



VILLAGE OF FRUITVALE  
SUBDIVISION AND DEVELOPMENT  
SERVICING BYLAW NO. 561



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WHEREAS the Village of Fruitvale wishes to revise the provisions of the present subdivision Control Bylaw No. 199, May, 1979;

AND WHEREAS pursuant to Division 7 of Part 29 of the Municipal Act, a local government, may by bylaw, regulate and require the provision of works and services in respect of the subdivision or development of land;

NOW THEREFORE, the Council of the Village of Fruitvale, in open meeting assembled, enacts as follows:



VILLAGE OF FRUITVALE  
SUBDIVISION AND DEVELOPMENT  
SERVICING BYLAW NO. 561

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**Schedules**

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SCHEDULE B - Regulations, Standards, and Specifications For  
The Design and Construction of Highways

SCHEDULE C - Regulations, Standards, and Specifications For  
The Design and Construction of Curbs and Gutters, Sidewalks,  
and Boulevards

SCHEDULE D - Regulations, Standards, and Specifications For  
The Design and Installation of Water Systems

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STANDARD FORMS

Standard Development Agreement Document Fee

Simple Subdivisions

Standard Statutory Right-of-Way Document

Confirmation of Commitment by Owner

Confirmation of Professional Assurance

APPENDIX 1.0 Standard Drawings

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SECTION 1 – TITLE

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This bylaw may be cited as the Village of Fruitvale Subdivision and Development Servicing Bylaw No. 561, 1995.

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## SECTION 2 – INTERPRETATION

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### INTERPRETATION

In this bylaw, unless the context requires otherwise:

"Applicant" means a person applying for the approval of a subdivision, pursuant to the provision of the Land Title Act, or a person applying for development other than subdivision, whether as the owner of the property proposed to be subdivided or developed or as agent for the owner or his contractor.

"Approval, Final" means the Approving Officer's affixation of his signature to the subdivision plan pursuant to Section 88 of the Land Title Act.

"Approval" means written approval of a subdivision by the Approving Officer or issuance of building permit by the Building Inspector.

"Approving Officer" means any person duly authorized by the Village Council to act as Approving Officer pursuant to the provisions of the Land Title Act.

"Building Inspector" means the Building Inspector for the Village of Fruitvale.

"Building Regulations" means the Village of Fruitvale Building Bylaw No. 512 as amended.

"Communications wiring" means Telephone or Cable TV wiring or both.

"Community Sewer System" means a sanitary sewer or a system of sewage disposal works which is owned, operated and maintained by the municipality.

"Community Water System" means a system of waterworks within the meaning of the Health Act which is owned, operated and maintained by the Municipality, an Improvement District under the Water Act or the Municipal Act, or which is regulated under the Water Utility Act, and authorized by the Municipal Council.

"Council" means the Council of the Corporation of the Village of Fruitvale.

"Cul-de-sac" means a length of local street made for vehicular use, the end of which is permanently closed either by subdivision design or by a natural feature such as inaccessible terrain.

"Design Engineer" means the Professional Engineer engaged by the developer to design and prepare drawings for construction of works in a subdivision or development, or his authorized representative.

"Development" means an activity that requires a Building Permit.

"Drainage System" means a system of works designed and constructed to control the flow of storm water, ground water, or both.

"Frontage" means the length of a parcel boundary which immediately adjoins a highway other than a lane or a walkway. In the case of a parcel fronting on more than one highway, the narrower side of the parcel abutting a highway shall be its frontage.

"Gradient or Grade" expressed as a percentage is determined by dividing the vertical height from the lowest to highest elevation on the parcel by the horizontal distance between the lowest and highest point.

"Highway" includes a street, road, lane, bridge, viaduct and any other way open to public use, but does not include a private right-of-way on private property.

"Highway, Collector" means a street which carries traffic from local highways to arterial highways and includes the principal entrance streets for circulation of traffic within such a subdivision.

"Highway, Local" means a street used primarily for travel and access to and from the parcels of land contiguous thereto.

"Irrigation District" means an irrigation district incorporated under the Municipal Act or in the Water Act.

"Lane" means a highway more than 3 metres but not greater than 8 metres in width, intended to provide secondary access to parcels of land.

"Medical Health Officer" means the Medical Health Officer appointed under the Health Act.

"Municipality" means the Village of Fruitvale or the area within the municipal boundaries thereof as the context may require.

"Owner" in respect of real property means the registered owner of an estate in fee simple, and includes;

- the tenant for life under a registered life estate;
- the registered holder of the last registered agreement for sale;
- the holder or occupier of land held in the manner mentioned in Sections 409 and 410 of the Municipal Act;
- an Indian who is an owner under the letters patent of a municipality, incorporated under Section 10 of the Municipal Act.

"Panhandle Parcel" means any parcel which is serviced and gains highway frontage through the use of a narrow strip of land which is an integral part of the parcel (hereinafter called the "Access Strip").

"Parcel" means any lot, block or other area in which land is held or into which land is subdivided, but does not include a highway or portion thereof.

"Parcel Area" means the total land area of a parcel contained within all of the parcel lines measured on a horizontal plane and expressed in units of square metres.

"Parcel Depth" means the average distance from the front parcel line to the rear parcel line.

"Parcel Line" means a line marking the boundary of a parcel.

"Parcel Line - Front" means the parcel line which immediately adjoins a highway other than a lane or walkway. In the case of a parcel fronting on more than one highway, the narrower side of the parcel abutting a highway shall be its front parcel line.

"Parcel Line - Rear" means the parcel line furthest from and opposite to the front parcel line, except that there shall not be more than one rear parcel line.

"Parcel Line - Side" means a parcel line marking the boundary between two parcels or between a parcel and a lane or between a parcel and a highway in the case of a corner parcel of which one or both ends intersect a front parcel line.

"Parcel Width" means the horizontal distance between the side parcel lines measured at right angles to the parcel depth.

"Potable Water" means water which is approved for drinking purposes by the Medical Health Officer.

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

"Proven Supply" means that a supply of potable water is available and proven with respect to volume, delivery and continuity of supply from an on-site groundwater system, a source requiring a water license from the Ministry of Environment or a community water system.



"Right-of-Way" includes land or any interest in land acquired for any public purpose including:

- a) public rights of passage with or without vehicles; or
- b) constructing, maintaining, or operating any railway;
- c) erecting and maintaining any pole-line;
- d) laying, placing, and maintaining drains, ditches, pipes, transmission lines, or wires, for the conveyance, transmission, or transportation of water, electric power, communication, or for the disposal of sewage;
- e) the operation and maintenance of vehicular traffic and as registered as a public right-of-way.

"Service Level" means the standard of municipal services required for development of subdivisions under the provisions of this bylaw.

"Street" means a highway except a lane, trail, or walkway.

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

"Village" means the Village of Fruitvale.

"Village Engineer" means the person or persons designated from time to time by Council to fulfill the duties assigned by this Bylaw.

"Walkway" means a highway intended to carry pedestrian and non-motorized traffic.

"Watercourse" means any natural or man-made drainage course or source of water, whether usually containing water or not, and includes any lake, river, creek, spring, ravine, swamp, gulch, or source of ground water, whether enclosed in a conduit or not.

"Works and Services" means any public service, facility or utility which is required or regulated by this Bylaw and without restricting the generality of the foregoing includes: the supply and distribution of water; collection and disposal of sanitary sewage and drainage water; street lighting; highways, access roadways, curbs, gutters, and sidewalks; and natural gas, power, telephone and cablevision services.

"Zone" means a zone as provided for in the Village of Fruitvale Zoning Bylaw in effect at the date of an application for subdivision or building permit.

All words or expressions used in the Bylaw shall have the same meaning assigned to them as like words or expressions contained in the Interpretation Act and the Municipal Act.

Items noted in italics are not part of this Bylaw and are provided for information only.

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## SECTION 3 -GENERAL PROVISIONS

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### SEVERABILITY

- 3.1 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.

### ADMINISTRATION

- 3.2 This Bylaw shall be administered by:
- (a) The Approving Officer of the Village of Fruitvale where works and services are to be provided because of subdivision of land; or
  - (b) The Building Inspector for the Village of Fruitvale where works and services are to be provided because of an application for a building permit.

### RECORD KEPT

- 3.3 The Approving Officer may maintain a record of all applications submitted under this Bylaw with respect to subdivisions; the record will indicate the final disposition of all such applications;
- 3.4 The Building Inspector may maintain a record of all occasions when works and services are required in accordance with the standards of this Bylaw and this record will show what works and services were provided and where.

### AUTHORIZATION OF ENTRY

- 3.5 The Approving Officer, Building Inspector or any other officer appointed by Council are hereby authorized to enter at all reasonable times upon any property or premises to inspect the same in connection with their duties under this Bylaw and to ascertain whether the provisions of this Bylaw are being complied with.

### LEVEL OF SERVICE

- 3.6 Unless otherwise approved by a Development Variance Permit or Development Permit issued by the Council pursuant to the Municipal Act, all subdivisions and developments shall be provided with service as prescribed in Schedule A of this Bylaw. The service levels may be different for different zones within the Village in accordance with the provisions of Schedule A of this Bylaw.

### EXCESS OR EXTENDED CAPACITY

- 3.7 Pursuant to Section 990 of the Municipal Act, the Village may require that the Applicant provide excess or extended services to provide access to or service land other than the land being subdivided or developed.

### SUBDIVISIONS WHERE SERVICING REQUIREMENTS MAY BE WAIVED

- 3.8 Notwithstanding Subsection 5 of this Section, the servicing requirements prescribed in Schedule A of this bylaw do not apply where the parcel created is to be used solely for the unattended equipment necessary for the operation of:
- .1 a community water system;
  - .2 a community sewer system;
  - .3 a community gas distribution system;
  - .4 a community radio or television receiving antennas;
  - .5 a radio or television broadcasting antenna;
  - .6 a telecommunications relay station;
  - .7 an automatic telephone exchange;
  - .8 an air or marine navigational aid;
  - .9 an electrical substations or generating stations; or
  - .10 any other similar public service or quasi public service facility or utility.

### CONNECTION TO THE COMMUNITY WATER SYSTEM

- 3.9 All water distribution or fire hydrant systems provided in accordance with this Bylaw shall be connected to the community water system.

### CONNECTION TO THE COMMUNITY SEWER SYSTEM

- 3.10 All sanitary sewage collection systems provided in accordance with this Bylaw shall be connected to the community sewer system.

### CONNECTION TO THE COMMUNITY DRAINAGE SYSTEM

- 3.11 All drainage collection systems provided in accordance with this Bylaw shall be connected to the community drainage system.

### COMPLIANCE WITH BYLAW

- 3.12 No person shall subdivide land in the Village except in compliance with the provisions of this Bylaw.

### COST OF SERVICES

- 3.13 All works and services required in this Bylaw shall be constructed and installed at the expense of the owner of the land being subdivided or developed.

### BONDING AND DEVELOPMENT AGREEMENT REQUIRED

- 3.14 All works and services to be constructed and installed to serve any proposed subdivision of any lands shall be constructed and installed as prescribed in Schedules A to H hereto at the expense of the Applicant prior to the approval of such subdivision by the Approving Officer. A plan of subdivision may be finally approved prior to the completion of the construction and installation of the required works and services where the Applicant deposits with the Village of Fruitvale the security as specified in the Standard Development Agreement Document and enters into a form of agreement with the Village as contained in the Standard Development Agreement Document for subdivisions pursuant to the Land title Act of the Province of British Columbia, to do all things required to carry out and construct the necessary works and services.

### RIGHT-OF-WAY AGREEMENT

- 3.15 Where the provisions of this Bylaw require an Applicant to grant a utility or drainage right-of-way to the Village, the Applicant shall be required to enter into an agreement with the Village and the Applicant shall pay all associated costs.

### VIOLATION

- 3.16 Every person who:

- .1 violates any of the provision of the Bylaw;
- .2 causes or permits any act or thing to be done in contravention or violation of any of the provisions of this Bylaw;
- .3 neglects or omits to do anything required under this Bylaw;
- .4 carries out, causes or permits to be carried out any subdivision or development in a manner prohibited by or contrary to any of the provisions of this Bylaw;
- .5 fails to comply with an order, direction or notice given under this Bylaw; or
- .6 prevents or obstructs or attempts to prevent or obstruct the authorized entry of an officer on property;

shall be deemed to be guilty upon summary conviction of an offence under this Bylaw.

OFFENCE

3.17 Each day's continuance of an offence under Section 3.16 constitutes a new and distinct offence.

PENALTY

3.18 Every person who commits an offence under this Bylaw is liable on summary conviction to a fine not exceeding \$2,000 plus the cost of prosecution for each offence.

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## SECTION 4 - SERVICING REQUIREMENTS

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### REQUIREMENTS

4.1 As a condition of the approval of a subdivision or development, the Council requires that the owner of the land being subdivided or developed provide works and services in respect of the subdivision of land, as set out in Sections 4.2 to 4.8 below.

4.2 Highways

All highways created by plan of subdivision, including the widening of highways, shall:

- .1 comply with the dimensions, location, alignment and gradient requirements set out in Schedules A and B of this Bylaw; and;
- .2 be cleared, graded and surfaced in accordance with standards set out in Schedules A and B of this Bylaw.

4.3 Sidewalks, Curbs and Gutters

In subdivisions where highways are created, sidewalks and curbs and gutters shall be provided as required in Schedule A and constructed in accordance with the standards set out in Schedule C of this Bylaw.

4.4 Street Lighting

In subdivisions where highways are created, street lighting shall be provided as required in Schedule A and constructed in accordance with the standards set out in Schedule G of this Bylaw.

4.5 Electrical and Communications Wiring and Gas Distribution

Each parcel shall be provided with electrical and communications supply consistent with the standards set out in Schedule A and Schedule H of this Bylaw. Where cablevision and gas service are to be provided, such services shall be provided consistent with the standards set out in Schedule A and Schedule H of this Bylaw.

4.6 Water Distribution System

Each parcel shall be supplied with a complete water distribution system connected to a community water system as required in Schedule A, and all system components shall be installed in accordance with the standards set out in Schedule D of this Bylaw.

#### 4.7 Sanitary Sewer

Each parcel shall be:

- .1 provided with a complete sewage collection system and connected to the community sewer system, or
- .2 provided with an on-site sewage disposal system;

as required in Schedule A of this Bylaw and all system components shall be installed in accordance with the standards set out in Schedule E of this Bylaw.

#### 4.8 Drainage System

Each parcel shall be provided with a complete and fully operative drainage system as required in Schedule "A" of this Bylaw and constructed in accordance with the standards set out in Schedule F of this Bylaw.

#### 4.9 Minimum Standards

The standards and specifications set out in this Bylaw are the minimum standards and shall be supplemented by the design engineer in accordance with generally accepted engineering practice in particular circumstances that warrant a higher standard.

#### Development Permit Area

*If the subdivision is located within a Development Permit Area as set out in the Official Community Plan (see the OCP for a map of the area), then the Village may require additional works and services.*

#### Servicing Requirements for Highways Abutting a Site Being Subdivided or Developed

*Pursuant to Section 989(4) of the Municipal Act, Council may require as a condition of*

- (a) the approval of a subdivision, or*
- (b) the issue of a building permit*

*that the owner of the land provide works and services, in accordance with the standards prescribed in this bylaw, on that portion of a highway immediately adjacent to the site being subdivided or developed, up to the centre line of the highway.*

#### Servicing Requirements for Developments Not Requiring Subdivision

*Council may require as a condition of the issue of a building permit that the owner of the land provide, on the site being developed, works and services in accordance with the standards prescribed in this Bylaw.*

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## SECTION 5 -FEES

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### FEES

#### 5.1 Application Fees

An Applicant for subdivision approval shall submit with the application fee the following fees:

.1 Application Fees for Subdivisions Under the Land Title Act

A fee of Three Hundred (\$300.00) Dollars for the first parcel proposed to be created by subdivision and Fifty (\$50.00) Dollars for each addition parcel is payable to the Municipality.

.2 Application Fees for Subdivision Under the Condominium Act

A fee of Three Hundred (\$300.00) Dollars for the first bare land strata lot proposed to be created by subdivision and Fifty (\$50.00) Dollars for each additional bare land strata lot is payable to the Municipality.

#### 5.2 Administration and Inspection Fees

An Applicant, prior to making application for Final Subdivision Approval, shall submit with the application the following fees:

.1 Charges for inspection of works in the amount equal to three percent (3%) of the Design Engineer's cost estimate approved by the Municipality for constructing utilities and roads required for the new subdivision, or a minimum of \$500.00, whichever is greater, plus the current Goods and Services Tax.

.2 The cost of connecting the work to the Village's drainage, sewage and water collection systems.



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## SECTION 6 – SCHEDULES

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### SCHEDULES

6.1 The following is a list of schedules attached hereto and forming part of this Bylaw:

SCHEDULE A -Level of Service

SCHEDULE B - Regulations, Standards, and Specifications For The Design and Construction of Highways

SCHEDULE C - Regulations, Standards, and Specifications For The Design and Construction of Curbs and Gutters, Sidewalks, and Boulevards

SCHEDULE D - Regulations, Standards, and Specifications For The Design and Installation of Water Systems

SCHEDULE E - Regulations, Standards, and Specifications For The Design and Construction of Sanitary Sewers

SCHEDULE F - Regulations, Standards, and Specifications For The Design and Installation of Drainage Systems

SCHEDULE G - Regulations, Standards, and Specifications For The Installation of Street Lighting

SCHEDULE H - Regulations, Standards, and Specifications For The Installation of Electrical and Communications Wiring and Gas Distribution System

SCHEDULE I - Standards for the Preparation of Engineering Drawings

6.2 The following is a list of standard forms that are provided for convenience only and do not form part of this Bylaw:

Standard Development Agreement Document Fee Simple Subdivisions

Standard Statutory Right-of-Way Document

Conformation of Commitment by Owner

Confirmation of Professional Assurance

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SECTION 7 – ENACTMENT

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Repeal of Previous Bylaw

Subdivision Control Bylaw Number 199, 1979 and all amendments thereto, is hereby repealed.

Read a FIRST time this \_\_\_\_\_ day of \_\_\_\_\_, 1995.

Read a SECOND time this \_\_\_\_\_ day of \_\_\_\_\_, 1995.

Read a THIRD time this \_\_\_\_\_ day of \_\_\_\_\_, 1995.

RECONSIDERED AND FINALLY ADOPTED this \_\_\_\_\_ day of \_\_\_\_\_, 1995.

\_\_\_\_\_  
Mayor

\_\_\_\_\_  
Clerk

Certified to be a true and correct copy of Bylaw No. 561 cited as Subdivision and Development Servicing Bylaw No. 561, 1995.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 1995.

**SCHEDULE A  
LEVEL OF SERVICE**

This is Schedule A of the Village of Fruitvale Subdivision and Development Servicing Bylaw No. 561, 1995.

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Clerk

SCHEDULE A  
LEVEL OF SERVICE

ESTABLISHMENT OF SERVICE LEVELS

The type of services to be constructed by an applicant prior to obtaining approval for a plan of subdivision shall be based on the zone in which the land is located as set out on the Official Zoning Map of the Zoning Bylaw of the Corporation of the Village of Fruitvale as amended. In Table A.1, the level of service to be provided with respect to sanitary sewer, water, drainage, street lighting and wiring is set out in Columns 2, 3, 4, 5 and 6, and the zones which are subject to each service level are described in Column 1. In Table A.2(A) & A.2(B), the required standards for various classifications of streets are provided in Columns 2, 3 and 4, and the zones which are subject to each standard are described in Column 1.

For the purposes of Table A.1:

**Community Sanitary Sewer System (CSSS)** means construction of a sewage collection system and connection to community sanitary sewer.

**Community Water System (CWS)** means construction of a water distribution system and connection to a community water system.

**Storm Sewer System (SSS)** means construction of a storm sewer system and connection to the Village's storm sewer system.

**On-Site Sewage Disposal (OSSD)** means on-site effluent disposal.

**On-Site Water Supply (OSWS)** means a proven water supply located on each parcel.

**Ditch System (DS)** means a drainage collection and disposal system by open ditches and culverts.

**Overhead Wiring (OHW)** means overhead electrical and communications wiring.

**Underground Wiring (UGW)** means underground electrical and communications wiring.

**Street Lighting - Through Subdivision** means the provision of street lighting throughout the subdivision at intervals specified in this Bylaw.

**Street Lighting - Intersections** means the provision of street lighting at intersections only.

**TABLE A.1**  
**REQUIRED LEVEL OF SERVICE FOR**  
**SANITARY SEWER, WATER, DRAINAGE, STREET LIGHTING AND WIRING**

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6
ZONES	SANITARY SEWER	WATER	DRAINAGE	STREET LIGHTING	WIRING
<b>Residential</b>					
R1, R2, R3, R5	CSSS	CWS	SSS	Thru Subdivision	UGW
R4	CSSS	CWS	SSS	Thru Subdivision	UGW
RU	OSSD	CWS	DS	Intersections	OHW
<b>Commercial</b>					
C1, C2	CSSS	CWS	SSS	Thru Subdivision	UGW
<b>Industrial</b>					
I, T	CSSS	CWS	SSS	Thru Subdivision	UGW
<b>Public</b>					
PR, ICF	CSSS	CWS	SSS	Thru Subdivision	UGW



**TABLE A.2 (B)  
REQUIRED ROAD  
HIGHWAY**

COLUMN 1			COLUMN 4		
<b>UNDIVIDED ARTERIAL HIGHWAY</b>					
Zones	ROW Width (Metres)	Pavement Width (Metres)	Curb & Gutter	Sidewalk	
				Side	Width (Metres)
<b>Residential</b>					
R1, R2, R3, R5	25	15	Yes	Both	1.5
R-4	25	15	Yes	Both	1.5
RU	25	8.5	No	No	
<b>Commercial</b>					
C1, C2	25	15	Yes	Both	1.85
<b>Industrial</b>					
I, T	25	15	Yes	One	1.85
<b>Public</b>					
PR, ICF	25	15	Yes	One	1.85

**MINIMUM  
STANDARDS**

**SCHEDULE B**  
**REGULATIONS, STANDARDS AND SPECIFICATIONS**  
**FOR THE DESIGN AND CONSTRUCTION OF HIGHWAYS**

This is Schedule B of the Village of Fruitvale Subdivision and Development Servicing Bylaw No. 561, 1995.

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Clerk



SCHEDULE B  
REGULATIONS, STANDARDS AND SPECIFICATIONS FOR THE DESIGN AND  
CONSTRUCTION OF HIGHWAYS

1.0 GENERAL

Where the provisions of Schedule A of this Bylaw require the construction of roads, the Applicant shall construct such roads consistent with the regulations, standards and specifications set out in this Schedule.

1.01 Approval of Engineering Drawings Required Prior to Construction

Engineering drawings showing detailed design of roads shall be submitted to the Village Engineer for approval prior to commencement of construction. These drawings shall show existing groundline and proposed alignment and grade of the highways, horizontal and vertical curve information and all other details as may be required. Grades shall be given at all changes in vertical and horizontal alignments for centreline and gutter lines. Elevations shall be shown on the drawings at all changes in vertical alignments.

1.02 Classification of Highways

Prior to design of the road system, the Village Engineer shall classify each road proposed within the subdivision and stipulate the required standards in accordance with the provisions of this Bylaw.

1.03 Geotechnical Evaluation

The Applicant shall be responsible for engaging the services of a qualified Geotechnical Engineer to investigate surface and sub-surface conditions within the proposed subdivision. The Geotechnical Engineer shall prepare a report outlining his findings and shall provide clear, definitive recommendations on the geometry and placement of fill sections, compaction requirements over and above those stipulated in this Bylaw, cut slope geometry, pavement structures for roads, and any other geotechnical issues affecting road construction within the proposed subdivision. A copy of the Geotechnical evaluation shall be submitted to the Approving Officer at the time the engineering drawings are submitted to the Approving Officer for approval.

## 2.0 DESIGN CRITERIA

### 2.01 General Design Requirements

In the preparation of engineering plans for highways, the Applicant shall take into account the following general design considerations:

#### .1 Continuation of Existing Streets

The design and arrangement of highways within a subdivision shall provide for the continuation or projection of existing streets in the surrounding area. In no case shall the arrangement of highways within a proposed subdivision make impractical the subdivision of adjoining parcels.

#### .2 Topography to be taken into Account

The design and arrangement of highways shall be suited to the topography of the land proposed to be subdivided.

### 2.02 Consistency with Official Community Plan

The location, classification and standard of all highways proposed within a subdivision shall take into account the proposed use of the land and shall conform to the provisions of the Village of Fruitvale Official Community Plan.

### 2.03 Local Highways

Local highways within a proposed subdivision shall be arranged so that their use by through traffic will be discouraged.

### 2.04 Cul-de-Sacs

Cul-de-sac streets shall not exceed 150 metres in length and shall be provided with an area designed to permit safe and adequate space for the turning of motor vehicles.

### 2.05 Lanes

Lanes, meeting the standards set out in this Bylaw, shall be provided where the Village Engineer deems them to be necessary.

### 2.06 Walkways, Bicycle Paths and Fences

.1 Walkways and bicycle paths shall be provided where the Village Engineer deems them to be necessary to provide access through a subdivision to schools, parks, playgrounds, commercial areas or other community facilities, or for the safe and efficient circulation of pedestrian traffic.

- .2 Walkways shall be chain link fenced for their full length on both sides. The minimum height shall be 1.5 metres but may vary at the discretion of the Approving Officer according to individual situations and the height requirements of the Municipal Zoning Bylaw.
- .3 The minimum width of a walkway or bicycle path shall be 1.85 metres. The maximum grade shall be 15% and the minimum grade shall be 0.5%.

## 2.07 Driveways

- .1 Single Family Residential Driveway:
  - .1 Minimum driveway width shall be 3.0 metres.
  - .2 Driveway widths (surfaced) in excess of 8.0 metres must be approved in writing by the Village Engineer.
  - .3 Maximum driveway grade shall not exceed 12%.
  - .4 Minimum driveway surface shall be compacted all weather gravel surface.
  - .5 Surface water from driveway on private property must be contained on-site, unless otherwise approved in writing by the Village Engineer.
  - .6 Driveway access roads must have a minimum of 9.0m centre line radius on all curves and corners along the road.
  - .7 Where access to the property is controlled by the use of gate(s), such gate is to be approved by the Building Inspector prior to installation.
  - .8 Turn around facilities are to be provided for any dead-end access driveway fronting an arterial roadway.
  - .9 The finished elevation of the driveway at the road property line shall not vary more than 150mm from the elevation of the centreline of the existing road, unless otherwise approved in writing by the Village Engineer.
- .2 Reciprocal Access Driveway for a Maximum of Three (3) Single Family Residences:
  - .1 Minimum driveway width shall be 6.0 metres.
  - .2 Driveway widths (surfaced) in excess of 8.0 metres must be approved in writing by the Village Engineer.
  - .3 Maximum driveway grade shall not exceed 12%.
  - .4 Minimum driveway surface shall be hot mix asphaltic concrete with curb and gutter.
  - .5 Surface water from driveways on private property must be contained on-site, unless otherwise approved in writing by the Village Engineer.

