($80,690)	($445,197)
2008	3			85				85	$116,450		$116,450	($328,747)
2009	3	75		5				80	$84,625		$84,625	($244,122)
2010	4	38		22				60	$69,546	R 8 (E) ($163,000)	($93,454)	($337,576)
2011	3, 4			54				54	$73,980		$73,980	($263,596)
Totals								**954**	**$1,198,404**	**($1,462,000)**		**($263,596)**

Notes:

[1] Assumed that 30% of total school site area (75, 000 ft²) will be occupied by buildings.

[2] Based on a total maximum of $ 17, 500 / unit.

R 2, 9, ... Capital Works item numbers.

[A] Item 2 + 45% of Item 7

[B] 55% of item 7

[C] 70% of item 8

[D] 30% of item 8

TABLE F1.1

SANITARY SEWER CASH FLOW PROJECTIONS

DCC Program Year	Phase	Land Use / Units / DCC Rates						Total Units	Projected DCC Cash Flow			
		Town-house [2] $935	Small S.F. Lot $950	Urban S.F. Lot $950	Suburban 1/2 Ac. Lot $950	Commercial Residential $600	Public Schools [1] $300 / 1,000 ft²		Revenues	Expenditures / Items	Annual Balance + (-)	Cumulative Balance + (-)
2000	A		50					50	$47,500		$47,500	$47,500
2001	A		37	33				70	$66,500		$66,500	$114,000
2002	A			90				90	$85,500		$85,500	$199,500
2003	B		6	72	12		75,000 ft²	90	$108,000		$108,000	$307,500
2004	B		49	37	9			95	$90,250		$90,250	$397,750
2005	C	79	10	6				95	$89,065		$89,065	$486,815
2006	C	50	45					95	$89,500		$89,500	$576,315
2007	C	30	27	3		30		90	$74,550	$3 ($792,000)	($717,450)	($141,135)
2008	C			85				85	$80,750		$80,750	($60,385)
2009	C	75		5				80	$74,875		$74,875	$14,490
2010	D	38		22				60	$56,430		$56,430	$70,920
2011	C, D			54				54	$51,300		$51,300	$122,220
Totals								**954**	**$914,220**	**($792,000)**		**$122,220**

Notes:

[1] Assumed that 30% of total school site area (75, 000 ft²) will be occupied by buildings.

[2] Based on a total maximum of $ 17, 500 / unit.

$1, 3, ... Capital Works item numbers.

TABLE F2.1

DRAINAGE CASH FLOW PROJECTIONS

DCC Program Year	Phase	Land Use / Units / DCC Rates						Total Units	Projected DCC Cash Flow			
		Town-house [2] $1,565	Small S.F. Lot $1,400	Urban S.F. Lot $2,370	Suburban 1/2 Ac. Lot $4,740	Commercial Residential $590	Public Schools [1] $930 / 1,000 ft²		Revenues	Expenditures / Items	Annual Balance + (-)	Cumulative Balance + (-)
2000	A		50					50	$70,000		$70,000	$70,000
2001	A		37	33				70	$130,010	D 5, 6, 7, 11 ($1,662,750)	($1,532,740)	($1,462,740)
2002	A			90				90	$213,300		$213,300	($1,249,440)
2003	B		6	72	12		75,000 ft²	90	$305,670		$305,670	($943,770)
2004	B		49	37	9			95	$198,950		$198,950	($744,820)
2005	C	79	10	6				95	$151,855	D 1, 2, 3, 4, 10 ($879,600)	($727,745)	($1,472,565)
2006	C	50	45					95	$141,250		$141,250	($1,331,315)
2007	C	30	27	3		30		90	$109,560		$109,560	($1,221,755)
2008	C			85				85	$201,450		$201,450	($1,020,305)
2009	C	75		5				80	$129,225		$129,225	($891,080)
2010	D	38		22				60	$111,610		$111,610	($779,470)
2011	C, D			54				54	$127,980		$127,980	($651,490)
Totals								954	$1,890,860	($2,542,350)		($651,490)

Notes:

[1] Assumed that 30% of total school site area (75, 000 ft²) will be occupied by buildings.

[2] Based on a total maximum of $ 17, 500 / unit.

D 5, 6, ... Capital Works item numbers.

