Subdivision and Development Servicing Bylaw, 2008, No. 2744

A Bylaw to provide for Subdivision and Development Servicing Requirements within the City of Langley.

DISCLAIMER – THIS BYLAW IS CONSOLIDATED FOR CONVENIENCE ONLY. THE CITY DOES NOT WARRANT THAT THE INFORMATION CONTAINED IN THIS CONSOLIDATION IS CURRENT. IT IS THE RESPONSIBILITY OF THE PERSON USING THIS CONSOLIDATION TO ENSURE THAT IT ACCURATELY REFLECTS CURRENT BYLAW PROVISIONS.

Consolidated as of July 8, 2008

TABLE OF CONSOLIDATION	
BYLAW	**SUBJECT MATTER**

The Council of the City of Langley, in open meeting assembled, enacts as follows:

1.0 TITLE

1.1 This Bylaw may be cited as the "Subdivision and Development Servicing Bylaw, 2008, No. 2744."

1.2 The Subdivision Control Bylaw 1980 No. 1015 and all amending bylaws are repealed.

2.0 DEFINITIONS

2.1 In this Bylaw, unless the context otherwise requires, the following words and terms shall have the meanings hereinafter assigned to them:

Accepted means as accepted by the Director of Engineering, Parks and Environment or his representative.

City means the City of Langley.

Approving Officer means the officer so appointed by Council resolution according to the provisions of the Land Titles Act.

Arterial Road means a road designated as an arterial road in the Official Community Plan, Road Network Map, being a street whose primary function is to carry through traffic from one area to another with as little interference as possible from adjacent land uses.

Building Area means that part of parcel of land on which can be constructed a building in accordance with this Bylaw, the Zoning, Building and other relevant Bylaws.

Chief Building Inspector means that person designated as Chief Building Inspector or his representative.

City Drainage System means a system owned, operated and maintained by the City for the collection, treatment, conveyance and disposal of storm water.

City Sanitary System means a system owned, operated and maintained by the City for the collection, conveyance, treatment and disposal of sanitary sewage.

City Water System means a system of waterworks, within the meaning of the Drinking Water Protection Act, which is owned, operated and maintained by the City.

Collector Road means a road designated as a collector road in the Official Community Plan, being a street whose primary function is to distribute traffic between arterial streets and local streets but which also, usually, provides direct access to properties.

Complete means completion of the Works and Services to the acceptance of the Director of Engineering, Parks and Environment.

Contractor means the person or the company undertaking the construction of the Works and Services in a development, or on City property, including their employees, subcontractors and other duly authorized representatives.

Cul-de-Sac means a road which is designed to be permanently closed by the patterns of subdivision or which is terminated by a natural feature and provides a vehicular turning area at its termination.

Developer means the owner of land or the holder of a bona-fide interim agreement or option to purchase land, who has made application to the City for or is engaged in undertaking the development of such land and shall include his/her duly authorized representative.

Design Engineer means the Professional Engineer engaged by the Developer to design and/or prepare drawings for the construction of the Works and Services, or his/her duly authorized representative.

Development means the improvement of land requiring the installation of the Works and Services, which includes subdivision of land, development permits and building permits.

Director of Engineering, Parks and Environment means that person who is the head of the Engineering, Parks and Operations Department or his/her representative.

Director of Development Services & Economic Development means that person who is the head of the Development Services Department or his/her representative.

Drinking Water Office means the offices of the Fraser Health Authority located at 14265 – 56th Avenue, Surrey, BC V3X 3A4

Drinking Water Officer means the official appointed, pursuant to the Drinking Water Protection Act who has been appointed by the Fraser Health Authority.

Final Approval means that approval granted by the Approving Officer when all relevant requirements of this Bylaw, the Local Government Act, Community Charter, Land Title Act and any other relevant Bylaws and legislation have been fulfilled.

Highway means a public street, road. lane, walkway, bridge, viaduct, and any other way open to public use under the jurisdiction of the City.

Landscape Architect means a person who is registered as a member of the British Columbia Society of Landscape Architects.

Landscape Designer means a person whose major professional occupation and training is in landscape design and planting design

Lane means a narrow road which provides vehicular access to any abutting parcel.

Local Street means a road designed to provide direct access to individual parcels and to provide for circulation of traffic within subdivisions and which, usually, connects to other local roads or to collectors.

Manager of Parks Operations means that person appointed as head of Parks Operations or his / her representative.

Manager of Engineering Operations means that person appointed as head of Engineering Operations or his/her representative.

Manager of Engineering Services means that person appointed as head of Engineering Services or his/her representative.

Official Community Plan means the current Official Community Plan of the City as adopted by bylaw and as amended from time to time.

Panhandle means a relatively long and slim portion of a parcel, with a minimum width of 8.5 metres, designed to provide legal and practical access to a highway from the portion of the parcel on which the building area is located. Approval for any proposed panhandle lots will be reviewed by the Director of Development Services & Economic Development.

Parcel means any lot, block or other area in which land is held or into which land is subdivided.

Preliminary Approval means the conditional approval by the Approving Officer of a proposed subdivision plan, and outlines the requirements which must be fulfilled to obtain Final Approval.

Professional Engineer means a person who is registered, or duly licensed as such, under the provisions of the Engineers and Geoscientists Act of the Province of British Columbia

Public Interest means the “common well being” or “general welfare” of the citizens of the City of Langley

Security Deposit means cash, certified cheque or an irrevocable Letter of Credit from a Canadian Financial Institution.

Standard Drawings means the drawings that form part of the Design Criteria Manual and approved by the Director of Engineering, Parks and Environment.

Storm Water Management means a plan indicating the means by which storm water will be directed within, through and downstream of the development.

Subdivision means the division of land into two or more parcels, whether by plan, proper descriptive words, or otherwise.

Surveyor means a land surveyor currently licensed and registered in the Province of British Columbia.

Walkway means a narrow highway for the predominant use of pedestrian traffic.

Works and Services or The Work means any public service, facility or utility which is required by this Bylaw and without restricting the generality of the foregoing includes: the supply and distribution of water; collection and disposal of sewage; collection; treatment and disposal of drainage water; street lighting; access roadways, curbs, gutters, sidewalks, traffic signals, street trees and boulevard plantings; and the underground supply and distribution of electrical power, telephone, gas, and cable television.

Zoning Bylaw means the City of Langley Zoning bylaw, 1996, No. 2100, as amended from time to time.

Unless otherwise defined herein, all words or expressions used in this Bylaw shall have the same meaning assigned to them as like words or expressions contained in the "Land Title Act", Chapter 250, R.S.B.C. 1996, and amendments thereto.

3.0 ADMINISTRATION

3.1. The Approving Officer shall maintain a record of all subdivision applications submitted under this Bylaw, which shall indicate the final disposition of all such applications thereon.

3.2. The design criteria, standards and procedures set out herein do not apply to a strata unit wholly within a building located in an industrial, commercial or multiple or single family residential district.

3.3. All employees of the City are hereby authorized to enter at all reasonable times upon any property or premises to inspect same in connection with their duties under this Bylaw and to ascertain whether the provisions of this Bylaw are being complied with.

3.4. The servicing provisions of this Bylaw may be waived or varied at the discretion of the Director of Engineering, Parks and Environment:

3.4.1 For land which is subdivided for the purpose of creating parcels to support the installation of public facilities, utilities, structures and associated equipment.

3.4.2 For applications where:

a. No additional land registry parcels are proposed and where the smallest of the proposed new parcels is greater in size than the smallest of the original lots,

b. The subdivision proposes a lot line adjustment, and each parcel affected is serviced by existing City water and sewer system and where no future subdivision potential exists.

3.5. The provisions of this Bylaw are severable. If any provision is for any reason held to be invalid by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining provisions of this Bylaw.

4.0 APPLICATION FOR PRELIMINARY APPROVAL FOR SUBDIVISION AND DEVELOPMENT

4.1 Application for Preliminary Approval of subdivision shall be submitted to the Director of Development Services & Economic Development on the prescribed application form. The application form shall be signed by the Developer.

4.2 The Developer will be required to pay Inspection and Administration Fees as part of the development process as provided in Schedule "A", Clause GR5.1 of Subdivision and Development Servicing Bylaw.

4.3 Owners are required, as a condition of subdivision approval or development permit issuance, to provide the Works and Services in accordance with the requirements and standards as prescribed in Schedule "B", the Design Criteria Manual, on that portion of a highway immediately adjacent to the site being subdivided or developed, up to the centreline of the highway.

4.4 Owners are required, as a condition of a development to provide the Works and Services on the site being developed in accordance with the standards as prescribed in Schedule "B", the Design Criteria Manual.

4.5 Should any Works and Services to be provided under sections 4.3 and 4.4 be included in the schedule of works in a Development Cost Charge Bylaw, the Director of Engineering, Parks and Environment may provide the Developer with credits against DCC charges in accordance with the Local Government Act to a maximum of the development cost charges assessed for the specified works and services.

4.6 All Works and Services required pursuant to Clause 4.3 and 4.4 shall be constructed and installed at the expense of the Developer prior to subdivision approval or issuance of a development and/or building permit, unless the Developer complies with the requirements of Clause 10.0 and other relevant parts of this Bylaw.

4.7 If a subdivision application is not completed within six months of Preliminary Approval being granted by the Approving Officer, such Preliminary Approval shall be deemed to be void and of no further force and effect and the application for subdivision upon which it is based shall be deemed to have been withdrawn and of no further force and effect.

5.0 APPROVALS

5.1 Applications for subdivision will be reviewed for compliance with the requirements of this Bylaw and other relevant City and Provincial legislation. Approval of a subdivision plan does not imply that the City will expend City funds on works or services in support of the subdivision.

5.2 In considering an application for subdivision approval the Approving Officer may refuse to approve the subdivision plan if he/she considers that the deposit of the plan is against the public interest.

5.3 Without affecting the generality of Clause 5.2 in considering an application for subdivision approval, the Approving Officer may refuse to approve the subdivision plan if he/she considers that the subdivision does not conform to:

5.3.1 all applicable provisions of the Local Government Act and the Land Title Act.

5.3.2 the respective City bylaws regulating the subdivision and development of land.

5.3.3 impact on adjacent lands with subdivision potential.

5.4 Where applicable, the Developer shall be required to obtain approval of his/her subdivision from other agencies having jurisdiction.

5.5 The Owner of land being subdivided shall satisfy the requirements of the Approving Officer with respect to the provision of parkland in accordance with the requirements of the Local Government Act.

5.6 The Preliminary Approval of any proposed subdivision shall not be construed as Final Approval of subdivision for Land Title purposes. Preliminary Approval may be revoked by the Approving Officer at any time in the event that new information becomes available subsequent to review by the Approving Officer or in the event that any change in legislation, regulations or bylaws which would render the proposed subdivision unlawful takes effect prior to the granting of Final Approval.

5.7 Survey plans, from a qualified accredited surveyor, showing the lot sizes, shape, layout and legal description of the proposed subdivision, development or building must accompany the proposed application before Preliminary Approval is granted.

6.0 HIGHWAYS

6.1 All highways required in respect of subdivision or development shall be dedicated and constructed in accordance with the standards contained in Schedule "A" of this Bylaw.

6.2 Where the Approving Officer believes that, due to terrain and soil conditions, a roadway cannot be adequately supported, protected or drained, he/she may determine that the owner provide, without compensation, land of a width that, in the Approving Officer's opinion, would permit the highway to be supported, protected or drained.

6.3 Where a subdivision borders on a natural body of water, access to the body of water shall be given by highways in accordance with the requirements of the Land Title Act.

6.4 Half roads may be required only when the land parcel opposite or adjacent to the development is not participating in the development. The travel portion of half roads will have a minimum width of 6 metres and sufficient dedication to include all required services, including sidewalks, utilities and street lights.

7.0 DRAINAGE COLLECTION AND DISPOSAL SYSTEM

7.1 The Owner of any lands which are proposed to be developed or subdivided shall provide each parcel of land within the proposed subdivision or development with a drainage collection and disposal system including the standard service connection thereto, constructed in accordance with the standards contained in Schedule "A" General Requirements section, hereto, and the said drainage system shall be connected by drainage mains to the existing City Drainage System. Rockpits must be designed and certified by a professional engineer and are subject to review by the Director of Engineering, Parks and Environment and may be allowed only in areas where existing soil conditions are permeable or porous and where City drainage systems are not in place. Assessment of the capacity of the existing storm for full future development conditions and loadings from the catchment area surrounding and including the development site may be necessary. Depending on the information from the assessment report, upgrading of the downstream storm capacity may be required.

7.2 Drainage collection systems shall be provided in accordance with the requirements of the Design Criteria Manual.

8.0 WATER DISTRIBUTION SYSTEM

8.1 The Owner of any lands which are proposed to be developed or subdivided shall provide each parcel of land within the proposed subdivision or development with a water distribution system and a fire hydrant system, including the standard service connection thereto, which shall be constructed in accordance with the standards contained in Schedule "A" General Requirement section, hereto, and shall be connected to the existing City Water System. A water flow test and water modeling by a Professional Engineer may be necessary to determine if the existing water in the area is adequate for fire flows. Replacement of the existing watermain may be necessary to achieve the necessary pressure and flows to conform to Fire Underwriters Survey (FUS) "Water Supply for a Public Fire Protection, a Guide to Recommended Practice, 1995".

9.0 SEWAGE COLLECTION AND DISPOSAL SYSTEM

9.1 The Owner of any lands which are proposed to be developed or subdivided shall provide each parcel of land within the proposed subdivision or development with a sanitary sewage collection system including the standard service connection thereto, constructed in accordance with Schedule "A" General Requirement section, hereto, and the said sewerage system shall be connected by gravity to sewer mains to the existing City Sanitary System. The City of Langley prohibits the use and/or design of sanitary pump systems, unless approved by the Director of Engineering, Parks and Environment. Assessment of the capacity of the existing sanitary for full future development conditions and loadings from the catchment area surrounding and including the development site may be necessary. Depending on the information from the assessment report, upgrading of the sanitary capacity may be required.

10.0 COMPLETION OF THE WORKS AND SERVICES

10.1 All Works and Services required to be constructed and installed at the expense of the Owner shall be constructed and installed to the standards prescribed in this Bylaw before the Approving Officer approves the subdivision or the Chief Building Inspector issues the building permit unless the Developer:

10.1.1 Deposits with the City a cash deposit, or an irrevocable letter of credit from a financial institution, acceptable to the City, in the amount of 110% of the estimated construction cost, as estimated by the Developer's engineer from approved engineering drawings, for installing and paying for all Works and Services required under the Bylaw; and

10.1.2 Enters into a Servicing Agreement, for works that are valued greater than $100,000, with the City to construct and install the required Works and Services by a specified date or forfeit to the City the amount secured by the Security Deposit.

10.2 Where the physical construction of part or all of the Works and Services required under this Bylaw is considered by the Director of Engineering, Parks and Environment to be not feasible but within the short term construction plans of the City, the requirement may be fulfilled by the payment of a non refundable cash deposit equal to 100% of the amount estimated by the City to cover the cost of the required Works and Services. This deposit will be used by the City at a future time when construction of the Works and Services becomes feasible. In addition, the Developer shall pay an administration fee based on the estimated cost as outlined in Section GR5.1 of Schedule "A" General Requirement section. Cash deposits are required to be paid prior to Final Approval.

11.0 OVERSIZING OF WORKS

Where the Owner is required to construct any trunk water, sanitary sewer or storm sewer mains beyond the boundaries of his subdivision or to provide the mains with excess capacity to the benefit of other lands, the City will enter into a Latecomers Agreement, in accordance with the Local Government Act, with the owner of the lands to be subdivided to share all or part of the cost of any such trunk water, sanitary sewer, or storm sewer mains between:

a) The City and the owner of the land proposed to be subdivided; or,
b) The owner of the land proposed to be subdivided and the owners of any other land that will benefit from such mains.

12.0 BYLAW SCHEDULE

The following schedules attached hereto and forming part of this bylaw:
Schedule "A" - General Requirements section shall form part of this Bylaw.
Schedule "B" – Design Criteria Manual - Bound Separately
Schedule "C" - Standard Drawings - Bound Separately
Schedule "D" - Supplementary Specifications - Bound Separately
Schedule "E" - Water Meter Specifications - Bound Separately

13.0 INCORPORATION OF DOCUMENT BY REFERENCE

Filed copies, in the City Clerk's Office, of the Master Municipal Construction Documents (MMCD) published in April 2000 (Gold Edition) and Transportation Association of Canada documents (TAC) guidelines are hereby incorporated by reference into and forms part of this Bylaw.

14.0 BYLAW VIOLATION

Every person who violates any provision of this bylaw or who permits any act or thing to be done in contravention or in violation of any provisions of this bylaw, or who neglects to do or refrains from doing anything required to be done by any provision of this bylaw shall commit an offence is liable to a fine if not more than $2,000 or to imprisonment for not more than 6 months, or to both.

READ A FIRST, SECOND AND THIRD TIME this twenty third day of June, 2008

FINALLY ADOPTED this seventh day of July, 2008

_____
MAYOR

_____
CORPORATE OFFICER

City of Langley
"The Place to Be!"

Explanatory Note
Bylaw No. 2744

Motion that Bylaw 2736 be abandoned.

In order to simplify the revision amendments which are required, Bylaw 2744 will replace Bylaw 2736. The amendments are as follows:

Clause No.:	Revision:
2.1	***Arterial Road*** definition changed to reference the OCP network map rather than the Design Criteria Manual.
	Collector Road definition changed to reference the OCP network map rather than the Design Criteria Manual.
	Complete definition; Director title corrected to include "Parks and Environment"
	Storm Water Management, minor wording change from "Plan managed within" to "directed within".
	Works and Services definition; add storm treatment and traffic signals
	Definitions placed in alphabetical order
	Width of panhandle changed from 6.0m to 8.5m per Fire Department request
	Land Title Act reference updated
3.2	*Lot* replaced by *unit* in reference to building internal strata.
3.4.2a	Delete *In designated areas*; redundant
3.4.2b	Add *City* before *water and sewer services* to clarify.
4.0	Delete *Application*, duplication
4.1	Replace *Owner* with *Developer* to be consistent with application. (typical)
4.2	Add reference to Schedule
4.3	Add reference to Schedule
4.4	Add reference to Schedule
4.5	Reword to limit refund of DCC's to amount paid.
6.2	Minor wording change
6.3	Add *to the body of water* to clarify access requirements.
6.4	Amended to require minimum travel width of 6 meters and sufficient dedication for half

	road construction.
7.1	Add requirement for Engineering certification of Rock Pits and other minor wording changes.
10.1.1	Increase cash deposit to 110% of construction to cover soft costs.
10.2	Amended to reflect Court challenge to accepting deposits for works not anticipated in the near future.
13	Reference to MMCD corrected

Schedules

R11	Table headings clarified
D5.4	Slope in formula clarified
D6.5	Font changed to match
S2.2	Peaking Factor formula changed to MMCD design guidelines and graph added.

SUBDIVISION AND DEVELOPMENT SERVICING BYLAW

SCHEDULE "A"

GENERAL REQUIREMENTS
(See Below - Document 80256)

SCHEDULE "- A"- GENERAL REQUIREMENTS

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SCHEDULE "A" - GENERAL REQUIREMENTS

GR1 INTRODUCTION

This Schedule identifies the general requirements in connection with the Subdivision and Development Bylaw, and shall be read in conjunction with this Bylaw.

In adopting this Schedule, Council, through its Engineering Department, has reviewed the needs of the City with respect to Engineering Standards, compared the benefits of alternative practices, and identified the most acceptable approaches to provide satisfactory City services.

Additional information, clarification or suggestions for changes and amendments should be directed to:

Director of Engineering, Parks and Environment
City of Langley
20399 Douglas Crescent
Langley, BC V3A 4B3

GR2 STANDARD OF ENGINEERING WORKS

All engineering works and servicing provisions as required by the City of Langley Subdivision and Development Bylaw and its Schedule "A" shall be designed, constructed and carried out in accordance with the City's Design Criteria Manual, Schedule "B", Standard Drawings, relevant City Bylaws, Master Municipal Construction Documents (MMCD) and Transportation Association of Canada (TAC) as incorporated by reference into this Bylaw.

Should conflict exist between these documents, the City of Langley Subdivision and Development Bylaw and its Schedule "B", shall take precedence over the Master Municipal Construction Documents (MMCD – Gold Edition 2000) and Transportation Association of Canada (TAC), as amended from time to time.

GR3 RESPONSIBILITY OF ENGINEER AND DEVELOPER

GR3.1 Director of Engineering, Parks and Environment Status

The Director of Engineering, Parks and Environment or his representative, shall be the City's representative during the construction period and shall observe the work in progress on behalf of the City.

GR3.2 Consultants and Contractors to be Retained by the Developer

Unless otherwise specifically approved by the Director of Engineering, Parks and Environment, the Developer will retain a Professional Engineer for the design and construction supervision of new or modifications to existing water, storm and sewer utilities. Developers are financially responsible for the Work and will post adequate letters of credit prior to commencing work.

GR3.3 Work Performance

The whole of the Work, and the manner of performing the same, shall be done to the acceptance of the Director of Engineering, Parks and Environment, who shall be the sole judge of the Work and materials in respect to both quantity and quality and his decision with regard to work and materials shall be final and binding.