- .6 Driveway access roads must have a minimum of 10.25m centreline radius on all curves and corners along the road.
  - .7 Where access to the property is controlled by the use of gate(s), such gate is to be approved by the Fire Chief prior to installation.
  - .8 Turn around facilities are to be provided for any dead-end access driveway.
  - .9 The finished elevation of the driveway at the road property line shall not vary more than 150mm from the elevation of the centreline of the existing road, unless otherwise approved in writing by the Village Engineer.
- .3 Multi-Family Driveways and All Other Driveways Not Noted in Clause 2.07.1 and 2.07.2 of Schedule B:
- .1 Driveways shall be in accordance with the requirements of clause 2.07.2 of Schedule B.

## 2.08 Highway Right-Of-Way Requirements

- .1 Highway rights-of-way widths shall be in accordance with Table A.2 of Schedule A.
- .2 The tops of road cuts and the toes of road fills that are outside the highway right-of-way shall be identified and legally protected.

## 2.09 Intersections

Intersections shall be designed as follows:

- intersecting highways shall meet substantially at right angles (between 70 degrees and 110 degrees);
- jogs in highway alignment at intersections shall be avoided except where the distance between centrelines is sufficient to ensure traffic safety. The minimum spacing between the intersections along a street shall be 40 m;
- intersections having more than four intersecting legs shall not be permitted.
- intersections shall provide adequate crossing sight distances and stopping sight distances, whichever is greater;
- at all intersections, the property line radius shall be 6.0 metres for local roads and 8.0 metres for collector and arterial roads.

## 2.10 Reverse Curves

If reverse curves are required in a highway alignment, the Village Engineer may require that they be separated by means of tangents of sufficient length to allow super-elevation rotation.

### 2.11 Mail Boxes

Where required by Canada Post, the Applicant shall construct a base for super mail boxes in the location specified by Canada Post and approved by the Village Engineer. The applicant is referenced to Canada Post for location and design guidelines.

### 2.12 Street Names and Traffic Signs

Street name signs and traffic signs required as a result of constructing or improving streets shall be provided by the Village of Fruitvale at the expense of the Applicant. Street names shall be assigned by the Village of Fruitvale.

### 2.13 Appurtenances

The Design Engineer shall detail on the design drawings the location of all proposed traffic islands, retaining walls, guardrails, and permanent barricades. These structures shall be designed in keeping with good engineering practices. The design should show the location of all traffic signs, street signs, and other traffic control devices required to be placed in the road allowance. Drawings must show all utility poles. The Design Engineer shall indicate those poles which require relocating prior to road construction, and shall confirm with the utility the feasibility of their relocation prior to design completion. For underground systems, design drawings shall show the location of underground wiring, and appurtenances including the connections to properties.

### 2.14 Vertical Alignment

The vertical alignment of a road shall be set so the grades of the driveway to adjacent properties shall be in accordance with clause 2.07 of Schedule B. The maximum grade of the driveway as it crosses the road boulevard will be 3%. The minimum longitudinal gradient at the gutter line shall be 0.50% for all classifications of streets.

### 2.15 Design Speeds

The design speeds used for design of Highways shall be as in Table B.1.

TABLE B.1  
Design Speed

Arterial (A)	70 km/h
Collector (C)	60 km/h
Local (L)	50 km/h

## 2.16 Road Crossfall

Minimum road crossfall shall be 2%.

## 2.17 Road Grades

Minimum and maximum road centreline grades shall conform to Table B.2 based on the classification of the road:

TABLE B.2

<b>Road Classification</b>	<b>Minimum Grade</b>	<b>Maximum Grade</b>
Arterial	0.5%	8%
Collector	0.5%	10%
Local	0.5%	12%
Cul-de-Sac (entry downhill)	0.5%	8%
Cul-de-Sac (entry uphill)	0.5%	10%
Cul-de-Sac (bulbs)	0.5%	6%
Lane	0.5%	8%
Walkway	0.5%	15%

Maximum grades are to be reduced by 1% for each (or part of each) 30 metres that the centreline radius is less than 150 m.

## 2.18 Vertical Curves

Vertical curves shall be designed to provide safe stopping sight distances. Minimum stopping sight distance is the least distance required to bring the vehicle to a stop under prevailing vehicle and climatic conditions. Vertical curves shall be provided at all grade changes greater than 1.0%. Vertical curve length is calculated by the equation  $L = KA$  where:

L is the length of the vertical curve in metres

K is a constant related to lines and geometry of a parabolic curve

A is the algebraic difference in grades in percent

L (in metres) shall not be less than the design speed in kilometres per hour

Minimum K values (in metres) for vertical curve design shall be as described in Table B.3.

TABLE B.3  
MINIMUM K VALUES FOR VERTICAL CURVE DESIGN

Road Classification	Crest Curve	Sag Curve	
	Minimum	Lighting	No Lighting
Arterial	22	15	25
Collector	15	10	20
Local	7	6	11

2.19 Horizontal Alignment

Centre Line Radii

The minimum required centreline radius for various super elevation rates for each classification of roadways are as follows:

TABLE B.4  
MINIMUM CENTRELINE RADIUS

Road Classification	Horizontal Curve Radii (m)			
	Superelevation (m/m)			
	None	0.02	0.04	0.06
Arterial (70 kph design speed)	N/A	230	200	190
Collector (60 kph design speed)	160	140	130	N/A
Local* (50 kph design speed)	95	N/A	N/A	N/A

\* Radius may be reduced at the discretion of the Village Engineer

## 2.20 Curb Return Radii

Curb return radii shall conform to the following and be based on the lesser classified Highway.

Arterial 11 m

Collector 11 m

Local 8.0 m

Cul-de-Sac 11.5 m

Industrial 11 m

## 2.21 Intersection Design

Unless indicated elsewhere herein, all intersection design standards shall conform to those outlined in the latest edition of "Geometric Design Standards for Canadian Roads and Streets" as published by the Transportation Association of Canada (TAC).

## 2.22 Intersection Grades

Approach grades for a crest curve of minor streets at intersections to major streets shall not exceed 75% of the maximum grade allowed for that street classification. The minor street shall be designed to intersect the major street with a vertical curve of minimum length required for that street classification. The vertical curve shall terminate at the projected curb line of the major street using the following K values:

TABLE B.5  
INTERSECTION CURVES

<b>Intersecting Street</b>	<b>Minimum K Value (in metres)</b>	
	<b>Crest Curve</b>	<b>Sag Curve</b>
Arterial	17	See Note 1 below
Collector	7	See Note 1 below
Local	4	See Note 1 below

Note 1: Approach grades for a sag curve of minor streets at intersections to major streets shall be designed to provide a maximum gradient of 3% at a point 15 metres from the projected curb line of the major street.



## 2.23 Pavement Structure

The pavement structure shall be designed in accordance with Manual Series MS-1 of the Asphalt Institute (1981 or most recent edition). The pavement structure shall be designed for a fifteen (15) year design life. Staged construction may be considered in the structural design by the Village Engineer when a road is to be constructed and to be widened at a later date.

Roads shall be classified as follows for purposes of structural design of the total pavement structure; design traffic values and minimum depths of hot mix asphalt are defined as well:

TABLE B.6

<b>Road Classification</b>	<b>Design Traffic<sup>1</sup> (EAL'S)</b>	<b>Min. Depth of Hot Mix Asphalt (mm)</b>
<b>URBAN</b>		
Arterial	>2.8 x 10 <sup>5</sup>	See Note 2
Collector	2.8 x 10 <sup>5</sup>	75
Industrial	5.6 x 10 <sup>5</sup>	75
Residential	2.8 x 10 <sup>4</sup>	50
<b>RURAL</b>		
Lanes	Not Applicable	50
Walkways	Not Applicable	50

**NOTES:**

- (1) See Chapter IV of MS-1 of the Asphalt Institute.
- (2) To be specifically designed, based on projected EAL's, in accordance with MS-1 of the Asphaltic Institute.

Soils used to construct the roadway subgrade shall be evaluated in accordance with MS-1 (see Chapter V) to determine the load bearing capacity of the subgrade. For this purpose, the California Bearing Ratio (CBR) test value shall be obtained using soil moulded to the minimum specified compaction level. The design CBR values shall be determined in the soaked condition in accordance with ASTM Des D1883. This value shall be used for structural design purposes. The minimum compacted depth of crushed granular base course, in the total pavement structure, shall be 100 mm.

If the soaked CBR value of the subgrade soil is less than 3, subgrade enhancement shall be provided to create a soaked CBR of 3, and the pavement structure shall be designed using a soaked CBR of 3. Subgrade enhancement shall be provided by placement of an initial layer of granular sub-base of a thickness which has been calculated to provide the necessary structural improvement to the subgrade.

A minimum pavement structure for roads shall be provided, notwithstanding the structural character of the subgrade. Following minimum pavement structures are specified, and will be considered structurally adequate when the subgrade soil exhibits a minimum soaked CBR of 6:

TABLE B.7

<b>Road Classification</b>	<b>Sub-base (Pitrun) mm</b>	<b>Crushed Granular Base Course (mm)</b>	<b>Hot Mix Asphalt (mm)</b>
<b>URBAN</b>			
Arterial	Structural Design shall be project specific		
Collector	400	100	75
Industrial	400	150	75
Residential	300	100	50
Lanes	300	100	50
Walkways		150	50

The design of structural overlays of existing pavements shall be based on the analysis of the results of Benkelman beam tests and test hole information acquired from the existing road which is to be upgraded.

The Transportation Association of Canada procedure for designing structural design of overlays of existing pavements, as published in "The Pavement Management Guide", shall be used. The maximum permissible Benkelman beam deflections to be used for overlay design are:

TABLE B.8

<b>Road Classification</b>	<b>Maximum Permissible Deflection After Overlay</b>
Arterial	1.00 mm
Collector	1.25 mm
Industrial	See Note <sup>(1)</sup>
Residential	1.50 mm

NOTE:

<sup>(1)</sup> As specified by the Village Engineer.

The structural design of pavements for roads shall be performed by a qualified pavements engineer. Structural designs of pavements shall be submitted to the Village Engineer in an acceptable report format.

2.24 Highway Cross-Sections

The standard street cross-section for various classifications of roadways shall be as per Table B.9 and the Standard Drawings.

TABLE B.9  
HIGHWAY CROSS-SECTIONS

<b>Road Classification</b>	<b>(Standard Dwg. Number)</b>
Arterial Road Section	B-1
Collector Road Section	B-2
Local Road Section	B-3
Residential Cul-de-Sac	B-4
Paved Lane	B-5
Walkway and Bicycle Path	B-6
Rural Highway	B-7
Cul-de-Sac Bulb Layout	B-8

3.0 MATERIALS

3.01 Roadway Embankment

Roadway embankment material shall be free of rock detrimental to proper compaction and free of organic or other deleterious matter. Import roadway embankment material shall conform to the gradation limits shown in the following table.

<b>USBC Sieve Size</b>	<b>Percent by Weight Passing</b>
150mm	100%
75mm	74 - 100%
38mm	56 - 100%
25mm	46 - 94%
4.75mm	20 - 70%
1.18mm	10 - 52%
0.300mm	2 - 26%
0.075mm	0 - 8%

Rock, by definition, shall mean any material excepting hardpan or glacial till over 0.75 cu.m. in volume requiring continuous drilling and blasting. It shall mean masonry or concrete as well as natural boulders fitting this definition.

Rock fill shall be any material containing more than 15% by volume of rock larger than 150 mm diameter, to a maximum of 300mm diameter. It shall only be used in approved areas and by approved methods to provide maximum stability of the fill.

3.03 Granular Sub-base Course

Granular sub-base shall be well graded material within the following gradation limits when tested in accordance with ASTM C136:

<b>USBC Sieve Size</b>	<b>Percent by Weight Passing</b>
75mm	100%
25mm	50 - 85%
0.150mm	0 - 16%
0.075mm	0 - 8%

3.04 Crushed Granular Base Course

Crushed base course shall be composed of inert, durable aggregate, reasonably uniform in quality, and free from soft or disintegrated pieces, wood wastes, roots, organic material or other deleterious materials. The gradation shall be within the following limits when tested to ASTM C-136 and C-117, using the designated sieve sizes, and to have a smooth curve without sharp breaks when plotted on a semi-log grading chart.

<b>USBC Sieve Size</b>	<b>Percent by Weight Passing</b>
25.00mm	100%
19.00mm	80 - 95%
9.50mm	50 - 80%
4.75mm	35 - 65%
2.36mm	25 - 50%
1.18mm	15 - 35%
0.300mm	5 - 20%
0.075mm	3 -8%

A minimum of 60% of the material retained on a 4.75 mm sieve shall have at least two fractured faces as determined by particle count.

3.05 Crushed Granular Aggregate for Asphaltic Concrete

Crushed granular aggregate for asphaltic concrete shall be composed of hard, durable, crushed gravel free from shale, clay, silt balls loose coatings and other deleterious materials.

The gradation of aggregates, when blended to meet the job mix formula shall be within the following limits when tested to ASTM C-136 and C-117, using the designated sieve sizes, and to have a smooth curve without sharp breaks when plotted on a semi-log grading chart.

TABLE B.10

USBC Sieve Size	Arterial, Industrial and Collector Streets Percent Passing by Weight		Residential, Lanes, Walkways, Percent Passing By Weight
	Lower Course	Surface Course	
25 mm	100		
19mm	85 – 95	100	
12.5mm	65 - 85	85 - 95	100
9.5mm	70 - 85	50 – 90	
4.75mm	40 - 65	50 - 65	45 - 80
2.36mm	38 - 52	32 - 64	
1.18mm	20 - 38	28 - 42	24 - 51
0.600mm	20 - 30	17 - 40	
0.300mm	10 - 20	12 - 20	13 - 29
0.150mm	8 - 15	10 - 16	7 - 18
0.075mm	3 - 8	3 - 7	3 - 8

A minimum of 60% of the material retained on a 4.75 mm sieve shall have at least two freshly fractured faces as determined by particle count.

Tolerance Limits (% Passing By Weight)*	
Max. Size To 4.75	5.0
2.36	4.0
1.18	4.0
0.600	3.0
0.300	3.0
0.150	2.0
0.075	1.5

\*The tolerance limits are in relation to the design aggregate gradation submitted with the Marshall mix design.

Aggregate short of material passing the 0.075 mm sieve shall have approved mineral filler added. Mineral filler shall be material passing the 0.075 mm sieve and shall be non-plastic when tested in accordance with ASTM D424. The moisture content of the aggregate after leaving the drier and before mixing shall be not more than 0.5% by weight.

### 3.06 Tack Coat

Bituminous tack coat shall be undiluted SS-1H or SS-1 asphalt emulsion, and shall be applied at a rate not greater than 0.5 litres per square metre to a clean pavement surface, and provide for adequate curing time prior to placing asphalt paving mixtures. The temperature of the material shall be maintained between 30°C and 40°C at the time of application.

### 3.07 Asphalt Cement

TABLE B.11  
Type of Asphalt

Requirements	Minimum	Maximum
Viscosity @ 60°Pa/s	5	5
Min. Penetration @ 25°C	80	
% Ret. Pen. after T.F.O.T. @ 25°C - 100 g/5 s	55	
Solubility in Trichloroethylene %	99.0	
Flash Point, C.O.C. minimum °C	35	
Ductility at 25°C, 5 cm/min. - cm	100	
Water %		0.5

The asphalt cement shall be homogenous, free from water, and shall not foam when heated to 175°C.

### 3.08 Asphaltic Concrete

Asphaltic Concrete shall conform to the following:

TABLE B.12

Property	Arterial & Collector Streets		Residential
	Lower Course	Surface Course	Surface Course
Marshall blows per face	75	75	50
Marshall Stability @ 60°C, kN	10 min.	10 min.	8 min.
Marshall Flow, 0.25 mm units	8 - 14	8 - 14	8 - 15
Voids in Mineral Aggregate %	12.5 - 14.0	13.5 - 15.0	14.0 - 15.5
Air Voids in Mixture, %			
- at design A.C.	4.0 ± 0.2	4.0 ± 0.2	3.5 ± 0.3
- Allowable production range	3 - 5	3 - 5	3 - 5
Index of Retained Stability after water immersion for 24 hours @ 60°C	75% min.	75 % min.	75% min.

The Applicant shall supply the Village Engineer with a current 5 point Marshall mix design, performed in accordance with ASTM D-1559, under the signature of a Professional Engineer. The design asphalt content shall be specified to comply with the requirements of this article.

The asphalt content of hot mix asphalt which is produced in accordance with the approved Marshall design shall be maintained within plus or minus 0.3% of the approved design asphalt content.

### 3.09 Chain Link Fence

All frames to be welded and covered with two coats of zinc rich paint. Each knuckle to be independently tied and set flush with the top rail. Dome tops to be riveted or welded to end posts. All galvanizing shall be minimum of 488 gm/M. All poles to be set in concrete.

- a) Fabric - 9 gauge (3.55 mm) galvanized 50 mm mesh.
- b) Top Rail - 42 mm O.D., 3.55 mm wall thickness, galvanized steel pipe.
- c) End & corner posts - 73 mm O.D., 5.15 mm wall thickness, galvanized steel pipe.
- d) Line Posts - 48 mm O.D., 3.68 mm wall thickness galvanized steel pipe.
- e) Gates - Sizes as required. Frames 42 mm O.D., 3.55 mm wall thickness galvanized steel pipe.
- f) Barbed Arms - Galvanized malleable steel.
- g) Tension Wire - 6 gauge (4.50 mm) galvanized steel.
- h) Tie Wire - 9 gauge (3.55 mm) aluminium.
- i) Tension Bar - 4.76 mm x 19 mm galvanized steel.
- j) Dome Tops - size as required. Galvanized malleable steel.

4.0 WORKMANSHIP

4.01 Notification of Village Engineer Prior to Undertaking Roadworks

Adequate notice shall be given to the Village Engineer by the Applicant prior to the commencement of roadworks in accordance with Table B.13. The Applicant shall not proceed from one stage as described in Table B.13 to another stage without the approval of the Village Engineer.

TABLE B.13

Stage	Minimum Notice Required
Prior to construction of fills and subgrade preparation	24 hours
Prior to placement of sub-base gravel	24 hours
Prior to placement of concrete for curbs and sidewalks	48 hours
Prior to placement of base course	24 hours
Prior to paving	96 hours
Prior to top soiling boulevards	24 hours

4.02 Clearing

The road right-of-way shall be cleared of all trees, stumps, logs, roots, and any other objectionable material likely to cause settlement for the full width of the highway, and for such additional width as may be required to contain cut and fill slopes. In addition, buildings, fences, superfluous culverts, or any other structures within the highway shall also be removed. Trees may be left within the highway only where they do not conflict with utility services and where they are not deemed a hazard at the discretion of the Village Engineer.

4.03 Roadway Excavation and Embankment

Prior to placing of any granular aggregate on the highway, all existing topsoil or other deleterious matter shall be removed from the full width of the road right-of-way and the road surface graded to the desired cross-section.



Embankments shall be constructed by placing, shaping and compacting approved materials as classified in this Bylaw. All material placed in embankments shall be bladed smooth in level layers not exceeding 300 mm uncompacted depth over the entire embankment area and placed in successive uniform layers.

When embankments are to be made on hillsides or where a new fill is to be applied upon an existing embankment, the slopes of the original ground or embankment (except rock embankments) shall be terraced or stepped before filling is commenced.

Each layer shall be compacted with approved equipment to 95% Standard Proctor Density.

Sufficient amounts of watering and compaction equipment required to efficiently and properly compact the material for the rate at which the material is being hauled into the embankment area shall be provided.

The embankment shall be constructed to provide adequate drainage. Should the embankment material become damaged or saturated by rain, flooding, or other effects, repair, scarification, or whatever other measures required to restore the embankment to the moisture and compaction requirements this Bylaw shall be undertaken. Unsuitable materials encountered in the excavation areas, or at the subgrade elevation, shall be excavated, and wasted.

Overexcavations shall be rebuilt to grade with an approved compacted material and compacted to the satisfaction of the Engineer.

At transition sections where the profile grade changes from embankment to cut, the natural slope (excepting solid rock) shall be excavated to a depth of 1 metre and replaced with suitable material for a distance of 15 metres in order to prevent abrupt future differential grade changes.

#### 4.04 Subgrade Preparation

Prior to placement of the granular sub-base, the upper 300 mm of the subgrade shall be compacted to 100% of Standard Proctor density. Subgrade preparation shall extend a minimum of 600 mm out from back of curb or sidewalk on either side of the road.

#### 4.05 Proof Rolling

Upon completion of the subgrade preparation, the subgrade shall be proof rolled in the presence of the Village Engineer with a loaded single axle truck with a rear axle load of 8165 Kg.

Any areas found to be soft or wet shall be excavated and backfilled with select granular sub-base, or imported granular roadway embankment, and compacted to 100% Standard Proctor density.

#### 4.06 Spreading and Compaction of Granular Sub-Base and Base Gravels

Granular sub-base and base gravels shall be placed in maximum 150 mm lifts and shall be spread in an approved manner such that the aggregate is neither segregated nor contaminated with foreign material. Segregated materials shall be remixed until uniform. Immediately following spreading, granular aggregate shall be compacted to 100% Standard Proctor density. The finished surfaces shall be within +/- 15 mm of the design grade and cross-section.

#### 4.07 General Paving Requirements

Paving shall not be undertaken during snow, heavy rain, temperatures below 5 degrees C or other unsuitable conditions. Asphaltic concrete shall not be placed on a frozen, muddy or rutted base. Asphaltic concrete shall be constructed in lifts of compacted thickness as follows:

Mix type	Permissible Compacted Lift Thickness (mm)	
	Minimum	Maximum
Lower Course	50	100
Surface Course	40	75

#### 4.08 Placing and Compacting Asphaltic Concrete

Surfaces onto which bituminous concrete pavement is placed shall be dry, above 4 degrees C and cleaned of all loose and foreign materials. Mixtures shall not normally be laid when the atmospheric temperature is less than 4 degrees C and falling. An approved self-propelled mechanical paver shall be used to spread the mixture to the specified thickness.

Compaction shall commence immediately after the bearing capacity of the course is adequate to support the compaction equipment without undesirable displacement or cracking. Compaction methods shall be carried out as specified in the Asphalt Paving Manual published by the Asphalt Institute.

#### 4.09 Density of Completed Asphaltic Concrete Pavement

The minimum allowable density of the completed pavement shall be not less than 97% of the laboratory compacted Marshall density.

Flaws in the pavement surface shall be corrected by removal of the complete area and the full lift involved. Pavement which is unsatisfactory in the opinion of the Village Engineer by reason of faulty materials or methods of placement shall be repaired, removed, replaced or otherwise corrected.

#### 4.10 Tie-Ins to Existing Pavement

Tie-ins to existing pavement shall be made by cutting back the existing pavement to sound material as necessary to produce a neat, vertical face with a straight edge. Prior to placing asphaltic concrete, exposed faces and other abutting structures shall be painted with liquid asphalt and heated to 66 degrees C.

#### 4.11 Restoration of Improvements

Driveways, retaining walls, vegetation and other private or municipal improvements on private or municipal property or highways affected by the road construction shall be restored at minimum to the condition existing prior to construction and to the satisfaction of the Village Engineer.

#### 4.12 Materials Testing

The Applicant shall retain an independent materials testing firm to carry out comprehensive testing to frequencies defined below, for each stage of construction of roads and streets. The materials testing firm must employ a full time, qualified professional engineer within the office from which the testing services are provided and he shall review all test data. The applicant shall provide a copy of all test data in summary form to the Village Engineer prior to applying for final approval. Testing will be performed at the following minimum frequencies:

For Roadwork embankment and subgrade construction

- a) Moisture - density relationship (Standard Proctor) - ASTM D698; - one test for each soil type incorporated.
- b) Moisture and density tests.
  - i) roadwork embankment - one test per lift per 500 square metres of road.
  - ii) road subgrade preparations - one test per 500 square metres of road.

For Trench Backfill

- a) One test per lift per 120 lineal metres of trench.

For Sub-Base and Base Course Construction:

- a) Gradation analysis - one test per 1000 m<sup>3</sup> or 2200 tonnes of material delivered to the site with a minimum of 1 test per day of placement.
- b) Moisture - density relationship (Standard Proctor) - ASTM D698; - one test per class of material for each 1000 m<sup>3</sup>, or 2200 tonnes delivered to site.
- c) Compaction testing - one test per 500 square metres of road per lift, to include dry density and moisture content.

For Hot Mix Asphalt Pavement Production and Placement:

- a) Asphalt content and gradation of extracted aggregate - one test per production period, where a production period is defined as that part of the working day either before or after 12:00 Noon local time. In a full working day, the times of test shall be not less than two hours apart.
- b) Marshall analysis of hot mix asphalt - one per work week per mix type; additional tests shall be performed when any of the specified Marshall properties are not met in the initial analysis.
- c) Asphalt cement tests - one complete analysis per project or one every two work weeks, whichever is the lesser in timing; plus one penetration (ASTM D5) test per work week from product obtained from the Contractor's asphalt cement storage tanks.
- d) Density, air voids and pavement thickness tests - 1 core (100 mm dia.) per 500 m<sup>2</sup> of paved area per lift. Air void tests shall be performed in accordance with ASTM D3203.
- e) Tests on tack coat products - one test per product per project.

The Village shall be provided with copies of all sieve and compaction test results pertaining to subgrade, granular base, granular sub-base and pavement structure.

4.13 As Constructed Drawings

Prior to final acceptance, the Applicant shall deposit with the Village one set of original as constructed mylar drawings showing all the information requested by this schedule and conforming to the criteria set out in Schedule I.