TABLE F3.1

WATER CASH FLOW PROJECTIONS

DCC Program Year	Phase	Land Use / Units / DCC Rates						Total Units	Projected DCC Cash Flow			
		Town-house [3] $1,003	Small S.F. Lot $1,020	Urban S.F. Lot $1,020	Suburban 1/2 Ac. Lot $1,020	Commercial Residential $640	Public Schools [1] $320 / 1,000 ft²		Revenues	Expenditures / Items	Annual Balance + (-)	Cumulative Balance + (-)
2000	A		50					50	$51,000	W 9 [4] ($101,400)	($50,400)	($50,400)
2001	A		37	33				70	$71,400		$71,400	$21,000
2002	A			90				90	$91,800		$91,800	$112,800
2003	B		6	72	12		75,000 ft²	90	$115,800	W 2 - 8 [4] ($445,200)	($329,400)	($216,600)
2004	B	..	49	37	9			95	$96,900		$96,900	($119,700)
2005	C	79	10	6				95	$95,557		$95,557	($24,143)
2006	C	50	45					95	$96,050		$96,050	$71,907
2007	C	30	27	3		30		90	$79,890		$79,890	$151,797
2008	C			85				85	$86,700		$86,700	$238,497
2009	C	75		5				80	$80,325		$80,325	$318,822
2010	D	38		22				60	$60,554		$60,554	$379,376
2011	C, D			54				54	$55,080		$55,080	$434,456
Totals								954	$981,056	($546,600) [4]		$434,456

Notes:

[1] Assumed that 30% of total school site area (75, 000 ft²) will be occupied by buildings.

[2] Does not include Item W1 - K. G. Highway 450mm dia. Feeder Main.
(It is assumed it will have been constructed by the City in 1999)

[3] Based on a total maximum of $ 17, 500 / unit.

[4] Represents 40% of capital cost (ie. Upsizing amount eligible for funding)

W 2,8,... Capital Works Item numbers.

TABLE F4.1

TOTAL DCC CASH FLOW PROJECTIONS

DCC Program Year	Phase	Land Use / Units / DCC Rates [2]						Total Units	Projected DCC Cash Flow		
		Town-house [3] $4,540	Small S.F. Lot $4,740	Urban S.F. Lot $5,710	Suburban 1/2 Ac. Lot $8,080	Commercial Residential $2,600	Public Schools [1] $1,550 / 1,000 ft²		Total DCC Revenues	Total DCC Expenditures	Cumulative DCC Surplus/(Deficiency)
2000	A		50					50	$237,000	$419,900	($182,900)
2001	A		37	33				70	$363,810	$1,662,750	($1,481,840)
2002	A			90				90	$513,900	$157,500	($1,125,440)
2003	B		6	72	12		75,000 ft²	90	$652,770	$680,200	($1,152,870)
2004	B		49	37	9			95	$516,250	$412,000	($1,048,620)
2005	C	79	10	6				95	$440,320	$879,600	($1,487,900)
2006	C	50	45					95	$440,300	$0	($1,047,600)
2007	C	30	27	3		30		90	$359,310	$968,000	($1,656,290)
2008	C			85				85	$485,350	$0	($1,170,940)
2009	C	75		5				80	$369,050	$0	($801,890)
2010	D	38		22				60	$298,140	$163,000	($666,750)
2011	C, D			54				54	$308,340	$0	($358,410)
Totals								954	$4,984,540	$5,342,950	($358,410)