GR3.4 Variation of Work at Developer's Request

Any variation to the Work previously proposed, or as previously accepted in design, shall be subject to review by the Director of Engineering, Parks and Environment. All requests for variation to the Work designed and sealed by a Professional Engineer on behalf of a Developer and accepted by the City shall be made in writing by the Design Engineer. Any request for variation from the Developer's Engineer shall include a signed and sealed revision to the previously accepted drawings. The Director of Engineering, Parks and Environment decision as to the acceptability of any proposed revision shall be final and binding. Any variation to the approved street tree and boulevard planting plan shall be subject to the review of the Manager of Parks Operations.

GR3.5 Unforeseen Conditions

If at any time after the drawings have been accepted for construction, unforeseen conditions or circumstances become known which make it necessary that changes in the design or extra works be done in order to complete the project in an acceptable manner, the Director of Engineering, Parks and Environment shall have the right to order such changes or extra work as he deems necessary to complete the work in an acceptable manner. All costs of such extra work shall be borne by the Developer.

GR3.6 Verbal Agreements

No verbal instruction, objection, claim or notice by any party to the other shall change or modify any of the terms or obligations contained in any of the specifications and none of the Specifications shall be held to be waived or modified by reason of any act whatsoever, other than by an agreed waiver or modification thereof in writing.

GR3.7 Service of Notices

Any notice, order, direction, request or other communication given by the City to the Developer/Contractor shall be deemed to be well and sufficiently given to the Developer/Contractor if the same be left at any office used by the Developer/Contractor or be delivered to any of his officers, clerks, or servants, including the Design Engineer, or be mailed in any Post Office addressed to the Developer's last known place of business.

GR4 CONDUCT OF WORK

GR4.1 Responsibility

The Developer shall be held fully responsible to the City for the acts and omissions of his agents and of persons directly or indirectly employed by him. The Developer agrees to bind all agents or employees to the specifications and drawings applicable to his work.

No work may start on City roads or rights-of-way without written permission from the Director of Engineering, Parks and Environment in the form of a “Highway Use” permit.

The Developer, the Developer's Engineer and the Contractor must attend a pre-construction meeting with the Director of Engineering, Parks and Environment representative prior to the start of construction of the required Works and Services.

GR4.2 Materials and Workmanship

The whole of the Work shall be done in a workmanlike manner with materials and workmanship of the best quality and description. Unless otherwise specified, all materials shall be new.

GR4.3 Survey Monuments and Legal Postings

All legal posts, stakes, and integrated survey monuments within the area of the Work, and all construction stakes and marks on adjoining works, shall be preserved undisturbed and visible. In the event that any of the above are disturbed, lost or destroyed, they shall be replaced to the acceptance of the Director of Engineering, Parks and Environment. The establishment of all legal surveys will be undertaken by a qualified Surveyor, and all costs for replacement of any legal work shall be borne by the Developer/Contractor.

All legal surveys in the City shall be tied to the Global Positioning System Network (GPS) as set by the Greater Vancouver Regional District (GVRD) in the year 2004 and the existing integrated monument system based on the Surveyor General's Instructions. A deposit of $7,000 is required by the developer, if working in the immediate areas of a High Precision Network survey monuments (HPN), for the replacement of destroyed/disturbed HPN survey monuments. Refer to “Standard Drawings” section for locations.

GR4.4 Work of Others

The Director of Engineering, Parks and Environment shall be at liberty to enter upon the site of the work with his workers and materials to do other work, and the Developer/Contractor shall afford any such workers all reasonable facilities to the acceptance of the Director of Engineering, Parks and Environment.

The Developer shall arrange the work and dispose of his materials in such a manner as will not interfere with the work or storage of materials of others upon the site of the Work. The Developer shall join the work to that of others and perform his work in proper sequence in relation to that of others to the acceptance of the Director of Engineering, Parks and Environment.

GR4.5 Existing Structures and Utilities

Any plans or descriptions, verbal or otherwise, of existing utilities and structures that are given to the Developer are intended only as an aid in the location of these items. Measurements and locations of the existing underground utilities and structures shown on the drawings are compiled

from the most reliable information available, and must be verified by the Developer prior to proceeding with construction. The City accepts no responsibility for the accuracy of their locations.

GR4.6 Drainage

All portions of the site shall be kept properly and efficiently drained during construction and until final acceptance by the Director of Engineering, Parks and Environment. The Developer shall be held responsible for all damage which may be caused or result from water backing up or flowing over, through, from or along any part of the Work, or which any of his operations may cause to flow elsewhere.

Existing culverts, drains and ditches affected by the Work shall be kept clear of excavated material at all times during construction. When it is necessary to temporarily remove an existing drainage structure, suitable temporary ditches or other accepted means of handling the drainage shall be provided.

Culverts and drain pipes shall be replaced at the time of trench backfilling and shall be adequately supported such that trench settlement does not disrupt the flow of water. Culverts, drains, and ditches shall be replaced in a condition which is at least equal to that which existed before construction commenced and ditch walls shall be reinstated so as to prevent any erosion or seepage.

At all times during the course of construction and to the end of the Maintenance Period, there shall be no discharge of any silt, dirt or debris into any existing drainage facility or watercourse, as referred in the City's Watercourse Protection Bylaw No. 2518. Streets, catch basins, manhole sumps and siltation controls shall be cleaned and maintained to the satisfaction of the Director of Engineering, Parks and Environment.

GR4.7 Disposal of Excavated Material on Private Property

Material from excavations shall not be placed on private property within any Flood Plains or Agricultural Land Reserve unless the property owner has obtained a permit issued by the City as required under the Soil Conservation Act. Such permit will only be issued upon the BC Agricultural Land Commission approval of such deposition.

For placement of excavated materials on properties outside of any Flood Plain and Agricultural Land Reserve, governing conditions in the Langley Soil and Other Material Deposit Regulation Bylaw No.750 and No.997 shall apply.

GR4.8 Work to Fit With Others

All cutting, fitting or patching of the Work shall be done to properly fit or receive existing structures and utilities. Existing works shall not be endangered by cutting, digging or any other operation and the work of others shall not be disturbed or altered except with the written consent of the Director of Engineering, Parks and Environment.

GR4.9 Damage to Work

The Developer shall be responsible for all loss or damage which may occur on the Work until the same has been delivered to and accepted by the Director of Engineering, Parks and Environment as specified and if any loss or damage occurs before such acceptance by the Director of Engineering, Parks and Environment, the Developer shall immediately, at his own expense, repair, restore or re-execute the work so damaged or which may have been destroyed.

All such repair, restoration or re-execution of the work so damaged or which may have been destroyed, shall be carried out and completed to the acceptance of the Director of Engineering, Parks and Environment at no cost to the City.

GR4.10 Use of Completed Portions

The City shall have the right to take possession of and use any completed or partially completed portion of the work, but such possession and use shall not be deemed an acceptance of such work. If such prior use increases the cost of uncompleted work or causes refinishing of completed work beyond normal wear and tear, the Developer shall be entitled to such compensation as the Director of Engineering, Parks and Environment may determine.

GR4.11 City's Right to Repair, Restore or Re-execute the Work

Should the Developer fail to perform the Work to the acceptance of the Director of Engineering, Parks and Environment by failing to begin work or to repair, restore, re-execute or in any manner fails to comply with the specified standards as it applies to any part of the Work as requested by the Director of Engineering, Parks and Environment within a period of 14 days from sending of such notice in writing to do so, the City shall become empowered to do the Work itself or to

employ such person or persons to repair, restore or re-execute the works provided that the entire expense of repair restoration or re-execution shall be charged to the Developer.

The repair, restoration or re-execution shall in no way affect the Developer's duties and liabilities nor in any way relieve him from the performance and fulfillment of any or all of his obligations and duties described in this Schedule. All such repair, restoration or re-execution of the Work shall be carried out and completed to the acceptance of the Director of Engineering, Parks and Environment. The fact of the City not having disapproved of or rejected any part of the Work or any of the materials supplied in connection at the time of the Director of Engineering, Parks and Environment making an estimate or at any other time during the execution of the Work shall not be deemed or be construed to be an acceptance of any such part of the Work or any such materials.

The provisions of this Section shall remain in full force and effect and be applicable for the period of the execution of the Work and for the Maintenance Period.

GR4.12 Payment of Accounts by Developer

The Developer shall pay all accounts for labour, services and materials incurred by the City as a result of executing any Sections of this Schedule during the execution of the Work, as and when they become due and payable. Should payment of such accounts not be made when they become due, the City shall deduct the payment from the security deposit. In the event that the amount is greater than that owing to the Developer, the City shall charge the Developer the difference.

GR4.13 Employee and Plant Safety, Adequacy

The Developer shall at all times be responsible for the safety of their employees and for the safety, adequacy, efficiency and sufficiency of their plant, equipment and method of executing the Work.

The Developer shall be responsible for full compliance with the Worksafe BC Industrial Health and Safety Regulations. This includes the proper training and supervision of employees. The Developer shall be responsible for notification of the proposed Work to the Worksafe BC. A copy of the notification letter is to be forwarded to the Director of Engineering, Parks and Environment.

GR4.14 Public Convenience, Access, Clean-up

Prior to the commencement of work, the developer will meet with all property owners affected by the work to inform them of the project and schedule. The Developer will address the concerns of the property owners during the construction period.

In carrying out the Work, the convenience of the public must always be considered and provided for. Street, thoroughfare or sidewalk shall not be obstructed longer or to any greater extent than is absolutely necessary in the Director of Engineering, Parks and Environment opinion. In no case shall any street, roadway or place be obstructed more than is ordered or approved by the Director of Engineering, Parks and Environment in writing.

Safe access to driveways, buildings and property, both for vehicles and pedestrians, shall be provided whenever necessary both during the execution of the Work and at other times. Suitable and convenient platforms, approaches, structures, bridges, crossings or other works shall be constructed and maintained in good order and serviceable condition as required by the Director of Engineering, Parks and Environment.

No material shall be deposited upon any street, sidewalk, boulevard, grass plot, or other public property without due consultation with the Director of Engineering, Parks and Environment, so that the least damage will be incurred. Material shall not be allowed to remain thereon longer than necessary.

During all phases of the operations precautions shall be taken to abate nuisance caused by mud or dust by clean-up, sweeping, sprinkling with water, or other means as necessary to accomplish results acceptable to the Director of Engineering, Parks and Environment.

GR4.15 Traffic Control, Barriers, Lights

The Developer must, at his own expense, provide, erect, and maintain all required barriers, fences or other proper protection, and must provide, keep and maintain operating lights with amber globes or provide watchmen as may be necessary, in order to insure safety to the public as well as to those engaged about the premises or works and must (where it is practicable, in the Director of Engineering, Parks and Environment opinion) keep any roadway open for travel for the use of the public for such width as the Director of Engineering, Parks and Environment may direct. The Developer must also provide a sufficient number of "NO THOROUGHFARE", "DETOUR", or other signs or notices, as determined by the Director of Engineering, Parks and Environment, which he must cause to be placed at distance from the obstruction to serve sufficient warning to the travelling public and maintain such signs in good order in conspicuous places wherever any roadway, sidewalk or thoroughfare is torn up or dangerous, and so long as it remains unsafe or unfinished. All vehicular or pedestrian traffic warning, control or barrier devices shall be provided in accordance with the Traffic Control Manual for Work on Roadways as published by the BC Ministry of Transportation and shall be subject to the acceptance of, or conditions of, the Director of Engineering, Parks and Environment.

GR4.16 Disposal of Debris

A refundable deposit of $10,000 is required on all developments where there is demolition of buildings. This security is held until there is evidence that this debris was properly disposed at a licensed landfill site. Upon receiving a copy of the disposal receipt, the City will authorize the release of the refundable $10,000 deposit.

GR4.17 Easement Releases

On completion of the Work on private or City property or City rights-of-way, the Developer shall obtain from each property owner affected, a formal release in writing and over the Owner's signature, verifying that the clean-up has been performed and completed to the Owner's acceptance and that the Owner has no further claim upon the Developer or the City as a result of such work. A Form of Release shall be required by the Director of Engineering, Parks and Environment.

All such releases shall be turned over by the Developer to the Director of Engineering, Parks and Environment and shall be retained by the Director of Engineering, Parks and Environment as a part of the City's records.

GR4.18 Arbitration

In the case of any dispute between the City and the Developer during the progress of the Work or afterwards, as to any matter arising thereunder, either party may at his option give to the other notice of such dispute and demand arbitration thereof; and the parties may with respect to the particular matters then in dispute, agree to submit the same to arbitration in accordance with the laws of the Province of British Columbia; provided, however, that if arbitration has not been agreed upon either party may elect to have such dispute determined by a Court of competent jurisdiction. Arbitration shall not be a cause for the stoppage of work.

GR4.19 Maintenance Period for Works and Services Except Street Tree and Boulevard Plantings

Upon completion of the works and services, the Developer shall notify the Director of Engineering, Parks and Environment, who shall issue a letter of substantial completion upon

satisfactory inspection of the Work to determine conformance to the approved drawings and specifications.

The Maintenance Period shall be the one year period from the date shown on the Director of Engineering, Parks and Environment letter of substantial completion.

The Developer shall guarantee the stability and sufficiency of the materials and workmanship supplied and the whole of the Work performed and shall be responsible for and shall make good all defects, imperfections, vandalism acts and settlements which become apparent during the Maintenance Period.

The Developer shall ensure that the roads and sidewalks are kept clean and free of dirt and debris during the Maintenance Period.

Should the Developer fail to make good any defects, imperfections, vandalism acts, settlements or clean-up after being given at least seven days notice in writing during the Maintenance Period, the City shall be entitled to make alternative arrangements for the execution of the repairs and to recover the costs from the Developer.

GR4.20 Maintenance Period for Street Tree and Boulevard Plantings

Upon completion of the plantings, the Developer shall notify the Manager of Parks Operations who shall issue a letter of substantial completion upon satisfactory inspection of the Work to determine conformance to the approved drawings and specifications.

The Maintenance Period, which is responsibility of the Developer, shall be the one year period from the date shown on the letter of substantial completion.

During the Maintenance Period, the Developer shall replace any plant material that dies, is damaged or that fails to grow satisfactorily as determined by the Manager of Parks Operations. All replacements shall be with plant material of the same kind and size as the original plantings. The warranty on replacement plant material shall extend for a period equal to the original warranty period.

Should the Developer fail to make good any defects, imperfections, vandalism acts, settlements or clean-up after being given at least seven days notice in writing during the maintenance period, the City shall be entitled to make alternative arrangements for the execution of the repairs and to recover the costs from the Developer.

The Manager of Parks Operations reserves the right to extend the Developer's warranty responsibilities for an additional year if, at the end of the initial warranty period, leaf development, growth or overall vigour is not sufficient to ensure future survival.

GR5 AGREEMENTS, BONDING, INSURANCE, PERMITS

GR5.1 Servicing Agreement

Prior to commencement of construction, a Servicing Agreement will be required in accordance with Clause 10.1.2 of this Bylaw if the value of the estimated construction costs are greater than $100,000. The purpose of the Servicing Agreement is to protect the City against claims (including liability) for matters arising from the construction, installation, and inspection of the Work. It also allows for provisions which enable the Approving Officer to consider signing of the Subdivision Plans prior to the start and/or completion of the Work. The Servicing Agreement makes provision for the Security Deposit, Indemnity Clause, Insurance Requirements, Maintenance Periods, and Administration Fees.

The following shall be submitted by the Developer in the preparation of a valid Servicing Agreement:

a) Two copies of the Servicing Agreement will be prepared by the Engineering Department. The Agreements must be signed and sealed and returned to the Engineering Department.
b) Security Deposits (which may be cash or a Letter of Credit) in the amount and form specified by the Engineering Department. This deposit will be based on the estimated construction cost for the works to be constructed. Letters of Credit must note the City Project number to which they apply.
c) A Design Bond (which may be cash or a Letter of Credit) if applicable.
d) A Certificate of Insurance in accordance with the requirements of the Servicing Agreement.
e) Two complete sets of drawings which must be identical to the drawings accepted for construction.

A non-refundable Inspection and Administration Fee is based upon the estimated cost of construction prepared by the Developer's Engineer.

The rates are: Estimated Construction Costs	Fees Payable
<$100,000	6.0 %
$100,000 to $250,000	5.5 %
$250,001 to $500,000	5.0 %
>$500,000	4.5 %

GR5.2 Security Deposit

The City will require a security deposit from the Developer, acceptable to the Director of Engineering, Parks and Environment, to ensure the construction, installation and maintenance of the Work as identified in the Servicing Agreement.

GR5.3 Indemnity Clause

As stipulated in the Servicing Agreement the Developer covenants to save harmless and effectually indemnify the City against:

a) All actions and proceedings, costs, damages, expenses, claims, and demands whatsoever and by whomsoever, brought by reason of the performance of the Work.
b) All expenses and costs which may be incurred by reason of the execution of the Work resulting in damage to any property owned in whole or in part by the City or which the City by duty or custom is obliged, directly or indirectly, in any way or to any degree, to construct, repair or maintain.
c) All expenses and costs which may be incurred by reason of liens for non payment of labour or materials, Workers' Compensation assessments, Unemployment Insurance, Federal or Provincial Tax, and for encroachments owing to mistakes in survey.
d) All actions and proceedings, costs, damages, expenses, claims and demands arising from the Developer/Contractor's trespass or damage to private property or properties owned by persons other than the City.

If any monies are paid by the City because of failure of the Developer to execute this clause, then all such monies, and reasonable expenses attached, shall be chargeable to the Developer.

GR5.4 Public Liability and Property Damage

Prior to the commencement of any work, the Developer/Contractor shall obtain and maintain in force during the term of the Servicing Agreement and the Maintenance Period, a policy of insurance acceptable to the City with limits not less than those shown in the following items:

a) Comprehensive Public Liability Insurance and Property Damage Insurance providing coverage of at least $5,000,000 inclusive against liability for bodily injury or death and/or damage to property on an all risk occurrence basis.

b) Motor Vehicle Insurance for public liability and property damage providing coverage of at least $5,000,000 inclusive on owned, non-owned or hired vehicles.

c) Completed operations coverage on all-risk occurrence basis of at least $5,000,000 inclusive against liability for bodily injury, death and/or damage to property of others arising out of the existence of any condition in the Work when completed or any installation or repair operations during the Maintenance Period.

In all policies of insurance providing coverage called for by this clause (except motor vehicle insurance), the City shall be named as an additional insured, and all such insurance shall contain a provision that the insurance shall apply as though a separate policy has been issued to each named insured. In all such policies, each contractor engaged in the Work shall be named as an additional insured in respect of the performance of the Work, and each such policy shall provide that no expiry, cancellation or material change in the policy shall become effective until after thirty days notice of such cancellation or change shall have been given to the City by registered mail. The Developer shall maintain the insurance policy until the end of the Maintenance Period.

As a condition precedent to the issuing of Permission to Construct, the Developer shall be required to deliver to the City an Insurance Certificate signed by a licensed insurance agent. The Developer shall submit the certification along with a copy of the insurance policy.

GR5.5 Patents and Copyrights

The Developer shall pay all royalties, patent and licence fees and hold and save the City, its officers, agents, servants and employees, harmless from liability of any nature or kind, including costs and expenses, for or on account of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, articles, or appliances manufactured or used in the execution of the work, including their use by the City, and if the Developer shall fail to save the City, its officers, agents, servants and employees in manner aforesaid any monies collected from the City, its officers, agents, servants and employees by reason of such failure shall be recoverable from the Developer.

GR5.6 Permits

Work undertaken on a Highway or on a gazetted or otherwise dedicated Highway right of way or all full or partial road closures require approval of the Director of Engineering, Parks and Environment by way of a Highway Use Permit issued under the Highway Use Bylaw No.2402.

GR6 INSPECTION AND SECURITY DEPOSIT EXCEPT STREET TREE AND BOULEVARD PLANTINGS

GR6.1 Inspection of the Work

The Director of Engineering, Parks and Environment may inspect any part of the Work and any other places where material for the work is being prepared or stored as and when he/she deems it necessary, and the Developer shall afford him every necessary facility and access.

The Developer shall also supply representative samples of materials as and when requested by the Director of Engineering, Parks and Environment. Furthermore, the Developer shall provide any available competent labour required by the Director of Engineering, Parks and Environment on site in connection with survey, measurements, inspections, and testing of the Work. No payment shall be made for the cost to the Developer of any labour, material, work or delay occasioned by this requirement.

The Developer shall at the request of the Director of Engineering, Parks and Environment and within such time as the Director of Engineering, Parks and Environment shall designate, open for inspection any part of the Work that has been covered up. If the work thus uncovered is found to be to the acceptance of the Director of Engineering, Parks and Environment, the expense of the opening up shall be paid by the City.

Inspections by the Director of Engineering, Parks and Environment are limited to ensuring that the Work is in compliance with the standards stipulated in this Bylaw and that the finished product will be in general conformity with the intent of the accepted plans and in a condition acceptable to the City. They do not constitute supervision or coordination of the Work, and neither are they intended to serve in place of proper engineering supervision of the Work by the Developer's Engineer.

The Developer is responsible for making arrangements to ensure proper engineering supervision and coordination of the Work and for ensuring that all requirements of the City are met and completed within the stipulated time limits.

GR6.2 Security Deposit Reductions

As the works progress the Developer's Engineer shall prepare and submit an estimate of the quantity, value and percentage of the Work completed. Upon verification of the estimate the Director of Engineering, Parks and Environment may release security deposit held by the City to a maximum of 75% of the value of the works completed.