SCHEDULE C  
REGULATIONS, STANDARDS AND SPECIFICATIONS FOR THE  
DESIGN AND CONSTRUCTION OF CURBS AND GUTTERS,  
SIDEWALKS AND BOULEVARDS

This is Schedule C of the Village of Fruitvale Subdivision and Development Servicing Bylaw No. 531, 1995.

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Clerk

SCHEDULE C  
REGULATIONS, STANDARDS AND SPECIFICATIONS FOR THE  
DESIGN AND CONSTRUCTION OF CURBS AND GUTTERS,  
SIDEWALKS AND BOULEVARDS

1.0 GENERAL

1.01 Standards and Specifications of this Schedule to Apply to All Works

Where the provisions of Schedule A of this Bylaw require the provision of curbs and gutters, sidewalks and boulevards, the Applicant shall construct such services in a manner consistent with the regulations, standards and specifications set out in this Schedule.

1.02 Approval of Engineering Drawings Required prior to Construction

Engineering drawings showing detailed design of the necessary works shall be submitted to the Village Engineer for approval. No construction of the works shall commence until the design drawings have been approved by the Village Engineer.

1.03 Curb, Gutter and Sidewalk Requirements

Curb, gutter and sidewalk shall be provided as follows:

Highway Classification

Curb Type Required Minimum Sidewalk Widths

Residential Zones

Arterial Non-mountable concrete 1.5 m

Collector Roll type concrete 1.35 m

Local Roll type concrete 1.35 m

Commercial Zones

Arterial Non-mountable concrete 1.85 m

Collector Non-mountable concrete 1.85 m

Local Non-mountable concrete 1.85 m

Industrial

Arterial Non-mountable concrete 1.85 m

Collector Non-mountable concrete N/A

Local Non-mountable concrete N/A

2.0 DESIGN CRITERIA

2.01 Design Gradient

The design gradient shall be as specified for roads in Schedule B of this Bylaw, except that the minimum gradient around curb returns and around cul-de-sacs shall be 0.5%.

## 2.02 Curb Return

The minimum curb return radius shall be as set out in Section 3.07 of Schedule B of this Bylaw. Elevations shall be shown on the engineering drawings for the beginning and end of the curb return, as well as at any changes in grades in between. Engineering drawings shall provide all geometric details, both vertically and horizontally, of curb returns.

## 2.03 Grading of Boulevards

Upon completion of road, curb and gutter and sidewalk constructions, boulevards shall be shaped and graded as shown on the Standard Drawings. Native material and 100 mm of top soil shall be placed flush with the top of curb or back of walk and shaped to conform with general lot grading. Unless otherwise approved, boulevards shall be graded to drain to the curb at a minimum slope of 3% and a maximum slope of 10%.

## 2.04 Granular Sub-base and Base Gravel Depths

Granular sub-base and base gravel depths for curb and gutters, sidewalks, driveways and commercial crossovers shall conform to the depths of sub-base and base gravels specified for the road as noted in Table B.7 of Schedule B.

## 2.05 Sidewalks Cross Section

Concrete sidewalks shall have a thickness not less than 100 mm and shall be constructed consistent with the Standard Drawings. The sidewalk shall be graded to drain to the curb at a slope of 2%.

## 2.06 Driveway Access Across Boulevards

Maximum driveway access across all Village boulevards shall be 3%. Where non-mountable curb is required under this Bylaw, only one access per parcel shall be permitted. In residential subdivisions, only one access per parcel shall be permitted unless the parcel frontage is greater than 75 m. The number of additional accesses shall be at the discretion of the Village Engineer.

## 2.07 Curb and Gutter Cross Section

Curbs and gutters shall be constructed consistent with the Standard Drawings.

## 2.08 Commercial Crossovers

Commercial crossovers shall be provided at all access locations for usages other than residential.

Commercial crossovers shall be constructed consistent with the Standard Drawings.

## 2.09 Wheelchair Ramps

Wheelchair ramps shall be provided at all intersections on streets provided with sidewalks.

Wheelchair ramps shall be constructed consistent with the Standard Drawings.

## 3.0 MATERIALS

### 3.01 Base Material Granular Sub-Base and Base Course

Granular sub-base material shall be 75 mm minus gravel sub-base course conforming to gradation limits as referred in Schedule B, Article 3.03.

Granular Base material shall be granular 25 mm crushed gravel base course conforming to gradation limits as referenced in Schedule B, Article 3.04.

### 3.02 Concrete

Concrete shall conform to CSA CAN3-A23.1, Latest Edition; the mix design shall include the following:

- .1 Minimum compressive strength 30 MPa at 28 days;
- .2 Maximum aggregate size 19 mm for hand-formed; 10 mm for extruded;
- .3 Slump - 80 mm for hand-formed; 25 mm for extruded;
- .4 Air entrainment 6% - 8%.

### 3.03 Testing

The Applicant shall retain an independent materials testing firm to carry out comprehensive testing of concrete which shall be taken to include determination of unit weight of the plastic concrete, performing slump and air content tests and casting of test cylinders. One test consisting of three standard cylinders may be made for each 175 m of curb and gutter or sidewalk installed. In no case, however, will there be less than one test for concrete placed in one day. One cylinder shall be tested at seven days, and two at twenty-eight days. All test results shall be submitted to the Village Engineer for review and approval.

### 3.04 Curing Compound

Curing compound shall be spray-applied of liquid type conforming to ASTM C309 containing a fugitive dye applied at a rate recommended by the manufacture.

### 3.05 Boulevards Top Soil

Top soil used for boulevard improvement shall be loam, free from any rock, clay lumps, roots or any other deleterious material.



### 3.06 Driveway Approaches

Base for driveway approaches shall consist of a minimum of 300 mm of 75 mm minus pitrun gravel, 100 mm of 25 mm minus gravel placed on compacted subgrade. Approaches shall be paved using 50 mm hot mix asphalt.

## 4.0 WORKMANSHIP

### 4.01 Base Preparation

All topsoil, organic soils, peat, frozen materials, roots, branches or other deleterious material shall be removed and the base shall be excavated or filled to subgrade elevation prior to placement of granular base and sub-base material. All embankment material shall be compacted to 95% Standard Proctor Density. The top 300mm of sub-grade shall be compacted to 100% Standard Proctor Density. Granular sub-base and base shall be compacted to 100% Standard Proctor Density.

The granular base aggregate shall be moistened immediately prior to placing concrete.

### 4.02 Commercial and Industrial Crossovers

Commercial and industrial crossovers shall be built on a base with the same construction as the roadway they border. Commercial and industrial crossovers shall have a minimum concrete thickness of 150 mm and be reinforced with 15M metric bars on 300 mm centres both ways. Commercial and industrial crossovers shall have the concrete curb and gutter reinforced by two 15M bars running the full length between the extremities of the flare of the crossovers. Expansion joints shall be made at the sides of the crossover.

### 4.03 Placing and Finishing Concrete

The Village Engineer shall be notified forty-eight hours in advance of any concrete pour for curb and gutter or sidewalks. Concrete shall be prepared, delivered, and placed in conformance with CSA CAN3-A23.1-M (Latest Edition) "Concrete Materials and Methods of Concrete Construction". The surface of the curb, gutter and sidewalk shall be finished prior to final set by brushing to provide a uniform non-skid finish. Both edges of the sidewalk shall be trowelled smooth to a width of 50 mm and rounded to a radius of 12 mm.

During hot, cold, or drying weather conditions, special attention shall be given to preparation, delivery, placement, and airing of concrete to ensure that the requirements of CSA CAN 3-23.1-M are met.

Curb and gutter shall be monolithic unless otherwise approved by the Village Engineer.

Curb and gutter contraction joints shall be made at a maximum of 3 m intervals.

15 mm thick contraction joints shall be installed through the full depth and the entire width at the beginning and end of every curb return, on both sides of crossovers and against walls and structures. A 6 mm rounded edge shall run along each side of the joint.

Contraction joints shall be made by cutting a groove through the surface of the concrete to a minimum depth of 25 mm. Horizontal and vertical alignments shall not vary from established line and grade by more than 5 mm over a 3 m section. Where these tolerances are not met, the faulty section shall be removed and replaced.

Expansion joints shall be 13mm width and located at all tangent points and at the end of each day's pour.

#### 4.04 Curing Concrete

Between April 1 and October 1, concrete shall be sprayed with two coats of an approved membrane curing compound as soon as the concrete has obtained its initial set. Prior to April 1, or after October 1, alternate methods of curing concrete must be used and the method approved by the Village Engineer.

#### 4.05 Boulevards Driveway Approaches

Construction of driveway approaches shall be according to specifications set out in Schedule B of the Bylaw. Care shall be taken to avoid damage to existing utilities such as curb and gutter and water curb stops.

SCHEDULE D  
REGULATIONS, STANDARDS AND SPECIFICATIONS  
FOR THE DESIGN AND INSTALLATION OF WATER SYSTEMS

This is Schedule D of the Village of Fruitvale Subdivision and Development Servicing  
Bylaw No.561, 1995.

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Clerk

SCHEDULE D  
REGULATIONS, STANDARDS AND SPECIFICATIONS FOR THE DESIGN AND  
INSTALLATION OF WATER SYSTEMS

1.0 GENERAL

1.01 Water Distribution System to be Constructed by Applicant

Where the provisions of Schedule A of this Bylaw require the construction of a water distribution system, the Applicant shall provide a water distribution system and storage facilities including water mains, valves, hydrants, service connections, pump stations, reservoirs and pressure reducing stations consistent with the regulations, standards and specifications set out in this Schedule. All standards not specifically described in this schedule shall be in accordance with appropriate AWWA standards or as directed by the Village Engineer.

1.02 Approval of Engineering Drawings Required prior to Construction

Engineering drawings showing detailed design of the necessary works shall be submitted to the Village Engineer for approval. No construction shall commence until the engineering drawings have been approved by the Village Engineer. These drawings shall show alignment, size and depths of pipes, pipe bedding requirements, existing ground line and proposed final ground line over the pipe, location and detail of all fittings, valves and hydrants, location of all service connections, location, access to, size and details of any pump stations and reservoirs, all easements and all such other details as may be required. Where a water system is not yet available, rights-of-way may be required to be provided by the Applicant to allow for the eventual installation of this facility. Such rights-of-way shall be registered in favour of the Village of Fruitvale at the Applicant's expense.

2.0 DESIGN CRITERIA

2.01 Capacity of System and Sizing of Water Mains

Water distribution systems shall be designed to deliver water in adequate quantities at adequate pressures for both domestic use under peak consumption conditions and fire flows. Mains shall be sized to carry the peak hourly flow rate or the maximum daily flow rate plus the fire flow rate, whichever is the greater. Mains shall be sized using the Hazen-William formula with "C" equal to 120 and maximum flow velocity for peak hourly demand rate of 2.0 m per second. For fire flow, plus the maximum day rate, the flow velocity shall not exceed 3.0 m per second.

## 2.02 Domestic Demand Criteria

For residential areas, the daily domestic demand criteria for purposes of designing water distribution systems shall be assumed to be:

Average day: 800 litres/day/capita

Maximum Day: 3500 litres/day/capita

Peak Hour/Maximum day Consumption Ratio: 1.5

For other than residential areas, the demand criteria shall be selected to suit the particular circumstances subject to the Approval of the Village Engineer.

## 2.03 Fire Flow Requirements

Water distribution systems shall also be designed to ensure that fire flows as required by the Insurers' Advisory Organization (IAO) are available for required durations. Fire flows shall not be less than 3640 litres per minute. The amount and duration of design fire flows shall be provided to the Village Engineer for his approval prior to final design of the water distribution system.

## 2.04 Design Pressures

Water systems shall be designed for pressures in the range of 245 KPa to 630 KPa, with 245 KPa measured under peak hourly conditions and 630KPa measured under static conditions. The minimum pressure shall be measured or calculated at the main floor elevation of the highest proposed house and an allowance made for pressure loss in the service line to the house wall. Minimum residual pressure at any hydrant shall not be less than 140 KPa under maximum day domestic consumption plus fire conditions. Reservoir level shall be assumed at mid point for calculation of minimum pressures and full for calculation of maximum static pressures.

## 2.05 Minimum Pipe Size

The minimum pipe size for all water mains shall be 150 mm diameter. For short cul-de-sac streets where hydrants are not required, the minimum size may be reduced to 100 mm. The Village may require water mains larger than 150 mm in diameter if on main feeder lines.

## 2.06 Location and Grade of Water Mains

Water mains shall be located in the road right-of-way as shown on the Standard Drawings unless otherwise approved by the Village Engineer.

There shall be a minimum lineal horizontal clearance of 1 metre between a water main and other existing or proposed underground services, except sanitary sewer mains. A minimum of 3 metre horizontal distance between a watermain and a sanitary sewer main shall be maintained.

In special cases such as installations in rock or hardpan, the horizontal clearance may be reduced, with the approval of the Village Engineer, provided the invert of the water main is a minimum of 450 mm above the crown of the sanitary sewer and subject to any Provincial regulations. On side-hill streets, the main shall, where possible, be located on the cut side of the centre line of the street.

Water mains shall be normally designed to follow a straight alignment between intersections, at grades parallel to the road centreline.

Curved alignments may be accepted provided that the pipe alignment is at a parallel offset with an established boundary and the radius of curvature is not less than 60 m or twice the minimum radius of curvature recommended by the pipe manufacturer, whichever is the greater. The design drawings shall indicate where short lengths or field belled pipe lengths are required on curves.

Water mains shall be designed with a rising grade wherever possible to minimize high points in the main. Where a high point is unavoidable, either a blow off, service or air release valve shall be installed at that point.

Where the water main network is weak, installation of supplementary mains of a minimum of 150 mm diameter to existing mains may be required at the discretion of the Village Engineer and may necessitate the provision of rights-of-way in favour of the Village of Fruitvale.

No gas main, electric or telephone duct or other utility line shall be installed in the same trench with water mains.

Where it is necessary for the water main to cross other underground services, the crossing shall be made at an angle greater than 20 degrees and the vertical clearance between services at the crossing point shall be not less than 200 mm except for sanitary sewers where the clearance shall be 450 mm between the exterior walls of the pipes.

The drawings shall indicate whether the water main passes over or under other underground services which it is crossing.

## 2.07 Spacing of Fire Hydrants

Fire hydrants shall be located, in general, at highway intersections and at maximum spacing of 150 metres in low density residential areas and 100 metres in high density residential, commercial and industrial areas. Additional hydrants may be required by the Village Engineer at schools, major multiple family developments, commercial buildings or other major developments consistent with the current fire flow requirements of the Fire Underwriters Survey - Water Supply for Public Fire Protection - a Guide to Recommended Practice, as ammended from time to time.

Where hydrants are located other than at intersections, they should be located on the projection of the property line dividing two lots. In selecting the location of a hydrant, the probable route of the fire engine shall be considered.

A hydrant shall not be located within 3 m of a utility pole, pad mounted transformer or light standard, within 1.5 m horizontally of underground service pipes or open ditches, or within 1 m of the curb line or back of sidewalk.

#### 2.08 Line Valves

Line valves in residential areas shall be located at a maximum spacing of 250 m in a continuous line and shall generally be located so that not more than 2 hydrants or 50 dwelling units will be without adequate pressure in the event of any one water break. In commercial and industrial areas, line valves shall have a maximum spacing of 120 m and be located so that not more than one hydrant will be out of service during water system repairs.

Each tee shall have two line valves; each cross shall have three line valves. Each line valve shall be the same diameter as the pipe on each downstream branch of the tee or cross. At the discretion of the Village Engineer, line valves may be required on all branches of a wye or tee.

A line valve may be required on a new pipe line near each point of connection to existing mains.

#### 2.09 Blow Offs

Permanent blow offs shall be installed at all permanent dead-ends and an adapter will be required for connecting a standard 63 mm fire hose for flushing the main, as shown on the Standard Drawings.

Temporary blow offs (usually a corporation cock) may be installed to facilitate chlorination and flushing of any part of the system. After flushing, the temporary blow off shall be removed as directed by the Village Engineer.

#### 2.10 Air Relief Valves

Double acting air relief valves shall normally be installed at all summits in the mains.

#### 2.11 Fittings and Appurtenances

Fittings and appurtenances with other than standard hub ends shall be so indicated on plan.

Where practical, all fittings shall be located in respect to each other so that flanges or standard pipe lengths can be used to connect them.

The centre-to-centre dimension between fittings near each other shall be shown on the final engineering drawing.

## 2.12 Service Connections

The diameter of water services shall be determined by the Design Engineer and is subject to approval of the Village Engineer, and in no case shall the diameter be less than 20 mm.

Water services shall be installed 3.5 metres from the lot line in accordance with the Standard Drawings and shall be installed, whenever possible, in a common trench with the sanitary sewer and storm sewer service.

A water service shall be installed where required to provide a connection to each lot created by the subdivision and to any other existing or possible future lot which can be serviced from mains installed by or for the subdivision.

In general, 20 mm to 50 mm diameter service connections may be tapped into mains 150 mm diameter and greater with double strap service saddles. Multiple corporation stops shall be staggered and not less than 300 mm apart.

No tappings shall be made at an angle of greater than 30 degrees above the horizontal centreline plan of the pipe.

Where it is necessary to install service connections at less than 1 m centres in a 100 mm diameter main, the 100 mm diameter main, in all cases, shall be ductile iron.

The curb stop at the end of each service pipe shall be located 0.3 m in front of the street/property boundary line, and 1.0 metres from the corner lot pin. Where such location will conflict with other services, the location may be revised with the approval of the Village Engineer.

## 2.13 Depth of Cover

The depth of the water main shall be sufficient to provide all services with a minimum cover of 1.5 m to the top of the service anywhere within the Right-of-Way. In no instance shall the minimum cover over the crown of the main be less than 1.5 m.

## 2.14 Tie-ins to Existing Water Mains

Connection of a new pipe to an existing water main generally shall be done by wet tap (hot tap) and shall be done by the Village unless the existing main has an acceptable provision for a direct extension. The Applicant shall pay for the supply of all materials required and shall pay the full cost of making the tie-in. This portion of the work, including details of materials required, shall be clearly indicated on the design drawings. Only the Village may operate valves on the existing water mains. Application for tie-in shall be made one week in advance of the proposed work.



## 2.15 Reservoirs

Reservoirs, where required, shall be designed to suit the particular circumstances. In general, reservoir capacity shall be not less than:

$$\text{Total Storage Requirement} = A + B + C$$

where

A = Fire Storage, based on minimum 3640 litres per minute fire flow

B = Equalization Storage (25% of maximum day demand)

C = Emergency Storage (25% of A + B)

Reservoir design, at minimum, shall incorporate the following features:

- structures to be below ground and covered, unless specifically approved otherwise;
- material - reinforced concrete;
- 2 cells, each containing one-half of total required volume and capable of being drained and filled independently;
- lockable access opening in roof for cleaning and maintenance - minimum dimension 1 m x 1 m to be located between overflow pipe and wall;
- ventilation pipes or openings;
- slope floor to sump;
- sub-drain under floor to collect and drain any leakage (connect to overflow pipe in a manhole);
- interior wall ladder from roof access to floor (no exterior ladder required);
- inlet, outlet pipe to be perforated and designed to disperse water throughout the reservoir;
- overflow drain to be provided and sized to transmit the maximum pump discharge. The overflow drain shall be connected to an acceptable point of discharge;
- access roads;
- telemetry alarm system.

Reservoir valve chamber design shall incorporate:

- sump in valve chamber floor, connected to overflow pipe;
- 50 mm valved outlet off supply line within valve chamber for water supply for cleaning reservoir;
- valves shall be OS & Y.

## 2.16 Pump Stations

Pump stations, where required, shall be designed to suit the particular circumstances. In general, pump stations shall be designed to meet maximum daily demands with the largest pump out of service with balanced storage on line. If equalization storage is not on line, pump station capacity must meet peak hour demand with the largest pump out of service.

Pump station design, at minimum, shall incorporate the following features:

- reinforced concrete, blockwork or brick construction, aesthetically pleasing;
- lockable access doorways sized so that the largest single piece of equipment may be safely removed and replaced. Lifting hooks or rails with pulley blocks as required;
- pumps to start and stop individually. Start and stop to be based on water levels in control reservoir.

Automatic alternation of pump sequence;

- power failure protection with manual reset;
- high water override start plus alarm;
- high pressure (discharge) override start;
- low pressure (discharge) override start plus alarm;
- low pressure/no flow (suction) override start;
- alarms to be audible and visible;
- control valves to minimize starting and stopping surges;
- duplicate control cables (without splices) between pump stations and reservoirs;
- power factor correction as required by Power Authority;
- hour meters on each pump;
- recording flow meter at each pump station;
- recording suction and discharge pressure gauges at each pump station;
- automatic heating, ventilating and dehumidifying systems;
- in-station lighting;
- drainage to be provided for all pump station;
- telemetry alarm;
- electrical phase loss protection;
- electrical drawing schematics for control panels;
- access roads;
- pump manuals.

For each design submission to the Village, an extra set of drawings pertaining to the design of the pump station, keyplan, and a location plan shall be submitted for the maintenance department to review.

Before commencement of construction, the Applicant shall provide five sealed sets of mechanical shop drawings and five sealed sets of electrical line diagrams for review by the Village Engineer. Two sealed copies of design calculations shall be provided for documentation. Before acceptance of the completed station, by the Village, the Applicant shall provide 3 copies of an Operation and Maintenance Manual to the Village. The manual shall contain:

- Cover page and table of contents
- As constructed shop drawings.
- Equipment layout drawings.
- Electrical, control, and alarm wiring diagrams.
- Operating instructions for all equipment.

- Maintenance instructions for all equipment, including frequency of maintenance tasks.
- Equipment data sheets.
- Certified head/capacity curves for pumps.
- Equipment part lists.
- Emergency operating procedures.

The maintenance manuals shall be hard-backed bound documents with the name of the facility embossed on the cover. Each section of the manual shall be identified by plastic covered tabbed dividers, with the section name identified on the tab.

## 2.17 Pressure Reducing Stations

Pressure reducing stations, were required, and shall be designed to suit the particular circumstances. In general, each pressure reducing station shall have a separate pressure reducing valve and appurtenances for maximum daily demand and a separate pressure reducing valve and appurtenances for fire flows.

Pressure reducing station design, at minimum, shall incorporate the following features:

- precast or cast in place buried concrete chamber suitable for H20 Highway loading, minimum size 2.13m x 4.57m x 1.98m high;
- aluminum lockable gas assisted spring access hatch with drip proof gasketed drain channel (914mm x 914mm minimum);
- aluminum ladder to WCB requirements;
- sump with sump pump assembly;
- fluorescent lighting and one duplex GFI electrical outlet;
- pressure reducing valves with downstream surge control;
- venting to WCB requirements;
- wye strainers;
- OS&Y isolating gate valves;
- victaulic couplings;
- pressure gauges on upstream and downstream side of PRV;
- one 20mm hose bib connection;
- pipe stands
- ceiling and wall of chamber to be painted with two coats of latex white paint;

For each design submission to the Village, three sets of drawings pertaining to the design of the pressure reducing station, key plan and a location plan shall be submitted.

## 2.18 Access

Vehicular access shall be provided to all reservoirs, pressure reducing stations and pump stations.

The minimum standard shall be as for an emergency access road as shown on Standard Drawing B-6, with curbing and drainage provisions as may be required by the Village Engineer.

### 3.0 MATERIALS

#### 3.01 Pipe

Pipe for water mains shall either be ductile iron or polyvinyl chloride (PVC).

- .1 Ductile iron pipe shall conform with American Standard AWWA C150/A21.50 and C151/A21.51, Latest Edition. All pipes shall conform to AWWA C151, minimum pressure class 150, unless specified otherwise by the Village Engineer. Pipes shall be cement mortar lined, conforming with AWWA C104/A21.4, Latest Edition. Joints shall be mechanical or a rubber gasket bell and spigot to AWWA C111, A21.11, Latest Edition.
- .2 PVC pipe shall conform with AWWA C-900 and CSA CAN3-B137.3 for mains 100 - 300 mm dia. and with AWWA C-905 and CSA CAN3-B137.3 for mains 350 mm to 600 mm dia. Joints shall be wall thickened and sleeve reinforced bell and spigot ends with formed groove for elastomeric gasket seal conforming to ASTM D2122.

#### 3.02 Fittings

Fittings shall be ductile iron for use with ductile iron or PVC pipes conforming to AWWA C110/A21.10 and shall be designed for a minimum pressure of 1720 kPa unless specified otherwise by the Village Engineer.

#### 3.03 Buried Gate Valves

Buried gate valves shall conform to:

AWWA C-500 iron body, bronze mounted wedge valves with non-rising stem, O-ring stem seal, suitable for 1 MPa minimum; or

AWWA C-509 iron body, resilient seated valves with non-rising stem, O-ring stem seal, suitable for 1 MPa minimum.

Valves shall be equipped with a 50 mm square operating nut and tie-lugs where restraining is required. Valves to open counterclockwise.

#### 3.04 Valve Boxes

Valve boxes shall be Nelson or Robar type with anchored flanges approximately 100 mm from the top of the box.

### 3.05 Hydrants

All hydrants shall be Canada Valve Century compression, complete with 2 - 63mm ports and 114 mm pumper port. Threads shall conform to the British Columbia Fire Hose Thread specifications. Hydrants shall be painted yellow above the ground line. Drain outlets shall be provided. Depth of bury shall be a minimum of 1.5 metres. Hydrant extensions shall be installed as required to suit the final boulevard grade. Hydrants shall be equipped with a standard BC pentagon operating nut and shall open counterclockwise. Cap chains not required. Hydrant colour shall be red.

Hydrant lead pipe shall be a minimum of 150 mm diameter. At the discretion of the Village Engineer, a concrete wing wall shall be installed at hydrants adjacent to road cut slopes. In areas where road ditches exist, a culvert and a 3 metre wide gravelled pad across the ditch shall be provided for access to the hydrant.

### 3.06 Service Connection Pipe, Saddles, and Joints

All pipe for underground services 50 mm diameter and smaller shall be Type K annealed copper conforming to ASTM B88. Pipe for services 100 mm and 150 mm diameter shall be as specified for the watermain pipe.

Service connections to PVC pipe shall be made using bronze double strap saddles with either bronze or stainless steel fasteners tapped for AWWA thread. Saddles shall provide full support around the circumference of the pipe and shall provide a minimum bearing width of 50 mm measured along the axis of the pipe.

Joint fittings shall be compression type suitable for 1035 Kpa working pressure.

### 3.07 Corporation Stops

Corporation stops shall be Mueller H15008 for 20 mm diameter through 50 mm diameter, or approved equal.