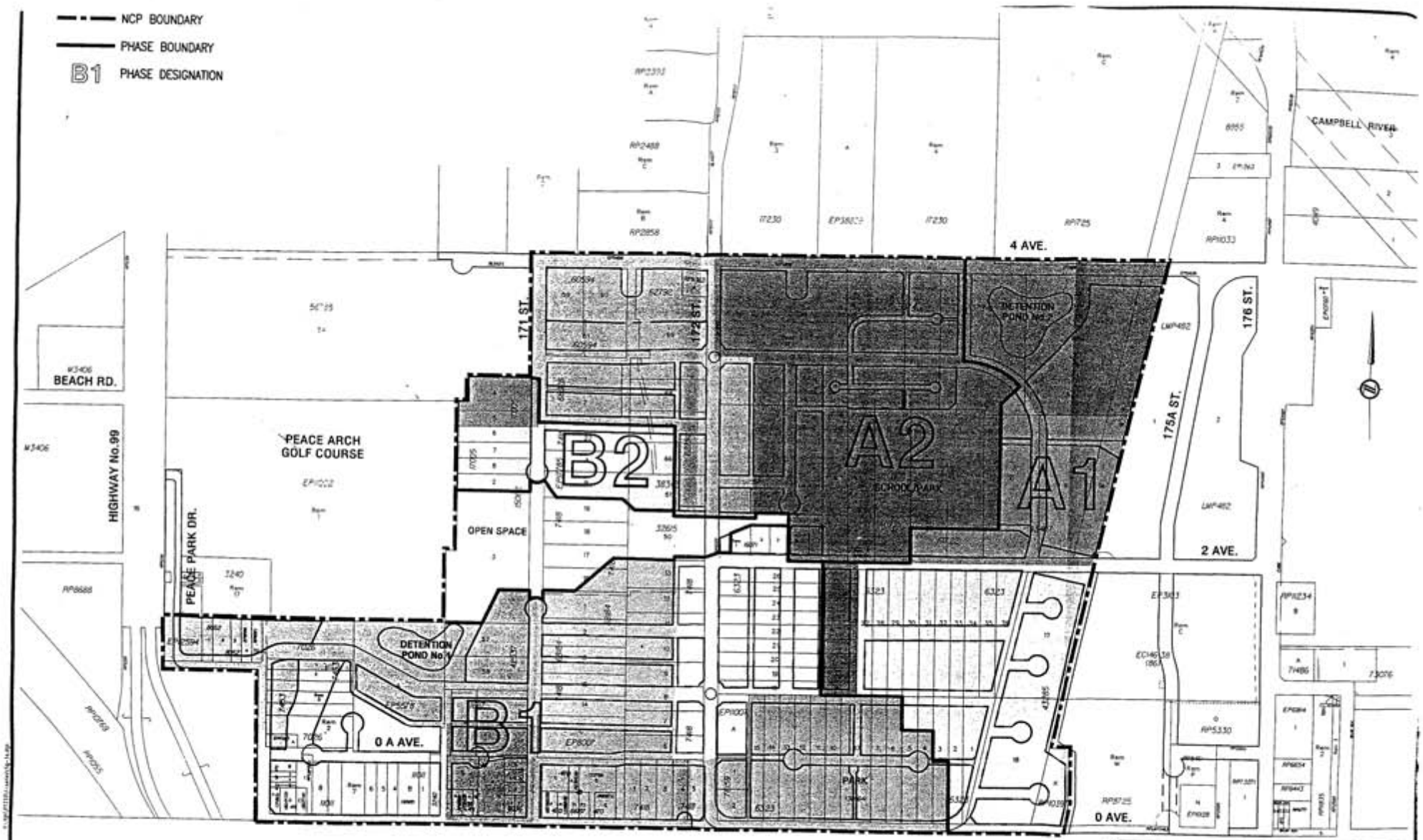
Notes:

[1] Assumed that 30% of total school site area (75, 000 ft²) will be occupied by buildings.

[2] Represents a total of Water, Sewer, Major Collector Roads, and Storm Water Management DCC components. Arterial Roads not included since no Arterial Roads infrastructure is required in this NCP.

[3] Based on a total maximum of $ 17, 500 / unit.