Reductions may be denied by the Director of Engineering, Parks and Environment, where in his/her opinion it is required to cover the remainder of the Work. No release period shall be less than one month. Security reductions are for the convenience of the Developer and in no case shall be taken as acceptance of the material and work or as a release of the Developer from his responsibilities for the Work.

GR6.3 Certificate of Substantial Completion

On the completion of the Work the Developer shall notify the Director of Engineering, Parks and Environment. The Director of Engineering, Parks and Environment shall, on receipt of notice, inspect the Work and, if necessary, issue a list of deficiencies that must be corrected. Upon correction of the deficiencies, to the acceptance of the Director of Engineering, a Certificate of Substantial Completion shall be dated and issued where upon all the monies held by the City shall be released, less 15% of the cost of the total works plus the value of any deficiencies.

GR6.4 Record Drawing Release

Within 60 days of the issuance of the Certification of Substantial Completion, the Developer shall deliver to the Director of Engineering, Parks and Environment:

a) service record cards, provided by the City, showing the location of water, storm, and sanitary services for each lot,
b) record drawings consisting of 2 sets of signed and sealed paper prints, and 1 set of drawing files in DWG or DFX format,
c) Any Inspection Certificates.

On acceptance and review of the service record cards and record drawings, the City will release all security withheld less a Maintenance Holdback of 15% of the total secured cost of the Work to insure payment of any maintenance or repair. The value of any deficiencies will be held in addition to the above amounts.

GR6.5 Maintenance Holdback Release

The Director of Engineering, Parks and Environment will release the Maintenance Holdback, less the cost of any repairs chargeable to the Developer, upon expiry of the Maintenance Period when so requested in writing by the Developer.

The Maintenance Holdback does not apply to BC Hydro or Telus approved installations.

GR6.6 BC Hydro and Telus Poles

The Director of Engineering, Parks and Environment will review all rezoning, development and subdivision applications for the removal of all utility poles along the frontages of the development site, including B.C. Hydro and Telus poles. This will include, as part of this removal, replacing the overhead wiring with underground ducting and wiring/cable. A developer

shall include a "cash-in-lieu" contribution, if it is determined that the poles cannot be replaced until some time in the future.

GR6.7 Testing or Confirmation of Works Completed

The City reserves the right to conduct independent testing of any works constructed or being constructed. Generally, these tests will be conducted on a random basis and are for the expressed purpose of ensuring that the Work being accepted by the City meet the minimum acceptable standards.

In addition, to ensure the City has proper and accurate records of the works constructed, survey spot-checks may be conducted from time to time to verify the authenticity of the as-built information.

The costs for testing or surveying shall be borne by the Developer.

GR6.8 Issuance of Building Permits

In new subdivisions where City services are being installed, all essential services (water, storm and sanitary systems, lot grading, road base, first lift of asphalt and curbs) shall be in place and accepted by the Director of Engineering, Parks and Environment, prior to the issuance of Building Permits.

GR7 INSPECTION AND SECURITY DEPOSIT FOR STREET TREE AND BOULEVARD PLANTINGS

GR7.1 Inspection of the Work

The Manager of Parks Operations may inspect any part of the Work and any other places where material for the Work is being prepared or stored as and when he deems it necessary, and the Developer/Contractor shall afford him every necessary facility and access.

The Developer shall also supply representative samples of materials as and when requested by the Manager of Parks Operations. Furthermore, the Developer/Contractor shall provide any available competent labour required by the Manager of Parks Operations on site in connection with survey, measurements, inspections, and testing of the works. No payment shall be made for the cost to the Developer of any labour, material, work or delay occasioned by this requirement.

The Developer shall at the request of the Manager of Parks Operations and within such time as the Manager of Parks Operations shall designate, open for inspection any part of the Work that

has been covered up. If the Work thus uncovered is found to be to the acceptance of the Parks Operations Manager the expense of the opening up shall be paid by the City. Inspections by the Manager of Parks Operations are limited to ensuring that the Work is in compliance with the standards stipulated in this Schedule and that the finished product will be in general conformity with the intent of the accepted plans and in a condition acceptable to the City. They do not constitute supervision or coordination of the Work, and neither are they intended to serve in place of proper supervision of the Work.

The Developer is responsible for making arrangements to ensure proper supervision and coordination of the Work and for ensuring that all requirements of the City are carried to a satisfactory conclusion within the stipulated time limits.

GR7.2 Planting Completion Certificate

Upon completion of street tree and boulevard plantings, the Developer shall notify the Parks Operations Manager who shall inspect the Work and, if necessary, issue a list of deficiencies that must be corrected. Upon correction of the deficiencies, to the acceptance of the Parks Operations Manager, a letter of completion shall be dated and issued. Upon issuance of a letter of completion by the Manager of Parks Operations, the City will release the security held for the Street Tree and Boulevard Plantings, less a maintenance holdback of 15%.

GR7.3 Maintenance Holdback

The maintenance holdback of 15% shall be held for the one year period next ensuing from the date shown on the letter of completion. The maintenance holdback shall be released after the expiration of the one year Maintenance Period and the completion of all maintenance requirements.

Replacement plant material shall be warranted for a period equal to the original warranty period.

End of Schedule “A”

SUBDIVISION AND DEVELOPMENT SERVICING BYLAW

SCHEDULE "B"

DESIGN CRITERIA MANUAL
(see Document 80364)

I N D E X

DESIGN CRITERIA MANUAL

SECTION G - GENERAL

SECTION G - GENERAL

For convenience of reference, Section G Index is duplicated as follows:

SECTION G – GENERAL

G1 INTRODUCTION

The purpose of this section is to outline the minimum standards and requirements the City of Langley will accept in the design and record drawing submissions for engineering works.

Design Engineers remain fully responsible for the design and construction of City Infrastructure in accordance with good engineering standards adequate to address the site specific needs and site conditions of the project.

Quality submissions of design and record drawings are expected. It is recommended that whenever engineering works are required or proposed, the Design Engineer arrange a pre-design meeting to ensure compliance with the latest municipal standards, specifications and policies.

Incomplete or substandard submissions will be returned to the Developer without comment on the drawings and with a short letter of explanation as to why the drawings are being returned. A subsequent re-submission which remains incomplete or substandard will result in a request to meet with the Design Engineer, the Developer and the Director of Engineering, Parks and Environment.

Where a question arises, please contact the Engineering Department for clarification.

All submissions shall comply with all applicable requirements of the following City of Langley Bylaws and Design references:

(a) Subdivision and Development Control Bylaw
(b) Zoning Bylaw
(c) Highway Use Regulation Bylaw
(d) Traffic Regulation Bylaw
(d) Waterworks Regulation Bylaw
(e) Sanitary Sewer and Storm Sewer Rates and Regulation Bylaw
(f) Drainage Bylaw
(g) Watercourse Protection Bylaw
(h) Design Criteria Manual
(i) Standard Drawings
(j) Supplementary Specifications
(k) Master Municipal Construction Documents (MMCD)
(MMCD Green Design Guidelines- where appropriate)
(l) Soil & Other Material Deposit Regulation Bylaw

G2 SURVEY INFORMATION

All surveys shall be conducted in a safe manner so as not to create a nuisance to traffic or the public at large. The permission of the registered owners is required before entering private property.

All elevations shall be from the Geodetic Datum. Information regarding the location and elevation of benchmarks or monuments may be obtained from the Engineering Department.

Originating benchmarks and survey monuments in the immediate area shall be noted on all plans as well as those to be established in the Work. All legal surveys in the City shall be tied to the Global Positioning System Network (GPS) as set by the GVRD and the existing integrated monument system.

Copies of legible field notes shall be made available to the City upon request.

Centrelines (or offset lines) are to be marked and referenced in the field and all drainage shall be keyed to the legal posting.

All existing items, such as monuments, manholes, catchbasins, fire hydrants, poles, existing dwellings, fences, trees, hedges and unusual ground conditions, shall be noted on the drawing.

Where applicable, cross sections will be required. The sections shall include centreline, edge of pavement or gutter line, edge of shoulder, ditch invert, top of ditch, property line, and an existing ground elevation inside property line.

The drainage “as constructed” drawings shall be supplied by the Engineering Department or if acceptable, as established by previous engineering designs. Generally, the diameter of drainage pipes shall increase from left to right. North shall be at the top or right side of a drawing.

G3 DRAWING SUBMISSION

All drawings shall be prepared in accordance with the following requirements, all other applicable requirements of this document, and the City of Langley Subdivision and Development Bylaw:

All drawings, except for the street tree and boulevard planting plan, shall be signed and sealed by a Professional Engineer registered in British Columbia.

The street tree and boulevard planting plan shall be signed and sealed by a Landscape Architect registered in British Columbia or a Landscape Designer.

The City will supply to the Design Engineer, an electronic copy of the City's standard title block and drafting standards. The City Project Number must conform to the City's drawing guidelines.

All drawings shall clearly identify the works in sufficient detail. Road cross-sections are to be provided with good quality and clarity.

All new works are to be drafted in bold lines.

Notes pertaining to the construction of a service are to be shown on that service drawing.

Survey baseline is to be referenced to legal lot lines and illustrated on each sheet. Chainages are to be shown on profile in even 10 metre intervals.

Offsets are to be shown to both sides of the road allowance or to one side with the road allowance width annotated.

Plans shall show the legal layout of roads and properties, with all legal descriptions (lots and plan numbers) and dimensions (to the nearest 0.01 m). Also show existing house numbers and all registered statutory rights-of-way.

A complete set of engineering design drawings shall include, in the following sequence:

G3.1 Cover Sheet

Noting the Consultant's name, the Developer's name, address and telephone number, the City File Number, the legal description of the lands involved, a Site plan at a 1:5000 scale, and an index.

The site plan shall note all proposed roads and the proposed subdivision layout. The cover sheet may be utilized to show the drainage catchment area.

G3.2 Key Plan

The Key Plan shall be at a 1:500 scale and shall note all proposed services, including street lighting and all non-standard connection offsets. If more than one sheet is required, note the westerly or southerly portion first and identify as Key Plan "A" with additional plans noting "B" and "C", etc. The development site is to be outlined with a bold line.

If a profile drawing is not required for a utility, then the service connection depths and inverts are to be noted on the Key Plan.

G3.3 Storm Water Management Plan

Shall be at 1:500 scale and identified as per key plan system if more than one sheet is required. The Storm Water Management Plan shall include:

a) the pre-development contour lines at maximum 1 m intervals. This topography shall extend a minimum 30 m outside the development site;

b) all existing lot corner elevations (uncircled);

c) all proposed lot corner elevations (circled);

d) the proposed building envelop with the Minimum Building Elevation (MBE). All MBE's are to be set above the hydraulic grade line of the 1:100 year storm;

e) the slope of the lot (directional arrow), noting a minimum 1% grade on the lots and lot dimensions;

f) the minor (1:5,1:10 or 1:25 year) storm sewer system with the flows noted per section and the accumulated flows from all upstream sections. Provision must be made for upstream development potential where applicable;

g) the major (1:100 year) storm sewer system with the flows noted per section and the accumulated flows from all upstream sections. Where the hydraulic grade line of the major flow is within the storm sewer or below the ground surface, a note identifying its location shall be marked on the drawings. Overland or surface flows shall be identified with a wide directional arrow. Provision must be made for upstream development potential where applicable;

h) all swales required in the Storm Water Management Plan. Where grading is not feasible to direct surface drainage away from adjacent lots, swales shall be incorporated generally on the upstream side of the downstream lot. A City standard form private easement is required over any lot accepting directed drainage from upstream lots. In addition, when a swale is proposed over several lots, a lawn basin, connected to a storm sewer system, is to be provided at every third lot;

i) No surface drainage shall be proposed to flow off-site over adjacent lands. Attempts should be made to "meet" existing elevations along the development boundary;

j) a legend noting all items proposed in the Storm Water Management Plan. Applicable general notes should also be included;

k) a site plan showing the catchment areas involved. This generally can be at a scale of 1:5000 and set as an insert on the sheet. Where this is not physically possible, it is suggested that the catchment areas be noted on the Cover Sheet. Size of catchment areas in hectares and run-off coefficients are to be noted;

l) all catchbasins are to be shown with rim elevations;

m) storm connections to be shown on Plan;

n) fill over 0.45 m is to be shaded, with fill over 1.0 m highlighted;

G3.4 Road and Water

Plan and profile drawings shall show all grades, inverts, curbs, radii, valves, hydrants, bends, ground profiles at property lines, centreline of existing road, elevations at curb returns and at quarter points, wheelchair letdowns, trees, fences, retaining walls, etc. The scale shall be 1:500 for plans and 1:50 for profile. The full pipe shall be shown for the watermain on the profile. All crossover points with sewers shall be noted and where the watermain is below any sewer, or is less than *0.5* m above any sewer, the watermain shall be protected in accordance with the Fraser Health Authority requirements. On the plan, a list of the watermain fittings is to be "boxed in" for each location and tied to chainages. On the profile the fittings are to be shown and the chainages indicated. Standard road cross sections are to be shown.

G3.5 Storm and Sanitary Sewers

Plan and profile drawings shall show grades, inverts, manholes, catch basins, etc. The scale shall be 1:500 for Plan and 1:50 for profile. Symbols to denote the service connection elevation at the property line shall be shown on the profile plan, as well as the minor and major system hydraulic grade lines. The full pipe shall be shown on the profile. All rim elevations are to be noted. All connection inverts and depths at the property line are to be shown on the plan.

G3.6 Road Cross Sections

Shall be scaled at 1:100 horizontal and 1:50 vertical and shall note the existing ground elevation, the proposed elevations of the road centreline, the curb and gutter (or road edge) and property lines. Cross-sections are required at 10 m intervals. Additional sections may be required or requested where excessive cuts or fills are involved. These plans may be by hand, provided they are of good quality and clarity. Side and back slopes are to be shown. Each sheet shall have a typical cross section.

G3.7 Ornamental Street Lighting Plan

Shall be a 1:500 plan of the proposed street lighting, signed and sealed by a Professional Engineer qualified to do street light calculations. There shall be general notes included on the plan noting references to the City standards and specifications and the appropriate design criteria. Generally, street lights shall be located at all intersections and within 1m of the property lines. All street lighting plans shall be accompanied by photometric calculations together with the make and model of luminaire proposed.

G3.8 Street Tree and Boulevard Planting Plan

Shall be a 1:500 plan of the proposed street tree and boulevard treatment designed, signed and sealed by a Landscape Architect or a Landscape Designer. The plan shall show:

a) The location of the plant material with respect to curb, sidewalk, underground utilities, overhead utilities, driveway locations, mailbox locations, and street lights;

b) Planting detail as per City standard drawings pertaining to street tree and boulevard plantings;

c) Plant list showing quantity, botanical name, common name and size of proposed trees;

d) Surface treatment of proposed boulevard strip;

e) Notation on drawing that "Final location and species selection shall be to the satisfaction of the “Manager of Parks Operations";

f) Standard notes as required by the Management of Parks Operations.

G3.9 Sediment Control Plan

Shall show all proposed controls to prevent the release of sediment into any ditch, storm sewer, watercourse or ravine, as outlined in Section “D” item D9.11 – Siltation Controls

G3.10 - Construction Details

Shall show all proposals for construction which are not covered or specifically detailed in the City’s standards and specifications. Where there is a City standard, the Standard Drawing number may be quoted. It is not always necessary to include details for which there is a Standard Drawing.

G3.11 Standard Note Sheet

A copy of City of Langley's standard note sheet is available to consultants free of charge. This sheet is not to be changed in any way and is to be included as the last page of all submissions.

G3.12 Seal and Signature

The Design Engineer's original seal and signature shall be placed on all sheets of all design submissions except for the street tree and boulevard planting plan which shall be

signed and sealed by a registered Landscape Architect or Landscape Designer. Failure to do so will result in the plans being returned without comment. The Design Engineer's seal and signature shall infer that all works as proposed are structurally sound, comply with the applicable design criteria of this manual, and good Engineering practice.

G3.13 Other Requirements

Notwithstanding the previously detailed requirements, the following additional information is to be noted in design submissions:

a) the size, grade, inverts, and type of material on profile sections

b) the locations, offsets, curvatures, size and identification of the mains noted on the Plan sections

c) the clearance between mains at all cross-over points

d) all existing Structures, including houses, sheds, fences, wells, septic tanks and fields, shall be shown on the appropriate drawings, with a notation indicating their fate (i.e. to be removed, filled, etc.)

e) survey monument locations and indicate which ones are to be relocated or re-established.

f) consultants are requested to fold all drawings to facilitate processing. The Standard Title Block is to be located at the bottom right hand comer of the cover sheet for drawing sets to be included in the Servicing Agreement.

G3.14 First Submission

The first complete design submission shall consist of:

a) three complete sets of drawings complete with street lighting and street tree plantings.

b) two additional sets of water system drawings including a site and key plan with each set (for Fraser Health Authority approval)

c) soils report to verify road structure design (Soils reports are required on all new road construction design)

d) all applicable utility calculations (water, sanitary, storm sewer).

G3.15 Submission Revisions

Subsequent design submissions requiring changes to the previous submission shall consist of:

a) three complete sets of drawings

b) a complete construction estimate

c) all submissions subsequent to first submission shall have highlighted with yellow any changes made by the Design Engineer which are in addition to "Red Line" changes required by the City

d) items "Red Lined" must be addressed by the Design Engineer. Failure to do so will result in submissions being returned.

G3.16 Final Submission

The final submission for city acceptance shall consist of:

a) three complete sets of drawings

G4 CONSTRUCTION COST ESTIMATE

The Developer will provide a detailed format for the breakdown of the construction cost estimate. These items and costs will be reviewed and amended if necessary.

All Hydro and Telephone installation costs are to be bonded, and are to be included in the calculation of the Administration fee.

G5 SERVICE RECORD CARDS

The Engineering Department will provide, on request, a sufficient number of service record cards for each development. These cards are to indicate clearly and accurately the location, size, etc., of each city utility connection. Service Record Cards are considered part of the Record Drawing submission.

G6 RECORD DRAWING SUBMISSION

The following procedures shall be followed in the submission of Record Drawings:

a) The Developer's Engineer shall submit two complete sets of paper prints, except for the road cross-section sheets, and a complete set of connection cards for City review.

b) One marked-up set of the Record Drawing paper prints will be returned to the Design Engineer for revision. If there are minor changes, the mylar may be revised. If amendments are numerous, it is likely that the Design Engineer will be requested to resubmit two sets of revised paper prints for a second review. The City File Number will have been noted on each drawing for identification of the mylar drawings and the micro-films.

c) Record drawings shall be presented as follows:

(i) Key plan noting water, sanitary, storm mains, street lights, roadworks, bench marks and monuments. The plan shall show the "as-constructed" offsets for those works and the locations of all service connections relative to the lot lines.

(ii) Detailed plan profile drawings for water, sanitary, storm and roadworks. Elevations, inverts and offsets to show the works "as constructed". The profile drawings for the utilities shall state the pipe materials used.

(iii) Where required in the design submission, the stormwater management plan including lot grading. The plan shall note the elevations at all lot corner pins, lawn basin and catch basin rims and swale inverts. Uniform grades between lot comers will be assumed (to a tolerance of $\pm$ 100 mm).

(iv) Street light drawings shall show make, model and type of luminaire unit and locations of service bases and photocells.

(v) Plans of details for which there is no City standard (pump stations etc.).

(vi) In all cases notes with instructions to the Contractor are to be removed or amended to indicate the results of construction. Previously existing works that have been deleted as a result of construction, or reconstructed in accordance with design shall be removed or amended to show works as constructed. It is intended that the record drawings shall show the works

as they have been constructed in order to provide accurate and detailed information when adding to, or maintaining, the works shown on the plans.

(vii) The Record Drawings shall be submitted together with service connection cards as shown in the Standard Drawings.

d) When the City is satisfied with the Record Drawings submission, the Design Engineer will be requested to submit the following:

(i) One set of mylar drawings identified in bold letters with the words "CERTIFIED RECORD DRAWINGS". Mylars shall not be taped together, and where originals are taped, every attempt should be made to match printing densities of the component parts. Mylars will not be signed and sealed. The City File Number must be added to the mylar drawings.

(ii) One set of paper prints with the following certification:

"I certify this drawing represents the works and services as designed, installed, and inspected."

The signature and seal shall be by the Engineer who personally performed or personally supervised the required inspections. One set will be retumed to the Design Engineer upon acceptance by the City.

(iii) One set of drawing files in DWG or DXF format on diskettes or cd.

(iv) One copy of a Certificate of Inspection. This form is to be signed by the Design Engineer.

e) Once accepted by the City, the Engineering Department will automatically authorize a reduction of the security deposit, to reflect the acceptance of the drawings and the service connection cards.

DESIGN CRITERIA MANUAL

SECTION R - ROAD

SECTION R - ROAD

For convenience of reference, Section R Index is duplicated as follows:

SECTION R – ROAD

R1 INTRODUCTION

All roads in the City shall be designed in accordance with the recommended practice as outlined in the City of Langley Design Criteria Manual, Standard Drawings, Master Transportation Plan, Traffic Calming Policy, Supplemental Specifications and relevant City Bylaws, "Geometric Design Guide for Canadian Roads", (1999 Edition), by the Canadian Transportation Association (TAC), Institute of Transportation Engineers Guidelines (ITE) and Master Municipal Construction Documents (MMCD) 2000 Edition, (Gold Book), amended from time to time, or as accepted by the Director of Engineering, Parks and Environment.