### 3.08 Curb Stop and Boxes

Curb stops shall be Mueller Mark II Oriseal H 15209 stop, or approved equal, for 20 mm diameter through 50 mm diameter. Service boxes shall be Mueller A726, or approved equal, for 20 mm diameter to 40 mm diameter and Mueller A728, or approved equal, for 40 mm diameter through 50 mm diameter.

### 3.09 Air Valves

Air valves shall be 50 mm Terminal City, Apco, or approved equal, double acting air valves or as approved by the Village Engineer.

### 3.10 Stops and Drains For Blow Offs

Stops and drains shall be minimum 50 mm Mueller A-10284 Mark II Oriseal, or approved equal.

### 3.11 Meters

Meters shall be installed indoors above ground at the Applicant's expense. Location shall be as approved by the Village Engineer. All meters and remote readout devices shall be easily accessible to the Village. Meter chambers or enclosures shall include:

- structures shall be watertight
- drainage, ventilation and lighting
- protection from freezing
- adequate access and interior space for maintenance and equipment removal
- minimum headroom of 2.0 m
- piping primed and painted with a rust-inhibiting paint
- remote readout device
- meter bypass
- meter for domestic and irrigation use - bypass for fire flows

### 3.12 Concrete

All concrete shall conform to CSA:A23.1M with a minimum 28-day compressive strength of 14 MPa for unshrinkable fill and thrust blocks, and 20 MPa for all other purposes. Concrete slump shall be in the range of 50 mm to 100 mm.

Cement shall be Portland cement conforming to CSA:A.5, and shall be normal type unless specified by the Village Engineer or dictated otherwise by soil conditions.

Admixtures shall not be included in the concrete mix without the approval of the Village Engineer.

### 3.13 Bedding Material

Bedding shall for all pipe bedding shall be sand or crushed rock free of clay lumps, organic and other deleterious material. Gradation shall conform to the gradation limits set out in the following table:

USBC Sieve Size	Percent by Weight Passing
19	100
12.5	75 - 100
4.75	40 - 80
2.36	25 - 65
0.300	5 - 25
0.075	0 - 8

3.14 Backfill Material in Pipe Zone (Pipe Surround)

Backfill material in the pipe zone (pipe surround) shall be sand or crushed rock free of clay lumps, organic and deleterious material. Gradation shall conform to the gradation limits set out in Clause 3.13, Schedule D.

3.15 Backfill Material Above Pipe Zone

In Road Areas

- .1 Backfill material below the pavement structure for trenches in road areas may be native soil provided the native soil is free of organic or foreign matter and can be readily compacted to a minimum of 95% standard Proctor density in compliance with ASTM D-698. Native material is not acceptable if it will not provide an adequate subgrade base for the proper placement of road sub-base, base and asphalt. Maximum particle size of backfill material not to exceed 200mm.

If the native material is deemed unacceptable, the backfill material shall be imported granular material, conforming to Clause 3.01 of Schedule B.

In non-road surfaces:

- .2 Backfill material for trenches and easements or other non-road areas may be native material excavated from the trench providing it is sufficiently free of frozen soil, roots or other objectionable material so as not to cause undue settlement. Maximum particle size of backfill material not to exceed 200 mm.

3.16 Encasement Pipe Filler Sand

To be well graded, clean sand, free from organic materials and conforming to the following to gradation limits;

<b>USBC Sieve Size</b>	<b>Percent By Weight Passing</b>
4.750 mm	100
2.360 mm	20 -70
1.180 mm	13 -50
0.850 mm	8 -35
0.300 mm	5 -25
0.150 mm	2 -15
0.075 mm	0 -8

3.17 Bolts and Nuts

Bolts and nuts to be Type 314 stainless steel.

#### 4.0 WORKMANSHIP

##### 4.01 Trench Excavation

Trenches shall be excavated to suit the cross-section shown on the Standard Drawings. Open trenches through existing paved surfaces will be allowed only with the prior express consent of the Village Engineer. When trenches through existing pavement are allowed, the pavement shall first be saw-cut by mechanical means in straight continuous lines parallel to the trench centreline.

If trenches are excavated wider than the specified widths, a higher class of pipe or special bedding may be required.

Rock excavation in trenches shall provide a minimum clearance of 150 mm below the pipe for pipes 600 mm in diameter or less, and 250 mm for pipes larger than 600 mm in diameter.

The top of the trench at ground level shall be kept to the minimum width consistent with the depth, natural angle of repose of the material and the regulations of the Workers' Compensation Board.

Excavation for chambers, fittings and other appurtenances shall be to the lines which will permit the assembly of these sections, and to permit adequate backfilling and compaction operations.

Where an existing structure or underground installation may be affected by the works, it is the responsibility of the Applicant to inform the owner of such facility sufficiently in advance that the owner may make an inspection and specify the protective measures to be undertaken.

Where an unforeseen or other obstruction is encountered which interferes with the designed alignment or grade, the construction shall cease until such time as revised proposals are approved by the Village Engineer.

The attention of the Applicant is directed to the provisions of the Workers' Compensation Board safety regulations. All municipal employees have been instructed not to enter excavations which are not properly braced or which otherwise do not conform with the requirement of the Board. It follows, therefore, that approvals cannot be given to installations not inspected because of unsafe working conditions.

Any over-excavation of the trench subgrade beyond the specified depth shall be backfilled with select material and compacted to 100% Standard Proctor density.

In rock excavation the depth of compacted bedding material below the pipe shall be a minimum of 150 mm for pipe of 600 mm diameter or less and 250 mm for pipe in excess of 600 mm diameter. This depth shall exist for the full wall-to-wall width of the trench.



Where the bottom of any excavation as uncovered is soft and is in the Design Engineer's opinion unfit to support the pipes or structures, a further depth shall be excavated and refilled to the correct shape, grade and elevation as directed by the Design Engineer.

When the bottom of a trench is found to consist of unstable material which, in the opinion of the Design Engineer, cannot be removed and replaced with bedding material, a pile foundation or other structural support in accordance with plans prepared by the Design Engineer shall be constructed.

In areas of clay or other impermeable soils, where overexcavation of the trench subgrade is required, the overexcavation shall continue to a point where ponding of water in the trench bottom will be avoided.

Open cut trenches shall be sheeted and braced as required by the Workers' Compensation Act, as may be necessary to protect life, property, or the work, unless the trench excavation is sufficiently wide at the top to be naturally stable. When close sheeting is required, it shall be driven so as to prevent the soil from entering the trench either from below or through such sheeting. A minimum distance of 150 mm from the closest point of the pipe to the sheeting shall be maintained.

When possible, vertical trench timber or sheeting shall be placed so that it does not extend below the level of the bottom of the excavation. Sheeting driven below the pipe grade shall not be removed unless the sheeting can be removed without causing settlement or lateral displacement of the pipe.

Unless otherwise indicated in the drawings or specifications, or unless approval to leave it in place is received from the Village Engineer, trench sheeting and bracing shall be removed when backfilling has been completed or has reached a level which will permit its safe removal without causing injury to persons or damage to the works. When sheeting and bracing is left in place, it shall be cut such that no sheeting remains closer than one metre to the established sub-base road grade or the existing ground surface, whichever is the lower.

Particular caution will be taken to ensure that pipe bedding is not disturbed such that settlement of the pipe results.

Timber supports or sheeting shall be left in place when its removal would endanger adjacent structures or result in a shifting of pipe bedding material and a displacement of the pipe. The Village Engineer may require the pipe to be bedded in concrete (Class A Bedding) when, in his opinion, the removal of sheeting would disturb the pipe bedding. Discharge from trench pumps, well points, or other dewatering aids, shall be located and controlled in such a manner as to not cause loss or damage to public or private property, nuisance on roads or walks, or injury to the public.

#### 4.02 Pipe Class and Bedding Class

Notwithstanding other provisions of this Bylaw, the quality of the pipe and bedding shall be so selected such that the installation will adequately support the loads to be placed on it during construction and in operation. For ductile iron pipe, the calculations shall follow the method shown in AWWA C-150, latest edition. For PVC pipe, the calculations shall follow the methods outlined in AWWA C-900 and C-905, latest edition.

For all pipe, a minimum Class B bedding, as defined by the Standard Drawings, is required. Pipe class and bedding class must be identified on all engineering drawings.

#### 4.03 Pipe Alignment and Depth of Cover

Pipe shall be installed true to the alignment shown on the approved construction drawings and to a depth sufficient to provide a minimum cover of 1.5 m measured from the top of the installed pipe to the finished grade elevation over the pipe.

#### 4.04 Pipe Installation

Prior to installing pipe, all standing water shall be drained or pumped from the trench. Pipe shall be carefully offloaded and lowered into the trench in a manner that will prevent damage to the pipe. The pipe shall be jointed in strict accordance with the manufacturer's recommended practice.

Pipe anchors are required for pipes installed on grades in excess of 20% as shown on Standard Drawing.

#### 4.05 Service Connections

Service connections shall be connected to the Corporation stop and a gooseneck formed as shown on Standard Drawing. Pipe shall be installed in a straight line between the gooseneck and the terminus of the service.

Compression joints shall be required for connecting service piping. Service tapping shall be spaced along the length of pipe and staggered around the circumference to avoid cracking of pipe between tappings. Minimum distance between two tappings and between the end of a pipe and the tapping shall be 300 mm. A marker stake shall be set with bottom flush with the end of the service and the top projecting a minimum 1000mm above the ground. Marker stakes shall be cut to an even 200 mm length, and depth from top of marker to water service shall be clearly marked on the stake. Marker stake tops shall be painted blue with yellow painted stenciled numbers and letters.

Service boxes shall be set flush with ground or road surface. A length of copper flattened on one end shall be installed on the private property side of the curb stop to prevent entrance of foreign material and this pipe shall extend 1500 mm into private property.

#### 4.06 Thrust Blocking

Concrete thrust blocking shall be provided at fittings and on hydrants as shown on Standard Drawings. Concrete shall be placed between undisturbed ground and the fitting to be anchored such that the pipe and the fitting joints are accessible for repair. Bolts on flanged fittings shall be left free.

#### 4.07 Valves, Fittings and Hydrants

Valves, fittings and hydrants shall be set plumb and directly on the centreline of the pipe. A valve box shall be provided for every valve. The valve box shall not transmit shock or strain to the valve and shall be centered and plumb over the nut of the valve. The 150 mm riser pipe must be placed in such a manner as to permit the use of long-handled angle wrenches through the box to tighten packing gland nuts. On valves 200 mm and over, a cast bell bottom fitting shall be used over the valve. A 1.5 metre radius asphalt apron shall be placed around all valves installed on gravel roads and gravel shoulders.

Hydrants shall be plumb and shall have their nozzles at right angles to the curb. Hydrants shall be set with ground flange above the ground at the elevation directed by the Village Engineer generally at 50 mm above finished design grade. When set in a permanent sidewalk or other solid structure, a suitable expansion joint material shall be placed around the hydrant to allow for movement between hydrant and structure. All hydrants shall be supplied with drains. Sufficient drain rock shall be placed to allow for proper hydrant drainage, generally a minimum of 0.5 cubic metres.

#### 4.08 Blow-Offs

Blow-offs shall be installed as shown on the Standard Drawing.

#### 4.09 Granular Bedding and Backfill in Pipe Zone

The pipe zone is considered as being the depth of trench between the trench bottom and a level 300 mm above the top of the pipe.

The pipe zone backfill shall be hand placed and thoroughly compacted to a density of 95% Standard Proctor Density in layers not exceeding 150 mm using hand tampers.

#### 4.10 Backfill Above Pipe Zone

In Road Areas:

- .1 In road areas trench backfill material shall be placed in layers not exceeding 300 mm in thickness and compacted by mechanical means to a minimum of 95% Standard Proctor density. The water content of the material shall be controlled to achieve the required density.

In Non-Road Areas:

- .2 In easements and other non-roads areas, native trench material may be used for trench backfill above the pipe zone. Backfill shall be placed and compacted to 90% Standard Proctor Density.

#### 4.11 Pipe Casings

Pipe casings shall be installed as shown on the Standard Drawing. The water pipe shall be blocked at each joint to ensure line and grade is maintained and the casing is to be sealed at both ends with joint filler with proper care taken to ensure that the pipe remains on line and grade and does not float. The annular space between the water pipe and the casing pipe shall be filled with sand as specified in Section 3.16. A length of 6 mm polypropylene rope shall be laid alongside the carrier pipe inside the casing to assist future retrieval.

#### 4.12 Asphalt Restoration

If the edges of the cut asphalt become ragged as a result of the construction operation, the asphalt shall be re-cut to form a straight line prior to placing new pavement. The edges of the existing asphalt shall be thoroughly clean and coated with an approved bituminous bonding agent prior to placing the new hot asphalt mix. The finished grade of the asphalt surface shall conform with that of the existing surface such that no rises, depressions or ridges result from the repaving process.

#### 4.13 Leakage Tests

Following final trench backfilling, leakage tests shall be performed on all installed piping according to AWWA C600, Latest Edition. Tests shall be conducted in the presence of the Village Engineer with 24 hour notice provided to the Village in advance of the test. A leakage test shall be conducted after all mains and service connections have been completely installed and backfilled. The Applicant shall furnish all necessary apparatus, test water and labour to conduct test. Leakage tests shall be performed in the following manner:

The section to be tested shall be filled with water and all air expelled from the piping. It is recommended that the test section be filled with water for at least 24 hours prior to testing. By pumping water into the test section, the pressure within the piping shall be increased to the pressure rating of the main or at least 1 1/2 times the operating pressure at the point of testing, whichever is greater. This pressure shall be maintained constantly in the pipe within  $\pm 35$  KPa throughout the duration of the test, by the addition of make-up water. The duration of the test shall be a minimum of 2 hours. Hydrant leads shall be shut off at the hydrant such that the hydrant is placed under test. The quantity of water pumped into the test section to maintain the specified pressure over the period of the test shall be considered to be the leakage. Piping will not be accepted until the leakage is less than the maximum allowable leakage determined from the following formula:

$L = NDP_{\frac{1}{2}} 131,000$  in which

L = the allowable leakage in L/hr.

N = the number of joints in the test section.

D = the nominal diameter of the pipe in mm.

P = the average test pressure during the leakage test, in KPa, not to vary more than  $\pm 35$  KPa.

Should any test disclose leakage greater than that specified above, the source of the leakage shall be located and the defect repaired or the necessary replacement made and the section retested until a satisfactory test is obtained. All repairs to the work shall be made with new material equivalent to that requiring repair or replacement. The use of repair and maintenance aids such as clamps will not be permitted. Leakage tests shall be carried out between valved sections of the installation such that every valve in the system is tested for leakage in the shut-off position.

#### 4.14 Flushing

The pipe shall be cleaned of dirt and other foreign materials. The pipe shall be flushed at water velocities of 1 m/s or as high a velocity as can be obtained from the available water source. Flushing time shall be at least five times the time required to travel the main at 1.5 m/s velocity. Flushing shall continue for the required time or until 10 minutes after the water has cleared, whichever is greater.

#### 4.15 Chlorination

On completion of the flushing operation, main pipes and services shall be chlorinated. Chlorination procedures shall conform to AWWA C651, Latest Edition. No pills, powders or solids shall be placed in the main during installation or for chlorination purposes. Chlorination shall be applied by the continuous feed method. After preliminary flushing, the chlorine solution shall be injected at a measured rate such as to fill the main with a 25 mg/L available chlorine solution. All appurtenances shall be operated in this solution to disinfect them. All measures shall be taken to prevent the disinfectant solution from flowing into existing water supply system. The disinfecting solution shall remain in the main for 24 hours and shall have no less residual than 10 mg/l at the end of that period. Following disinfection of lines to the required standard, the line shall have a final flushing to completely purge all disinfecting solution. Any water with residual greater than 2.5 mg/L shall be diluted prior to discharging to an open ditch. Flushing shall continue for 15 minutes after a concentration of 1 mg/L is reached. Water with a chlorine concentration greater than 1 mg/L shall not be discharged to a recognized water course without the approval of the Ministry of Environment. A log of all test results and disinfection procedures shall be submitted to the Village Engineer. On completion of chlorination, the entire piping system shall be thoroughly flushed, filled with water and left in a condition ready for use.

4.16 Materials Testing

The Village shall be provided with copies of all sieve and compaction test results pertaining to bedding, backfill, and road restoration.

4.17 As Constructed Drawings

Prior to final acceptance, the Applicant shall deposit with the Village one set of original as constructed mylar drawings showing all the information requested by this schedule and conforming to the criteria set out in Schedule I.

SCHEDULE E  
REGULATIONS, STANDARDS AND SPECIFICATIONS FOR THE DESIGN AND  
CONSTRUCTION OF SANITARY SEWERS

This is Schedule E of the Village of Fruitvale Subdivision and Development Servicing  
Bylaw No. 561, 1995.

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Clerk

SCHEDULE E  
REGULATIONS, STANDARDS AND SPECIFICATIONS FOR THE DESIGN AND  
CONSTRUCTION OF SANITARY SEWERS

1.0 GENERAL

- 1.01 Where a sanitary sewage collection and disposal system is required, sanitary sewer facilities including gravity sewer mains, pump stations and force mains, manholes, service connections and all related appurtenances shall be provided.

A sewer service lateral shall be installed where required to provide a connection to each parcel to be created by the subdivision and to any other existing or possible future parcels which can be serviced from mains installed by or for the subdivision. The routing of sewers shall be in accordance with the directions of the Village Engineer.

Where sanitary sewer facilities are not required, rights-of-way may be required to be provided by the Applicant to allow for the eventual installation of this facility. Such rights-of-way shall be registered in favour of the Village of Fruitvale at the Applicant's expense.

Where a subdivision is located in a zone where on site disposal is permitted, the individual treatment systems (e.g. septic tanks) shall be designed to facilitate connection of the individual service lines to a future sanitary sewer system, should it become available.

1.02 Approval of Engineering Drawings Required Prior to Construction

Engineering drawings showing detailed design of the necessary works shall be submitted to the Village Engineer for approval. No construction of sanitary sewers shall commence until the drawings have been approved by the Village Engineer. These drawings shall show alignment and size of pipes, proposed grades, distances between manholes, manhole invert elevations, existing ground line and proposed final ground line over pipe, location of all service connections to the property line, all easements, lift stations, force mains, pipe bedding requirements and all other details which may be required by the Village Engineer.

2.0 DESIGN CRITERIA

2.01 Pipe Capacity

Sanitary sewer facilities constructed in a subdivision shall be designed to provide sufficient capacity to carry the required quantity of sewage flow from the fully developed upstream contributing area, as defined by the Village Engineer.



Sewage design flows shall be based on the equivalent population of the contributing area as determined by the Village Engineer but no less than 66 persons per hectare with an average per capita flow of 510 litres per day. A peaking factor calculated using the Harmon Peak Factor curve shall be applied to the average flow as follows:

$$\text{Peak Factor} = 1 + \frac{14}{4 + P^{1/2}}$$

Where P = equivalent contributing population in thousands.

An infiltration rate of 5,000 litres per hectare per day shall be used. In areas where the water table is higher than the sewer main inverts, 8000 litres per hectare per day shall be used.

The peaking factor shall be applied to the sanitary contribution only and not to the infiltration allowance.

Pipe sizes shall be selected so that sewers flow 2/3 to 3/4 full at peak hour design flow.

## 2.02 Minimum Velocity and Design Grade

Minimum velocity for pipe flowing full or half full shall be 0.6 metres per second. Minimum grades are as follows, assuming a pipe roughness coefficient "n" of 0.013:

<u>Pipe Dia.</u>	<u>Min. Grade</u>	<u>Pipe Dia.</u>	<u>Min. Slope</u>
100mm	2.00%	375mm	1.15%
150mm	1.00%	400mm	0.14%
200mm	0.40%	450mm	0.12%
250mm	0.28%	525mm	0.095%
300mm	0.22%	600mm	0.080%
350mm	0.17%		

There shall be no change in the grades of pipe between manholes.

## 2.03 Sizing of Sewer Mains

The minimum pipe size for all sewer mains shall be 200 mm.

No reduction of pipe size shall be made downstream, irrespective of pipe grade.

## 2.04 Depth of Cover

The depth of the main shall be sufficient to provide all service connection piping with a minimum cover of 1.5 m to top of the service piping anywhere within the finished right-of-way. Sanitary mains shall be designed such that gravity drainage is possible from the full basement level of all parcels. In no instance shall the minimum cover over the crown of gravity and force mains be less than 1.5 m.

## 2.05 Manhole Spacing

Manholes shall be installed at a maximum spacing of 100 metres and in the following locations:

- .1 at the end of each line where cleanouts are not provided;
- .2 at all changes in grade and/or alignment (for non curvilinear sewers);
- .3 at all changes in pipe size;
- .4 at all pipe junctions;
- .5 at all intersections.
- .6 at the beginning and end of pipe curvature for curvilinear sewers

Where, in the opinion of the Village Engineer, the grades of sewer pipes are sufficient to provide proper cleaning, the maximum spacing of manholes may be increased to 120 metres.

Manholes shall normally be constructed in accordance with the details as shown on the Standard Drawings. In cases where these details will not suffice, a detailed design drawing must be approved by the Village Engineer.

Drop manholes on sanitary sewers may be allowed where particular circumstances preclude the use of normal manholes and where invert elevations differ by more than 60 cm.

The relative elevations of sanitary sewers entering and leaving a manhole are to be such as to ensure that the manhole does not substantially reduce the hydraulic capacity of the system. Minimum fall through the manhole shall be 30 mm.

## 2.06 Cleanouts

Cleanouts rather than manholes, may be permitted at the end of non-extendable sewer mains in non-travelled areas with the consent of the Village Engineer. Cleanouts shall be constructed in conformance with the Standard Drawing.

## 2.07 Service Connections

The diameter of sewer services shall be determined by the Design Engineer, subject to the approval of the Village Engineer, but in no case shall the diameter be less than 100 mm.

Sewer services shall be installed 3.0 metres from the lot corner in accordance with the Standard Drawings and shall be installed, wherever possible, in a common trench with the water service, and storm sewer service.

Service connections shall be made with an approved branch wye and be installed in a straight line and at a uniform grade from the terminus at the property line to the 45 degree long radius bend at the main. An approved wye saddle may be used to connect a 100 mm diameter service to an existing main. The minimum pipe grade for sewer service pipes shall be:

- 2% for 100 mm service pipe
- 1% for 150 mm service pipe
- 

In areas where the depth of the service pipe at the main is less than that of the pipe main, service risers shall be constructed consistent with the Standard Drawing.

For services 150 mm and larger, a manhole shall be installed at the intersection of the main and the service. A wye or saddle will not be accepted for services 150 mm or larger.

## 2.08 Location of Sewer Mains

Sanitary sewer mains shall, wherever possible be located in the road right-of-way as shown on the Standard Drawings. Where the location of the sewer main within the road right-of-way is not practical due to topography or other factors, the sewer main shall be located in a utility right-of-way registered in favour of the Village of Fruitvale and having a width of not less than 4.5 metres. The Village Engineer may require a utility right-of-way wider than 4.5 metres in the case where services in addition to sanitary sewer will be placed in the same right-of-way or where the depth of the sewer main requires a wider easement. There shall be a minimum clear lateral distance between the outside walls of sanitary sewers and storm sewers of 0.75 m.

## 2.09 Alignment of Sewer Mains

Sewer mains shall generally be designed to follow a straight alignment between manholes. Curved alignments within rights-of-way shall be subject to the approval of the Village Engineer and provided that the pipe is set at a grade greater than the specified minimum and pipe alignment is at a parallel offset with an established boundary. In these cases, the radius of curvature shall be not less than 30 metres, or twice the minimum radius recommended by the pipe manufacturer, whichever is the greater.

## 2.10 Sanitary Force Mains and Lift Stations

### Pre-design Requirements

The objective of the Village of Fruitvale is to minimize the number of sewage lift stations required and thoroughly consider other options to avoid lift stations wherever practical. The Design Engineer shall obtain approval from the Village Engineer as to the siting of the lift station.

Prior to commencing detailed design of a lift station, the Design Engineer shall submit a pre-design report that addresses the design considerations of the station to the Village Engineer. Approval of the pre-design concepts must be obtained prior to the Design Engineer commencing detailed design. This requirement covers both dry well and submersible sewage lift stations. Larger capacity sewage lift stations or lift stations with special design or siting requirements may require additional assessment and review of criteria.

The location and layout of a lift station shall include, at minimum, an assessment of the following basic design considerations.

- Lift station shall be designed to handle the flows of the designated catchment area.
- Type of station and impact on neighbours.
- Construction dewatering requirements.
- Access for construction and maintenance complete with asphalt driveway or approved equivalent of sufficient strength to handle heavy trucks and with enough space to turn around.
- Aesthetics, noise, odour, and landscaping requirements.
- Security against vandalism and theft.
- Flood elevations. Station uplift design shall be based on maximum flood level.
- Proximity of receiving sewers, watermains, and adequate power supply.
- Minimizing energy requirements.
- Standby power and its requirements and compatibility.
- Soils investigation shall be undertaken prior to site approval being given.
- Convenience of operation and maintenance.
- Safety of operators and the public.
- Capital costs and operation and maintenance costs.

## 2.11 Design Requirements

All sewage lift stations shall meet the following design requirements.

- Pumps shall meet maximum flow condition with one pump in failure mode. The pump shall handle the maximum flow with the smallest impeller for that pump size to allow for any future expansion.
- Pumps shall operate alternately. However, a further safety feature shall allow for both pumps to operate at the same time during extreme flows.
- Pumps shall have non-clog impellers that will pass a 60 mm minimum spherical solid.
- Control panel shall be mounted in the dry well or in a suitable kiosk on a concrete pad and it shall contain a Crouse Hinds receptacle with reverse contacts and manual transfer switch suitable for connecting standby power at 347/600 volts and should be capable of handling the pumps with the largest impeller installed and running simultaneously. An extra power outlet for small hand tools operating at 110/220 volts is also required.