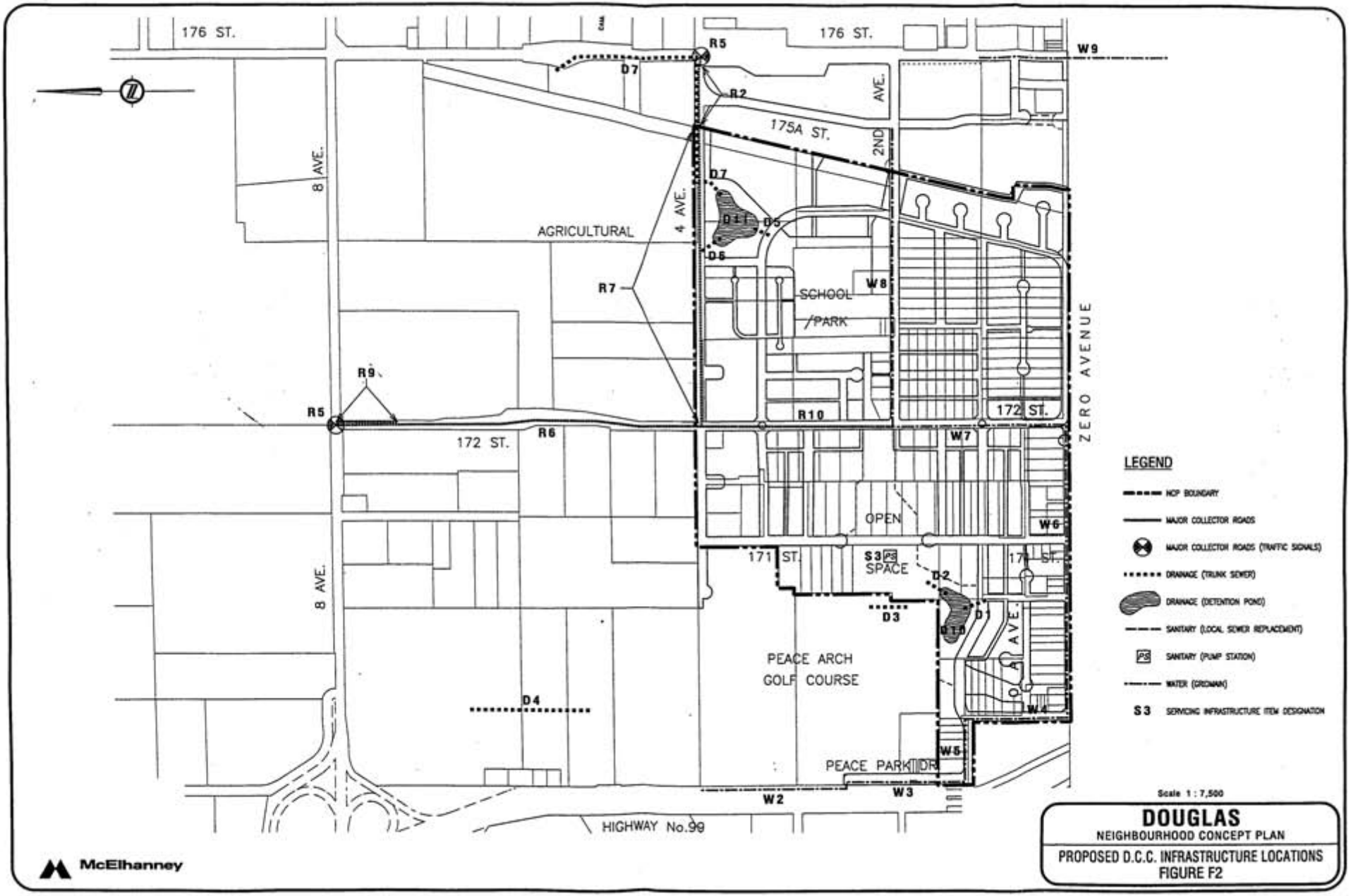
TABLE F5.1



McElhanney

SCALE 1:5000

DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
PROPOSED PHASING PLAN
FIGURE F1


176 ST.
176 ST.
R5
D7
R2
W9
175A ST.
2ND AVE.
8 AVE.
4 AVE.
AGRICULTURAL
D7
D11
D5
D5
R7
SCHOOL
/PARK
W8
ZERO AVENUE
R9
R5
R6
R10
172 ST.
172 ST.
W7
OPEN
SPACE
W6
171 ST.
S3 PS
171 ST.
D2
D3
D1
D10
8 AVE.
PEACE ARCH
GOLF COURSE
D4
W4
W5
PEACE PARK DR.
W2
W3
HIGHWAY No.99
LEGEND
MCP BOUNDARY
MAJOR COLLECTOR ROADS
MAJOR COLLECTOR ROADS (TRAFFIC SIGNALS)
DRAINAGE (TRUNK SEWER)
DRAINAGE (DETENTION POND)
SANITARY (LOCAL SEWER REPLACEMENT)
PS SANITARY (PUMP STATION)
WATER (GRIDMAIN)
S3 SERVICING INFRASTRUCTURE ITEM DESIGNATION
Scale 1 : 7,500
DOUGLAS
NEIGHBOURHOOD CONCEPT PLAN
PROPOSED D.C.C. INFRASTRUCTURE LOCATIONS
FIGURE F2
McElhanney