R2 CLASSIFICATONS

The City will advise the Developer of the Classification of each road within or adjacent to any particular development. The design of these roads shall be in accordance with the Standard Drawings for each road type. Generally, the following criteria will be applicable, although traffic volumes, cut and fill slopes, the requirement for turn lanes and predominant type of development may require adjustment to these widths:

Classification	**Right,-of-Way Width (m)**	**Pavement Width Curb to Curb (m)**	**Standard Drawing #**
Arterial Divided (incl median) **(1)(3)**	24-35	15-27	SDR 002
Arterial Undivided**(3)**	25-30	15-20	SDR 003
Collector (Commercial & Industrial)**(3)**	25	15-20	SDR 003
Collector (Residential) **(2)(3)**	20-22	12.5	SDR 003
Local (Residential)**(3)**	18-20	8.6-12.5	SDR 003
Local (Commercial)**(3)**	20	12.5	SDR 003
Local (Industrial)**(3)**	22	12.5	SDR 003
Lane **(4)**	6.0	6.0	SDR 007

Notes:

(1) 20 m pavement on 28 m ROW for 4 lanes; 27 m pavement on 35 m ROW for 6 lanes.

(2) 12.5 m pavement in areas of predominantly multi family developments.

(3) Bicycle Routes: Refer to the Master Transportation Plan – Appendix "C" for additional pavement width requirements.

(4) 8.0 to 8.5m lane width may be required by the Fire Department in certain areas of the City.

R3 GRADES

The maximum longitudinal grades generally shall be as follows:

a)	local residential roads	8%
b)	cul-de-sac	8%
c)	collectors, industrial and commercial roads	8%
d)	arterials	6%

The minimum longitudinal grade generally shall be 0.5%.

Where topographical constraints restrict the attaining of the minimum or maximum grade, the Director of Engineering, Parks and Environment may consider variations to the above limits. Under no circumstances should the grades be less than 0.35 % or more than 12%.

Where sidewalks are required refer to Section on Sidewalks.

R4 CROSS-SLOPES

Standard cross-slopes on streets shall be 2% with the crown point in the center of the pavement.

Where extreme topography is involved, limited local roads may be designed with cross-slopes from 1% to 3% and with one-way cross falls subject to the acceptance of the Director of Engineering, Parks and Environment.

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R5 HORIZONTAL AND VERTICAL CURVES

Horizontal and vertical curves shall be governed by the design speed of the road as follows:

a)	Locals	50km/h
b)	Collectors	60km/h
d)	Arterials	60km/h

The criteria contained in the TAC "Geometric Design Guide for Canadian Roads" concerning horizontal and vertical curves shall be followed.

R6 CURB RETURNS

Curb return radii shall be as follows:

		Intersection with	
	Local	**Collector**	**Arterial**
Lanes	3m	with 3:1 flare to property comers	
Locals	7m	9m	l1m
Industrial Locals	9m	l0m	l1m
Collectors	9m	l0m	l0m
Arterials	11 m	l0m	*

*Curb return radii at arterial roads require specific designs taking into account projected volumes, turning movements, truck traffic, whether turning lanes are provided, etc.

The Director of Engineering, Parks and Environment may require variations to protect pedestrians and to preclude instances where awkward geometry may otherwise result in vehicles turning into the path of other oncoming vehicles.

Corner truncations shall be required at all street corners to maintain a minimum 3 m distance from curb face to property line.

R7 CUL-DE-SACS

Design of cul-de-sacs shall follow the applicable Standard Drawings.

The following minimum radii shall apply:

Road	Pavement Radius	ROW Radius
Residential	11.5	15.5
Multi Family Residential	14	17
Commercial	14	17
Industrial	15	l8.5

The design of cul-dc-sacs is not limited to the above and the designer may propose alternatives provided that good engineering practice is followed. Alternative designs are subject to review by the Director of Engineering, Parks and Environment.

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R8 TEMPORARY TURNAROUNDS

In cases where the proposed road exceeds 50 m in length and is to be extended in the future, temporary turnarounds shall be required.

A temporary turnaround can be by way of a hammerhead design. See Standard Drawings for details.

R9 INTERSECTIONS

Particular attention shall be given to the design of all intersections. The designer should employ good engineering practice as set out by TAC in assessing the following concerns:

a) Approach grades and grade transitions
b) Crossing sight distance
c) Design speeds
d) Intersection cross-slopes
e) Curb Returns
f) Intersection alignment

Specifically, grades of major and minor roads at intersections shall be adjusted where topographic or other conditions dictate the use of maximum or near maximum permissible grades. Such adjustments are essential to provide reasonable stopping opportunities during extreme roadway icing conditions.

RI0 CROSS SECTION CONSIDERATIONS

The basic design road width and thicknesses shall be determined by:

a) The Standard Drawings applicable and,

b) The results of soils tests and analysis of Benkleman Beam tests, or by the CBR asphalt pavement design method. (See also Section on Road Base and Pavement Design)

Maximum side slope in earth fills or cuts shall be 1.5H: lV. Flatter slopes shall be used where unstable soil conditions are encountered. If cut or fill slopes extend beyond the road allowance, a right-of-way sufficient to support the slope plus 1 m shall be registered in favour of the City.

In developed urban areas, wherever the side slopes beginning at a point 600 mm from the back of the sidewalk create a depth of vertical cut or fill at the existing property line in excess of 600 mm at 2H: 1V slope, a concrete retaining wall shall be constructed unless otherwise permitted by the Director of Engineering. Retaining walls, if required, shall be placed within private property, adequately drained, contain a vehicle and pedestrian access to each property, and be equipped with railings.

Where applicable, the design shall ensure that the road cross-sections are established to accommodate the Major Flood Path Routing.

R11 ROAD BASE AND PAVEMENT DESIGN

The structural design of the road pavement shall be adequate for an expected road life of 20 years under the expected traffic conditions for the class of road.

a) Existing Road Upgrading

Road construction and asphalt overlay design shall be based on the analysis of the results of the Benkleman Beam tests and test holes carried out on the existing road which is to be upgraded, or by the CBR asphalt pavement design method.

b) New Road Construction

The design of new roads shall be based on the results of the analysis of materials from test holes dug on the proposed road site at representative intervals, or by the CBR asphalt pavement design method.

Test holes and samples shall be undertaken by a qualified soils test company and all reports shall be signed and sealed by a qualified Geotechnical Engineer.

Where the Benkleman Beam design method is used, the Maximum Seasonally Adjusted Design Deflections (mean plus two standard deviations) shall be as follows:

Classification	Min Sub-base in Clay areas	Min Sub-base in sandy soils	Min Base mm	Min Asphalt		Max Seasonally Design Deflection(mm)	
						Base	Pavement
Arterial	450	200	100	60	40	1.45	0.75
Collector	450	200	100	60	40	2.10	1.15
Local	450	200	100	50	35	2.60	1.50
Lane	450	200	100	75	--	3.10	1.50
Industrial	450	n/a	100	60	40	1.75	1.00

(1). Recommended sub-base and base thicknesses are minimum requirements only. Site conditions, may dictate greater thicknesses of granular material to achieve design rebound.

(2). Where rebound readings are greater than the design reading for the base course, the subgrade should be investigated for potential weakened areas.

(3). The standard pavement material is hot mixed, machine laid, asphaltic concrete.

R12 PAVING PROCEDURE

The paving of all roads with curb and gutter shall be done in 2 lifts in thicknesses as stipulated in the Road Base and Pavement Design section.

a) The asphaltic base course shall be laid on a pre-determined and adequately compacted aggregate road base.

b) The final lift shall be laid on the primed asphaltic base course prior to one year from the completion inspection or at such time that all construction in the development is substantially complete and all foreseeable utility construction and service connections are complete.

c) The paving and upgrading of existing roads shall be done in accordance with the recommendations noted from the Benkleman Beam results. The designer shall conform to all City requirements for new road construction design.

d) When it is deemed physically or economically unfeasible to conform to new road construction design criteria, the Director of Engineering, Parks and Environment may consider alternatives outside the limits noted in this Manual.

R13 DRIVEWAYS

Refer to Highway Use Regulation Bylaw No.2402 for definitions, conditions and general regulations regarding driveways.

Residential driveway access to an arterial road is not permitted unless alternate access is not possible. Wherever physically possible, alternate local road access shall be dedicated to preclude residential driveways accessing directly onto arterial roads. Residential areas allow one driveway per road frontage. A second driveway is permitted for a corner lot, if the driveway is not on an arterial road. Upon demonstrated need and approval from the Director of Engineering, Parks and Environment more than one access may be granted to residential areas.

Driveway crossings, from the road pavement to the property line, shall conform to the applicable Standard Drawings. Each property shall have only one driveway access per road frontage. Upon demonstrated need and approval from the Director of Engineering, Parks and Environment more than one access may be granted to service stations, major commercial and other developments.

Driveways that will cross a ditch shall incorporate a culvert designed to handle a 1 in 5 year storm flow without surcharge. The culvert shall have a minimum size of 300 mm and a minimum length of 7 m. Ditches less than 0.5 m deep may be replaced by swales with french drains below. Deeper ditches shall require culverts at crossings.

Driveways in developments with barrier curbs will require letdowns to City standards. Refer to Highway Use Regulation Bylaw No. 2402 for general regulations regarding driveways of this type.

Refer to Highway Use Regulation Bylaw No. 2402 for driveways to commercial and industrial corner lots. See Standard Drawings for typical layouts. Where a residential, commercial or industrial comer lot adjoins a road of different classification, the driveway shall be constructed so as to access the road of the lower classification, except for service stations where access may be provided from both adjoining roads.

Driveway access grades shall be designed to permit the appropriate vehicular access for the zone, without "bottoming-out" or "hanging-up". From edge of pavement to property line, the driveway shall follow proper boulevard slope to drain towards the road. For the first 10 m on private property, the maximum driveway grade shall be 15% if accessing a local road. This maximum grade shall be limited to 10% if accessing a collector or arterial road, or if in a commercial or industrial zone.

At the discretion of the Director of Engineering, Parks and Environment, access to large parking areas shall be by curb returns rather than a driveway letdown. The Director of Engineering may require deceleration and acceleration lanes for access off major roads for safety reasons and to minimize disruption to traffic flows. Design of such access shall follow the recommendations in the British Columbia Supplement to TAC Geometric Design published by the Ministry of Transportation.

Single family and duplex residential properties shall have a minimum width of 3.5 metres to a maximum of 7.0 metres Multi family, commercial, and public parking uses, shall have a minimum of 4.5 metres to a maximum of 9.0 metres. Refer to Highway Use Regulation, Bylaw No. 2402 for minimum and maximum widths of driveways.

R14 EMERGENCY ACCESSES

The Director of Engineering, Parks and Environment may require the installation of a concrete emergency access, in development projects. The location, width and construction requirements must meet the Fire Department’s design criteria. Refer to Standard Drawing No. SDR 009.

Curb letdown shall be provided when an emergency access meets a road which has a barrier curb.

Temporary emergency accesses in urban developments will require a special design. The travel surface may be of asphalt and fencing may not be required. However, vehicular restriction devices must be designed for each end, as required.

R15 BOULEVARDS

Street trees and boulevard plantings of a species and spacing acceptable to the Manager of Park Operations will be required. Planting shall be in accordance with Standard Drawings pertaining to street tree and boulevard plantings.

Topsoil and seeding of boulevards may be required at the discretion of the Manager of Park Operations where it appears that the boulevards will not be developed or upgraded in the near future.

R16 SIGNAGE

All traffic signage and pavement markings required for each project will be installed by the City at the Developer's expense. Depending on the size of development, the Director of Engineering, Parks and Environment may require the Developer to engage an engineering consultant to provide traffic signage and pavement marking drawings to the City.

R17 DEVELOPMENT TRAFFIC ACCESS AND IMPACT STUDIES

The Developer may be required to perform a traffic and impact study to determine if there will be a significant impact and traffic concerns with the proposed development. The scope of the study must be approved by the Director of Engineering, Parks and Environment prior to initiation. Also a study will be required if, in the opinion of the Director of Engineering, Parks and Environment, any of the following conditions exists:

a) The proposed development will generate 100 or more additional peak direction trips (in-bound or out-bound) to or from the site during the adjacent street's peak hour or the development's peak hour.

b) The proposed development is adjacent to a roadway or intersection with localized safety or capacity deficiencies.

c) The development is in close proximity to a neighbourhood, that may have some concerns about potential problems associated with it, such as noise, traffic, and other major concerns of the residents.

d) Other specific local traffic problems exist which may affect the ability of the road system to accommodate the proposed development.

R18 CURBS, SIDEWALKS AND WALKWAYS

R18.1 Curbs and Gutters

All full urban roads shall be complete with concrete curbs and gutters on both sides of the road.

All commercial, industrial, and residential roads 12.2 m in width and wider shall have barrier curbs.

Residential roads 11 m or less in width shall have rollover curbs, except when next to schools, parks or multi family developments, in which cases barrier curbs are required.

Where major flood path routing dictates, and on steep grades, the designer may propose barrier curbs on residential roads 11 m or less in width, provided that predetermined driveway accesses are incorporated in the design.

The transition between barrier and rollover curbs shall be done through a minimum distance of 2 metres.

The road support structure shall be constructed to a point 0.3 m wider than the curb in order to provide support for the curb.

R18.2 Wheelchair Ramps

Wheelchair ramps are required at all intersections and where deemed appropriate by the Director of Engineering, Parks and Environment, except where rollover curbs are installed. The design for wheelchair ramps shall be in accordance with the Standard Drawings.

Special designs for the assistance of the physically handicapped shall be encouraged.

A catchbasin must be located to intercept road drainage in advance of the wheelchair ramp. This may influence road grade designs or cross slopes.

R18.3 Sidewalks

Sidewalk requirements are stipulated in the cross-sections for the applicable road classifications, and shall be constructed as per the Standard Drawings.

If only one sidewalk or one row of streetlights are required, they shall be placed at the side opposite to the power and telephone corridor.

For cul-de-sacs, a sidewalk will be required on one side of the access road to the bulb portion. Where a walkway is proposed off the bulb portion, the sidewalk is to be extended around and connected to that facility.

All urban through roads, and all roads in Commercial zones, shall require sidewalks on both sides. The Director of Engineering, Parks and Environment may require that the width of sidewalks along arterial roads be greater than 1.5 m.

The requirements of two sidewalks on a single family residential local road may be relaxed by the Director of Engineering, Parks and Environment if the road is not a pedestrian link to a trail, park, school and is not a continuation of a two sidewalk road.

One sidewalk may be required on industrial roads where stipulated by the Director of Engineering, Parks and Environment.

Sidewalks shall be continuous around curb returns and for a minimum of 3 m after the curb return into roads not requiring sidewalks.

The grade of the sidewalks shall be consistent with the grade of the road.

All sidewalks adjacent to rollover curbs shall be a minimum 140 mm thick. All sidewalks adjacent to barrier curbs shall be a minimum 115 mm thick.

Sidewalks shall be continuous around curb returns and for a minimum of 3 m after the curb return into roads not requiring sidewalks.

The grade of the sidewalks shall be consistent with the grade of the road.

All sidewalks adjacent to rollover curbs shall be a minimum 140 mm thick. All sidewalks adjacent to barrier curbs shall be a minimum 115 mm thick.

The preparation of the road base and subbase shall be done to a point 0.3 m wider than the sidewalk to provide structurally sound support for the sidewalk.

R18.4 Walkways

Walkways shall be constructed in accordance with the Standard Drawings. Walkway pavement width shall be 2.85 m and walkway right of way width shall be 3 m.

Walkways shall be concrete with chain link fencing on both sides and bicycle baffles at both ends.

The maximum grade shall not exceed 12%, unless steps, wheelchair ramps and hand rails independent of the chain link fencing are provided.

R18.5 Handrails

Handrails shall be constructed in accordance with the Standard Drawings.

Handrails shall be required for walkways where grades are in excess of 12% or where steps are provided or where grade separation exceeds 0.6 m.

Handrails may also be required along the top of major storm sewer outfalls, along walkways and sidewalks where steep or excessive side-slopes may be encountered, or in any location as deemed necessary by the Director of Engineering, Parks and Environment where, in his opinion, the safety of pedestrian traffic or the protection of the public so requires.

R19 REMOVAL OF UTILITY POLES

The Director of Engineering, Parks and Environment will review all rezoning, development and subdivision applications for the removal of all utility poles along the frontages of the development site, including B.C. Hydro and Telus poles. This will include, as part of this removal, replacing the overhead wiring with underground ducting and wiring/cable. A developer shall include a "cash-in-lieu" contribution, if it is determined that the poles cannot be replaced until some time in the future.

R20 BICYCLE ROUTES

Bicycle routes shall form part of the design for the roadway fronting the development if that road is designated as a "Bicycle Route" in the City of Langley's Official Community Plan, Schedule "C". Refer to the City of Langley Master Transportation Plan "Appendix "C" for design guidelines. Any variance to this standard requires approval by the Director of Engineering, Parks and Environment.

R21 TRANSIT ROUTES

Any development that fronts a transit route serviced by the Community Shuttle and/or Coast Mountain Bus Lines, will consult with Translink and address any concerns, such as traffic calming, bicycle and pedestrian access, bus stops, etc.

R22 TRAFFIC CALMING

Traffic calming initiatives shall be in accordance with the City's Traffic Calming Policy and approved by the Director of Engineering, Parks and Environment.

R23 PAVEMENT RESTORATION

Refer to MMCD standards, drawing number G5.

DESIGN CRITERIA

SECTION D - DRAINAGE

SECTION D - DRAINAGE

For convenience of reference, Section D Index is duplicated as follows:

SECTION D - DRAINAGE

Dl INTRODUCTION

The purpose of the drainage design criteria is to standardize the procedures for designing common drainage facilities in the City of Langley. All drainage works shall be designed with considerations for public safety, regulatory requirements, economic benefits and the natural environment.

Designers shall consult with the Engineering Department to determine what existing information may be of assistance to them.

The presence of an existing city drainage system does not mean, or imply, that the system has adequate capacity to receive the proposed design flows, nor does it indicate that the existing system pattern is acceptable to the City. Existing facilities which are undersized or inadequate to accept additional drainage must be upgraded at the Developer's expense to accommodate the appropriate flows. Alternative drainage proposals may be considered.

It must be shown that all downstream drainage facilities for a distance of 1.5 km are capable of handling the projected increase in runoff created by the proposed development.

Proper erosion and sediment control is required for all developments or works discharging runoff into the city drainage system and/or natural watercourses (Refer to Section D8.11).

D2 STORMWATER MANAGEMENT PRINCIPLES

D2.1 Definition

Stormwater Management is the planning, analysis and control of storm runoff in consideration of the entire watershed. The design of the drainage system shall incorporate techniques such as minor-major systems, lot grading, surface infiltration, subsurface disposal, storage, erosion control and other acceptable methods to mitigate the runoff impacts due to changes in land use.

A comprehensive Stormwater Management Plan is required for all developments. The plan shall include all drainage facilities, lot grading (showing pre and post-development ground elevations), major flood path routing, and all other appropriate information pertinent to the design as identified in Section G3.3

D2.2 Minor and Major Systems

The *Minor System* comprises storm sewers, culverts, channels and flow control facilities designed

to collect and carry the runoffs from frequent storm events. flow control facilities include detention/retention ponds, exfiltration trenches, dry wells, and other acceptable methods suitable for reducing the rate of runoff into the downstream drainage system.

The minor system shall be designed to prevent flooding and property damage and minimize public inconvenience caused by the frequent storm events up to the return frequency specified in Section D3. The runoff from the minor storm is referred to as the minor flow.

The *Major System* comprises surface flood paths, swales, roadways, watercourses and flow control facilities designed to accommodate the runoff from rare and intense storms.

The major system shall be designed to protect the public and prevent significant property damage due to flooding caused by the rare storm events with the return frequency specified in Section D3. The runoff from the major storm is referred to as the major flow.

Roadways, overland flow paths, channels and watercourses shall be designed to ensure that the maximum hydraulic grade line for the major flow is below the lowest existing or proposed minimum building elevation of adjacent buildings. Surcharging at the inlet under the major flow is acceptable provided the headwater profile does not rise above the Minimum Building Elevation. Adequate erosion protection shall be required where surcharging is proposed.

In the event that surface flow is not feasible or that the inlet facility is likely to be blocked or restricted, consideration shall be given to the sizing the storm sewer system to accommodate the major flow.

D3 DESIGN FREQUENCIES

The following storm return frequencies shall be used for the design of the drainage system:

Minor Systems: 1 in 10 year

Major Systems: 1 in 100 year

Under special circumstances, drainage facilities in major watercourses may be required to accommodate flows with return frequencies greater than 1 in 100 year. The Designer should confirm the required return frequency with the Director of Engineering, Parks and Environment.

D4 RUNOFF ANALYSIS

Storm drainage systems shall be designed to accommodate the post-development flows using the Rational Method. All calculations pertinent to the design of the drainage system shall be signed and sealed by the design engineer and submitted to the City.

For developments where the total tributary area is 10 hectares or less, the Rational Method shall be used to compute the peak runoffs.