- Sloping bottom and filleted corners in wet well to direct the flow to the pump suction inlet and prevent solids deposition.
- Minimum 38 mm stand pipe water supply within 10 m of the station for washdown complete with a pressure reducer and a ball shutoff valve. Water supply to be installed outside the pump entrance, below the frost line, in an accessible chamber. Back flow preventers must be installed.
- Liquid level sensing system EHN-10 float switches as provided by Flygt Canada Ltd. or an equivalent acceptable to the Village Engineer.
- Compatible telemetering system.
- Emergency pump-out arrangement approved by the Village Engineer.
- Sufficient access to remove components for repair.
- Minimum 150 mm diameter pipe vent with vandal proof insect screen on outlet for the ventilation of the wet well. Explosion-proof exhaust fan which has sufficient capacity to exchange the total volume of air inside the well with fresh air within 3 minutes.
- Check valve and isolating valve for each pump must be provided. Where possible, locate valves in a horizontal position. Where surge pressures for the check valve would be excessive, an electric activated slow closing resilient seated eccentric plug valve, with battery standby, shall be used.
- A Workers' Compensation Board approved aluminum or galvanized steel ladder for access to wet well and dry well.
- Sump pump for the interior of the dry well discharging above the TWL in the wet well.
- Minimum 2 hour storage between the high level alarm and the start of overflow to be provided within the wet well, influent pipes and surface ponds at peak wet weather flow. Surface ponds are only to be used on approval of the Village Engineer and must be adequately secured with chain link fencing.
- The wet well shall be sized to allow a minimum of 3 minutes to elapse between successive pump starts at peak flow conditions to prevent pump burn-out.
- Emergency overflow should prevent flooding of buildings connected to the sewer system and prevent damage of components in the lift station. Overflow should be to a confined storage area.
- All equipment must be CSA approved.

- An explosion proof light with protective cover activated by a switch inside the kiosk should be provided.
- Gate valve on the pressure line from the pump station is required.
- Bell mouth on pump intake required on all dry well pumps.
- Inside deck plates to be light weight fibre glass or aluminum complete with stainless steel hinges. Open grate deck plates preferred.
- Special flex joints shall be used at the inlet pipe such as Flex-Tend by EBAA Iron Inc. or an approved equivalent.
- The outlet pipe and all other connections to the station shall be brought to within 1.5 m of the expected ground line around the pump station by the use of risers either on the inside of the station or attached to the outside of the station.
- Particular criteria for submersible and for dry well stations are to be reviewed with the Village Engineer.
- For each design submission to the Village, an extra set of drawings pertaining to the design of the pump station, the sanitary mains and force mains, key plan and a location plan shall be submitted for the maintenance department to review.
- Before commencement of construction, the Design Engineer shall provide five sealed sets of mechanical shop drawings and five sealed sets of electrical line diagrams for review by the Village Engineer. Two sealed copies of design calculations shall be provided for documentation. Before acceptance of the completed lift station, by the Village, the Design Engineer shall provide 3 copies of an Operation and Maintenance Manual to the Village. The manual shall contain:
  - Cover page and table of contents.
  - As constructed shop drawings.
  - Equipment layout drawings.
  - Electrical, control, and alarm wiring diagrams.
  - Operating instructions for all equipment.
  - Maintenance instructions for all equipment, including frequency of maintenance tasks.
  - Equipment data sheets.
  - Certified head/capacity curves for pumps.
  - Equipment part lists.
  - Emergency operating procedures.

The maintenance manuals shall be hardbacked bound documents with the name of the facility embossed on the cover. Each section of the manual shall be identified by plastic covered, tabbed dividers, with the section name identified on the tab.

## 2.12 Access

Vehicular access shall be provided to sewage lift stations. The minimum standard shall be as for a paved lane as shown on the Standard Drawings, with curbing and drainage provisions as may be required by the Village Engineer.

## 2.13 Force Mains

At the lowest pump delivery rate anticipated to occur at least once per day, a cleansing velocity of at least 0.9 m/s should be maintained. Maximum velocity should not exceed 3.5 m/s.

An automatic air relief valve shall be placed at high points in the force main to prevent air locking.

Force mains should enter the gravity sewer system at a point not more than 600 mm above the flow line of the gravity sewer.

The minimum size for mains discharging raw sewage shall be 100 mm diameter.

The materials selected for force mains shall meet Village standards and shall adapt to local conditions, such as character of industrial wastes, soil characteristics, exceptionally heavy external loadings, abrasion and similar problems. Ductile iron shall be used from the pump station to the edge of the excavation and under creeks or ditches or, if desirable, an encasement pipe shall be used.

Other than for ductile iron force mains, a trailing wire shall be installed for the purpose of locating the force main.

All force mains shall be designed to prevent damage from superimposed loads, or from water hammer or column separation phenomena.

## 2.14 Tie-ins to Existing Sewer Mains

Connection of a new pipe to an existing sewer main shall be done by the Village unless the existing main has an acceptable provision for a direct extension. The Applicant shall pay for the supply of all materials required and shall pay the full cost of making the tie-in. This portion of the work, including details of materials required, shall be clearly indicated on the design drawings. Application for tie-in shall be made one week in advance of the proposed work.

## 2.15 Pipe Class and Bedding Class

The quality of pipe and bedding shall be so selected such that the installation will adequately support the loads to be placed on it during construction and in operation. For concrete pipe, the calculations shall follow the method shown in *Water Pollution Control Federation Manual of Practice No. 9*, latest edition. A safety factor of 1.5 shall be used

for concrete pipe and the bedding classifications shall be as identified on the Standard Drawing.

For PVC pipe, the calculations shall follow the methods outlined in the Uni-Bell Plastic Pipe Association publication *Handbook of PVC Pipe - Design and Construction*, latest edition.

Pipe class and bedding class must be identified on all engineering drawings. Pipe shall have at least Class B bedding.

### 3.0 MATERIALS

#### 3.1 Pipe and Fittings

- .1 Pipe for gravity sanitary sewer mains and for services of 200 mm in diameter and larger may be any of the following:
  - reinforced concrete pipe conforming to ASTM C76. Pipe strength (Class III min.) shall be specified for the trench conditions under which the pipe will be installed and operated. Joints shall conform to ASTM C443;
  - polyvinylchloride pipe up to 375 mm in diameter, S.D.R. 35, conforming to ASTM D3034 and CSA B182.2, stiffness (F/Y) of 320 kPa at 5% deflection conforming to ASTM D2412, complete with approved rubber gasket joints. Maximum pipe length shall be 4 metres.
- .2 Pipe for sanitary sewer connections of 100 mm and 150 mm diameter and for 150 mm diameter sewer mains shall correspond in material to that used for the main sewer and shall be one of the following:
  - non-reinforced concrete pipe conforming to ASTM C-14, Class III. Joints shall conform to ASTM C-443;
  - Polyvinylchloride pipe, S.D.R. 28, conforming to ASTM D3034 and CSA B182.1, complete with rubber gasket joints. Maximum pipe length shall be 4 metres.

Sewer fittings shall correspond with the respective main and service pipes and shall conform with consistent specifications for main pipe.
- .3 Pipes and fitting for sanitary sewer force mains shall be as approved for watermains in accordance with Schedule D, Section 3.01.
- .4 Other types of pipe shall be used only with the written consent of the Village Engineer.



### 3.02 Pipe and Fitting Joints

Sewer pipe and fittings shall be jointed with a rubber gasket or other preformed, factory-manufactured gasket or approved material.

### 3.03 Service Junctions

Connection of services to the sewer shall be made using wye or service saddle fittings. The type of joint of the service connection pipe to the sewer main shall conform with the type of joints on the sewer main.

Service wye saddle shall only be used to connect a 100 mm diameter service to an existing main.

Where service saddles are used, they shall be equipped with steel straps. Service saddles shall only be used with the approval of the Village Engineer.

### 3.04 Manholes

Precast concrete manhole sections shall conform to ASTM C478 and shall be minimum 1050 mm diameter with 115 mm wall thickness for mains less than 450 mm diameter; for mains greater than 450 mm diameter, the precast manhole sections shall conform to the diameters specified on the Standard Drawings. Concrete for cast-in-place manholes shall have a minimum compressive strength of 20 Mpa at 28 days.

Concrete for cast-in-place manhole bases and benching shall have a minimum compressive strength of 20 Mpa at 28 days.

Precast manhole bases of a design and construction quality acceptable to the Village Engineer will be accepted in lieu of cast in place bases.

Cover slabs may be precast or cast-in-place concrete reinforced to withstand H-20 loading conditions.

Manhole rungs shall be 20 mm diameter steel, hot dipped galvanized after bending, or an approved aluminum alternate, at 300 mm o.c., cast into the wall of the manhole section, or set in 30 mm holes filled with epoxy cement. Rungs shall protrude 125 to 150 mm from the manhole wall. If precast manhole barrels are used having inset wire lifting lugs, the lugs shall be galvanized.

### 3.05 Manholes Frames and Covers

Covers and frames shall be cast iron of an approved pattern to withstand H20 loading. The cover shall have a weight of 66 Kg and the frame shall be of the round base pattern having a weight of 84 Kg. Bearing faces of the cover to frame shall be machined for a non-rocking fit. The cover shall have 2 - 22 mm diameter lifting holes. The lid shall be embossed with "Sanitary Sewer".

### 3.06 Bedding Material

Bedding shall for all pipe bedding shall be sand or crushed rock free of clay lumps, organic and other deleterious material. Gradation shall conform to the gradation limits set out in Schedule D, Clause 3.13.

### 3.07 Backfill Material in Pipe Zone (Pipe Surround)

Backfill material in the pipe zone (pipe surround) shall be sand or crushed rock free of clay lumps, organic and deleterious material. Gradation shall conform to the gradation limits set out in Schedule D, Clause 3.13.

### 3.08 Backfill Material Above Pipe Zone

In Road Areas

- .1 Backfill material below the pavement structure for trenches in road areas may be native soil provided the native soil is free of organic or foreign matter and can be readily compacted to a minimum of 95% Standard Proctor density in compliance with ASTM D-698. Native material is not acceptable if it will not provide an adequate subgrade base for the proper placement and road sub-base, base and asphalt. Maximum particle size of backfill material not to exceed 200mm.

If the native material is deemed unacceptable, the backfill material shall be imported granular material conforming to Clause 3.01 of Schedule B.

In non-road surfaces:

- .2 Backfill material for trenches and easements or other non-road areas may be native material excavated from the trench providing it is sufficiently free of frozen soil, roots or other objectionable material so as not to cause undue settlement. Maximum particle size of backfill material not to exceed 200 mm.

### 3.09 Encasement Pipe Filler Sand

To be well graded, clean sand, free from organic materials and conforming to the following to gradation limits;

<b>Sieve Designation</b>	<b>Percent By Weight Passing</b>
4.750 mm	100
1.360 mm	20 -70
1.180 mm	13 -50
0.850 mm	8 -35
0.300 mm	5 -25
0.150 mm	2 -15
0.075 mm	0 -8

### 4.0 WORKMANSHIP

#### 4.01 Trench Excavation

Trenches shall be excavated to suit the cross-section shown on the Standard Drawing. Open trenches through existing paved surfaces will be allowed only with the prior express consent of the Village Engineer. When trenches through existing pavement are allowed, the pavement shall first be saw-cut by mechanical means in straight continuous lines parallel to the trench centreline.

If trenches are excavated wider than the specified widths, a higher class of pipe or special bedding may be required.

Rock excavation in trenches shall provide a minimum clearance of 150 mm below the pipe for pipes 600 mm in diameter or less, and 250 mm for pipes larger than 600 mm in diameter.

The top of the trench at ground level shall be kept to the minimum width consistent with the depth, natural angle of repose of the material and the regulations of the Workers' Compensation Board.

Excavation for manholes, fittings and other appurtenances shall be to the lines which will permit the assembly of these sections and to permit adequate backfill and compaction.

Concrete for bases may be cast against the walls of the excavation, if the soil conditions are suitable.

Where an existing structure or underground installation may be affected by the works, it is the responsibility of the Applicant to inform the owner of such facility sufficiently in advance that the owner may make an inspection and specify the protective measures to be undertaken.

Where an unforeseen or other obstruction is encountered which interferes with the designed alignment or grade, the construction shall cease until such time as revised proposals are approved by the Village Engineer.

The attention of the Applicant is directed to the provisions of the Workers' Compensation Board safety regulations. All municipal employees have been instructed not to enter excavations which are not properly braced or which otherwise do not conform with the requirement of the Board. It follows, therefore, that approvals cannot be given to installations not inspected because of unsafe working conditions.

Any over-excavation of the trench subgrade beyond the specified depth shall be backfilled with select material and compacted to 100% Standard Proctor density.

In rock excavation the depth of compacted bedding material below the pipe shall be a minimum of 150 mm for pipe of 600 mm diameter or less and 250 mm for pipe in excess of 600 mm diameter. This depth shall exist for the full wall-to-wall width of the trench.

Where the bottom of any excavation as uncovered is soft and is in the Design Engineer's opinion unfit to support the pipes or structures, a further depth shall be excavated and refilled to the correct shape, grade and elevation as directed by the Design Engineer.

When the bottom of a trench is found to consist of unstable material which, in the opinion of the Design Engineer, cannot be removed and replaced with bedding material, a pile foundation or other structural support in accordance with plans prepared by the Design Engineer shall be constructed.

In areas of clay or other impermeable soils, where overexcavation of the trench subgrade is required, the overexcavation shall continue to a point where ponding of water in the trench bottom will be avoided.

Open cut trenches shall be sheeted and braced as required by the Workers' Compensation Act, as may be necessary to protect life, property, or the work, unless the trench excavation is sufficiently wide at the top to be naturally stable. When close sheeting is required, it shall be driven so as to prevent the soil from entering the trench either from below or through such sheeting. A minimum distance of 150 mm from the closest point of the pipe to the sheeting shall be maintained.

When possible, vertical trench timber or sheeting shall be placed so that it does not extend below the level of the bottom of the excavation. Sheeting driven below the pipe grade shall not be removed unless the sheeting can be removed without causing settlement or lateral displacement of the pipe.

Unless otherwise indicated in the drawings or specifications, or unless approval to leave it in place is received from the Village Engineer, trench sheeting and bracing shall be removed when backfilling has been completed or has reached a level which will permit its safe removal without causing injury to persons or damage to the works. When sheeting and bracing is left in place, it shall be cut such that no sheeting remains closer than one metre to the established sub-base road grade or the existing ground surface, whichever is the lower.

Particular caution will be taken to ensure that pipe bedding is not disturbed such that settlement of the pipe results.

Timber supports or sheeting shall be left in place when its removal would endanger adjacent structures or result in a shifting of pipe bedding material and a displacement of the pipe. The Village Engineer may require the pipe to be bedded in concrete (Class A Bedding) when, in his opinion, the removal of sheeting would disturb the pipe bedding. Discharge from trench pumps, well points, or other dewatering aids, shall be located and controlled in such a manner as to not cause loss or damage to public or private property, nuisance on roads or walks, or injury to the public.

#### 4.02 Tie-Ins to Existing Sanitary Sewer

Tie-ins to existing sanitary sewer mains shall not be made until after new lines have been flushed and tested.

The Applicant shall install plugs in the nearest manhole to each connection so that no water enters the existing sewer system. The plugs shall be left in place until final connection and acceptance of the new works by the Village. No turning in of sewage to the new system shall be done until the new works have been flushed and approval obtained from the Village. The Applicant shall be charged a minimum of \$500.00 for each time he allows water or sewage from the new system to enter the existing system plus any additional costs for cleaning the existing sewers or any additional costs for cleanup or for repair of damage to the existing sewers, appurtenances, flooded buildings, or the sewage treatment plant.

#### 4.03 Pipe Installation

Prior to installing pipe all standing water shall be drained or pumped from the trench.

Pipe shall be carefully lowered into the trench in a manner that will prevent damage to the pipe.

Pipe shall be jointed in strict accordance with the manufacturer's recommended practice.

When pipes are not being installed, the open end of the newly laid pipeline shall be protected with a suitable bulk head to prevent the entry of any foreign material.

Trench conditions shall be such that pipe jointing can be accomplished without getting muck, silt, gravel and other foreign material into the pipe.

The grade of every pipe length shall be checked before the pipe is backfilled. Any part of the trench excavated below grade shall be regraded with approved material thoroughly compacted.

All pipe must be laid to the design lines and grades within the following tolerances:

.Horizontal deviation from the approved alignment shall not exceed 60 mm and the rate of deviation shall not exceed 40 mm in 10 metres.

.Vertical deviation from true grade varies with the grade and shall not exceed the limits shown in the following table:

<b>Grade</b>	<b>Max. Departure From Design Elevation</b>	<b>Max. Rate of Deviation</b>
Over 5%	30 mm	20 mm in 10 metres
2% to 5%	15 mm	10 mm in 10 metres
Less than 2%	6 mm	10 mm in 10 metres

#### 4.04 Granular Bedding and Backfill in Pipe Zone

The pipe zone is considered as being the depth of trench between the trench bottom and a level 300 mm above the top of the pipe.

The pipe zone backfill shall be hand placed and thoroughly compacted to a density of 95% Standard Proctor Density in layers not exceeding 150 mm using hand tampers.

#### 4.05 Backfill Above Pipe Zone

In Road Areas

- .1 In road areas trench backfill material shall be placed in layers not exceeding 300 mm in thickness and compacted by mechanical means to a minimum of 95% Standard Proctor density. The water content of the material shall be controlled to achieve the required density.

In Non-Road Areas

- .2 In easements and other non-roads areas, native trench material may be used for trench backfill above the pipe zone. Backfill shall be placed and compacted to 90% Standard Proctor Density.

#### 4.06 Manholes

Manholes shall be constructed as shown on the Standard Drawings.

All water shall be removed from the excavation prior to placing concrete. Concrete shall be placed only on a firm base. If the bottom of the excavation is unsuitable for support, it shall be excavated to a firm base and backfilled to the required grade with pipe bedding material.

Manhole channelling shall be constructed as shown on the Standard Drawings. The channel shall be constructed to form a smooth transition through the manhole. Channelling is to be formed using half pipe or fittings whenever possible. Where it is impossible to use half sections of pipe or fittings, the channel will be formed in the manhole base in a manner approved by the Village Engineer.

Precast sections shall be placed plumb with joints mortared inside and outside and exclude the entrance of groundwater.

Drop structures shall be constructed as shown on the Standard Drawing.

#### 4.07 Stubs

Blind stub sections for connection of future sewers to the manholes shall be installed as directed by the Village Engineer. The stub shall be plugged at the end with a watertight removable plug.

#### 4.08 Service Connections

Service connections shall be installed as shown on the Standard Drawing.

Service connections shall be capped and shall be tested with mains where main testing is required.

A 50 x 100 mm marker stake shall be set with the bottom flush with the invert of the end of the service connection and against the cap and with the top projecting a minimum of 1000mm above the ground surface. Marker stakes shall be painted "green", be cut to an even 200 mm length and the depth from top of stake to the invert of pipe shall be clearly marked on the stake with yellow, painted stencilled letters and numbers.

For 100 mm services, the sanitary service shall be extended 1.5m into private property, as per the Standard Drawings.

Information as to size of service pipe and type of service shall also be indicated on the stake.

#### 4.09 Pipe Casings

Pipe casings shall be installed as shown on the Standard Drawing. The sewer pipe shall be blocked at each joint to ensure line and grade is maintained and the casing is to be sealed at both ends with joint filler with proper care taken to ensure that the pipe remains on line and grade and does not float. The annular space between the sewer pipe and the casing pipe shall be filled with 14 mm sand, as specified in Section 3.09.

A length of 6 mm polypropylene rope shall be laid alongside the carrier pipe inside the casing to assist future retrieval.

#### 4.10 Asphalt Restoration

If the edges of the cut asphalt have become ragged as a result of the construction operation, asphalt shall be recut to form a straight line prior to placing new asphalt. The edges of the existing asphalt shall be thoroughly cleaned and coated with an approved bituminous bonding agent prior to placing the hot asphalt mix. The finished grade of the asphalt surface shall conform with that of the existing surface such that no rises, depressions or ridges result from the repaving process.

#### 4.11 Cleaning and Flushing

Prior to testing, the sanitary sewer pipe shall be cleaned by flushing, or the use of mechanical equipment as necessary to remove all foreign material from the pipe. After paving and landscaping and before subdivision acceptance, the sanitary lines shall be flushed to remove any deleterious material deposited by associated construction works. No water from the flushing and cleaning process shall enter the existing service system.

#### 4.12 Force Mains

Force mains shall be constructed and tested in accordance with Schedule D or as specified by the Village Engineer.

#### 4.14 Testing

##### Lamping

Sewer mains shall be lamped from manhole to manhole to check alignment and grade of the sewer pipe. Variations in line or grade from that shown on the approved construction drawings and any jointing, pipe cleaning, or other deficiencies discovered shall be rectified. Manholes shall be inspected and any defects or deficiencies found shall be rectified.

#### 4.15 Leakage Tests

##### Sewer Mains

Sewer mains shall be tested by a low pressure air test.

Pipe mains and services shall be clean and plugged in preparation for the test. An air supply system should have adequate valves to isolate the test section and to vent off excess air.

Pressure gauges should be clean and functional. Adequate blocking shall be placed behind all plugs to prevent plugs from blowing out. Blocking should allow the plugs to move approximately 6.4 mm.



If the ground water level with respect to the pipe is not known, this level shall first be determined at the lowest point of the line under test. The external ground water pressure shall then be calculated (depth of ground water in meters above invert of pipe multiply by 9.8 = pressure in KPa).

The section of pipeline under test shall be gradually surcharged to a pressure of 27.6 KPa above ground water pressure as determined above. Time will be allowed for the air temperature to stabilize (not less than 5 minutes). If the pressure drops below 24.2 KPa (pressure refers to the amount of pressure above ground water pressure), the 24.2 KPa pressure shall be maintained from the make-up air supply. If the pressure does not drop to 24.2 KPa during the period of stabilization, the air shall be released slowly until the pressure drops to 24.2 KPa.

The time is then measured for the period that the resultant air pressure drops 6.9 KPa from 24.2 to 17.3 KPa. If the time measured equals or exceeds the specified time, the test may be stopped, the readings recorded, including pressure readings, and the test considered satisfactory.

The time specified shall be as per Table E.1. If the time measured does not equal or exceed the specified time, the section of sewer main shall be checked for excessive leakage, and after repairs are made the pipeline shall be retested in the same manner.

TABLE E.1

Pipe Diameter (mm)	Time in Minutes
100	3 min.46 sec.
150	5 min.42 sec.
200	10 min.08 sec.
250	15 min.49 sec.
300	22 min.47 sec.
375	35 min.36 sec.
450	51 min.16 sec.
525	69 min.48 sec.

### Manholes

Upon the entire completion of the manhole installations, watertight plugs or seals shall be inserted on inlets and outlets of each new sanitary sewer manhole. The manhole filled to the underside of the top concrete slab. The water level shall be recorded at the beginning and end of the 2 hour test period and the leakage shall not exceed 0.3% of the manhole volume per hour. If the permissible leakage is exceeded, defects shall be corrected and the test repeated until the installation is acceptable. Plugs and water shall be removed after the test.

#### 4.16 Materials Testing

The Village shall be provided with copies of all sieve compaction test results pertaining to bedding, backfill and road restoration.

#### 4.17 Video Inspection Tests

Before paving of asphalt surfaces, all sewer mains shall require a closed circuit televised inspection by the Applicant, to check jointing, possibility of debris in the pipe, leakage, alignment and grade of the sewer pipe. Any deficiencies discovered shall be rectified prior to paving.

Television equipment shall consist of a self contained camera and a monitoring unit connected by a coaxial cable. This equipment shall be specifically designed and constructed for such inspection purposes. The camera shall be mounted on adjustable skids to facilitate the inspection of different sizes of pipe. The camera and skids shall be small enough to insure passage through a 150 mm dia. sewer. The camera shall be waterproof and shall have a remotely controlled adjustable self-contained lighting system capable of producing at least 100 foot candles of light. The lighting system shall be capable of lighting the entire periphery of the pipe.

Picture quality shall be such to produce a continuous 500 line resolution picture showing the entire periphery of the pipe. Picture quality and definition shall be to the satisfaction of the Village Engineer.

Measurement of defects shall be made by devices having a proven accuracy of plus or minus one percent. Cable markings if used, shall not be spaced at a distance of more than 600 mm along the length of the cable. Any type of measurement system used shall be subject to inspection by the Village Engineer.

Direct voice communication shall be established between the monitoring station and the camera towing device. This may be accomplished by a direct line of communication or radio. No loudspeaker devices shall be allowed.

Equipment shall be mounted in an appropriate type vehicle. Electrical power for the system shall be self-contained and shall not require removal for each set-up. External power sources from public or private residences shall not be permitted. Ample sound dampening shall be applied to the vehicle and equipment.

A television work report, in log form, shall be maintained during the inspection. This log shall show the exact location of each leak or fault discovered by the television - e.g. open joints, broken, cracked or collapsed pipe, presence of grease, roots, debris, accumulation, obstructions, infiltration, water depth variations, and other points of significance. The reference location shall include the distance away from the reference manhole and also the position of the leak or fault as referenced to the crown of the pipe using clock face notation.

The report shall include the location of all service connections together with a statement of opinion as to whether or not the service connections are leaking. Protrusions of the service connections into the mainline shall be noted with reference to the degree of protrusion.

Photographs of all sewer defects shall be taken. The photographs shall be co-ordinated with the written report by reference numbers. A minimum of one photograph per line shall be taken to show a representative view of the workmanship, as well as additional photographs of deficiencies as required.

Each manhole section of pipe shall be located on the report form in such a way as to be readily identifiable. Identify such items as name of subdivision, street names, manhole numbers, type of pipe, joint length, direction of flows, pipe diameter, manhole depth, inspection date, names of the inspection technician, persons viewing, and video tape identification numbers.

Three copies of a final typewritten report with corresponding photographs and one copy of video tapes shall be furnished to the Village Engineer within two weeks after the completion of the inspection. This report shall contain no less than one photograph per manhole section inspected and additional photographs as required to show line faults and representative line conditions.

Full colour video tapes shall be of a format acceptable to the Village Engineer. All video tapes shall be numbered and cross indexed to the typewritten report. Video tape footages to fault locations shall also be cross indexed to the typewritten report, as well as referenced to the description of the fault included on the video tape. Tapes shall be in the VHS format.

To insure photographic quality 35 mm still photographic cameras shall be designated. Polaroid or similar cameras that do not produce negatives for rapid reproduction will not be acceptable. All still photographs shall be in colour.

If, during the inspection procedures the television camera will not pass through the entire manhole section, the equipment shall be reset in a manner so that the inspection can be performed from the opposite manhole.

Prior to inspection, all lines shall be cleaned thoroughly to remove dirt, grease, sand and other foreign and objectionable debris from inside the pipe and manholes so that cracks and other faults may be observed.