D5 RATIONAL METHOD

The Rational Method calculates the peak flow using the formula:

$$Q = RAIN$$

Where R = Runoff Coefficient x Soil Adjustment Factor(SAF)
A = drainage area in ha
I = rainfall intensity in mm/h
N = 0.00278

D5.1 Runoff Coefficients

The following runoff coefficients shall be used for the Rational Formula:

Land Use	Percent Imperv	5/10 Yr Runoff Coeff	100 Yr Runoff Coeff
Suburban Residential	20	0.35	0.40
Low Density Residential	40	0.50	0.55
Medium Density Residential	65	0.60	0.65
High Density Residential	78	0.70	0.75
Commercial	90	0.80	0.85
Industrial	90	0.80	0.85
Institutional (ic Schools)	80	0.75	0.80
Parks/Grasslands	20	0.20	0.30
Cultivated Fields	30	0.30	0.40
Woodlands	5	0.10	0.30

D5.2 Soil Adjustment Factor

A soil adjustment factor (SAF) shall be applied to the runoff coefficient to reflect the local ground conditions.

Surface Type	SAF
Sandy soil with flat slope (up to 5%)	0.9
Sandy soil with steep slope (over 5%)	1.0
Clayey soil with flat slope (up to 5%)	1.0
Clayey soil with steep slope(over 5%)	1.1

The runoff coefficients and soil adjustment factors listed above are for general application. The Designer shall verify that the coefficient is appropriate for the design area. The Director of Engineering, Parks and Environment will be the final authority on the coefficient to be utilized.

D5.3 Catchment Area

The tributary area used for the design of the storm drainage system shall be consistent with the actual contours of the land. Although minor changes in the catchment boundaries may be necessary for development, the total developed tributary area should not deviate from the total natural drainage area.

While contour maps provided through the Engineering Department are reasonably indicative of the actual conditions, designers are cautioned not to interpret them to be exact and correct. The Designer is responsible for obtaining true and accurate surface elevations for the analysis.

D5.4 Time of Concentration

The time of concentration is the time required for water to flow from the most remote part of the catchment area under consideration to the design node. For urban areas, the time of concentration consists of the following formula:

$$Tc = Ti + Tt$$

Where Tc = time of concentration (minutes)
Ti = inlet or overland flow time (minutes)
Tt = travel time in sewers, ditches, channels or watercourses (minutes)

Inlet or Overland Flow Time (Ti)

a) Typical inlet times for urban areas are as follow:

Single Family Lot	10 minutes
Multi-Family Lot	10 minutes
Commercial/Industrial/Institutional	10 minutes

Travel Time (Tt)

The travel time in sewers, ditches, channels or watercourses can be estimated using the following formula:

$$Tt = \frac{Ct\ L\ n}{12\ (S)^{0.5}}$$

Where Tt = travel time (minutes)
Ct = flow travel coefficient (0.5)
L = length of flow (m)
n = roughness coefficient
0.050 Natural channels
0.030 Excavated ditches
0.013 Concrete lined channels
0.013 Concrete or PVC pipe
S = slope in mm

The above equation provides an approximate travel time which shall be corrected with the actual time of flow calculated from the hydraulic properties of the selected pipe/channel. A composite value for Tt shall be calculated in cases where the type of flow along the longest path varies or the slope changes.

D5.5 Rainfall Intensity

The rainfall intensity for the Rational Formula shall be determined from a rainfall Intensity-Duration-Frequency (IDF) curve based on the calculated tune of concentration. One Atmospheric

Environment Services (AES) IDF curve (Figure Dl) was adopted for the City of Langley.

D5.6 Presentation of Rational Calculations

The Designer will be required to tabulate the rational calculations on Table Dl for submission along with the appropriate plans and other relevant information.

D6 STORMWATER STORAGE FACILITIES

Storage facilities shall be designed according to requirements of the Master Drainage Plan (if available) in consideration of the minor and major systems. The construction of a community storage facility servicing a large catchment area is preferred over small ponds servicing localized areas. The common storage facilities are:

* Detention (Dry) Storage
* Retention (Wet) Storage
* On-site Storage

The Designer shall consider the site and downstream conditions and consult the Engineering Department to determine the most suitable type of storage facility.

D6.1 Release Rates

Runoff storage facilities are generally incorporated in the master drainage plans to mitigate flooding problems and environmental impacts associated with changes in land use. The design release rate will be based on the predominant role of the facility in the overall drainage plan. The design release rates are determined as follows:

a) For the exclusive purpose of mitigating environmental impacts, the storage facility shall be sized to limit the peak flow from the 1:2 year storm to the pre-development levels.

b) For the purpose of drainage and flood control, the storage facility shall be sized to limit the 1:5 year and 1:100 year flow to the pre-development level. Where justified on the basis of a risk analysis, or in consideration of adequate downstream capacities for the major runoff, the 1:100 year flow may be permitted to discharge without flow control subject to the approval of the Director of Engineering, Parks and Environment.

c) For the multi-purpose role of mitigating both environmental impacts and flooding the

storage facility may be required to control the 1:2 year, 1:5 year and the 1:100 year storms. Where justified on the basis of a risk analysis, or in consideration of adequate downstream capacities for the major runoff, the 1:100 year flow may be permitted to discharge without flow control subject to the approval of the Director of Engineering, Parks and Environment.

D6.2 Outlet Control

The outlet control for storage facilities may be designed using the standard orifice and weir equations:

Orifice Equation: $Q = CA(2gh)^{0.5}$

Where
- Q = release rate (m^3/s)
- C = orifice coefficient (0.62 for sharp or square edge)
- A = area of orifice (m^2)
- g = gravitational acceleration (9.81 m/s^2)
- h = net head on orifice (m)

Weir Equation: $Q = CLH^{1.5}$

Where
- Q = release rate (m^3/s)
- C = weir coefficient (from published references)
- L = effective length of weir crest (m)
- H = net head on weir crest (m)

Large storage facilities shall include provisions for discharging water above the design release rate. The rapid drawdown of the facility may be necessary for emergency purposes or to restore the available storage to accommodate subsequent storm events.

The provisions to accommodate higher discharges will involve oversizing the fixed openings and sewers connected to control structure. Adjustable mechanism such as slide gates or removable orifice plates can be used to regulate the design release rates. The extent of the oversizing will depend on the capacity of the downstream drainage system.

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The design of inlet/oudet structures shall consider flow energy dissipation and erosion control. Safety grates are required over all inlet/outlet openings larger than 525 mm in diameter. Locks for access hatches are required to prevent unauthorized entrance to the structure.

D6.3 Emergency Overflow

An emergency overflow spillway with capacity to convey the 1:100 year flow and larger is required for all storage facilities. The spillway surface shall be finished with erosion resistant materials such as concrete, turf stone or other approved equal. The maximum spillway slope is 4 (horizontal) to 1 (vertical). The design of the spillway and/or overflow shall consider the possibility of blockages in the outlet structure and the consequences of extreme storm events.

D6.4 Operation and Maintenance Requirements

A minimum 3 metres wide all-weather vehicle access shall be constructed from a public road right-of-way to the control outlet and other works requiring maintenance. The maximum grade of the access is 8%. The surface shall be finished with gravel, concrete, or turf stones suitable for maintenance traffic. A sediment sump accessible to maintenance equipment shall be provided near the pond inlet.

D6.5 Safety Barrier and Signage

Storage facilities with open water greater than 1.0m depth may be hazardous to the public. If the side slope is steeper than 7:1 and the design depth is greater than 1.0 metres, fencing or log rail barriers with proper signage should be erected along the perimeter of the storage ponds.

D6.6 Detention (Dry) Storage

One of the most common forms of runoff control is detention (dry) storage. A detention pond is normally "dry" and only retains water during severe storm events. A control outlet permits the low flow to discharge downstream but limits the higher flows exiting into the downstream system. The excess runoff is temporarily stored in the detention pond and gradually release back into the drainage system.

A detention pond can be constructed on-line or off-line from the drainage path, depending on the site conditions and the environmental constraints. The design standards are as follow:

maximum depth of storage (up to 1:10 Year)	1.5 metres
maximum depth of storage (over 1:10 Year)	2.5 metres
minimum bottom slope	0.7%
maximum pond side slopes	4(H): 1(V)
preferred side slope	7(H): 1(V)

The berm of the pond shall be constructed of stable impermeable material such as clay, compacted glacial till or an impermeable geo-membrane.

A landscaping plan detailing the reinstatement of grass cover or other approved surface finish is required for all dry detention ponds.

D6.7 Retention (Wet) Storage

Retention storage provides temporary detention of severe storm runoff while maintaining a permanent pool of water throughout the year. A control outlet regulates the amount of flow released into the downstream system. During a storm event, the permanent pool of water is partially or completely replaced with stormwater. The design criteria is as follow:

min. land requirement (% of total catchment area)	0.5% to 2%
recommended minimum length to width ratio	2:1
minimum pond depth (normal water level)	1.0metres
maximum pond depth (high water level)	3.0m
max side slopes from pond bottom to low water level	4(H): 1(V)
max side slopes from low water to high water level	7(H): 1(V)
maximum side slope above high water level	4(H): 1(V)
minimum freeboard above high water level	0.5 metres

A retention pond requires a continuous base flow to maintain the permanent pool. A complete water budget analysis under post-development conditions is required to ensure that the base flow will exceed evaporation and seepage losses. Considerations shall be given for the circulation of water while narrow and/or dead bay areas are to be avoided. Provisions for draining the lake completely by gravity should be included if possible. Otherwise, provisions for a mobile pumping unit shall be included. A forebay shall be provided at the pond inlet for sedimentation control.

The pond berm shall be constructed of stable impermeable material such as clay, compacted glacial till or an impermeable geo-membrane.

A landscaping plan detailing the reinstatement of grass cover or other approved surface finishes on the side slopes and the surrounding berm is required. Special plant species may be required for environmental enhancement.

D6.8 On-Site Detention Storage

On-site detention may consist of a number of methods such as parking lot storage, exflltration trenches/drywells, rockpits, etc. Some common on-site storage methods are outlined below:

a) Parking Lot Storage

i. Requires detailed lot grading design to ensure proper drainage
ii. Ponding shall be located in the remotest areas of the parking lot or along grass medians
iii. Maximum ponding depth is 100 mm for 1:2 year storm, 150 mm for 1:10 year storm and 300 mm for 1:100 year storm
iv. Emergency overflows are required for events exceeding the design frequency.
v. Release rate shall be regulated by a standard flow control chamber (see Standard Drawings).

b) Exfiltration Trenches and Drywells

i. Only permitted where the native soils demonstrate high permeability and groundwater table is well below the invert of the trench (geotechnical investigation required)
ii. Capacity of the system shall be determined from site-specific data
iii. A positive drainage outlet is required
iv. Exfiltration trench shall consist of perforated storm sewer with a geotextile sleeve embedded in a geotextile wrapped drain rock filled trench. See Standard Drawings for a standard exfiltration trench cross-section.
v. The 1:10 year hydraulic grade line shall be below all service connections at the property lines
vi. The 1:100 year hydraulic grade line shall be at least 0.35m below adjacent MBE's
vii. Sediment traps are required at or before inlet to trenches
viii. Drywell (perforated) manholes shall be used in place of standard manholes
ix. Shall be located in greenways, parks and open spaces wherever possible
x. Emergency overflows are required for storm events exceeding the design frequency
xi. Release rate shall be regulated by a standard flow control chamber

c) Other Storage Systems

i. Due to a variety of site-specific characteristics, it is not possible to list all the unique or typical storage alternatives. Designers shall review all proposals for on-site detention systems with the

Engineering Department prior to detailed design.

ii. On-site detention for a single detached family lot and roof top storage are not permitted.

D7 STORM SEWERS AND APPURTENANCES

D7.1 Sizing of Storm Sewers

The required storm sewer capacity shall be calculated using the Manning Formula under free flow (non-surcharged) condition. The Manning formula is:

$$Q = \frac{AR^{0.667} S^{0.5}}{n}$$

Where
- Q = flow capacity (m^3/s)
- A = cross sectional area (m^2)
- R = hydraulic radius (m)
- S = slope of hydraulic grade line (m/m)
- n = roughness coefficient
  - 0.009 for PVC pipe
  - 0.013 for asbestos cement, clay and concrete pipe

NOTE: Asbestos cement pipes, clay pipes and corrugated pipes are not acceptable for new storm sewers. Downsizing of storm sewers will not be accepted for sizes 600 mm diameter or less. A maximum downsizing of two pipe sizes for storm sewers larger than 600 mm diameter will be considered.

The minimum size of storm sewers shall be 250 mm diameter except at a terminal section of a short cul-de-sac with no catch basin connections where the size may be reduced to 200 mm diameter.

For the purpose of reference in this section, large diameter sewer refers to sizes 675 mm or larger and small diameter sewer refers to sizes 600 mm and smaller.

D7.2 Minimum/Maximum Velocity

The minimum velocity for pipes flowing full or half full shall be 0.60 m/s.

There is no limit on the maximum velocity. However, if the design velocity exceeds 3.0

m/s and/or supercritical flow occurs, provisions for structural stability and durability of the pipe shall be included. Anchor blocks are required where the pipe grade is steeper than 15%. Where drainage discharge enters a natural watercourse, DFO and MOE generally requires adequate rip rap protection and limits the maximum velocity to 1 m/s.

D7.3 Minimum Depth of Cover

The minimum depth of cover shall be 1.0 metres for storm sewers up to 600 mm diameter. For pipe sizes larger than 600 mm, or for cover less than that specified above, an engineering design for cover will be required.

The depth of storm sewers shall be adequate to service all adjacent developments as well as all existing properties within practical limits. The invert of storm sewers at the upstream end must be of sufficient depth to service all of the tributary lands. In common trench installations, the sanitary service connections shall be permitted to cross over the top of the storm sewer.

D7.4 Pipe Joints

All storm sewer systems shall be designed for closed joint construction unless otherwise specified.

D7.5 Sewer Location

Storm sewers shall be designed inside the road right-of-way using the offsets in the typical road cross-sections in the Standard Drawings. Sewers and manholes should be offset from the vehicular wheel paths wherever possible to minimize the roughness of travel.

Where the storm sewer is required to cross private lands, the right-of-way shall have a minimum width of 3 metres Where both storm and sanitary sewers are located within a single right-of-way, the minimum width shall be 4.6 metres.

When a storm sewer and other appurtenances (ie. manholes, valve chambers, etc.) are located within a right-of-way, the Developer may be required to construct and dedicate a road access for City maintenance. The maintenance access shall be constructed to City standards, adequate to support the maintenance vehicles for which the access is intended.

D7.6 Utility Separations

Refer to Section W8 for clearance with watermains. For clearances with other utilities such as Terasen Gas, Telus, BC Hydro, etc., consult the respective authorities.

D7.7 Manholes - Standard Requirements

a) Manholes are required at:

i every intersecting sewer
ii all changes in pipe size
iii every 150 metres for pipes less than 900 mm diameter
iv every 200 metres for pipes 900 mm diameter and larger
v all changes in direction that exceeds 1/2 of the maximum joint
vi deflection recommended by the pipe manufacturer.

b) Common design requirements are:

i. The springline of the downstream pipe shall not be higher than that of the upstream pipe.
ii. Outside drop connections shall be provided wherever the drop exceeds 0.6 metres.
iii. Sudden and extreme changes in direction for large sewers should be avoided.
iv 90 degree bends in large sewers shall not be located inside a junction with other sewer connections. Separate manholes are required.
v To minimize the head loss in large sewers, high incoming flows from opposite direction should not impinge in the same manhole structure. Separate manholes are to be used.
vi Manhole anchorage may be required for 90 degree bends with large flows or high velocity flows.
vii Intermediate safety platform is required for all manholes in excess of 6 metres deep.

D7.8 Manholes - Hydraulic Losses

Invert drops across manholes are required to compensate for the hydraulic (energy) losses due to changes in flow directions. The required drop in invert levels is the hydraulic loss across the manhole.

For junctions involving large diameter sewers or high velocity flows, detailed engineering analyses may be required. For small diameter sewers (600mm or smaller) and low velocity flows, the following equation can be used to calculate the head loss:

$$HL = k\frac{v^2}{2g}$$

Where HL= head loss (m)
k = head loss coefficient
v = outlet flow velocity (m/s)
g = gravitational acceleration (9.81 m/s^2)

The minimum drops are:

* straight run 50mm drop
* deflection up to 45 degrees 50mm drop
* deflection 45 to 90 degrees 50mm drop

D7.9 Catch Basins

Catch basins shall be provided at regular intervals along roadways, at upstream end of radius at intersections and at low points (sags). Low points are not to be located within curb returns at intersections. The Designer must ensure that sufficient inlet capacity is available to collect the entire minor flow into the underground pipe system.

The spacing of the catch basins shall be based on hydraulic requirements. The capacity of a single catch basin can be calculated by the orifice equation:

$$Q = O.67CA(2gh)^{0.5}$$

Where Q = inlet capacity (m^3/s)
0.67 = clogging factor
C = orifice coefficient (0.8)
A = open area (0.068 m^2 for Dobney B-23 grate)
G = gravitational acceleration (9.81 m/s^2)
H = depth of ponding (m)

The maximum spacing shall be established to permit each catch basin to drain a maximum area of 500 m^2 on road grades up to 5% and 350 m^2 on steeper grades. If the major flow is to be conveyed in the pipe system, additional catch basins are required.

The minimum size for catch basin leads is 200 mm for single catch basins and 250 mm for double catch basins. Catch basin leads should be taken directly into manholes if feasible. Double catch basins shall not be directly connected together; instead the lead from each catch basin shall be connected to a wye and into the manhole. The minimum grade for leads is 1%. The maximum length is 30 metres. Side inlet catchbasins are required to be installed where Barrier "B" curb is installed. Refer to Schedule "C" - Drawing #SSD 7.

D7.10 Lawn Basins

Lawn basins shall be provided as per the requirements listed in the Section on Storm Water Management Plan. Lawn Basin leads shall have a minimum size of 150 mm and a minimum slope of 2%. Where a lawn basin lead connects directly to a storm sewer instead of a manhole, an inspection chamber is required at the property line.

D7.11 Service Connections

Service connections shall be installed to provide a "gravity-flow" connection to all buildings fronting the main, except where the land can drain to an acceptable alternate existing system. The design requirements are:

a) The minimum diameters are 100 mm for residential and 150 mm for industrial/commercial.
b) The minimum slope is 1.5%.
c) The connection shall be located at the lower (downstream) portion of a larger lot or land parcel. In urban developments, connections shall be as noted on the Standard Drawings.
d) The service connection at the property line shall be above the hydraulic grade line of the minor flow.
e) Each connection shall only service one single lot.
f) When the design proposes to infill an existing ditch, all existing service connections are to be connected to the proposed main.

D7.12 French Drains

The use of french drains shall only be permitted where the topography and soil conditions are proven adequate to the acceptance of the Director of Engineering. A soils report will be required to support the design.

D7.13 Rockpit/DryweIl

The use of rockpits or drywell drainage is discouraged and will only be permitted at the discretion of the Director of Engineering, Parks and Environment. Rockpits or drywell drainage will only be considered in certain areas of the City where it can be demonstrated that the subsoil conditions will provide a percolation rate equal to, or in excess of, twice the minor runoff flows. A soils report will be required to confirm the suitability of the soils.

This does not preclude the requirement for Major flood Path Routing and all designs shall incorporate a positive outlet for rainfall intensities in excess of the minor system design.

D8 MAJOR FLOW ROUTING AND FLOOD CONTROL

D8.1 Major Flow Routing

Unless the storm sewer system is oversized to accommodate the major flow (ie. 1:100 year return frequency storm), provision for surface flow is required wherever the overland flow in excess of 0.05 m^3/s is anticipated. Major flow routing is generally accommodated along roadways, swales and watercourses. These designated flow paths shall be protected by restrictive covenants or right-of-ways and clearly identified in the stormwater management plan.

The quantity of flow to be conveyed by the surface flow path is the total major flow less the capacity of the minor system. The design of the major flow routing shall ensure to the satisfaction of the Director of Engineering, Parks and Environment that no endangering of public safety nor substantial property damages will occur under the major flow conditions.

D8.2 Roadway Surface Drainage

Roadways with curbs and gutters can be designed as wide shallow channels to convey major surface flow. The water elevation at maximum ponding/flow shall be at least 0.35 metre below the lowest minimum building elevation of the adjacent buildings. The maximum depths of flow shall not exceed 150 mm above the gutter line.

The design of intersections shall ensure that the surface flow can continue along the designated path crossing over lateral streets. Similar considerations are required if a change of surface flow direction is required at an intersection.

D8.3 Ditches

Ditches are not acceptable for permanent servicing of land development projects. They may be considered only for special interim uses.

Ditches adjacent to roadways shall conform to the following criteria:

a)	maximum depth	l.0metre
b)	minimum bottom width	0.5 metre
c)	maximum side slope	1.5(H): 1(V)
d)	minimum grade	0.5%

e) maximum velocity (Unlined ditch) 1.0m/s

Where soil conditions are suitable or where erosion protection is provided, higher velocities may be permitted. If grades are excessive, erosion control structures or ditch enclosure may be required.

The minimum right-of-way width for a ditch shall be 5 metres where the ditch crosses private property. The ditch shall be offset in the right-of-way to permit a 3 metres wide access for maintenance vehicles. Additional right-of-way may be required to facilitate the ditch construction and access. The top of the ditch adjacent to the property line shall be a minimum 0.5 metre away from that property line.

D8.4 Watercourses

Natural watercourses are integral components of the major drainage system and the ecological system. If the process of development or drainage design involves instream works, the Designer shall refer to the "Land Development Guidelines for the Protection of Aquatic Habitat" by Department of Fisheries and Oceans, B.C. Ministry of Environment and City of Langley Watercourse Protection Bylaw #2518.

All proposals for works affecting natural watercourses must be forwarded
(by the Designer) to the following Federal and Provincial Government Agencies for review:

1. Department of Fisheries and Oceans (DFO)
   Habitat Management Unit
   610 Derwent Way
   Annacis Island
   New Westminster, B.C. V3M 5P8
   Tel 666 - 6627

2. Ministry of Environment (MOE)
   10334 - 152A Street
   Surrey, B.C. V3R 7P8
   Tel 582-5200

D8.5 Culverts

Culverts located in natural watercourses or culverts crossing all roads shall be designed to convey the major flow or greater. The Designer shall determine whether the culvert will operate under inlet or outlet control at design conditions.

Concrete culverts are preferred for general uses. Corrugated steel culverts may be considered under special circumstances when their use can be justified.

The minimum diameter of culverts is 450 mm (300 mm for driveway culverts).

The average water velocity in culverts should not exceed:

* 1.2 m/s for lengths up to 24.4 metres
* 0.9 m/s for lengths over 24.4 metres
* for culverts longer than 61 metres within a fishery stream, special conditions from DFO and MOE will apply.

The minimum depth of cover for culvert is 1.0 metre, subject to the correct pipe loading criteria.

Inlet and outlet structures are required for all culverts designed for the major flow.

Considerations for the installation of energy dissipation and erosion control shall be included in the design.

Driveway culverts that form part of the minor system shall have capacity for the runoff from the 1:10 year storm with the design headwater not to exceed the top of the culvert.

D8.6 Inlet and Outlet Structures

Refer to Standard Drawings for the design of inlet and outlet structures for pipes up to 1200 mm diameter. Pipes larger than 1200 mm diameter and non-circular culverts require specially designed inlet and outlet structures. Concrete block headwall (see Standard Drawings) may be

used for culverts up to 750 mm diameter.

Outlets having discharge velocities in excess of 1 m/s require rip rap protection and/or energy dissipating structures for erosion control.

Grills are required at the inlets and outlets of all pipes over 450 mm in diameter and exceed 30 metres in length (except large culverts in major watercourses). Trash racks are required at the inlet of the pipes utilizing the grills. Grills may also be required on smaller diameter storm sewers at the discretion of the Director of Engineering, Parks and Environment. See Standard Drawings for grill details.

D8.7 Site and Lot Grading

Developments shall incorporate site and lot grading techniques.

The following criteria shall be used:

a) Each lot should be graded to drain into a City Drainage System or a natural drainage path independent of adjacent lots where possible. Minimum lot grades to be 1%. Lot grading is to be uniform and consistent.

b) Areas around buildings (or proposed building sites) shall be graded away from the (proposed) foundations to prevent flooding.

c) Lots lower than adjacent roadways should be avoided where possible or acceptable storm water management techniques must be incorporated to direct the runoff to an existing or proposed drainage system. Proper flood proofing is required at the low points of roadways.

d) Existing or proposed buildings must be sited above the hydraulic grade line of the Major System. The Designer shall note any existing Minimum Building Elevations (MBE).

e) Individual lots will not be permitted to direct storm runoff into any natural watercourse, park or green belt areas, or adjacent lots.

NOTE: The Developer is advised that lot grading is considered an "essential service" and is required prior to the issuance of building permits. To facilitate Building Permit issuance, and to

provide the builders with accurate site information, the submission and acceptance of the lot grading record drawings is required prior to issuance of the building permits.

D8.8 Minimum Building Elevations (MBE)

The MBE is defined as the elevation of the lowest floor slab in a building or the underside of the floor joists where the lowest floor is constructed over a crawlspace.

Crawlspace is a space between a floor and the underlying ground having a maximum height of 1.2 metres to the underside of the joists and not used for the storage of goods or equipment damageable by floodwater.

The MBE shall be established at least 0.6 m above the service connection invert and 0.1 metre above the 100 year hydraulic grade line elevation.

Accepted MBE's may not be revised without referral to the Director of Engineering, Parks and Environment.

A gravity connection to the city storm drainage system may be made only where the habitable portion of a dwelling is above the Major System hydraulic grade line.

Refer to Ministry of Environment on MBE requirements.

D8.9 Roof Drainage

Roof drainage will be discharged into the City drainage system where the size of the proposed or existing storm sewer has been designed for, or can be shown to accommodate the anticipated flows.

D8.10 Swales

Swales shall be a maximum 150 mm deep and shall conform to Standard Drawings. All swales are to be lined with turf on a minimum 100mm of topsoil. Swales required for lot grading conformity shall

be located on a 3 metre easement (Easement width may be reduced to 1.8 metres where no drainage pipes are required) for accepting drainage from adjacent lots. Swales designed for Major Flow Routing may exceed the 150 mm depth to accommodate the anticipated flows with the easement established accordingly. Swales shall have a minimum 1 % grade.

D8.11 Siltation Controls

Designers are required to demonstrate how work will be undertaken and completed so as to prevent the release of silt, raw concrete, concrete leachate and other deleterious substances into any ditch, storm sewer, watercourse or ravine. Construction materials, excavation wastes, overburden soils, or other deleterious substances shall be disposed of or placed in such a manner as to prevent their entry into any watercourse, ravine, storm sewer system, or restrictive covenant area.

The Designer shall refer to the "Land Development Guidelines for the Protection of Aquatic Habitat" by DFO and MOE and consult these agencies with regards to the required siltation controls. Details of the proposed controls are to be included in the design drawings and shall be installed as part of the works.

All siltation control devices shall be situated to provide ready access for cleaning and maintenance. Proposed siltation control structures must be maintained throughout the course of construction and to the end of the maintenance period (final acceptance). Changes in the design of the structure will be required if the proposed structure is found to be inadequate.

DESIGN CRITERIA

SECTION 5 - SANITARY SEWER

SECTION 5 - SANITARY SEWER

For convenience of reference, Section 5 Index is duplicated as follows:

SECTION 5 - SANITARY SEWER

S1 SANITARY SEWER SYSTEMS

Sanitary sewer systems shall be designed in accordance with the requirements of the Greater Vancouver Regional District (G.V.R.D.) "Liquid Waste Management Plan" 2000 Edition, as amended from time to time, Master Municipal Construction Documents (MMCD) 2000 Edition, (Gold Book), Stanard Drawings, Design Criteria Manual Schedule and relevant City Bylaws.

S2 DESIGN FLOWS

Sanitary sewers shall be designed using the Peak Wet Weather flow (PWWF). The PWWF is the sum of the Peak Dry Weather flow (PDWF) and infiltration flow.

S2.1 Average Daily Flow (Dry Weather)

Residential	350 l/day/capita
Commercial	40,0001/day/ha
Industrial	30,000 1/day/ha
Institutional	40,000 1/day/ha

If reliable information indicates that the non-residential flows will be greater than the above rates, the higher flows shall be used in the design analysis.

S2.2 Peak Dry Weather Flow (PDWF)

The Peak Dry Weather flow shall be calculated by the following formula:

$$Q = \frac{q\ P\ PF}{86{,}400}$$

Where Q = Peak Dry Weather flow
q = Average Daily Flow (Dry Weather) (1/day/capita)
P = Population
PF = Harmon Peaking Factor:

$$PF = 1 + \frac{14}{4 + \sqrt{\frac{p}{1000}}}$$

S2.3 Infiltration Rate

An infiltration rate of 0.1 l/s/ha shall be added to the PDWF to determine the PWWF.

S3 PIPE FLOW FORMULAS

Gravity Sewers:

Manning's formula shall be used to size gravity sanitary sewers. Refer to Section on Sizing of Storm Sewers for the relevant formula and roughness coefficients.

Gravity sewer shall be sized such that the Peak Wet Weather flow depth will not exceed 75% of the full depth of the pipe.

S4 MANHOLES

Manholes shall be required at:

a) all changes in grade
b) all changes in direction
c) all changes in pipe sizes
d) all intersecting sewers
e) all terminal sections
f) downstream end of curvilinear sewers

Manholes shall be placed where future extensions are anticipated and shall be spaced no greater than 150 m apart.

Sanitary manhole rim elevations in off road areas shall be designed to be:

a) above the adjacent storm manhole rim elevation

b) above the surrounding ground so that infiltration from ponding will not occur.

S5 HYDRAULIC LOSSES ACROSS MANHOLES

The following criteria shall be used:

a) The springline of the downstream pipe shall not be higher than that of the upstream pipe.

b) Minimum drop in invert levels across manholes:

(i) Straight run - no drop required

(ji) Deflections up to 45 degrees - 15 mm drop

(jii) Deflections 45 degrees to 90 degrees - 30 mm drop

c) Manhole drops shall be provided as follows:

Invert Difference	Use
Up to 0.25 m	Inside ramp
0.25-0.90 m	Outside ramp
Over 0.90 m	Outside drop.

See Standard Drawings for details of manhole drops.

S6 TEMPORARY CLEAN-OUTS

Temporary clean-outs may be provided at terminal sections of a main provided that:

a) future extension of the main is proposed or anticipated.

b) the length of sewer to the downstream manhole does not exceed 45 m.

c) the depth of the pipe does not exceed 2 m at the terminal point.

Note: Clean-outs shall not be considered a permanent structure.

S7 MINIMUM PIPE DIAMETER

The minimum size of pipe shall be 200 mm except for the last upstream section which may be 150 mm, provided the sewer cannot be extended in the future.

S8 VELOCITIES

The minimum velocity shall be 0.75 m/s. There is no maximum velocity, however, consideration must be given to scour problems where flow exceed 2.5m/s and anchoring

should be incorporated where the grades of the sewer are 15% or greater.

S9 MINIMUM GRADE

The grade of any sewer is governed by the minimum velocity required. However, the last section of a main that will not be extended in the future, shall have a minimum grade of 1% where 150 mm diameter pipe is proposed.

S10 MINIMUM DEPTH OF COVER

The minimum cover over any main shall be 1 m. The depth of the sewer must be sufficient to provide gravity flow service connections to both sides of the roadway and must allow for future extensions to properly service all of the upstream tributary lands for ultimate development.

S11 CURVILINEAR SEWERS

Where permitted, horizontal curves will require a constant offset and shall be uniform throughout the curve. The radius of the curve shall not be less than 60 m. The design velocity must exceed 0.91 m/s. The minimum grade shall be 1% and each joint is to be located by survey. Refer to Section on Manholes for manhole location requirements.

All curvilinear sewers shall be video tested as directed by the Director of Engineering, Parks and Environment at the Developer's expense to ensure proper grade and alignment.

S12 SEWER LOCATION/CORRIDORS

Sanitary sewers shall be located within the road right-of-way as noted in the applicable Standard Drawings for road cross-sections.

When the sewer is required to cross private lands, the right-of-way shall be a minimum of 3m wide. Where both storm and sanitary sewers are in one right-of-way, the width shall be a minimum of 4.6m wide.

When a sewer, manhole, valve chamber, or other appurtenances are located within a right-of-way, the Developer may be required to provide road access from a City road for maintenance vehicles. The maintenance access shall be constructed to City standards, adequate to support the maintenance vehicles for which the access is intended.

S13 SERVICE CONNECTIONS

a) Service connections shall be provided to each lot fronting the main. All services shall enter the main at a point just above the springline. Where it is not feasible to service on the fronting road, a rear yard sewer may be required.

b) Single connections only will be permitted.

c) Connections to new mains shall be made using wye fittings. Connections to existing mains shall be made using saddles.

d) The standard size for service connections shall be 100 mm.

e) The minimum grade of service connections from the main to the property line shall be 2%.

f) The minimum depth of a service at the property line shall be 1 m and the maximum depth of a service at the property line shall be 2 m unless otherwise accepted by the Director of Engineering, Parks and Environment.

g) Service connections may be permitted into manholes provided that:

(i) The connection is not in an adverse direction to the flow in the sewer main.

(ji) The provisions noted in the Section on Hydraulic Losses Across Manholes are met.

h) Inspection chambers are required for all residential connections. See Standard Drawings for details.

S14 PRIVATE SANITARY PUMP STATIONS

Private sanitary pump station installations are discouraged from being used in the design stage. Any proposed use of private pump stations must receive prior approval from the Director of Engineering, Parks and Environment. All private sanitary pump station designs shall be carried out by a professional Engineer at the developer's expense. Any private sanitary pump station must be located within a right-of-way outside the road dedication.

S15 MUNICIPAL SANITARY PUMP STATIONS

Where municipal sanitary pump stations are required, specific design criteria must be established and approved by the Director of Engineering, Parks and Environment.

S16 MUNICIPAL SANITARY FORCE MAINS

Where municipal sanitary force mains are required, specific design criteria including velocities, odour control, isolation valve spacing and force main cleaning provisions must be approved by the Director of Engineering, Parks and Environment.

DESIGN CRITERIA

SECTION W - WATER

SECTION W - WATER

For convenience of reference, Section W Index is duplicated as follows:

SECTION W - WATER

W1 WATER DISTRIBUTION SYSTEM

W1.1 Water Supply

Watermain design shall conform to the requirements of the Drinking Water Protection Act, Drinking Water Officer, Design Criteria Manual, Standard Drawings, Supplementary Specifications, MMCD and relevant City Bylaws.

The system shall be designed to provide peak domestic requirements and also shall provide adequate flows for fire protection. The required flow shall be the greater of maximum day domestic flow plus fire or peak hour flows.

W2 DOMESTIC DEMANDS

Average daily domestic flow	570	litres/capita/day
Peak Day Demand	1364	litres/capita/day
Peak Hour Demand	1700	litres/capita/day

Design populations used in calculating water demand shall be computed in accordance with the City's population predictions or with the planned development in the area to be served, whichever is larger.

Hydraulic design computations shall be based on the Hazen-Williams formula:

$$Q = \frac{CD^{2.63}S^{0.54}}{278{,}780}$$

Where Q – Rate of flow in l/s
C - Roughness coefficient (minimum 110)
D - Internal pipe diameter in mm
S - Slope of hydraulic grade line in m/m

W3 FIRE FLOW DEMANDS

All new Multiple Residential, Commercial and Industrial buildings shall be designed to provide fire protection in accordance with the Fire Underwriters Survey (FUS). The Design

Engineer shall submit calculations verifying the fire flow requirements. Any developments that do not submit this fire flow information will be rejected unless the necessary system improvements are made, as identified by the Director of Engineering, Parks and Environment. Reduced interim fire flows may be approved by the Director of Engineering, Parks and Environment.

Additions to existing buildings, 30% or greater of the assessed value of the building, will be required to install sprinklers in that building. Any building with an assembly occupancy permit, will automatically require sprinklers. Refer to the City of Langley's Building Bylaw #2498.

W4 WATER PRESSURES

Maximum allowable pressure	1035 kPa
Minimum pressure at Peak Hour Demand	300 kPa
Minimum pressure anywhere in system during design Fire Flow and Peak Day Demand	150 kPa

All service connections where the services pressure exceeds 517 kPa shall be individually protected by pressure reducing valves in the dwelling.

W5 HYDRAULIC NETWORKS

Where there is an existing hydraulic network in place, the City will provide information for design calculations.

Designs shall accommodate the ultimate development projections using either the Peak Day Demand plus Fire Flow or the Peak Hour Demand, whichever has the greater effect on pressure and flow.

Depending on the complexity and extent of the proposed distribution system, the City may require a hydraulic analysis design showing minimum flows and pressures.

Pipe segments shall be sized with consideration for velocities during peak events. Generally the velocity should be kept below 1.5 m/s during peak hour conditions.

The maximum desirable length of any permanent non-interconnected watermain shall be 85 m. Any main exceeding 85 m in length, unless it is a temporary situation, shall be looped,

except with the approval of the Director of Engineering, Parks and Environment.

In residential areas, watermains servicing fire hydrants shall be 150 mm diameter or larger. Watermains 100 mm in diameter may be permitted for domestic service on dead end roads where no further extension is planned.

Wherever practical, watermains shall be looped. Dead-end mains should not be promoted.

In commercial/industrial/institutional areas, the minimum watermain size shall be 200mm diameter.

W6 DEPTH OF COVER

The minimum cover over any watermain shall be 1.2 m with 0.3 m cover over valve stems.

W7 WATERMAIN GRADES

The minimum grade for a main shall be 0.1%. The maximum grade shall be 8 % unless provisions are made to anchor the pipe to the bottom of the trench with concrete poured in place.

W8 CLEARANCE WITH SEWER PIPES

All cross over points with sewers shall be noted and where the watermain is below or is less than 0.5 m above any sanitary or storm sewer, the water main shall be adequately encased. The concrete encasement shall be as noted in the Standard Drawings.

Where pipes do not cross, the minimum horizontal clearance between a watermain and a sanitary or storm sewer shall be 3 m unless the watermain is concrete encased or installed in a carrier pipe, or protected in a manner approved by the Drinking Water Officer.

W9 VALVES

In general, valves shall be located as follows:

a) In intersections, in a cluster at the pipe intersection or at hydrant tees the minimum shall be:

(i) 3 valves at "X" intersection
(ii) 2 valves at "T" intersection

so that specific sections of mains may be isolated.

b) Valves shall be provided in all legs of "X" or "T" intersections in industrial areas.

c) Spacing of valves in industrial areas shall isolate no more than 1 hydrant or 2 service connections.

d) Spacing of valves shall not be more than 200 m apart for single family residential areas or 150 m apart for commercial areas. All other zones shall require special designs.

e) Not more than 1 hydrant is to be isolated per valve.

Valves shall be the same diameter as the main up to 300 mm diameter. For mains larger than 300 mm in diameter, valves shall be no more than one diameter size smaller.

All direct bury mainline valves shall be gate valves. Butterfly valves shall not be used unless approved by the Director of Engineering, Parks and Environment in special circumstances where a gate valve is not practical. Valves larger than 400 mm shall be provided with bypass valves.

W10 HYDRANTS

Fire Hydrants shall be located in general at street intersections, and at a maximum spacing of 150 m in residential areas with no lot further than 75 m from a hydrant. In high density residential, commercial, and industrial areas, hydrants shall be located at a maximum of 75 m or as approved by the Director of Engineering, Parks and Environment.

In mid-block locations, fire hydrants shall be located at property lines. It shall be the Design Engineer's responsibility to ensure the design and proposed locations of the fire hydrants will not conflict with existing or proposed streetlights, power poles, driveways, kiosks and other structures. The Design Engineer must ensure sufficient hydrants and access paths are provided to deliver the required fire flows.

W1I AIR VALVES

Air and vacuum release valves shall be installed at the summit of all mains of 200 mm diameter and larger except where the difference in grade between the summit and valley is less than 600 mm.

Air and vacuum release valves shall be sized as follows:

Watermain Size	**Valve Size**
Up to 300mm	25 mm
Up to 600 mm	50mm
Larger mains	Special design

W12 BLOW-OFF'S

Blow-offs are required at the ends of all watermains and at system low points. See Standard Drawings for details. Blow-offs for watermains larger than 200 mm shall require special design. A gate valve is required for temporary blow-offs.

W13 THRUST BLOCKING

Concrete thrust blocking shall be provided at valves, bends, tees, wyes, reducers, plugs, caps, and blow-offs. Thrust block sizes shall be indicated on the design drawings.

W14 VALVE CHAMBER DRAINAGE

Chambers or manholes containing valves, blow-offs, meters, or other appurtenances shall not be connected directly to any sewer. Such chambers or manholes shall be drained to the ground surface where they are not subjected to flooding by surface water, or to absorption pits, subject to adequate soils conditions.

W15 SERVICE CONNECTIONS

Minimum 20 mm diameter service connections shall be required for all lots. These connections shall typically be located at the centreline of the lot and the curb stop located at 300 mm from the property line, or the road right-of-way.

A corporation stop and a curb stop shall be installed for each connection 50mm diameter in size or smaller.

All service connections 100 mm diameter and larger shall be installed complete with a check valve as shown on Standard Drawings. Where approved backflow prevention devices are installed in the building, the Director of Engineering, Parks and Environment may waive the requirement of check valve at the property line.

The City of Langley Building Bylaw stipulates the conditions for mandatory fire sprinkler systems. A Professional Engineer with experience in sprinkler system design shall size each water service connection to accommodate the anticipated fire sprinkler installations. Designs are to conform with the National Fire Protection Association standards.

Water meters are required for all residential, commercial and industrial developments as per the City of Langley Waterworks Regulations Bylaw.

W16 WATER SYSTEM LOCATION/CORRIDORS

Watermains shall be located within the road right-of-way as noted in the applicable Standard Drawings for road cross-sections unless otherwise approved by the Director of Engineering, Parks and Environment.

When the watermain is required to cross private lands, the right-of-way shall be a minimum of 3 m wide.

When a watermain, manholes, valve chambers, or other appurtenances are located within the right-of-way, the Developer may be required to provide access from a City road for maintenance vehicles. The maintenance access shall be constructed as shown in Standard Drawing and be adequate to support the maintenance vehicles for which the access is intended.

W17 CORROSION PROTECTION

A geotechnical soils analysis shall be completed by a Professional Engineer on the alignment of any proposed metallic pipeline and in areas of corrosive soils identified by the Director of Engineering, Parks and Environment. This study shall identify recommended means of corrosion protection.