A small diameter poly rope or similar line shall be installed in the sewer in advance of the inspection in order that the camera traction cable may be drawn through the sewer. This line shall be installed on a manhole to manhole basis with the line being tied off at each individual manhole to facilitate the quick removal of any portion of this line should the need arise due to mainline sewer blockages or other emergency situations.

Interference to the normal flow of traffic shall be kept to a minimum. The equipment shall be arranged so that one lane of traffic is maintained at all times.

4.18 As Constructed Drawings

Prior to final acceptance, the Applicant shall deposit with the Village one set of original as constructed mylar drawings showing all the information requested by this schedule and conforming to the criteria set out in Schedule I.

SCHEDULE F  
REGULATIONS, STANDARDS AND SPECIFICATIONS FOR THE DESIGN AND  
INSTALLATION OF DRAINAGE SYSTEMS

This is Schedule F of the Village of Fruitvale Subdivision and Development Servicing  
Bylaw No. 561, 1995.

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Clerk

SCHEDULE F  
REGULATIONS, STANDARDS AND SPECIFICATIONS FOR THE DESIGN AND  
INSTALLATION OF DRAINAGE SYSTEMS

1.0 GENERAL

Where the provisions of Schedule A of this Bylaw require the construction of a storm drainage system, the Applicant shall provide a storm drainage system including sewer mains, manholes, service connections, and all related appurtenances consistent with the standards and specifications contained in this Section.

1.01 Approval of Engineering Drawings Required Prior to Construction

Engineering drawings and design calculations which show detailed design of the necessary works shall be submitted to the Approving Officer, Village Engineer, or Public Works Superintendent for approval prior to the commencement of construction. The drawings shall show alignment and size of pipes, proposed grades, distances between manholes, manhole invert elevations, existing ground line, proposed final ground line over the pipe, location of all service connections to the property line, all easements, pipe bedding requirements and all other details as may be required.

1.02 Where Sewage Collection System Not Required

Where storm drainage facilities are not required at the time of development, the Village of Fruitvale may require rights-of-way to be provided by the Applicant to allow for the eventual installation of these facilities. Such rights-of-way shall be registered in favour of the Village of Fruitvale at the Applicant's expense. In this instance, the Applicant will be required to provide for surface drainage as required by the Approving Officer, with all catch basins and other appurtenances designed to facilitate connection to the future storm sewer system.

1.03 Stormwater Management

All drainage systems in the Village of Fruitvale shall be designed considering the overall management of stormwater. The primary purpose will be to limit the effect of peak flows and volumes of runoff on property, receiving streams, and watercourses.

1.04 Minor and Major Drainage Systems

The drainage system shall consist of two components, the minor and the major systems. The minor system will consist of underground conduits, open channels and watercourses designed to convey a 10 year return period flow for residential, industrial, commercial, institutional, and high density residential areas. The major system will consist of surface flood paths, roadways and watercourses designed to convey the 100 year return period flow. In special conditions where surface flood paths cannot be established, pipes and culverts of the minor system may be enlarged to accommodate the major system flow.

### 1.05 Adequate Drainage

All subdivisions shall be adequately drained throughout the year. Where the whole or part of any proposed subdivision is wet or subject to intermittent or periodic flooding, approval of the subdivision will be withheld until the Approving Officer is satisfied that appropriate steps have been taken to drain the land or otherwise remedy such wet or flooding conditions.

### 1.06 Existing and Natural Watercourses

Where a subdivision is traversed by a watercourse, drainage way or stream, a right-of-way shall be provided along such watercourse or its planned re-alignment of a width deemed necessary by the Approving Officer for construction, maintenance, conservation, and beautification purposes.

No natural drainage course shall be altered or diverted unless such alteration or diversion has been approved by the Village of Fruitvale and the Provincial Ministry of the Environment.

Storm water shall only be discharged from a subdivision to a drain, ditch, watercourse, stream or other waterway as may, in the opinion of the Approving Officer, be adequate to receive the discharge therefrom, or which has been declared a part of the Village of Fruitvale drainage system.

### 1.07 Drainage Systems Through Private Property

Where it is necessary to construct a drainage system through privately-owned land, the Applicant shall obtain or grant a right-of-way in favour of the Village of Fruitvale to guarantee the right of access, in perpetuity, to the drain area facility in perpetuity.

## 2.0 DESIGN CRITERIA

### 2.01 Sizing of Systems

The system shall be of sufficient capacity to accommodate all tributary areas as defined by the Village. For drainage areas 20 hectares and smaller, the Rational formula shall be used:

$$Q = KCIA$$

Where: Q = Flow in m<sup>3</sup>/s

K = Constant to establish units of compatibility (.00278)

C = Dimensionless runoff coefficient

I = Rainfall intensity in mm/hr

A = Runoff area in hectares

Rainfall intensities shall be as shown on Standard Drawing F-1 or calculated according to the following equation:

$$I = A \times T^B$$

Where: T = the time of concentration in hours

A and B are coefficients as specified in Table 5.1

TABLE 5.1  
RAINFALL INTERPOLATING EQUATION COEFFICIENTS

Rainfall Frequency	A	B
10 Year Storm	18.4	-0.711
100 Year Storm	27.3	-0.739

For the minor system, the 10 year frequency curve shall be used.

For the major system, and for special structures such as in the design of storm retention basins, underpass drainage or arterial roads, the 100 year rainfall curve shall be used.

The time of concentration, or inlet time, will vary with topography and the nature of the drainage areas, but will generally be fifteen minutes or greater for residential areas. Inlet times shall be determined by the Design Engineer.

Runoff coefficients for storm sewer design shall be assumed to be not less than the values specified in Table 5.2.

TABLE 5.2  
RUNOFF COEFFICIENTS

Description of Area	Runoff Coefficient
Commercial	
Downtown	0.82
Neighbourhood	0.60
Industrial	
Light area	0.65
Heavy area	0.75
Residential	
Suburban	0.30
Single - family	0.40
Multiunits - detached	0.55
Multiunits - attached	0.65
Apartment dwelling area	0.60
Parks, cemeteries	0.15
Playgrounds	0.25
Unimproved areas	0.15



Runoff coefficients other than those specified in this section shall be used only with the express written consent of the Village Engineer.

For tributary areas greater than 20 hectares, the method used by the Design Engineer to calculate storm flows shall be approved by the Village Engineer.

## 2.02 Design Grade

The minimum design grade shall be calculated by use of the Manning Formula such that a minimum velocity of 0.6 m/s shall be maintained during the design flow.

Pipes shall be designed to carry the required quantity when flowing 3/4 full for pipes sized 450 mm and smaller. Pipes sized 525 mm or larger shall be sized to carry the required quantity when flowing full.

## 2.03 Roughness Coefficients

Roughness coefficients for use with the Manning's Formula shall be as specified in Table 5.3.

TABLE 5.3  
ROUGHNESS COEFFICIENTS

Pipe or Channel Material	Roughness Coefficient
Concrete Pipe	0.013
PVC Pipe	0.011
Corrugated Metal Pipe	
Unpaved	0.024 - 0.033
25% paved	0.021 - 0.028
100% paved	0.013
Smooth Asphalt	0.012
Asphalt or Concrete Paving	0.014
Packed Clay	0.030
Light Turf	0.200
Dense Turf	0.350
Dense Shrubbery	0.400

Minimum velocity of pipes, flowing full, shall be 1.0 m per second.

There are no maximum allowable velocities except that the designer shall ensure that supercritical flow does not occur. Where grades exceed 15%, scour protection may be needed and anchor blocks will be required. These criteria may be modified by the Village Engineer to meet local conditions.

#### 2.04 Minimum Pipe Size

Minimum pipe size shall be 250 mm for mains, 200 mm for catch basins leads, 100 mm for residential service connections, and 150 mm for non-residential service connections. The minimum pipe size for mains accepting flows from open ditches shall be 400 mm and suitable silt traps shall be provided.

#### 2.05 Culverts

Where an open ditch system is required to cross a road, street or driveway, the ditch shall be enclosed by means of a culvert. All culverts shall be of sufficient size to properly drain all of the area naturally draining into the channel or ditch feeding into the culvert but shall be a minimum 400 mm diameter. Allowance shall be made for future flows as a result of full development of the upstream tributary area.

#### 2.06 Location of Sewer Mains

Storm sewer mains shall, wherever possible, be located in the road right-of-way as shown on the Standard Drawings. Where the location of the sewer main within the road right-of-way is not practical due to topography or other factors, the sewer main shall be located in a utility right-of-way registered in favour of the Village of Fruitvale and having a width of not less than 4.5 metres. The Approving Officer may require a utility right-of-way wider than 4.5 metres in the case where services in addition to storm sewer will be placed in the same right-of-way or where the depth of the sewer main requires a wider easement. There shall be a minimum clear lateral distance between the outside walls of storm sewers and sanitary sewers of 0.75 m.

#### 2.07 Alignment of Sewer Mains

Storm sewer mains shall generally be designed to follow a straight alignment between manholes.

Curved alignments within rights-of-way shall be subject to the approval of the Village Engineer and provided that the pipe is set at a grade greater than the specified minimum and pipe alignment is at a parallel offset with an established boundary. In these cases, the radius of curvature shall be not less than 65 metres, or twice the minimum radius recommended by the pipe manufacturer, whichever is the greater.

## 2.08 Depth of Cover

The minimum depth of storm sewer mains shall be sufficient to provide all service connection piping with a minimum cover of 1.5 m to the top of the service, anywhere within the finished right-of-way. In no instance shall the cover over the crown of the main be less than 1.5 m.

## 2.09 Manholes

Manholes shall be installed at a maximum spacing of 120 metres and in the following locations:

- .1 All changes in grade.
- .2 All changes in alignment, including non-curvilinear sewers.
- .3 All changes in pipe size.
- .4 All pipe junctions.
- .5 All intersections.

Where, in the opinion of the Approving Officer, the grades of sewer pipes are sufficient to provide proper cleaning, the maximum spacing of manholes may be increased to 120 metres.

Manholes shall normally be constructed in accordance with the details as shown on the Standard Drawings. In cases where these details will not suffice, a detailed design drawing must be approved by the Village Engineer.

The relative elevations of storm sewers entering and leaving a manhole are to be such as to ensure that the manhole does not substantially reduce the hydraulic capacity of the system.

Minimum fall through the manhole shall be 30 mm.

There shall be no change in the grades of pipe between manholes.

## 2.10 Catchbasins

Catchbasins shall be constructed as shown on the Standard Drawings.

Catchbasins shall be located at a maximum spacing of 75 m along the drainage path, at all intersections, at all low points, or spaced at intervals such that not more than 10% of the gutter flow reaching each inlet will pass on to the next inlet downstream, provided this carry-over is not objectionable to pedestrian or vehicle traffic and the inlet is not in a sump. Catch basins shall be located at intervals such that surface drainage does not exceed gutter or flow channel capacities, to eliminate overflow to driveways, boulevard, margins, sidewalks, or private property.

## 2.11 Catchbasin Leads

Catch basin leads shall discharge into a manhole and not directly into the sewer pipe wherever possible.

Catch basin leads shall have a minimum cover of 0.6 m, except for PVC pipe which shall have a minimum cover of 0.9 m.

## 2.12 Service Connections

Storm sewer service connections shall only be used for foundation perimeter drains unless otherwise approved by the Village Engineer.

The diameter of storm sewer service connections shall be determined by the Design Engineer, but shall be 100 mm diameter minimum for a single family residential service and in no case shall a non-residential service connection be less than 150 mm.

Service connections shall be made with an approved branch wye and be installed in a straight line and at a uniform grade from the terminus at the property line to the 45 degree long radius bend at the main. An approved wye saddle may be used to connect a 100m diameter service to an existing main. The minimum pipe grade for sewer service pipes shall be:

- 2% for 100mm service pipe
- 1% for 150mm service pipe

For services 150mm and larger, a manhole shall be installed at the intersection of the main and service.

Sewer services shall be installed 4.0 metres from the lot corner in accordance with the Standard Drawings and shall be installed, wherever possible, in common trench with the water and sanitary sewer services.

## 2.13 Pipe Class and Bedding Class

The quality of pipe and bedding shall be so selected such that the installation will adequately support the loads to be placed on it during construction and in operation. Pipe class and bedding class must be identified on all engineering drawings. Pipe shall have at least Class B bedding, as defined by the Standard Drawings.

For concrete pipe, the calculations shall follow the method shown in the latest edition of the *WaterPollution Control Federation Manual of Practice No. 9*. A safety factor of 1.5 shall be used for concrete pipe and the bedding classifications shall be as identified on the Standard Drawing.

For PVC pipe, the calculations shall follow the methods outlined in the latest edition of the Uni-Bell Plastic Pipe Association publication *Handbook of PVC Pipe - Design and Construction*.

For CSP pipe, the calculations shall follow the methods outlined in the latest edition of the American Iron and Steel Institute publication *Handbook of Steel Drainage & Road Construction Products*.

## 2.14 Major Flow Routing

All overland flows in excess of 0.05 cu.m./sec shall have specifically designed flow routes, that are protected and preserved by restrictive covenants or rights-of-way. The major flow routing shall normally be provided along roads and in natural watercourses. In some cases, the major flow may also be carried alongside the road in grassed swales, across country in rights-of-way and along public walkways.

In special circumstances, or where desired to enable lower building elevations, the pipes and culverts, which form a part of the minor system, may be enlarged or supplemented to accommodate the major flow. All habitable areas of buildings shall be above the major flow hydraulic grade line, except where specific flood prevention measures have been taken and which are acceptable to the Village Engineer.

The proportion of flow to be carried along the major routing shall be the total major flow less the flow carried in the minor system.

Where the road is used to accommodate major flow, it shall be formed, graded and sufficiently depressed below the surrounding property lines to provide adequate hydraulic capacity. On arterial roads, the 100 year hydraulic grade shall not be higher than centreline of the pavement with the maximum flow depth not to exceed 300 mm. On collector and local roads, the entire roadway may be used as a major flood path with the maximum flow depth not to exceed 300 mm.

Where roadways used for major flows intersect, care shall be taken to lower the intersection to allow flows to pass over the cross street. Where major flow routes turn at intersections, similar care in the road grading design is required.

In areas where surface major flow routes cannot be provided, a pipe system will be designed to accommodate the required major flow, and sufficient inlet capacity will be provided to accommodate introduction of the major flow into a piped system.

Major flow routing over 0.05 cu.m./s shall be shown on the engineering drawings and sufficient design shall be carried out to provide assurance to the Village Engineer that no property damage or endangering of public safety will occur under major flow conditions. The Design Engineer shall provide the Village Engineer with the depth of flow along the major flow route and shall show on the Design Drawings the hydraulic grade line above the design curb and gutter or above the finished surface of other drainage courses. The discharge point from the development for the major flow route shall be coordinated with the downstream routing to outfalls as determined by the Village of Fruitvale. Where major flow outfalls to a receiving watercourse, the velocity shall not exceed 1.5 m/s, or energy dissipaters shall be provided to minimize erosion.

The use of catchbasin inlet control devices to separate major and minor hydraulic grade lines may be allowed, subject to the satisfaction of the Village Engineer regarding the suitability of such control devices. Where catchbasin inlet control devices are used, building elevations may be controlled by the hydraulic grade line occurring in the minor system.

2.15 Drainage Drywells

Where drainage drywells are used as a means for disposal, drainage drywell wall surface areas shall be sized using Darcy's empirical law:

$$Q = A K i$$

Where: Q = rate of flow in m<sup>3</sup>/s

A = cross-sectional area of soil through which flow takes place in m<sup>2</sup>

K = coefficient of permeability in m/s

i = hydraulic gradient over a given flow distance

Typical values for the Coefficient of Permeability, K, are presented in Table 5.4.

**TABLE 5.4  
TYPICAL VALUES OF COEFFICIENT OF PERMEABILITY**

Typical Soil	Relative Permeability	Typical Value of K, m/s
Coarse Gravel	High Permeability	over 10 <sup>-3</sup>
Sand, Fine Sand	Medium Permeability	10 <sup>-3</sup> to 10 <sup>-5</sup>
Silty Sand, Dirty Sand	Low Permeability	10 <sup>-5</sup> to 10 <sup>-7</sup>
Silt	Very Low Permeability	10 <sup>-7</sup> to 10 <sup>-7</sup>
Clay	Practically Impervious	10 <sup>-7</sup> to 10 <sup>-7</sup>

Upon determination of permeability factor, a safety factor of 2 shall be applied.

Drainage drywells shall, unless otherwise approved by the Approving Officer, Village Engineer, or Public Works Superintendent, be located in the road boulevard or in other lands dedicated to the Village for the purpose of drainage disposal.

The depth of the drywell will vary in accordance with the requirements derived from Darcy's empirical law.

Drainage drywells shall be constructed as shown on the Standard Drawings.

### 3.0 MATERIALS

Materials shall meet the standards specified in Schedule E of this Bylaw except as modified herein.

#### 3.01 Pipe

CSP shall be used for culverts only and shall consist of galvanized corrugated steel pipe designed to carry H-20 loading in accordance with the *American Iron and Steel Institute "Handbook of Steel Drainage and Highway Construction Products"*, latest edition.

#### 3.02 Drainage Drywells

Drywells shall be 1200 mm diameter and shall be as per Article 3.04 of Schedule E and the Standard Drawings. Drywells shall have 75 mm x 150 mm holes through the walls spaced vertically 150 mm on centre and horizontally 200 mm on centre.

#### 3.03 Pipe and Fitting Joints

Under certain approved conditions, storm sewer mains may be installed without gaskets or grouting to facilitate infiltration of ground water.

Suitable precautions such as shimming must be taken on these installations to ensure pipe to pipe alignment with no projecting inside edges or pipe misalignment.

#### 3.04 Catch Basins

Catch basin barrels shall be pre-cast concrete conforming to ASTM C478. All catch basin barrels shall be 900 mm in diameter. Concrete cover slabs shall be designed to withstand H-20 loading conditions. Catch basins shall be fitted with "Sur-Trap" trapping hoods, or equivalent.

Cast iron frames, grates and side inlets shall be Dobney Foundry or as approved by the Village Engineer.

#### 3.05 Headwalls

Headwalls for storm sewer inlets and outlets shall be designed by the Design Engineer and subject to the approval of the Village Engineer. As a minimum, the design shall include reinforced concrete slab, wingwalls and headwall, 30 mpa concrete at 28 days, 38mm diameter galvanized pipe handrail, hinged and galvanized trash grate.

### 4.0 WORKMANSHIP

Storm sewer systems shall be installed in the manner described in Schedule E of this Bylaw except as modified herein.

#### 4.01 Testing

##### **Lamping**

The storm sewer system shall be lamped as specified in Section 4.14 of Schedule E of this Bylaw and may be tested for leakage to Section 4.15 of Schedule E of this Bylaw at the discretion of the Village Engineer.

##### **Materials Testing**

As per Schedule E, Section 4.16.

##### **Video Inspection Tests**

As per Schedule E, Section 4.17, at the discretion of the Village Engineer.

#### 4.02 Head Walls and Aprons

Cleaning and flushing as per Schedule E, Section 4.12 of this Bylaw.



SCHEDULE G  
REGULATIONS, STANDARDS AND SPECIFICATIONS  
FOR THE INSTALLATION OF STREET LIGHTING

This is Schedule G of the Village of Fruitvale Subdivision and Development Servicing Bylaw No. 561, 1995.

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Clerk

SCHEDULE G  
REGULATIONS, STANDARDS AND SPECIFICATIONS  
FOR THE INSTALLATION OF STREET LIGHTING

1.0 GENERAL

1.01 Street Lighting To Be Provided By Applicant

Where the provisions of Schedule A require the provision of street lighting, the Applicant shall provide street lighting including all service wiring, bases, poles, luminaires, lamps, photo cells, control equipment and all related appurtenances consistent with the regulations, standards and specifications set out in this Schedule and the requirements of the Provincial Inspector of Electrical Energy.

1.02 Approval of Engineering Drawings Required Prior To Construction

Engineering drawings showing detailed design of the necessary works shall be approved by the Village Engineer before commencement of construction.

The street lighting system shall be designed in accordance with the Canadian Standard Practice For Street and Highway Lighting.

1.03 Permit Fees To Be Paid By Applicant

The Applicant shall be responsible for obtaining all required electrical permits, arranging for all electrical inspections covering his work and paying all fees for such permits. A copy of the permits are to be submitted to the Village at the time of application for final approval.

2.0 DESIGN CRITERIA

2.01 Levels of Illumination

The average levels of illumination in lux shall be as follows:

**TABLE G.1**

	Residential Areas	Commercial and Industrial Areas
.1 Arterial Highway	10.0	21.5
.2 Collector Highway	6.5	11.0
.3 Local Highway	4.5	10.0

The maximum uniformity ratio for local residential highways shall be 6:1; all other highways shall be 3:1.

## 2.02 Pole Locations

In general, poles shall be installed as follows:

- .1 Arterial Highways - opposite or staggered spacing;
- .2 Collector Highways - staggered spacing;
- .3 Local Highways - spaced one side of streets behind the sidewalk.

Poles shall be located within 0.6 metres of the property corners and shall be checked for conflict with driveways, underground services and fire hydrants.

## 2.03 Rules and Regulations

Equipment, installation, wiring methods, and materials used shall be in accordance with the latest edition, including amendments, of the Rules and Regulations for the installation and maintenance of electrical equipment as issued by the Province of British Columbia and all bulletins issued thereto. Work shall also be in accordance with all applicable Municipal codes and regulations, Provincial Statutes in effect at the site, and the Fire Marshall and Workmen's Compensation Acts, hereinafter called the Rules and Regulations.

Wherever the drawings or specifications call for material, workmanship, arrangement or construction of a superior quality than is required by the rules and regulations, the drawings and specifications shall prevail. Otherwise, should there be a conflict between the rules and regulations and the drawings and specifications, the rules and regulations shall prevail. The Applicant shall obtain, and pay for all permits, and arrange for all electrical inspections covering his work, and pay all other fees and charges, and make all deposits that are in any way connected with the installation of the systems specified as shown on the Drawings. He shall give all necessary notices to authorities having jurisdiction, and shall be responsible for keeping all applicable public ordinances.

Scheduling West Kootenay Power Authority shall be the Applicant's responsibility. Systems shall be compatible with power services available. Where costs are incurred with West Kootenay Power Authority in installing the light system, these shall be considered as part of the cost of the system.

Before acceptance of any part or all of the system, it shall meet the requirements of Schedule H. As built drawings of the street lighting system shall be furnished to the Village Engineer prior to acceptance. The information shown shall be pole locations and locations of all conduits, together with any other pertinent information.

Before acceptance of any work by the Village Engineer, he shall have received a Certificate of Inspection by the governing electrical authorities showing that the installation is unconditionally approved.

## 2.04 Connection to Utility

An allowance for a minimum of 8 street lights per electrical connections shall be made and future extension of the street lighting system should accommodate this requirement.

Each connection to West Kootenay Power will be made to a service box located at a lamp standard as shown on the Standard Drawings.

## 3.0 MATERIALS

### 3.01 General

Electrical materials used in the street lighting system shall be new and shall be approved by and bear the label of the Canadian Standards Association.

### 3.02 Street Light Poles

Poles shall be as shown on the Standard Drawing and shall be a minimum 11 gauge octagonal steel anchor base type with 1.8, 2.5 or 3.0 m davit and a minimum height of 7.9 m for local highways and 9 m for collector and arterial highways. Poles shall be complete with anchor bolts, nuts and nut covers, handhole and water tight cover assembly, grounding stud and fuse and terminal block assembly as shown on the Standard Drawing. Poles shall be factory painted inside and outside with one coat of metal primer. Poles shall be finished with a hard dry metal aluminum paint to the Village standard colour.

### 3.03 Conductors

All conductors shall be copper and if larger than 10 AWG shall be stranded. All insulated conductors shall be colour coded . White shall be used for the mutual conductor.

Conductors run in rigid pvc conduit or in the interior of street light poles shall be wire type as listed in Table 19 of the Canadian Electrical Code for use in raceways (wet location). Adequate slack shall be provided in the pole to permit removal of connected wires and fusing through the handhole for maintenance.

In no case shall the conductor be less than 10 AWG.

### 3.04 Conduit

Rigid PVC conduit shall be acceptable provided that it bears a CSA Certification label and all fittings shall be CSA Certified. PVC conduit shall be installed in strict accordance with the Manufacturer's recommendation, using CSA certified cement. The conduit shall not be bent in the field. Only factory bends shall be acceptable. The minimum conduit size shall be 32 mm diameter.

### 3.05 Luminaries and Lamps

Luminaries shall be High Pressure Sodium Cobra Head Fixtures, 100 watt Landmark 100 - L2HS100P2V, 120/240 volt for local roads and 150 watt Landmark 150-L2HS150P2Y, 120/240 volt on collector and arterial roads, or as otherwise approved by the Village Engineer. Photocells shall be Fisher Pierce 6660 or 6690 or equivalent. There shall be one photocell per luminaire.

On local and Cul-de-Sac highways, a Cooper Industries Crouse-Hinds Lighting Promenade Type PR, 100 watt, HPS Post Top, poly carbonate, type 3 distribution luminaire may be used.

Photocells shall be Fisher Pierce 6660 or 6690 or equivalent. There shall be one photocell per luminaire.

### 3.06 Junction Boxes

Junction boxes shall be PVC or concrete as shown on the Standard Drawing. PVC boxes with street lids shall be used in sidewalk areas only. Concrete boxes with street lids shall be used in all areas subject to vehicle traffic. Concrete lids may be used in areas not subject to vehicle traffic. There will be one junction box per street light.

### 3.07 Ground Rods

Ground rods shall be 19 mm diameter steel with hot forged point, full length galvanized or copperweld and located in the junction box adjacent to each pole.

### 3.08 Connectors

Insulated connectors shall be Scotchlok as manufactured by Minnesota Mining and Manufacturing Co. Ltd., or as otherwise approved by the Village Engineer. For conductor combinations too large to use Scotchlok connectors, a solderless line connection shall be used, such as connector CL2 manufactured by Thomas & Betts Ltd., or approved equal. Bare copper lug used for connecting ground conductor to ground stud in lighting pole handhole shall be Thomas & Betts 54106 full compression lug, or approved equal. The connector serving a ground rod shall be Burndy type GAR, or approved equal.

### 3.09 Pole Bases

Concrete bases for poles shall be as shown on the Standard Drawing.