W18 PRESSURE REDUCING VALVES (PRV)

If a design of a water system includes the use of pressure reducing valves, it must be approved by the Director of Engineering, Parks and Environment.

W19 CROSS CONNECTION CONTROL

Refer to the City's Cross Connection Policy for methods on how to prevent contamination of the domestic water supply.

DESIGN CRITERIA

SECTION L - STREET LIGHTING

SECTION L - STREET LIGHTING

For convenience of reference, Section L Index is duplicated as follows:

SECTION L - STREET LIGTING **PAGE**

SECTION L - STREET LIGHTING

L1 GENERAL

Design of street lighting systems shall be in accordance with the City of Langley Design Criteria Manual, Standard Drawings, and Master Municipal Construction Documents (MMCD) 2000 Edition, (Gold Book) , as amended from time to time, A copy of the lighting calculations shall be submitted. The drawing is to note the types of refractors to be used.

L2 ILLUMINACE AND CONFIGURATION

Road Class	***Land Use***	***Average Horiz Illumce lux***	***Uniformity***		***Average Veiling Illumce Cd/m2***	***Configuration***	
			Max Av:Min Ratio	***Max Max:Min Ratio***		***Mounting Height***	***Location***
Arterial	Downtown Commercial	22	3:1	6:1	0.28	9	Opposite each other (19m Spacing)
	Commercial	22	3 : 1	6 : 1	0.28	9	Staggered
	Residential	20	3 : 1	6 : 1	0.24	9	Staggered
	Industrial	13	3 : 1	6 : 1	0.24	9	Staggered
Collector	Downtown Commercial	22	3 : 1	6 : 1	0.28	9	Opposite each other (19m Spacing)
	Commercial	13	3 : 1	6 : 1	0.20	9	Staggered
	Residential	10	3 : 1	6 : 1	0.18	9	Staggered
	Industrial	6.5	3 : 1	6 : 1	0.16	9	Staggered
Local	Residential	6	6 : 1	12 : 1	0.16	7.5	One Side
	Industrial	6	6 : 1	12 : 1	0.16	7.5	Staggered

Lanes	Commercial	10	3 : 1	6 : 1	0.18	7.5	One Side
	Industrial	6	6 : 1	12 : 1	0.16	7.5	One Side

a) Lighting design shall follow recommended practices provided in "Guide for the Design of Roadway Lighting" published by the Transport Association of Canada and the City approved edition of the Electrical Section of the Master Municipal Specifications -MMCD.

b) Lighting level at all major intersections shall be increased by 25% over that of the higher of the approach roads.

c) Luminaires shall be 100 W or 150 W High Pressure Sodium unless approved by the Director of Engineering, Parks and Environment.

d) All electrical power shall be rated for 120 volts unless connecting to an existing system having a non-standard power rating.

e) Street lights shall have polycarbonate lenses.

f) The make and model of the lurninaire upon which the illumination levels were calculated shall be specified on the drawings.

L3 LUMINAIRES AND POLES

a) All street lights shall have Cobra type luminaires mounted on davit poles, except in the Downtown Commercial Areas, where decorative lights are to be installed as described in item (e).

b) Post top luminaires may be permitted in lanes or walkways.

c) Luminaires and poles for special development areas or streetscape themes shall conform to the type and style approved by the Director of Engineering, Parks and Environment.

d) Where special street lights are installed, the developer shall supply to the City one additional spare luminaire and pole for every ten such units installed.

e) Any special poles, bases and luminaires in the downtown area of the City are to be approved by the Director of Engineering, Parks and Environment. The poles and luminaries must match the design, colour and specifications of the Downtown Enhancement Policy. The

poles, decorative base and luminaries shall match our current colour scheme. They should be a Lumec New Westminster Series complete with a West Coast Engineering Pole and Base or approved equivalent.

L4 UNDERGROUND DUCTS

a) Underground wiring for street lighting shall be designed in accordance with the Canadian Electrical Code (Part 1) and all bulletins as issued by the BC Electrical Safety Branch, the Provincial Electrical Inspection amendments and any municipal codes or bylaws and other authorities having jurisdiction shall be followed.

b) The standard offset for the location of the underground streetlighting ducts in road rights-of-way shall conform to the applicable Standard Drawings for the road type.

c) The minimum depth for the underground ducts shall be 0.6 m in boulevards and 0.9 m below the finished grade of the roadway.

d) It is the designer's responsibility to ensure that the supply service to the street lighting system receives connection permit from BC Hydro, a copy of which shall be forwarded to the City.

L5 CIRCUIT SIZE

a) Service bases shall service a maximum of 25 lights.

b) Roads having staggered lighting shall have separate circuits on either side of the road.

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DESIGN CRITERIA - SECTION T

STREET TREE AND BOULEVARD PLANTING

SECTION T - STREET TREE AND BOULEVARD PLANTING

For convenience of reference, Section T Index is **duplicated as follows:**

SECTION T - STREET TREE AND BOULEVARD PLATING **PAGE**

SECTION T - STREET TREE AND BOULEVARD PLANTING

T1 GENERAL

Design of street tree and boulevard planting shall in accordance with the City's Design Criteria Manual, Standard Drawings, City of Langley's Street Tree Program, dated October, 1999, Master Municipal Construction Documents (MMCD) 2000 Edition, (Gold Book) as amended from time to time and the City of Langley Downtown Master Plan. Designs must be prepared by a Landscape Architect, registered with the British Columbia Society of Landscape Architects or a Landscape Designer, and will be reviewed by the Parks Operations Manager.

T2 PLANTING REQUIREMENTS

Street trees of a species and spacing acceptable to the Parks Operations Manager will be required in boulevard plantings where the boulevard is physically separated from the adjacent development by a solid landscape screen or fence.

T3 PLANT SPACINGS

Street trees shall be spaced from 9 m to 15 m apart depending on the species used in the design.

Boulevard plantings shall be designed to fill in as a mass planting within 3 years of installation. A maximum spacing at installation shall be 900 mm O.C. for #2 pot evergreen shrubs and 450 mm O.C. for 10 cm pot evergreen ground covers.

T4 MINIMUM TREE PLANTING CLEARANCES

Street trees in different road categories shall be planted at offsets shown in the Standard Drawings. In addition, street trees shall have a minimum distance from the following:

Lamp standards	6m
Steel/wooden poles	3m
Driveways	2m
Catch Basins	2m
Manholes, Valve Boxes, Services	1.2m
Sewer Services	1.5 m
Hydrants	2m
Corners	inline with 8m sight triangle

T5 SPECIES SELECTION

Street tree species selection shall be made from the list of recommended street trees included in the guidelines of the City's Street Tree Program, dated October, 1999. The species must be acceptable to the Parks Operations Manager.

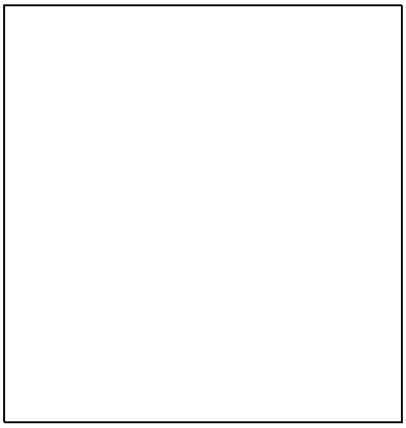
SUBDIVISION AND DEVELOPMENT SERVICING BYLAW

SCHEDULES “C”


0744_001.pdf

SUBDIVISION AND DEVELOPMENT SERVICING BYLAW

SCHEDULES "D"



City of Langley

CIVIL SECTION

SUPPLEMENTARY SPECIFICATIONS INDEX

GENERAL INFORMATION

DIVISION 1 - GENERAL REQUIREMENTS

DIVISION 2 - SITE WORK

ELECTRICAL SECTION

SUPPLEMENTARY SPECIFICATIONS INDEX

DIVISION 16 - ELECTRICAL

Downtown Enhancement Policy

Streetscape Entrance Enhancement Policy

These Supplementary Specifications must be read in conjunction with the Master Municipal Specifications contained in the Master Municipal Construction Documents, Volume II, 2000

1.0 Master Municipal Construction Documents

The Supplementary Specifications contained herein must be read in conjunction with the Master Municipal Specifications contained in the Master Municipal Construction Documents, Volume II as identified in the Instructions to Tender article 2.2.

2.0 Format and Numbering System

The Supplementary Specifications follow the same format and numbering system as the Master Municipal Specifications, but is differentiated from it by having the letter "S" placed after the section number.

1.0 GENERAL

1.12 Site Offices

.1 *(amend clause 1.12.1 as follows)*

A Contract Administrator's temporary office will not be required for this project.

END OF SECTION

1.0	**GENERAL**	.1	***(amend clause 1.0.1 as replace as follows)*** Section 02111S refers to those sections of the work that are unique to clearing, grubbing and mass excavation. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.
1.2	**Definitions**	.5	***(add new clause 1.2.5 as follows)*** Mass Excavation consists of removal and disposal offsite of all above ground and underground structures including: pipes, asphalt, concrete, reiforced concrete

END OF SECTION

1.0 GENERAL

1.7 Seismic Survey and Monitoring

.1 *(delete clause 1.7.1 as replace as follows)*
Contractor will arrange for assessment of adjacent buildings and structures to determine existing conditions and will provide building and structure owners with proposed blasting procedures and copies of assessment reports and seismic recording operations.

.2 *(delete clause 1.7.2 as replace as follows)*
Cost of professional seismic survey and monitoring reports will be paid by Contractor.

END OF SECTION

1.7	**Disposal**	.2	***(add new clause 1.7.2 as follows)*** Surplus spoil from excavations may be placed on private property within the Agricultural Land Reserve only where the property owner is in possession of a valid permit issued by the local government as required under the Soil Conservation Act. Such permit may be issued when the B.C. Agricultural Land Commission has indicated its approval on such deposition. For placement of spoil material on private properties within the Agricultural Land Reserve, governing conditions in the Langley Soil and Other Material Deposition Regulation Bylaw shall apply.
1.8	**Limitations of Open Trench**	.1	***(delete clause 1.8.1 and replace as follows)*** Excavate trenches only as far in advance of pipe laying operation as safety, traffic, and weather conditions permit and, in no case, to exceed 30 m. Before stopping work each day completely backfill every trench on or adjacent to roadways. All other trenches to be completely backfilled before stopping work on last day of work before each weekend or holiday. If circumstances do not permit complete backfilling of all trenches, adequately protect all open trenches or excavations with approved fencing barricades and, where required, with flashing lights.
2.2	**Use of Specified Material**	.1	***(delete clause 2.2.1.2 and replace as follows)*** .2 19 mm clear crushed rock Delete Clause 2.2.3.3: Pit run sand.
		.3	***(delete clause 2.2.1.3)***
3.6	**Surface Restoration**	.6	***(amend clause 3.6.6 .1 as follows)*** .1 The following are classified as an arterial or collector road, patch same day excavation is made: - refer to City Map

END OF SECTION

1.0 GENERAL

1.6 Disposal

.2 *(add new clause 1.6.2 as follows)*

Surplus spoil from excavations may be placed on private property within the Agricultural Land Reserve only where the property owner is in possession of a valid permit issued by the local government as required under the Soil Conservation Act. Such permit may be issued when the B.C. Agricultural Land Commission has indicated its approval on such deposition.

For placement of spoil material on private properties within the Agricultural Land Reserve, governing conditions in the Langley Soil and Other Material Deposition Regulation Bylaw shall apply.

1.8 Measurement for Payment

.4 *(delete clause 1.8.4 and replace as follows)*

Common excavation will be measured in cubic metres by struck box measure. Volumes of hauling units will be based on two thirds (2/3) of the stuck box measure as determined by the *Contract Administrator*.

.8 *(delete clause 1.8.8 and replace as follows)*

Subgrade finishing and compaction shall be incidental to the work.

2.0 PRODUCTS

2.2 Specified Materials

.1 *(delete clause 2.2.1.3)*

END OF SECTION

3.0 EXECUTION

3.5 Proof Rolling .7 *(add clause 3.5.7 as follows)*

Prior to paving with asphalt concrete, the base surface shall be checked by the Contract Administrator, for deflections utilizing a Benkleman Beam, in order to insure that the final rebound requirements can be obtained with the asphalt pavement. In the event that such deflection are in excess of those required to produce the final standards, than the base shall be adequately strengthened by additional gravel or asphalt concrete to insure that final deflections as follows are not exceeded.

The Benkleman spring rebound value of the completed pavement surface shall not at any point exceed 0.75mm for arterial industrial roads and lanes, 1.15mm for collector roads, and 1.5mm for local roads and lanes as determined in the procedures outlined in the Transportation Association of Canada publication "Pavement Management Guide".

END OF SECTION

2.0 PRODUCTS

2.1 Specified Materials

.1 *(delete clause 2.1.1 and replace as follows)*
Material for road subbase to be:
.1 Select granular subbase.

END OF SECTION

1.0 GENERAL

1.5 Measurement for Payment .6 *(clause 1.5.6 amended)*

All unit prices shall include all costs relating to adjusting and cleaning frames, covers and lids of all casting as well as sawcutting for straight joints.

END OF SECTION

3.0 EXECUTION

3.15 Defective Concrete

.1 *(delete clause 3.15.1.4 and replace as follows)*

Any individual 28 day strength test is more than 3.5MPa below the specified 28 day strength.

END OF SECTION

3.0 EXECUTION

3.9 Expansion Joints .4 *(amend clause 3.9.4 as follows)*

Bond break compounds may not be used in lieu of expansion joint between back of curb and sidewalk.

3.17 Acceptance .2 *(add clause 3.17.2 as follows)*

Concrete patching of sidewalk and curb and gutter will not be accepted. Panels must be repaired by removal and replacement of complete panel between control joints.

END OF SECTION

3.0 EXECUTION

3.3 Application

.2 Painted Markings

(amend clause 3.3.2.3 and replace as follows)

.3 Paint shall be applied at a rate of not less than 28.25 litres per kilometre per 100 mm width line, thinner not included.

(amend clause 3.3.2.8 and replace as follows)

.8 Glass beads shall be applied at a minimum rate of 17 kg beads per kilometre for 100 mm wide single solid line.

.3 ***(add new clause 3.3.3 as follows)***

Thermoplastic:

.1 Pavement shall be clean and dry and free of sand, gravel, loose dust and foreign matter.

.2 Temperature of surface to be marked shall not be less that 50° C.

.3 Thermoplastic material shall be heated in the melter to a temperature of 382° F with continuous mixing and shall be placed on the road surface at a temperature of 382° F.

.4 Thermoplastic material thickness shall be:

Lane lines	0.090" (2.286mm)
Stop bars and crosswalks	0.125" (3.157mm)

.5 Testing of material thickness to be determined by placing metal plate of known thickness in the area to be painted. Once applied the sample is removed and the material plus metal plate is measured.

.6 Immediately following application glass spheres shall be dropped onto the molten surface. Spheres to be applied at a rate of 300 grams per square meter of line area.

1.0 GENERAL

1.8 Measurement for Payment

.4 *(amend clause 1.8.4 as follows)*
Hydrants, including mainline tee, lateral connections from watermain to hydrants, gate valve, adjustable valve box, access and ditch culvert with headwalls (as shown on Standard Detail Drawings SWD 1) where required will be measured in units installed.

.7 *(amend clause 1.8.7 as follows)*
Combination air valves and apparatus, including valve chamber, will be measured in units installed.

.14 *(add new clause 1.8.14 as follows)*
Tie-ins to existing mains will proceed only as directed by the Contract Administrator and only after the completion and acceptance of all new system testing. Payment will be at the unit price per tie-in as identified in the Schedule of Quantities and Prices. Payment includes exposing the existing system in order to confirm conditions, all labour, materials, equipment, reinstatement and coordination with the Owner's water crew required to complete the installation as shown on the Contract Drawings.

2.0 PRODUCTS

2.2 Mainline Pipe, Joints and Fittings

.1 Ductile Iron Pipe:
.1 Pipe:
(amend clause 2.2.1.1 as follows)
to AWWA C151, to Pressure Class 350 or Special Thickness Class specified in Contract Documents, and standard cement mortar lined to AWWA C104. Encase with polyethylene.

.2 Polyvinyl Chloride (PVC) Pressure Pipe:
.1 Pipe:
(add new clause 2.2.2.1.5 as follows)
.5 To be blue in color.

.4 Fittings:

(amend clause 2.2.4.11 as follows)

.11 Fabricated steel pipe fittings:

Exterior protected with hot applied coal tar enamel to AWWA C203. Interior protected with liquid epoxy to AWWA C210.

(amend clause 2.2.4.12. as follows)

.12 Couplings and Flanged Coupling Adapters:

.1 General Requirements:

.6 Bolts and nuts shall be stainless steel to ASTM F593 or F738 for bolts and ASTM F594 or F836 for heavy hex nuts. Rolled threads, fit and dimensions to AWWA C111.

.2 Plain end or transition couplings;
Approved Products:
- CAN PAC CDB
- Dresser 38 or 162
- Robar

Repair clamps not permitted.

.3 Flanged coupling adapters;
Approved Products:
- Dresser 128
- Robar

.13 Joint Restraint Devices: General Requirements:

.12 ***(add new clause 2.2.3.13.12 as follows)***
Set screw type restrainers not permitted on PVC pipe.

.13 ***(add new clause 2.2.3.13.13 as follows)***
Approved Products:
- Uniflange series 1300, 1350, 1390, 1300C, 1390C

.14 ***(add new clause 2.2.3.14 follows)***
PVC mainline 5° bend:
Approved Products:
- IPEX C900 Class 150 5° bend

.6 Steel Pipe:

.3 ***(delete clause 2.2.6.3 and replace as follows)***
Finishes - exterior : hot applied coal tar enamel to AWWA C203.
- interior : liquid epoxy to AWWA C210.

2.3 Valves and Valve Boxes

.2 Mainline Gate Valves

.7 ***(amend clause 2.3.2.7 as follows)***
Approved Products:
- Terminal City

.3 ***(amend clause 2.3.3 as follows)***
Mainline butterfly valves:
Approved Products:
- Mueller
- Centerline

.5 ***(delete clause 2.3.5 and replace as follows)***

Combination Air Valves:
.1 Gray cast iron or ductile iron body.
.2 Threaded or flanged connections.
.3 Maximum working pressure 2070 kpa.
.4 To AWWA C512
Approved Products:
- Appco
- Valmatic

.6 Mainline Valve Boxes:
.1 *(amend clause 2.3.6.1 as follows)*
Do not use rectangular type valve boxes.

.2 *(amend clause 2.3.6.2 as follows)*
Circular, nelson type valve box, with cover marke "WATER":
Approved Products:
- Terminal City

.7 Service Valve Boxes:
.6 *(add new clause 2.3.7 as follows)*
Nelson type service box, with cover marked "WATER":
Approved Products:
- Terminal City

2.4 Valve and Large Meter Chambers

.1 *(amend clause 2.4.1 as follows)*
Applicability:

.1 air valves
.2 butterfly valves (if called for on design drawings)
.3 mainline gate valves (if called for on design drawings)

.9 *(amend clause 2.4.9 as follows)*
Standard cast iron valve chamber frame and cover:
marked "LANGLEY CITY" and "WATER"
Approved Products
- Dobney C-20
- K Castings CK20

2.5 Service Connections, Pipe, Joints and Fittings

.3 Service Saddles:
.2 *(amend clause 2.5.3.2 as follows)*
Saddles for ductile iron pipe:
.2 Anti-corrosive coating to AWWA C213.
.3 Two Type 304 stainless steel U-bolt straps, with minimum width per strap of 50mm.
.4 Approved Products:
- Robar 2506DS

.3 *(amend clause 2.5.3.3 as follows)*
Saddles for PVC pipe to AWWA C900/905:
.2 Saddles for 19 to 50 mm services:
.1 Bronze body ...
Approved Products:
- Robar 2706DS

.2 Ductile Iron body ...
.1 Anti-corrosive coating to AWWA C213.
.2 Two Type 304 stainless steel U-bolt straps, with minimum width per strap of 50mm.
.3 Approved Products:
- Robar 2506DS

.3 All Stainless steel broad band saddle...
Approved Products:
- Canpac SC-2

2.6 Hydrants

.2 *(amend clause 2.6.2 as follows)*
Color: Cloverdale Paint Marine Enamel, Bright Red
Part No. 11187 or approved equal, applied by brush.

.3 *(amend clause 2.6.3 as follows)*
Approved standard 150mm Fire Hydrants:
- Terminal City C71P

2.7 Underground Service Line Valves and Fittings

.2 Corporation Stops:
.2 *(amend clause 2.7.2.2 as follows)*
Approved Products:
- Ford
- Mueller

.3 Curb Stops:
.3 *(amend clause 2.7.3.3 as follows)*
Approved Products:
- Ford
- Mueller

2.10 Miscellaneous *(add new clause 2.10 as follows)*

.1 Joint Protection Tape:
.1 Petroleum tape product to ANSI/AWWA C209 (field
.2 All materials used to have zero health hazard.
Approved Products:
- Trenton Tec Tape

3.0 EXECUTION

3.5 Granular Bedding

.6 *(delete clause 3.5.6 and replace as follows)*
Place copper water services on prepared flat bottomed trench free of rock in excess of 50mm without bedding and backfill with approved native or imported material and compact as specified.