### 3.10 Fusing

There shall be one in-line (cartridge type) fuse per street light, located within each pole and accessible through the handhole.

#### 4.0 WORKMANSHIP

##### 4.01 Installation

Conduits shall be installed as nearly as possible at a constant depth and on the alignment shown on the approved construction drawings. Conduits under existing paved roads, driveways or sidewalks shall be installed by tunnelling, unless the Village Engineer gives his express written consent for open trench construction. Service line conductors and all other electrical components shall be installed in conformance with the standard drawings in the B.C. Electrical Code. A conduit under curb or sidewalk shall be buried in a trench with the centre line not less than 750 mm below top of curb or sidewalk.

If no curb or sidewalk is installed, the conduit shall be buried 900 mm below finished grade of centreline of road; and all road, lane and industrial and commercial driveway crossings, the conduit shall be buried not less than 900 mm below top of crossing. If the top of crossing is covered by concrete slab, the depth of trench may not be less than 750 mm below the top of crossing.

In all trenches, the conduit shall be snaked slightly to permit expansion and contraction.

All ducts shall be sand bedded.

Bases shall be constructed and installed as shown on the standard drawings. The standards shall be erected plumb, using shims if required.

Luminaries shall be securely fastened to the lighting poles and oriented to produce the required light distribution.

##### 4.02 Restoration

All roadways, lanes, driveways, boulevards, and other areas traversed by trenches shall be returned to their original conditions or better by the Applicant.

SCHEDULE H  
REGULATIONS, STANDARDS AND SPECIFICATIONS FOR THE  
INSTALLATION OF ELECTRICAL, COMMUNICATIONS WIRING,  
CABLEVISION AND GAS DISTRIBUTION SYSTEM

This is Schedule H of the Village of Fruitvale Subdivision and Development Servicing  
Bylaw No. 561, 1995.

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Clerk

SCHEDULE H  
REGULATION, STANDARDS AND SPECIFICATIONS FOR THE  
INSTALLATION OF ELECTRICAL, COMMUNICATIONS WIRING, CABLEVISION  
AND GAS DISTRIBUTION SYSTEM

1.0 GENERAL

- 1.01 Standards and Specifications to Apply to All Electrical, Communications Wiring and Cablevision Electrical and telephone systems shall be provided to serve each parcel within the subdivision consistent with the standards and specifications set out in this Schedule and Schedule A.

Where it is proposed to develop a natural gas distribution system, the system shall be designed and constructed consistent with the provisions of this Schedule. Where it is proposed to develop a cablevision system, the system shall be designed and constructed consistent with the provisions of this schedule.

1.02 Approval of Engineering Drawings Required Prior to Construction.

Engineering drawings showing detailed design of the necessary works shall be submitted to the Village Engineer for approval. No construction of the works shall commence until the design drawings have been approved by the Village Engineer. The engineering drawings shall clearly indicate the locations of poles, structures, conduits, pipes and any other facilities required.

1.03 Construction In Compliance With Engineering Drawings

All poles, structures and facilities shall be constructed or installed in compliance with the engineering drawings approved by the Village Engineer.

1.04 Construction In Accordance With West Kootenay Power, B.C. Telephone, Cablevision Company, and B.C. Gas Requirements

Electrical, Telephone and Cablevision services shall be installed in accordance with the requirements of the West Kootenay Power Authority, the B.C. Telephone Company, the cablevision company supplying the subdivision and the Inspector of Electrical Energy of the Province of B.C. Natural gas distribution works shall be installed in accordance with the requirements of B.C. Gas. The applicant shall give the Village Engineer 48 hours notice so the Village Engineer may inspect the B.C. Gas installation.

1.05 Underground Electrical Systems

Underground systems shall include the supply and installation of all necessary conduits, wiring, transformers, service runs and connections for a complete and fully operative underground electrical system as laid out by the West Kootenay Power Authority and approved by the Village Engineer and the Inspector of Electrical Energy of the Province of B.C.



## 1.06 Underground Telephone and Cablevision

Underground telephone and cable vision shall include the supply and installation of the necessary conduits, wiring, service runs and connections for a complete and fully operative underground telephone system as laid out by the B.C. Telephone Company and the cablevision company serving the subdivision and approved by the Village Engineer.

## 1.06 Gas Distribution System

Where the proposed subdivision is to be served by a natural gas distribution system, the location of such a system shall be designed by B.C. Gas and shall be approved by the Village Engineer prior to the construction and installation of such a system. All mains forming part of a natural gas distribution system shall be buried at a minimum depth of 750 mm. The system or extension shall be installed following installation of sewer and watermains and prior to the installation of curb and gutters and asphalt. Rehabilitation of boulevards shall be the responsibility of the Applicant.

## 2.0 DESIGN CRITERIA

### 2.01 Horizontal Location

Horizontal location of underground ducting and gas main piping shall be as shown on the Standard Drawings. Systems shall be laid out with due regard for other utilities, and shall have the approval of the Village Engineer as well as the utility company involved. Where overhead distribution is specified, pole locations and any anchor easements shall be approved by both the Village Engineer and the appropriate utility company. Care shall be taken to eliminate any aerial trespass.

### 2.02 Vertical Location

All conduit and gas main piping to have a minimum of 750 mm cover or to the depths specified by the local authority, whichever is greater.

### 2.03 Detailed Design

Details of design such as vertical and horizontal location of service boxes, size and type of conduits and gas mains, kiosk dimensions and ducting and all wiring details shall be as per specifications and drawings provided by B.C. Hydro and Power Authority, B.C. Telephone Company, the appropriate cablevision company and B.C. Gas.

## 3.0 MATERIALS

### 3.01 West Kootenay Power

All materials used in the underground or overhead electrical distribution system shall be as specified by the West Kootenay Power Authority.

3.02 B.C. Telephone Company

All materials used shall be as specified by the B.C. Telephone Company.

3.03 Cablevision

All materials used shall be specified by the appropriate cablevision company and supplied by the Applicant unless otherwise directed by the cablevision company.

3.04 B.C. Gas

All materials used in the underground natural gas distribution system shall be specified by B.C. Gas.

4.0 WORKMANSHIP

4.01 Underground Installation

Installation requirements such as trenching, installation of ducting and backfilling shall be according to specifications supplied by the appropriate utility company.

4.02 Clean-up

After installation of all underground ducting service boxes, kiosks, etc. the boulevard area shall be shaped to grade and all debris shall be removed.

SCHEDULE I  
STANDARDS FOR THE PREPARATION OF  
ENGINEERING DRAWINGS

This is Schedule I of the Village of Fruitvale Subdivision and Development Servicing  
Bylaw No. 561, 1995

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Clerk

SCHEDULE I  
STANDARDS FOR THE PREPARATION OF  
ENGINEERING DRAWINGS

1.0 GENERAL REQUIREMENTS

These requirements pertain to the preparation of drawings for: sanitary sewers, storm sewers, water, gas, underground power, telephone, cablevision, street lighting, roads, curbs and gutters, sidewalks, culverts, bridges, and other permanent structures.

Where no standard is defined in this schedule for the preparation of a drawing to portray a particular service, structure, or other items, instructions and requirements may be obtained by discussion with the Village of Fruitvale, or its appointed representative.

As-built plans are to be completed and approved before securities are released.

As-built drawings are to be submitted within four (4) weeks of the completion of all services to be installed by the Applicant. The Design Engineer shall deliver as-built drawings as specified in this schedule to the Village Engineer. These drawings shall be signed and sealed by the Design Engineer.

A plan profile is a detailed engineering drawing record containing the permanent and temporary features within a public right-of-way. The plan profile is divided into two parts:

Part One:

The top plan view shows all surface features, legal descriptions and bordering property data, all underground utilities and their locations within the public right-of-way and related data.

Part Two:

The bottom profile shows, elevations, chainages, surface and utility grades with related data.

2.0 DRAWING STANDARDS

2.01 Sheet Size

Pre-cut sheets to be 841 mm x 594 mm (A-1 sheet size).

2.02 Sheet Material

3 mil mylar matte both sides with half plan and half profile.

### 2.03 Grid Standards

2 mm x 10 mm as shown on sample sheet.

### 2.04 Sheet Border

Border line width to be 1.0 mm. Top, bottom and right border to be 15 mm respectively from edge of sheet. Left border to be 42 mm from edge of sheet.

### 2.05 Title Block

- .1 Located along the bottom of the sheet.
- .2 Size of the title block is 46 mm wide.
- .3 Title block to be pre-printed. Stick-on type is not acceptable.
- .4 Title block shall describe the contents of the drawing (eg. key plan, roadworks, etc.) and shall clearly indicate the location of the works by road name(s) and/or legal description. See sample sheet.
- .5 Lettering to be an open style of Vertical Gothic - Leroy or Autocad. If using Autocad, use text font Roman If using some other computer graphic system, it should be compatible with Autocad. See sample sheet for lettering height and pen size.
- .6 Design Engineers must use the Village of Fruitvale A-1 standard sheets. Design Engineers identifications are to be placed on each drawing.
- .7 A sample of a prepared plan/profile sheet, and an Autocad disk of the Standard Drawing block shell may be obtained by contacting the Village of Fruitvale.

## 3.0 PREPARATION OF DRAWING

Drawings are to be prepared in a manner as illustrated on the attached standard plan/profile sample sheet.

### 3.02 Sheet Layout

- .1 Maintain a minimum clearance of 40 mm from all borders.
- .2 The profile SHALL NOT be drawn over the title block.
- .3 Place north arrow close to the top right hand side of the sheet whenever possible.
- .4 North arrow shall point either towards the top of the page or towards the left hand edge of the page. The north arrow may point not more than 60° to the right hand side of the page.
- .5 Show distances and location dimensions in metres and to 3 decimal places.
- .6 Show pipe sizes in mm as per A.S.T.M. specifications using 1" = 25 mm.
- .7 Existing imperial dimensions except for pipe sizes are to be soft converted using the factor:  
1 inch (1") = 25.4 cm  
1 foot (1') = 0.3048 m

### 3.03 Lettering

- .1 Lettering is to be an open style of Vertical Gothic (eg. Leroy or Autocad - Romans) minimum height being 1.8 mm. The standard lettering height is 2.5 mm.
- .2 Lettering to be applied by using a Leroy, a computer graphics system compatible to Autocad, or equivalent.
- .3 Use BLACK INDIA ink on all as-built drawings.

### 3.04 Scales

Use metric scales:

PLAN VIEW SCALE 1:500

PROFILE VIEW SCALE    Horizontal 1:500    Vertical 1:50

### 3.05 Plan View

- .1 Show utility and utility access R.O.W.'s.
- .2 In case of R.O.W.'s less than 6.0 m larger scales may be permitted.
- .3 Show control station monuments with identification number.
- .4 The PLAN VIEWS should not be fragmented or broken due to slight curves in the road right-of-way.
- .5 The PLAN VIEWS shall be fragmented or broken if the vertical alignment of the utilities in the PROFILE SECTION when shown at true length and when projected above to the utilities in the PLAN VIEW cannot be maintained in as close a relationship as possible without too much discrepancy.
- .6 If using co-ordinates for layouts, calculate and plot distances at SEA LEVEL, but show ground level distances on the plan.
- .7 Show the legal layout, dimensions, bearings, lot numbers, block numbers, legal plan numbers, street names, sidewalks with related data and catch basin installations with elevations.
- .8 All lots need not be numbered providing they are in sequence. Show first and second and next to last and last lots. If not in sequence, all lots shall be numbered.
- .9 All lot dimensions shall be given in metres and to three (3) decimal places. If the lots are of same dimensions and side by side, only the two outside lots need have the dimensions shown, the remainder with ditto marks.

- .10 Curb information should be shown and should include radius, delta angle, tangent length, and arc length
- .11 Face of curb information must be complete.  
ie. Rollover Face of Curb - Roll F.C.  
  
If other than concrete face of curb specify material used.  
ie. Rollover Asphalt Face of Curb - Roll Asph F.C.
- .12 Show Right of Way road widths and the actual roadway widths between curbs or between curbs and edge of pavement.
- .13 Show all utilities such as sanitary and storm sewers, water, hydro, telephone, gas, cable TV, manholes, valves, cleanouts, hydrants, service boxes, etc.
- .14 Reference each utility to the nearest property line or boundaries of right-of-ways.
- .15 Show flow directions of sewers.
- .16 Manholes in midblock shall be referenced to the nearest lot line (I.P)
- .17 Lot services (sanitary, storm, water) shall be shown and referenced to the nearest or convenient lot line of said lot.

### 3.06 Profile

- .1 The profile and related data are shown on the bottom half of the sheet. Establish 0+00 station on accented vertical grid line.
- .2 The original groundline (centreline) and related data prior to construction should be shown, along with date surveyed.
- .3 The profile shall be shown at true centreline length and projected above to the PLAN VIEW in as close a relationship as possible.
- .4 Show as constructed centreline for streets and lanes and date constructed.
- .5 Show centreline percent grade to two (2) decimal places, together with the following information on vertical curves:
  - the chainage and elevations of B.C., E.C., and V.P.I.
  - the external value, "e"
  - the length of vertical curve
  - the chainage and elevation of the low spot of sag curves or high point of crest curves
  - on super elevated curves and crossfall sections, percent crossfall, transition length and crown should be noted.

- .6 Show profiles of invert and crown of pipes for sanitary, storm, and water mains as well as length, size, type, grade, and class of pipe (eg. 75 m - 200 mm SAN SDR 35 PVC).
- .7 Show manholes with rim elevations, and invert elevations at both inlet and outlet.
- .8 Crown of pipes shall be shown at all locations where there is the possibility of conflicts with other utilities.
- .9 Show location type and elevation of all crossing utilities.
- .10 Elevations are placed at the right and left hand side of the profile and repeated when there is a break in the profile.
- .11 Elevations are to be shown at every even metre graduation and placed on the heavy accented line.
- .12 All elevations shall be relative to GEODETIC DATUM and in metric.

#### 4.0 DRAFTING GUIDELINES

The format of the Technical Legend places the symbol as it appears on the drawing on the left hand page with drafting guidelines on the right hand page.

The symbols presented in the Legend are sized for use on Plan Profile drawings. Dimensions used are given in millimetres. Pen and template sizes refer to the widely used Leroy equipment.

Metric pen and template sizes are given in millimetres along with their imperial equivalent.

#### 5.0 ABBREVIATIONS

##### TECHNICAL LEGEND PLAN PROFILE ABBREVIATIONS

ABANDONED - ABAND.  
 ABBREVIATION - ABBREV.  
 ACRE - AC.  
 ASBESTOS CONCRETE - A.C.  
 ASPHALT - ASPH.  
 ASPHALT WALK - ASPH.W.  
 AIR VALVE - A.V.  
 AVENUE - AVE.  
 AVERAGE - AVG.  
 BACK OF CURB - B.O.C.  
 BACK OF WALK - B.O.W. or B.W.  
 BASEMENT - BSMT



## TECHNICAL LEGEND PLAN PROFILE ABBREVIATIONS

BEARING - BRG.  
BEDDING - BED.  
BEGINNING OF CURVE - B.C.  
BENCH MARK - B.M.  
BETWEEN - BTWN  
BLOCK - BLK  
BOTTOM - BTM  
BOTTOM OF PIPE - B.O.P.  
BOULEVARD - BLVD.  
BOUNDARY - BDY  
BUILDING - BLDG  
BEGINNING OF VERTICAL CURVE - B.V.C.  
CABLE TELEVISION - T.V.  
CALCULATED - CALC  
CANADIAN NATIONAL RAILWAY - C.N.R.  
CANADIAN PACIFIC RAILWAY - C.P.R.  
CANADIAN STANDARDS ASSOCIATION - C.S.A.  
CAPACITY - CAP  
CAST IRON - C.I.  
CATCH BASIN - C.B.  
CATHODIC PROTECTION - C.P.  
CENTIMETER - CM  
CENTRE LINE  
CHECKED - CHKD  
CHECK VALVE - C.V.  
CHORD - CH  
CIRCLE - CIR  
CLASS - CL  
CLEAN OUT - C.O.  
CONCRETE - CONC  
CONCRETE WALK - C.W.  
CONDUIT - COND  
CONSTRUCTION/CONSTRUCT - CONSTR or CONST  
CONTOUR - CONT  
CONTRACTOR - CONTR  
COPPER - CU  
CORNER - COR.  
CORRUGATED METAL PIPE - C.M.P.  
COUPLING - CPLG  
COURT - CT  
CREEK - CR  
CRESCENT - CRES  
CROSSFALL - X-FALL  
CROSS SECTION - X-SECTION  
CULVERT - CULV  
CURB AND GUTTER - C & G

## TECHNICAL LEGENDPLAN PROFILE ABBREVIATIONS

DEGREE - DEG or °  
DELTA  
DEPARTMENT - DEPT  
DIAMETER - DIA. or  
DIMENSION - DIM  
DISTANCE - DIST  
DITCH - D  
DOUBLE - DBL  
DRAWING - DWG  
DRIVEWAY - DWY  
DRY WELL - D.W.  
DRIVE - DR  
DUCTILE IRON - DI  
DWELLING - DWLG  
EASEMENT - ESMT  
EAST - E  
EDGE OF MEDIAN - E.M.  
EDGE OF PAVEMENT - E.P.  
EDGE OF SHOULDER - E.S.  
ELECTRIC - ELEC  
ELECTRIC LIGHT - E.L.  
ELEVATION - ELEV  
END OF CURVE - E.C.  
END OF VERTICAL CURVE - E.V.C.  
ESTIMATE - EST.  
EXISTING - EXIST  
FACE OF CURB - F.C. ( Roll F.C., Std. F.C., Asph.  
(Rolled, Standard, Asphalt)F.C.)  
FACE OF WALK - F.W.  
FEET OR FOOT - FT  
FLANGE - FLG  
FLANGED OUTLET - F/O  
FLOOR - FLR  
FOOTING - FTG  
FORCE MAIN - F.M.  
FOUND - FD  
GALVANIZED - GALV  
GARAGE - GAR  
GARDEN - GDN  
GRAVEL - GRAV  
GRADE - GR  
GUARD RAIL - GDR  
HECTARE - HA  
HECTOMETRE - HM  
HEIGHT - HT  
HIGHWAY - HWY

## TECHNICAL LEGENDPLAN PROFILE ABBREVIATIONS

HORIZONTAL - HOR  
HORIZONTAL CURVE - HOR  
HOSPITAL - HOSP  
HYDRANT - HYD  
INCH - IN or "  
INLET CHAMBER - I.C.  
INSIDE DIAMETER - I.D.  
INTERSECTION - INT  
INVERT - INV  
IRON PIN, FOUND IRON PIN - I.P., F.I.P.  
INSULATE - INS  
INTAKE STRUCTURE - I.S.  
JOINT - JT  
KILOGRAM - KG  
KILOMETRES - KM  
KILOMETRES PER HOUR - KM/H  
LATERAL - LAT  
LEAD - L  
LENGTH - LGTH  
LENGTH OF CURVE - L.C.  
LIFT STATION - L.STA  
LIGHT STANDARD - L.S.  
LIP OF GUTTER - L.G.  
MAIN VALVE - M.V.  
MANHOLE - M.H.  
MANHOLE RIM - M.H.R.  
MAXIMUM - MAX  
MECHANICAL JOINT - M.J.  
METRE - m  
METRE CHAMBER - M.C.  
MEDIAN - M. or MED  
MILES PER HOUR - M.P.H.  
MILLIMETRE - mm  
MINIMUM - min  
MINISTRY OF TRANSPORT - M.O.T.  
MONOLITHIC SIDEWALK - MONO  
MONUMENT - MON  
MORTAR JOINT - M.J.  
MINUTES - MIN or'  
NORTH - N  
NORTH SIDE - N/S  
NOT TO SCALE - N.T.S.  
NUMBER - NO. or #  
OBLITERATED - OBL  
ON CENTRE - O.C. or O/C  
ORIGINAL GROUND - O.G.

## TECHNICAL LEGEND PLAN PROFILE ABBREVIATIONS

OPPOSITE FACE - O.F.  
OUTLET CHAMBER - O.C.  
OUTSIDE DIAMETER - O.D.  
PARALLEL - PAR  
PARKWAY - PKWY  
PAVEMENT - PVMT  
PER - /  
PERCENT - %  
PHASE - PH  
PIPE - P  
PLACE - PL  
PLAN PROFILE - P.P.  
PLUG - PLUG  
POINT - PT  
POINT ON CURVE - P.C.  
POINT ON COMPOUND CURVE - P.C.C.  
POINT ON TANGENT - P.T.  
POINT ON INTERSECTION - P.I.  
POUNDS - lbs  
POUNDS PER SQUARE INCH - P.S.I.  
POWER POLES - P-P  
PRESSURE REDUCING VALVE - P.R.V.  
PROPERTY LINE or P.L.  
PROPOSED - PROP  
PUMP STATION - P.S.  
QUANTITY - QTY  
RADIUS - RAD OR R  
RAILWAY - RWY  
RAISED FACE - R.F.  
RECTIFIER - RECT  
REDUCER - RED  
REFERENCE - REF  
REGISTERED PLAN - R.P.  
REINFORCED - REIN  
RESTORED - RSTD  
REPLACEMENT - REPL  
RESERVOIR - RES  
REVISION - REV  
RIGHT - RT  
ROAD - RD  
ROUND  
RIGHT OF WAY - R/W or R.O.W.  
SANITARY - SAN  
SECOND - SEC  
SECTIONSECT  
SERVICE - SERV

## TECHNICAL LEGEND PLAN PROFILE ABBREVIATIONS

SERVICE ROAD - SERV.RD.  
SET IN FIELD - S.I.F.  
SIDEWALK PROFILE - S.W.P.  
SLOPE - SLP  
SOUTH - S  
SOUTH SIDE - S/S  
SPECIFICATION - SPEC  
SPIRAL TO CURVE - S.C.  
SQUARE - SQ OR  
STANDARD - STD  
STATION - STA  
STEEL - STL  
STORM - STM  
STREET - ST  
STRUCTURE - STR  
SUPPLY - SUP  
SWALE - SWL  
SYMBOL - SYM  
TANGENT - TAN  
TANGENT TO SPIRAL - T.S.  
TECHNICAL - TECH  
TEMPERATURE - TEMP  
TEMPORARY - TEMPO  
TEST HOLE - T.H.  
TONGUE AND GROOVE - T.G.  
TOWNSHIP - T.W.P.  
TOP OF CURVE - T.O.C.  
TOP OF PIPE - T.O.P.  
TRAFFIC CONTROL - T.C.  
TRAIL - TR.  
TRANSFORMER - TRANSF  
TRANSITE - TRANS  
TYPICAL - TYP  
UNDERGROUND - U.G. or U/G/  
UNDER CONSTRUCTION - U/C  
VELOCITY - VEL  
VERTICAL - VERT  
VERTICAL CURVE - V.C.  
VOLUME - VOL  
WALL THICKNESS - W.T.  
WASH OUT - W/O  
WATER - W  
WEST - West  
WEST SIDE - W/S  
WEEPING TILE - W.TILE  
WEIGHT - Wt

## TECHNICAL LEGEND PLAN PROFILE ABBREVIATIONS

WIDTHWIDTH

WITNESS PIN - W.PIN

WOODEN POST - W.P.

YARD - YD2

STANDARD DEVELOPMENT AGREEMENT DOCUMENT  
FEE SIMPLE SUBDIVISIONS

THIS AGREEMENT made this \_\_\_\_\_ day of \_\_\_\_\_ A.D., 19\_\_\_\_ .

BETWEEN: THE VILLAGE OF FRUITVALE, a body corporate, duly incorporated under the laws of the Province of British Columbia, having an office at 1930A Columbia Gardens Road, in the Village of Fruitvale, Province of British Columbia, V0G 1L0

(hereinafter called the "Village")

OF THE FIRST PART

AND: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(hereinafter called the "Owner")

OF THE SECOND PART

WHEREAS:

- A. The Owner is the registered owner or holder of a Registered Right to Purchase lands and premises situate, lying and being in the Village of Fruitvale, Province of British Columbia, and more particularly known and described as:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(hereinafter called the "Land");

- B. The Owner wishes to subdivide the Land, or part thereof, in the manner shown on a Plan of Subdivision which has been submitted by the Owner to the Approving Officer of the Village for approval, a copy of which such plan is attached hereto as Schedule "One", and is hereinafter called the "Subdivision Plan";
- C. The Owner is desirous of entering into this Agreement with the Village pursuant to the provisions of Section 991 of the Municipal Act, in order to obtain approval from the Approving Officer of the Subdivision Plan prior to completion of the construction and installation on the Land of all works and services required by the Village to be constructed and installed on the Land by the Owner.



## AGREEMENT, CONT'D

NOW THIS AGREEMENT WITNESSETH that in consideration of the premises and of the mutual covenants and agreements herein contained, the parties hereto covenant and agree as follows:

1. In this Agreement, unless the context otherwise requires:

"Work" shall be construed to mean and include all works, services, roads and any other improvement required to be constructed and erected or installed, both on and off the Land, by the Owner under provisions of this Agreement.

"Complete" or "Completion" or any variation of these words, when used with respect to the work referred to herein, shall mean completion of the work, or a part thereof as the context requires, in accordance with the provisions of this Agreement and to the satisfaction of the Village Engineer when so certified by him in writing.

"Village Engineer" shall mean the Village Engineer for the Village or his deputy.

"Approving Officer" shall mean the Approving Officer or his deputy as appointed by the Council of the Village.

"Contractor" shall mean and include contractors and sub-contractors employed by the Owner, directly or indirectly, in the construction and installation of the work.

2. The Owner covenants and agrees to construct and install on the Land and off-site as the case may be, in accordance with the plans and specifications initialed by each of the parties hereto for identification, the following work:

- (a) Drainage works and services;
- (b) Sewage works and services;
- (c) Water works and services;
- (d) Boulevards;
- (e) Curbs, gutters and sidewalks;
- (f) Highways and lanes;
- (g) Street lighting; and
- (h) Underground electrical, telephone and cablevision works;

Each of the parties hereto acknowledge having in its or his possession a true copy of the aforesaid plans and specifications (herein called the "Approved Engineering Plans"), and acknowledge and agree that the Approved Engineering Plans are hereby incorporated into and made part of this Agreement and are attached as Schedule "Two".

## AGREEMENT, CONT'D

3. All work shall be carried out by the Owner or his contractors in accordance with the Approved Engineering Plans, and in accordance with the provisions of the Subdivision and Development Servicing Bylaw of the Village from time to time in force. Wherever the provisions of the plans and specifications and the said Subdivision Bylaw shall conflict, the Village Engineer shall determine and consent in writing the provisions which shall be enforced and constructed.
4. The cost of all work herein shall be borne by the Owner, and the Owner shall employ only bonded contractors to carry out and complete the work.
5. The Owner shall obtain and provide to the Village upon request and free of charge true copies of all contracts and sub-contracts entered into by the Owner or its contractors and relating to the work.
6. The decision of the Village Engineer shall be final and binding on all parties hereto in determining whether or not the work or any part thereof has been carried out and completed in accordance with the provisions of this Agreement.
7. As soon as the Owner is satisfied that he has caused the work to be completed, and prior to final approval, the Owner shall submit to the Village Engineer final as-built mylar drawings of all work constructed hereunder, sealed by a Professional Engineer. Where the as-built drawings have been completed using AUTOCADD or a similar computer drafting software, one copy of the diskette containing the as-built drawing files shall also be provided. Until the owner submits the final as-built mylar drawings, the Village will hold \$200 per sheet for drafting deficiencies.
8. The Owner shall cause all work herein to be carried out and completed not later than the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_ (hereinafter called the "Completion Date").
9. Prior to obtaining approval of the Subdivision by the Approving Officer, the Owner:
  - (a) Shall pay all arrears of property taxes chargeable against the Land by the Village;  
and
  - (b) Shall pay all current assessed property taxes levied against the Land by the Village.
10. The Owner further covenants and agrees to pay to the Village, prior to commencement of the subdivision, charges for the inspection of the works in the amount of \_\_\_\_\_, (\$\_\_\_\_\_) (equal to 3% of the estimated cost of constructing utilities and roads required for the new subdivision as approved by the Village Engineer; or a minimum of \$500, whichever is greater plus the current Goods and Services Tax); and further, to pay when the same are billed by the Village, administration fees, engineering fees and legal costs incurred by the Village and relating to the Subdivision of the Land and construction and installation of the work, and the cost of connecting the work to the Village's drainage and sewage collection systems and, where applicable, the Village waterworks.

## AGREEMENT, CONT'D

11. Prior to approval of the Subdivision Plan by the Approving Officer, and as security for the due and proper performance by the Owner of all his covenants and agreements herein contained, the Owner shall deposit with the Village an unconditional, irrevocable Letter of Credit drawn on a chartered bank in Canada for a term of not less than twelve (12) months, in the amount of (\$ ), which is equal to One Hundred and Twenty-Five percent (125%) the cost of constructing and providing all of the work required to be constructed and installed by the Owner under the terms of this Agreement, as estimated by the Village Engineer, and containing such terms and provisions as may be required by the Village Engineer. The Owner agrees that if the work or any part thereof is not completed in accordance with the provisions of this Agreement and by the Completion Date, or if the Owner shall be in default of any of his covenants herein contained, and such default shall continue for a period of fourteen (14) days after notice thereof has been given by the Village to the Owner, the Village may call for and receive the funds secured by the Letter of Credit and the Village may complete the work at the cost of the Owner and deduct from any fund held by the Village as security hereunder, the cost of such completion, and the balance of the deposit, if any, shall be returned to the Owner less any administration fees required by the Village. If there is insufficient money on deposit with the Village under the Letter of Credit, then the Owner shall pay such deficiency to the Village immediately upon receipt of the Village's bill for completing the work. It is understood and agreed that the Village may do such work either by itself, or by contractors employed by the Village. Any bill rendered by the Village to the Owner under the provisions of this paragraph, shall be regarded as charges for work done or service provided under the provisions of Section 435 of the Municipal Act and may in addition to any other remedy available to the Village, be collected in the same manner and with the like remedies as ordinary taxes upon Land and improvements are collected under the said Act.
  
12. The Village will consent to reduction in the amount secured by the Letter of Credit, or cash, from time to time, and in accordance with the following:
  - (a) The percentage of the credit reduction will be equal to the percentage of the cost of the work done and approved by the Village Engineer; and
  - (b) No reduction will be allowed for any amount less than 10% of the total cost of the construction and installation of the work.
  - (c) Notwithstanding (a) and (b) herein, the Village will not refund an amount whichever is the lessor of 10% of the total cost of the constructing and installing of the work or \$50,000.00 until the expiry of one (1) year following the full and final completion of all the work;  

and
  - (d) Upon the expiry of the aforesaid one (1) year period, and provided that the Owner is not then in default under any of his covenants herein contained, and upon final approval of the work by the Village Engineer, the Village will as soon as possible, reduce the remaining security to zero (nil).

## AGREEMENT, CONT'D

13. The Owner covenants and agrees to indemnify and save harmless the Village and its servants, agents and employees from and against all actions, proceedings, costs, damages, expenses, claims and demands whatsoever and by whomsoever brought or made against the Village or its said servants, agents and employees, resulting directly or indirectly from the construction or installation of the work.
14. In consideration of due and proper performance by the Owner of his covenants herein contained, the Village covenants and agrees to permit the Owner to carry out and perform the work.
15. Any demand or notice required or permitted to be given under the provisions of this agreement shall be in writing and may be given by mailing such notice by prepaid registered post to the party concerned at the address for such party first above-recited, and any such notice or demand mailed as aforesaid shall be deemed to have been received by the party to whom it is addressed on the second business day after the date of posting thereof.
16. The Owner acknowledges and agrees that immediately upon issuance by the Village Engineer of his certification stating that the work has been completed, all right, title and interest in and to the work shall immediately pass to and vest in the Village, but nothing herein contained shall derogate from the obligation of the Owner to maintain the work for a period of one (1) year following completion as aforesaid.
17. It is understood and agreed that the Village has made no representations, covenants, warranties, guarantees, promises or agreements (oral or otherwise) with the Owner other than those contained in this Contract.
18. Wherever the singular or masculine is used herein, the same shall be construed as meaning the plural, feminine or body corporate or politic where the context or the parties so require.
19. This Agreement and the terms, covenants and conditions herein contained shall ensure to the benefit of and be binding upon the parties hereto and their respective heirs, executors, administrators, successors and assigns.

AGREEMENT, CONT'D

IN WITNESS WHEREOF the parties hereto have executed this Agreement at the Village of Fruitvale, Province of British Columbia, the day and year first above written.

THE CORPORATION OF  
THE VILLAGE OF FRUITVALE

\_\_\_\_\_  
Mayor:

\_\_\_\_\_  
Clerk:

\_\_\_\_\_  
Owner:

\_\_\_\_\_  
Owner:

)  
)  
)  
)  
)  
)  
)  
) C/S  
)  
)  
)  
)  
)  
)  
) C/S  
) (if a corporation)  
)  
)  
)  
)  
)  
)

STANDARD STATUTORY RIGHT OF WAY DOCUMENT

THIS INDENTURE made the \_\_\_\_\_ day \_\_\_\_\_ of, 19\_\_\_\_ .

BETWEEN: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(hereinafter called the "Grantor")

OF THE FIRST PART

AND

The Village of Fruitvale  
1930A Columbia Gardens Road  
Fruitvale, BC V0G 1L0

(hereinafter called the "Grantee")

OF THE SECOND PART

WHEREAS the Grantor is the registered owner or is entitled to become the registered owner of an estate in fee simple of ALL AND SINGULAR those certain parcels or tracts of land and premises situate, lying and being in the Village of Fruitvale, in the Province of British Columbia, and being more particularly known and described as:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(hereinafter called the "Lands of the Grantor")

AND WHEREAS the Grantor and Grantee have agreed to enter into this agreement pursuant to Section 214 of the Land Title Act, R.S.B.C. 1979, Chapter 219 and amendments thereto;

AND WHEREAS it is necessary for the operation and maintenance of the Grantee's undertaking, hereinafter described, to install and maintain a system of sewerage works, and/or water works, and/or drainage works, and/or gas works including all pipes, valves, fittings, buildings and facilities in connection therewith and/or hydro electric works including all wires, poles, conduits and other facilities in connection therewith;

(hereinafter called the "Works")

The Grantor has agreed to permit the construction by the Grantee of the aforementioned works on a portion of the said Land and to grant for that purpose the right-of-way hereinafter described;

NOW THEREFORE THIS INDENTURE WITNESSETH that in consideration of the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) of lawful money of Canada, now paid by the Grantee to the Grantor (the receipt and sufficiency of which is hereby acknowledged by the Grantor), and in consideration of the covenants and conditions hereinafter contained to be observed and performed by the Grantee and for other valuable consideration:

1.0 THE GRANTOR DOTH HEREBY:

1.1 Grant, convey, confirm and transfer, in perpetuity, unto the Grantee the full, free and uninterrupted right, licence, liberty, privilege, permission and right-of-way to lay down, install, construct, entrench, operate, maintain, inspect, alter, remove, replace, bury, cleanse, string and otherwise establish one or more systems of Works upon, over, under and across that part of the Land of the Grantor as shown outlined in heavy black on right-of-way Plan Number \_\_\_\_\_: and designated as \_\_\_\_\_.

(hereinafter called the "Perpetual Right-of-Way")

1.2 Covenant and agree to and with the Grantee that for the purposes aforesaid and upon, over, under and across the Perpetual Right-of-Way the Grantee shall for itself and its servants, agents, workmen, machinery, vehicles, equipment and materials be entitled at all time to enter, use, pass and repass, labour, construct, erect, install, dig, carry away soil or other surface or subsurface materials, clear of all trees, growth, buildings or obstruction now or hereafter in existence, as may be necessary, useful, or convenient in connection with the operations of the Grantee in relation to the Works;

1.3 Grant, convey, confirm and transfer unto the Grantee for itself and its servants, agents, workmen, contractors and all other licensees of the Grantee, together with machinery, vehicles, equipment and materials the right at all reasonable times to enter upon and to pass and repass over such of the Lands of the Grantor as may reasonably be required for the purpose of ingress to and egress from the Perpetual Right-of-Way;

1.4 Grant, convey, confirm and transfer unto the Grantee for itself and its servants, agents, workmen, contractors and all other licensees of the Grantee, together with machinery, vehicles, equipment and materials for a period of \_\_\_\_\_ days only from the date of this Agreement, the full, free and uninterrupted right, licence, liberty, privilege, permission and right-of-way to enter upon, pass and repass, clear, labour, and use for the purpose of ingress to and egress from the Perpetual Right-of-Way and for the purpose of storing machinery, equipment, material or supplies used or to be used in connection with the construction of the Works herein described, and for the purpose of placing or storing the surface or subsurface material to be excavated from the Perpetual Right-of-Way upon and over, but not under that part or parts of the Lands of the Grantor, shown outlined in green on Right-of-Way Plan Number \_\_\_\_\_:

(hereinafter called the "Working Right-of-Way")



Provided always, and it is hereby agreed that nothing herein contained shall permit the Grantee to dig, trench or otherwise disturb the sub-surface of the Working Right-of-Way, and the Grantee shall only clear such trees and growth and interfere and disturb the surface of the Working Right-of-Way in a manner that is reasonably necessary in the conduct of its operations thereon;

2.0 THE GRANTOR HEREBY COVENANTS TO AND AGREES WITH THE GRANTEE, as follows:

2.1 That the Grantor will not, nor permit any other person, to erect, place, install or maintain any building, structure, mobile home, concrete driveway or patio, pipe, wire or other conduit on, over or under any portion of the Perpetual Right-of-Way so that it in any way interferes with or damages or prevents access to, or is likely to cause harm to Works authorized hereby to be installed in or upon the Perpetual Right-of-Way;

2.2 That the Grantor will not do nor knowingly permit to be done any act or thing which will interfere with or injure the said Works, and in particular, will not carry out any blasting on or adjacent to the Perpetual Right-of-Way without the consent in writing of the Grantee, provided that such consent shall not be unreasonably withheld;

2.3 That the Grantor will not substantially diminish the soil cover over any of the Works installed in the Perpetual Right-of-Way, and in particular, without in any way limiting the generality of the foregoing, will not construct open drains or ditches along or across any Works installed in the Perpetual Right-of-Way;

2.4 That the Grantor will from time to time and at all times upon every reasonable request, and at the cost of the Grantee do and execute or cause to be made, done or executed all such further and other lawful acts, deeds, things, devices, conveyances and assurances in

3.0 THE GRANTEE HEREBY COVENANTS TO AND AGREES WITH THE GRANTOR, as follows:

3.1 That the Grantee will not bury any debris or rubbish of any kind in excavations or backfill, and will remove shoring and like temporary structures as backfilling proceeds;

3.2 That the Grantee will thoroughly clean all lands to which it has had access hereunder of all rubbish and construction debris created or placed thereon by the Grantee, and will leave such lands in a neat and clean condition;

3.3 That the Grantee will, as soon as weather and soil conditions permit, and so often as it may exercise its right of entry hereunder to any of the lands of the Grantor, replace the surface soil as nearly as may be reasonably possible to the same condition as it was prior to such entry, in order to restore the natural drainage to such lands; PROVIDED, HOWEVER, that nothing herein contained shall require the Grantee to restore any trees or other surface growth, but the Grantee shall leave such lands in a condition which will not inhibit natural regeneration of such growth;

- 3.4 That the Grantee will, as far as reasonably possible, carry out all work in a proper and workmanlike manner so as to do as little injury to the Lands of the Grantor as possible;
- 3.5 That the Grantee will make good at its own expense all damage or disturbance which may be caused to the surface soil of the Lands of the Grantor in the exercise of its rights hereunder;
- 3.6 That the Grantee will, as far as reasonably possible, restore any fences, lawns, flower beds, at its costs as nearly as may be reasonably possible to the same condition that they were in prior to any entry by the Grantee upon the Lands.
- 4.0 THE PARTIES HERETO EACH HEREBY COVENANT TO AND AGREE WITH THE OTHER, as follows:
- 4.1 The said Works referred to above, together with all pipes, manholes, valves, conduits, wires, casings, fittings, lines, meters, appliances, facilities, attachments or devices used in connection therewith shall constitute the Works;
- 4.2 Notwithstanding any rule of law or equity to the contrary, the Works brought on to, set, constructed, laid, erected in, upon or under the Perpetual Right-of-Way by the Grantee shall at all times remain the property of the Grantee, notwithstanding that the same may be annexed or affixed to the freehold and shall at any time and from time to time be removable in whole or in part by the Grantee;
- 4.3 In the event that the Grantee abandons the Works or any part thereof the Grantee may, if it so elects, leave the whole or any part thereof in place;
- 4.4 That no part of the title in fee simple to the soil shall pass to or be vested in the Grantee under or by virtue of these presents and the Grantor may fully use and enjoy all of the Lands of the Grantor subject only to the rights and restrictions herein contained;
- 4.5 That the covenants herein contained shall be covenants running with the land and that none of the covenants herein contained shall be personal or binding upon the parties hereto, save and except during the Grantor's seisin or ownership of any interest in the Lands of the Grantor, and with respect only to that portion of the Lands of the Grantor of which the Grantor shall be seized or in which he shall have an interest, but that the Lands of the Grantor, nevertheless, be and remain at all times charged therewith;
- 4.6 If at the date hereof the Grantor is not the sole registered owner of the Lands of the Grantor, this agreement shall nevertheless bind the Grantor to the full extent of his interest therein, and if he shall acquire a greater or the entire interest in fee simple this Agreement shall likewise extend to such after-acquired interests;
- 4.7 Where the expression "Grantor" includes more than one person, all covenants herein on the part of the Grantor shall be construed as being several as well as joint;

4.8 This agreement shall endure to the benefit of and be binding upon the parties hereto and their respective heirs, administrators, executors, successors and assigns, as the case may be; and wherever the singular or masculine is used, it shall be construed as if the plural or the feminine or neuter, as the case may be, had been used; where the parties or the context hereto so require and the rest of the sentence shall be construed as if the grammatical and terminological changes thereby rendered necessary had been made.

IN WITNESS WHEREOF the parties hereto have executed these presents in the manner and on the date hereinafter appearing.

THE COMMON SEAL OF THE GRANTOR was )  
hereto affixed this \_\_\_\_ day of \_\_\_\_\_ )  
19\_\_\_\_ in the presence of: )  
)  
)  
)  
) C/S  
\_\_\_\_\_)  
Signature of Witness: )  
)  
)  
)  
)  
\_\_\_\_\_)  
Address: )  
)  
)  
)  
)  
)  
)  
\_\_\_\_\_)  
Occupation: )  
(as to all signatures of the Grantor) )

THE CORPORATE SEAL OF )  
THE VILLAGE OF FRUITVALE was )  
hereunto affixed this \_\_\_\_ day of \_\_\_\_\_, )  
19\_\_\_\_ in the presence of: ) C/S  
)  
)  
)  
)  
\_\_\_\_\_)  
Mayor: )  
)  
)  
)  
)  
\_\_\_\_\_)  
Village Clerk: )

CONSENT TO GRANT OF RIGHT-OF-WAY

KNOW ALL MEN BY THESE PRESENTS THAT \_\_\_\_\_ is the registered holder of a charge by way of \_\_\_\_\_ against the within-described property, which said charge is registered in the Land Title Office, District of Nelson, under Numbers \_\_\_\_\_, for and in consideration of the sum of One dollar (\$1.00) paid by the Village of Fruitvale to the said chargeholder (the receipt whereof is hereby acknowledged), agrees with the Village of Fruitvale, its successors and assigns, that the within Right-of-Way shall be an encumbrance upon the within-described property in priority to the said charge in the same manner and to the same effect as if it had been dated and registered prior to the said charge.

IN WITNESS WHEREOF the parties hereto have caused these presents to be signed, sealed and delivered in the presence of its duly-authorized officers this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_\_.

SIGNED, SEALED AND DELIVERED by the Grantor this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_\_ in the presence of:

\_\_\_\_\_  
Signature of Witness:

\_\_\_\_\_  
Address:

\_\_\_\_\_  
Occupation:

THE CORPORATE SEAL OF THE GRANTOR was hereunto affixed this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_\_ in the presence of:

) C/S

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

LAND TITLE ACT

FORM 6

(Section 46)

PROOF OF EXECUTION BY CORPORATION

I CERTIFY that on the \_\_\_\_ day of \_\_\_\_\_, 19\_\_ at \_\_\_\_\_ in British Columbia, \_\_\_\_\_, personally known to me, appeared before me and acknowledged to me that he/she is the authorized signatory of \_\_\_\_\_ and that he is the person who subscribed his/her name and affixed the Seal of the Corporation to the instrument, that he/she was authorized to subscribed his/her name and affix the Seal to it, and that the Corporation existed at the date the instrument was executed by the Corporation.

IN TESTIMONY of which I set my hand at \_\_\_\_\_, British Columbia, this \_\_\_\_ day of \_\_\_\_\_, 19\_\_ .

\_\_\_\_\_  
A Commissioner for Taking Affidavits  
for British Columbia

CONFIRMATION OF COMMITMENT BY OWNER

CONFIRMATION OF  
PROFESSIONAL ASSURANCE

CONFIRMATION OF "COMMITMENT BY OWNER"  
RE: DESIGN AND FIELD REVIEW OF CONSTRUCTION  
BY A REGISTERED PROFESSIONAL

The Corporation of the Village of Fruitvale  
1930A Columbia Gardens Road  
Fruitvale, B.C.  
VOG 1L0

Attention: Village Engineer

Dear Sir:

Re: \_\_\_\_\_  
(Description and Address) of Subdivision or Development

The undersigned has retained as my/our Professional Engineer,

(the "Design Engineer"), to undertake and/or co-ordinate and review all associated design criteria and "field reviews" required for this Project. It is understood that he/she will take all such steps as regulated under the Provincial Statute for his/her profession and by the definition of "field reviews" hereinafter set forth, to ascertain that the design will comply and construction of the project will substantially conform in all material respects with the provisions of Village of Fruitvale Subdivision and Development Servicing Bylaw No. 561, 1995, and other applicable Permits, Bylaws, Acts and Regulations which apply to the Project. This representative will ascertain that only qualified personnel are retained to carry out tests, inspect or carry out design work, detailing or "field reviews."

As used herein, "field reviews" shall mean such reviews of the work at the project site and at fabrication locations, where applicable, as the "Consultant", in his/her professional discretion, considers to be necessary in order to ascertain that the work substantially conforms in all material respects to the plans and supporting documents "accepted" by the Village of Fruitvale. This will include keeping records of all site visits and any corrective actions taken as a result thereof.

CONFIRMATION OF "COMMITMENT BY OWNER" (cont'd)

The undersigned has given a contractual mandate to the "Design Engineer" to review reports of other testing and inspection agencies and disciplines where necessary, comment on their acceptability, determine the corrective action to take if unacceptable, and maintain a detailed record of every such report and comments. The "Design Engineer" will automatically submit a monthly summary progress report to the Village Engineer including all field reports and change orders.

NOTE: The Owner will notify the Village Engineer in writing 30 days prior to any intended termination of or by the "Design Engineer". It is understood that work on the above project will cease as of the effective date of such termination, until such time as a new appointment is made, and a "Stop Work Order" shall be posted upon the said project by the Village.

\_\_\_\_\_  
Witness Name (Print)

\_\_\_\_\_  
Owner's Name (Print)

By:

\_\_\_\_\_  
Witness Signature

\_\_\_\_\_  
(Owner or Owner's appointed Agent)  
Signature

\_\_\_\_\_  
Address (Print)

Date: \_\_\_\_\_

\_\_\_\_\_  
Occupation

\_\_\_\_\_  
Title of Agent (if applicable)

\_\_\_\_\_  
Address (Print)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

The Corporate Seal of  
was hereunto affixed in the presence of:  
\_\_\_\_\_



The above must be signed by the Owner or his/her appointed Agent. The signature must be witnessed. If the Owner is a company, the corporate seal of the company must be affixed to the document in the presence of its duly authorized officers. The officers must also sign, setting forth their positions in the company.

This "Design Engineer" acknowledges that he/she has been retained to ascertain that the design will comply and construction of the project will substantially conform in all material respects with Bylaws as set out above and will submit letters of Confirmation of Professional Design Assurance from others, as needed, for the approval of the subdivision. Furthermore, the "Design Engineer" hereby covenants that he/she or his/her firm presently carries liability insurance in the amount of \_\_\_\_\_.

\_\_\_\_\_  
Name of Professional (Print)

\_\_\_\_\_  
Signature of Professional (Design Engineer)

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Mailing Address (Print)

\_\_\_\_\_  
Phone:

Professional Seal

CONFIRMATION OF PROFESSIONAL ASSURANCE

CONFIRMATION OF  
PROFESSIONAL ASSURANCE

The Corporation of the Village of Fruitvale  
1930A Columbia Gardens Road  
Fruitvale, B.C.  
V0G 1L0

Attention: Village Engineer

Dear Sir:

Re: \_\_\_\_\_

(Description and Address of Project)

This is to advise that I am a Professional Engineer licensed to practice in the Province of British Columbia and was retained by the Owner to undertake and coordinate all field reviews and inspections required with respect to this project and took all steps as regulated under The Engineering Act of British Columbia and required by good practices and by the definition of "field reviews" hereinafter set forth in order to issue the following certification.

As used herein, "field reviews" shall mean such reviews of the work at the project site and at fabrication locations where applicable as the Professional Engineer, in his professional discretion, considered to be necessary in order to ascertain that the work substantially conformed in all material aspects to the plans and drawings accepted by the Village of Fruitvale.

The following aspects have been reviewed by me or under by direction and have been found to comply with the engineering drawings and plans submitted and accepted by the Village Engineer.

1.0 Storm Drainage System including, but not restricted to, the following:

- the location, alignment, size and grade of all pipes and culverts;
- the spacing of manholes and catch basins;
- the construction of drywells;
- materials used for pipes, culverts, manholes, catch basins, pipe and fitting joints, service connections, inlet and outlet structures;
- materials used for pipe bedding and backfilling of trenches;
- workmanship in the construction and installation of all materials.

2.0 Sanitary Sewer System including, but not restricted to, the following:

- location, alignment, size and grade of all pipes;
- spacing of manholes and catch basins;
- materials used for pipes, manholes, pipe and fitting joints, service connections;
- materials used for pipe bedding and backfilling of trenches;
- workmanship in the construction and installation of all materials.

3.0 Water Distribution System including, but not restricted to, the following:

- location, alignment, size and grade of all pipes;
- spacing of hydrants and valves;
- construction of pumping stations and reservoirs;
- materials used for pipes, fittings, gate valves, valve boxes, hydrants, service connections, corporation stops, curb stop and boxes, air valves, stops and drains.
- materials used for pipe bedding and backfill of trenches;
- workmanship in the construction and installation of all materials.

4.0 Roads including, but not restricted to, the following:

- alignment, width and grade of all roads;
- materials used for preparation of road bases and road surfaces;
- workmanship in the installation of materials.

5.0 Curb and Gutter, Sidewalks, and Boulevards including, but not restricted to, the following:

- width and grade of sidewalks and boulevards;
- alignment and grade of curbs and gutters;
- materials used for preparation of subgrades and surfaces;
- workmanship in the installation of materials.

6.0 Street Lighting, Electrical and Communications Wiring and Gas Installations including, but not restricted to, the following

- number and spacing of street light poles and luminaires;
- materials used for street lighting, electrical and communications wiring and gas installations;
- materials used for backfilling of trenches;
- workmanship in the installation of materials.

I certify that the foregoing areas substantially comply in all material respects with the plans and supporting documents, including all amendments thereto, which supported the application for subdivision approval File No. which were "accepted" by the Village of Fruitvale.

In addition, significant revisions to the accepted plans and supporting documents have been submitted to the Village in order to depict, as nearly as possible, given my "field reviews" as defined herein, the services as finally designed and built.

\_\_\_\_\_  
Name of Professional Engineer (Print)

\_\_\_\_\_  
Signed

(PROFESSIONAL  
SEAL)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Address (print)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Phone

Attached hereto you will find the appropriate "field review" assurance from each of the associated Professional consultants, who are registered in the Province of British Columbia as members in good standing of the Association of Professional Engineers.

ASSURANCE OF "ENGINEERING" FIELD REVIEW

Re: \_\_\_\_\_  
(Project Address)

This is to assure that I/We provided "field reviews" as defined herein of all engineering work including checklist items 1.0 to 6.0 inclusive except as specifically noted below.

EXCEPTIONS:

\_\_\_\_\_  
Name (Print)

\_\_\_\_\_  
Signed

(PROFESSIONAL  
SEAL)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Address (Print)

Representing \_\_\_\_\_