.8 *(delete clause 3.5.8 and replace as follows)*
Use imported bedding material when using pipe materials other than copper. Use hand tools to compact material under 'haunch' area of pipe and around fittings and other materials.

3.6 Pipe Installation

.15 *(add new clause 3.6.15 as follows)*
Sewer Crossings:
Where the watermain is below or has less than 0.5 m clearance above any sewer, a next higher class of pipe shall be used and a full pipe length shall be centered across the cross over point. The end joints of this pipe shall be wrapped with joint protection tape in accordance with the manufacturers recommendations.

END OF SECTION

1.0 GENERAL

1.6 Measurement for Payment

.11 *(add new clause 1.6.11 as follows)*
Swales will be measured in lineal metres for each payment item described in Form of Tender. Payment will include top soil and sod where specified. Payment for perforated drain pipes, where specified, will be made separately under item 1.6.8.

.12 *(add new clause 1.6.12 as follows)*
Measurement for exfiltration trench will be made in horizontal lineal metres of perforated storm sewers from manhole centreline to manhole centreline over the surface after work has been completed. Payment will include excavation, disposal of surplus excavated materials, supply and installation of all pipe, fittings and related materials, clear drain rocks, filter fabric, import or native backfill as shown on Contract Drawings, cleaning and flushing, testing, (if applicable), surface restoration and all other work and materials necessary to complete the installation as shown on Contract Drawings and specified herein.

2.0 PRODUCTS

2.5 Service Connections

.8 *(delete clause 2.5.8.2 and replace as follows)*
.2 Connections to ribbed PVC pipe to be made with a manufactured wye fitting where wye locations are known in advance. For connections to ribbed PVC mainline pipe larger than 450 mm an insertable tee for ribbed PVC pipe is permitted for connections more than two sizes smaller than mainline pipe. When an insertable tee is used, hole cut into mainline pipe to cut as few ribs as possible

.11 *(add new clause 254.11 as follows)*
Insertable tee fitting shall have a rubber collar which inserts into the mainline pipe to form a tight seal and shall have stainless steel band to secure the tee insert. The tee insert shall be a standard bell end with depth control lugs.

2.7	**Granular Pipe Bedding And Surround Material**	.3	***(add new clause 2.7.3 as follows)*** 19 mm clear crushed rock.
3.0	**EXECUTION**		
3.12	**Video Inspection**	.1	***(delete clause 3.12.1 and replace as follows)*** Contractor shall video inspect completed sewer immediately following completion of installation and submit in standard City format prior to substantial performance.

END OF SECTION

2.0 PRODUCTS

2.1 Corrugated Steel Pipe

(delete clause 2.1 and replace as follows)
Do not use corrugated steel pipe for culverts.

2.3 Plastic Pipe, Smooth Profile

(delete clause 2.3 and replace as follows)
Do not use smooth profile plastic pipe for culverts.

2.4 Plastic Pipe, Ribbed Profile

(delete clause 2.4 and replace as follows)
Do not use ribbed profile plastic pipe for culverts.

END OF SECTION

1.5 Measurement for Payment

.2 .5 ***(delete clause 1.5.2.5 and replace as follows)***
Additional payment for drop or ramp type manhole connections, as shown on Standard Detail Drawings S3 and S4, will be made at the respective unit prices bid for each drop or ramp type manhole connection described in Form of Tender.

2.0 PRODUCTS

2.1 Materials

.7 ***(amend clause 2.1.7 as follows)***
Cast iron manhole frame and cover:
as shown on Standard Detail Drawing SDD1, marked "LANGLEY CITY" and either "STORM SEWER" or "SANITARY SEWER".
Approved Products:
- ACS C-18
- Dobney C-18
- K Casting CK18
- Sierra Dist SD18
- UIF 1AF, 1LAF (frame) & 1AC (cover)
- Westview TR18

.10 .1 ***(delete clause 2.1.10.1 and replace as follows)***
As shown on Supplemental Detail Drawing SS1.

.13 ***(amend clause 2.1.13 as follows)***
Cast iron catchbasin frame and grate (with fish identification).
Approved Products:
- ACS B-24 (frame) & B-23 (grate)
- Dobney B-24 (frame) & B-23 (grate)
- Dobney B-39B(side inlet curb frame)
- K Casting BJ24D (frame) & BJ23 (grate)
- Sierra Dist. SD24 (frame) & SD23 (grate)
- UIF 60CBFD (frame) & 60CBG (grate)
- Westview TR 24 (frame) & TR 23 (grate)

.14 ***(amend clause 2.1.14 as follows)***
Joints: rubber gaskets conforming to ASTM C443

.19 ***(amend clause 2.1.19 as follows)***
Lawn drain grating limited to the following:

Approved Products:
- ACS B-22A
- Dobney B-22A

END OF SECTION

2.0 PRODUCTS

2.3 Service Connections

.8 *(delete clause 2.3.8.2 and repalce as follows)*
.2 Connections to ribbed PVC pipe not allowed.

.11 *(add new clause 2.3.11 as follows)*
Inspection Chamber:
Approved Products
- LeRon 70A 4x8
- WLP-1
- Galaxy Plastics Ltd.

.12 *(add new clause 2.3.12 as follows)*
Service connections to existing mains shall be made with an extrusion molded PVC wye and approved couplings or, where approved by the Contract Administrator, by coring the mainline pipe and installation of an approved sewer saddle.

2.5 Granular Pipe Bedding and Surround Material

.3 *(add new clause 2.5.3 as follows)*
19 mm clear crushed rock.

3.0 EXECUTION

3.18 Video Inspection

.1 *(delete clause 3.18.1 and replace as follows)*
Contractor shall video inspect completed sewer immediately following completion of installation and submit in standard City format prior to substantial performance.

END OF SECTION

1.0 GENERAL

1.8 Measurement for Payment

.5 *(amend clause 1.8.5 as follows)*

Air-release/air-vacuum and combination air valves and apparatus, including valve chamber, will be measured in units installed.

2.0 PRODUCTS

2.2 Pipe, Joints and Fittings

.4 *(delete clause 2.2.4 and replace as follows)*

Do not use high density polyethylene pipe:

.5 Fittings:

.12 Couplings and Flanged Coupling Adapters:

.1 General Requirements:

.6 *(amend clause 2.2.5.12.1.6 as follows)*

Bolts and nuts shall be stainless steel to ASTM F593 or F738 for bolts and ASTM F594 or F836 for heavy hex nuts. Rolled threads, fit and dimensions to AWWA C111.

.2 *(amend clause 2.2.5.12.2 as follows)*

Plain end or transition couplings;
Approved Products:
- CAN PAC CDB
- Dresser 38 or 162
- Robar

Repair clamps not permitted.

.3 *(amend clause 2.2.5.12.3 as follows)*

Flanged coupling adapters;
Approved Products:
- Dresser 128
- Robar

.13 Joint Restraint Devices: General Requirements:

.12 *(amend clause 2.2.5.13.12 as follows)*

Approved Products:
- Uniflange series 1300, 1350, 1390, 1300C, 1390C

.14 *(add new clause 2.2.5.14 as follows)*

PVC mainline 5° bend:
Approved Products:
- IPEX C900 Class 150, 5° bend

2.3 Valves and Valve Boxes

.2 Gate Valves

.6 *(amend clause 2.3.2.6 as follows)*

Approved Products:

- AVK resilient seat
- Bibby - Ste - Croix resilient seat
- Canada Valve
- Clow resilient seat
- Jenkins
- McAvity
- Mueller solid wedge and resilient seat
- Terminal City

.5 Valve Boxes:

.1 *(amend clause 2.3.5.1 as follows*

Circular type, telescoping, cast iron, top flange type service box with cover marked "SEWER":

Approved Products:

- ACS D-7
- Dobney D-5
- K Casting 1977
- Terminal City
- UIF 85

2.4 Valve Chambers

.1 *(amend clause 2.4.1 as follows)*

Applicability:

.1 air valves

.3 mainline gate valves (if called for on design drawings)

.8 *(amend clause 2.4.8 as follows)*

Standard cast iron valve chamber frame and cover:
marked "LANGLEY CITY" and "SANITARY SEWER"
Approved Products

- ACS C-20
- Dobney C-20
- K Castings CK20

3.0 EXECUTION

3.5 Granular Bedding

.6 *(delete clause 3.5.6 and replace as follows)*

Place forcemain pipe in trench with prepared granular bedding and back fill with approved native or imported material and compact as specified. Use hand tools to compact material under 'haunch' area of pipe and around fittings and other materials.

.7 *(delete clause 3.5.7 and replace as follows)*

Use imported bedding for all forcemain pipe.

END OF SECTION

2.0 PRODUCTS

2.1 Materials

.3 *(delete clause 2.1.3 and replace as follows)*
Chain-link fence fabric: 9 gauge (3.55 mm diameter wire) 50 mm mesh, galvanized and vinyl coated. Fabric for fences adjacent to parks or conservation areas to be black vinyl coated.

.5 *(amend clause 2.1.5 as follows)*
Bottom tension wire: use bottom rail similar to top rail inplace of bottom tension wire.

3.0 EXECUTION

3.2 Installation of Fence

.12 *(amend clause 3.2.12 as follows)*
Weld top rail and bottom rail between posts and terminal posts. Spot weld overhanging waterproof dome caps to terminal and corner post tops.

.15 *(amend clause 3.2.15 as follows)*
Secure fence fabric to top rails and line posts as detailed on Standard Detail Drawing C13. Secure fabric to bottom rail in the same manner as the top rail. Give tie wires minimum two twists.

3.4 Touch up

.1 *(amend clause 3.4.1 as follows)*
Clean all welded and damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to cleaned surfaces. Pre-heat damaged surfaces according to manufacturer's instructions for zinc-rich paint.

END OF SECTION

3.0 EXECUTION

3.3 Concrete Bases

.1 *(delete clause 3.3.1 and replace as follows)*
Bases and controller foundations to be pre-cast concrete as shown on Contract Drawings. Cast in place concrete bases or controller foundations permitted only with the City Engineers approval.

.7 *(add clause 3.3.7 as follows)*
Anchor bolts shall provide continuous full thread contact around the anchor nut circumference.

3.6 Poles and Related Equipment

.7 *(amend clause 3.6.7 as follows)*
Field drilling of holes larger than 33mm diameter also not allowed in Single Unit Streetlight Davit Poles.

.13 *(add new clause 3.6.13 as follows)*
Service base as shown on Standard Detail Drawing E5.18 to be used with single unit davit luminaire poles, type 2 shafts and post top poles only. Padlock tab to be drilled with a 10 mm hole for a City lock prior to galvanizing.

.14 *(add new clause 3.6.14 as follows)*
Small hand hole cover to have a vertical backer bar.

.15 *(add new clause 3.6.15 as follows)*
Tamper Proof device required for all ornamental streetlights. – to City of Langley Specifications

3.7 Traffic & Pedestrian Signal Head Mounting Hardware

.2 *(3.7.2 clause amended)*
.2 Do not use City of Vancouver type hangers for overhead mounting.

.4 *(add new clause 3.7.4 as follows)*
All overhead primary traffic heads to be 300mm diameter.

3.10 Luminaires & Photocells

.1 *(amend clause 3.10.1 as follows)*
Streetlight luminaires to be standard cobra type high pressure sodium. Approved products:
- GTE Sylvania model No. R34
- Landmark L2.

3.13 Wiring

.11 *(add new clause 3.13.11.4 as follows)*
Seal connections, with the exception of loop to shielded cable splices:
.4 Fill each wire nut type connector with water proof sealant if the splice is within an underground junction box, or is otherwise susceptible to direct contact with water.

.13 *(amend clause 3.13.13 as follows)*
Bond poles to service bases with a No. 8 conductor.

.14 *(amend clause 3.13.14 as follows)*
Conductor connectors for street lighting to be Burndy type wire nuts.

3.14 Pole Mounted Receptacles

.2 *(delete clause 3.14.2 and replace as follows)*
Install receptacles at locations and to elevation and orientation shown on Contract Drawings.

3.15 Traffic Controller

.1 *(add new clause 3.15.1 as follows)*
Traffic controller to be NEMA type with provision for pre-emption.
Preferred products:
- Econolite – to City of Langley Specifications

.6 *(amend clause 3.15.6 as follows)*
Switch signals to full operation in the presence of the Contract Administrator and the Controller Manufacturer. Contractors on site representative during startup to be a certified Electrician familiar with traffic controller operation and maintenance.

.9 *(add new clause 3.15.9 as follows)*
Pre-emption:
Preferred products:
- Opticom.

.9 *(add new clause 3.15.9 as follows)*
Place new signalized locations in flash mode for 7 days prior to switching to full operation. Do not start signals on a Monday or Friday.

.10 *(add new clause 3.15.10 as follows)*
Owner will perform any necessary programming and timing of the controller following energization of the controller cabinet.

3.16 Detector Loops

.1 *(amend clause 3.16.1 as follows)*
Detector loops to be round type unless otherwise noted on Contract Drawings

3.19 Grounding & Bonding

.5 *(add new clause 3.19.5 as follows)*
Grounding Plate: 6.4 mm thick galvanized steel plate with a minimum surface area of 0.2m (squared).

3.23 ***(add new clause 3.23 as follows)*** **Owner Supplied Materials**

.1 Contractor to notify Contract Administrator in writing 7 days prior to the time materials are required.

.2 Unless otherwise noted owner supplied materials will be made available at the City of Langley Works Yard, 5713 198th Street. Contractor to make all necessary arrangements and pay all costs for collection of the materials and for delivery to the job site. The Contractor shall assume responsibility for materials at the time they are picked up and shall provide suitable storage to protect against theft or damage until materials are installed.

.3 The Contractor shall complete a Materials Release Form at the time materials are picked up. Contractor to check quantities and verify materials are correct and undamaged. Report any discrepancies to the Contract Administrator immediately.

3.24 **Traffic & Pedestrian Signal Heads**

.1 ***(add clause 3.24.1 as follows)***
Pedestrian signal heads to have full silhouette 460 x 450 mm illuminated display with 2-crate visor.
Approved products:

- ICC Model. No. 7090
-all RED sections of signal heads to be LED type
-all ARROW sections of signal heads to be LED type
-all Secondary signal heads are to be 300mm sections

END OF SECTION

	Title: **Downtown Enhancement Elements**	Number: **EN-24**
	Authority (if applicable):	Section: Engineering
	Date Adopted: April 8, 2002	Motion: 02/119
	Historical Changes (Amended, Repealed, or Replaced): Used to be 384	

Policy:

Brick Paver Sidewalks

1. Brick paver sidewalks including street trees complete with electrical provisions at to be installed on:
    - Fraser Highway – both sides between 201 A Street and 207 Street
    - Douglas Crescent – north side between 206 Street and 207 Street, both sides between 203 Street and 206 Street
    - 56 Avenue – both sides from 206 Street to Glover Road and Fraser Highway to 203 Street
    - Park Avenue – both sides
    - Glover Road – both sides between Logan Avenue and Fraser Highway
    - 204 Street – both sides between Fraser Highway and Douglas Crescent
    - 203 Street – both sides between Logan Avenue and 56 Avenue
    - 206 Street – both sides of Douglas Crescent to Fraser Highway, west side between Fraser Highway and 56 Avenue
    - Logan Avenue – south side between Glover Road and 203 Street.

Hanging Baskets

2. Hanging baskets are to be installed on:
    - Fraser Highway – both sides between 203 Street and 207 Street
    - 56 Avenue – both sides between 206 Street and Glover Road and north side between Fraser Highway and 203 Street
    - Salt Lane, Mc Burney Lane and Innes Corner Plaza
    - 204 Street – both sides between Douglas Crescent and Fraser Highway
    - Douglas Crescent – both sides from 203 Street to 206 Street
    - 203 Street – both sides between Fraser Highway and Douglas Crescent.

These Supplementary Specifications must be read in conjunction with the Master Municipal Specifications contained in the Master Municipal Construction Documents, Volume II, 2000

Ornamental Street Lighting

3. Ornamental street lighting is to be installed on:
    - Douglas Crescent – north side between 206 Street and 207 Street, both sides between 203 Street and 206 Street
    - 56 Avenue – both sides from Logan Avenue to Glover Road and both sides from Fraser Highway to 203 Street and south side between 201 A Street and 203 Street
    - Logan Avenue – south side from Glover Road to 203 Street
    - 203 Street – both sides from Logan Avenue to 56 Avenue
    - Park Avenue – both sides
    - Glover Road / 204 Street – both sides between Logan Avenue and Douglas Crescent, east side between Douglas Crescent and Park Avenue
    - 207 Street – west side between Fraser Highway and Douglas Crescent.

	Title: **Streetscape Entrance Enhancement**	Number: **EN-25**
	Authority (if applicable):	Section: Engineering
	Date Adopted: April 8, 2002	Motion: 02/121
	Historical Changes (Amended, Repealed, or Replaced): Used to be 385	

Policy:

Fraser Highway between 207 Street and 209 Street

1. Concrete sidewalks including street trees complete with electrical provision – both sides between 207 Street and 209 Street

2. Landscaped centre median – featuring single pole triple luminaire feature lighting, landscaped planter bed with low maintenance landscaping, including in-ground irrigation system surrounded by stamped concrete

3. Decorative ornamental street lighting – both sides between 207 Street and 209 Street featuring single pole double luminaire feature lighting; and

4. The use of attractive low maintenance landscaping in the area.

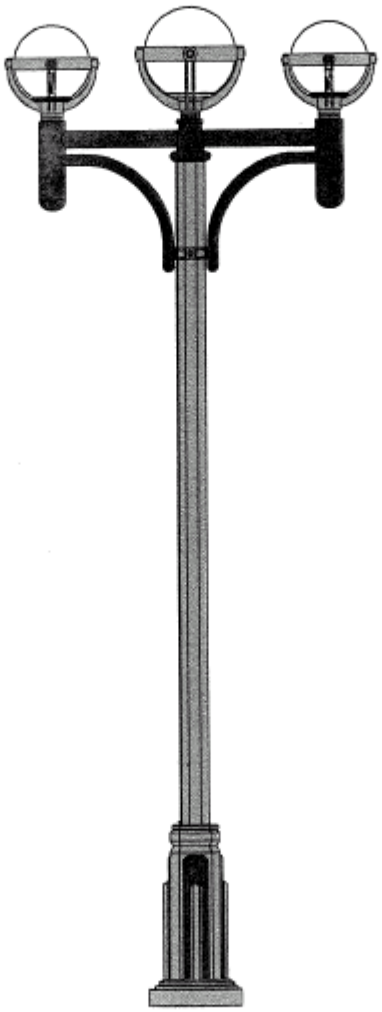
5. Colours of Street – lighting, poles, decorative pole bases and luminaries will maintain the existing downtown core coloure scheme.

These Supplementary Specifications must be read in conjunction with the Master Municipal Specifications contained in the Master Municipal Construction Documents, Volume II, 2000

METROLUME LIGHTING
#206 - 20641 Logan Ave. Langley BC V3A7R3 e-mail: metrolume@telus.net
web site: http://metrolume.com phone: 604-597-4777 fax: 604-597-4775

Fax/E-Mail:
Attn:
From: Randy Hanson Date: April 2, 2002

PRESENTATION DRAWING



Project **City of Langley - Median Lighting Option One**
Detail Lumec New Westminster Series Luminaire as per City of Langley standards.
West Coast Engineering Pole.

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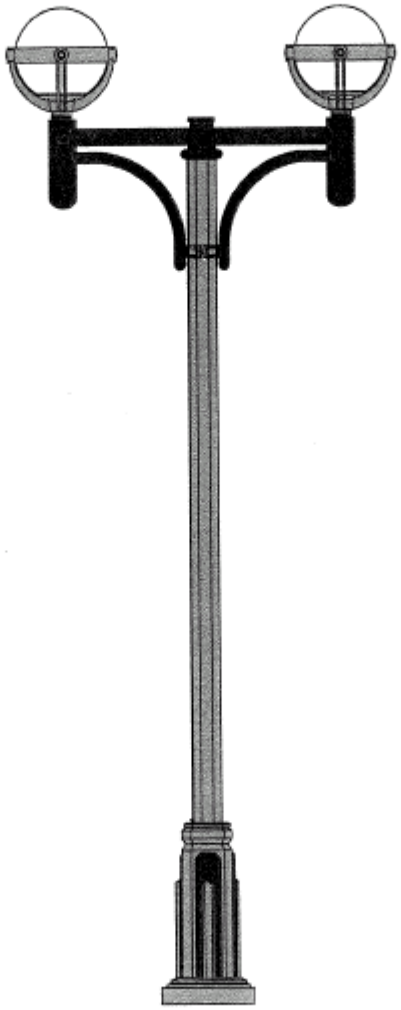
METROLUME LIGHTING
#206 - 20641 Logan Ave. Langley BC V3A7R3 e-mail: metrolume@telus.net
web site: http://metrolume.com phone: 604-597-4777 fax: 604-597-4775

Fax/E-Mail:
Attn:
From: Randy Hanson Date: April 2, 2002

PRESENTATION DRAWING



Project **City of Langley - Median Lighting Option Two**
Detail Lumec New Westminster Series Luminaire as per City of Langley standards.
West Coast Engineering Pole.

Supplementary Detail Drawings

SUBDIVISION AND DEVELOPMENT SERVICING BYLAW

SCHEDULE “E”

WATER METER SPECIFICATIONS

LANGLEY_WATER_METER_SPECIFICATIO