# TOWN OF PORT MCNEILL

# Bylaw #414

# SUBDIVISION AND DEVELOPMENT BYLAW

**BYLAW No. 414 – TABLE OF CONTENTS**


**SECTION 1 INTERPRETATION ..... 7**
**101 Title ..... 7**
**102 Definitions ..... 7**

**SECTION 2 ADMINISTRATION ..... 11**
**201 Approving Officer ..... 11**
**202 Approval Procedure ..... 11**
**203 Application for Preliminary Layout Approval for Subdivision ..... 12**
**204 Preliminary Layout Approval ..... 13**
**205 Design Approval ..... 15**
**206 Application for Final Approval ..... 16**

**SECTION 3 DESING AND CONSTRUCTION REQUIREMENTS ..... 17**
**301 Service Levels ..... 17**
**302 Design ..... 17**
**303 Construction Requirements ..... 17**
**304 Storm Water Drainage ..... 19**
**305 Provision of Parkland at Time of Subdivision ..... 19**

**SECTION 4 DEVELOPMENT OF LAND ..... 19**
**401 Conditions of Issuance of a Building Permit ..... 19**
**403 Design Approval ..... 20**
**404 Application for Building Permit ..... 20**

**SECTION 5 GENERAL PROVISIONS ..... 21**
**502 Application ..... 21**
**502 Prohibition ..... 21**
**503 Subdivisions Where Servicing Requirements May be Waived ..... 21**
**504 Cost of Services ..... 22**

**505 Completion of Works and Services ..... 22**
**506 Excess or Extended Service and Latecomer Payments ..... 24**
**507 Violation and Penalty ..... 24**
**508 Indemnification ..... 24**
**509 Schedules Form Part of Bylaw..... 25**
**511 Effective Date ..... 25**

## SCHEDULES

**Schedule “A” List of Approved Design Drawings ..... 26**
**Schedule “B” Certificate of Completion..... 27**
**Schedule “C” Certificate of Satisfaction..... 28**
**Schedule "D" Servicing Levels..... 29**
**Schedule "E" Application for Preliminary Layout Approval for Subdivision..... 30**
**Schedule "F" Application for Approval of Desing Drawings..... 33**
**Schedule “G” Appication for Final Approval of Subdivision Plan..... 35**
**Schedule “H” Development Works Specifications..... 35**
**Schedule “I” Section 911 Servicing Agreement ..... 202**
**Schedule “J” Irrevocable Letter of Credit ..... 214**
**Schedule “K”Warranty Agreement..... 216**
**Schedule “L” Statutory Right-of-Way Agreement..... 219**

# *SUBDIVISION BYLAW NO. 414*

## INDEX TO SCHEDULE "H" FOR DEVELOPMENT WORKS SPECIFICATIONS


| | Section | Page |
|---|---|---|
| General Introduction | A-1 | 1 |
| Development Procedures and Policies | A-2 | 1-5 |
| Design Drawings | B-1 | 1-6 |
| As Constructed Drawings | B-2 | 1-3 |
| Design of Sewers and Drains | SD-1 | 1-6 |
| Installation of Sewers and Drains | SD-2 | 1-5 |
| Design of Waterworks | W-1 | 1-5 |
| Installation of Waterworks | W-2 | 1-5 |
| Trench Excavation, Backfilling & Cleanup | T-1 | 1-2 |
| Design of Roads and Sidewalks | R-1 | 1-7 |
| Construction of Roads and Sidewalks | R-2 | 1-10 |
| SCHEDULE H | | |
| Appendix 1 – Asphaltic Materials | R-2 | 1-10 |
| Appendix 2 – Base and Sub-base Preparation | R-2 | 1-5 |
| Appendix 3 – Surface Preparation for Asphalt Paving | R-2 | 1-5 |
| Appendix 4 – Asphaltic Concrete Paving | R-2 | 1-15 |
| Appendix 5 – Surface Treatment | R-2 | 1-8 |
| Appendix 6 – Asphalt Testing and Inspection | R-2 | 1-3 |
| Appendix 7 – Methods of Testing Asphalt | R-2 | 1-3 |
| Appendix 8 – Concrete | R-2 | 1-5 |
| STANDARD DRAWINGS | Drawing Number | |
| Rainfall Intensity Duration Chart | A1 | |
| Trench Conditions above the Pipe Zone | T1 | |
| Standard Manhole for up to & Including 375mm Pipe | SD1 | |
| Drop Manhole | SD2 | |
| Cleanout | SD3 | |
| 200mm Manhole Cover & Frame | SD4 | |

| Standard Drawings | Drawing Number |
|---|---|
| 100mm Manhole Cover & Frame | SD5 |
| General Service Connection Details Drain & Sewer | SD6 |
| Service Connection Details Drain & Sewer | SD7 |
| Classes of Pipe Beddings for Sewer & Water | SD8 |
| Silt Trap | SD9 |
| Rectangular Catch Basin (for use with Curb & Gutter) | SD10 |
| Double Catch Basin (for use with curb & gutter) | SD11 |
| Square Catch Basin | SD12 |
| Rectangular Catch Basin Frame & Grate | SD13 |
| Square Catch Basin Frame & Grate | SD14 |
| Combination Silt Trap & Grease Interceptors | SD15 |
| Thrust Blocks | W1 |
| Fire Hydrant Assembly | W2 |
| 19mm Air Valve Assembly | W3 |
| 2 ½” Standpipe Assembly | W4 |
| N.T. (Nelson Type) Valve Box | W5 |
| 19mm & 25mm Water Service Connection | W6 |
| Classes of Pipe Bedding | W7 |
| 39mm Water Service Connection | W8 |
| 50mm Water Service Connection | W9 |
| Typical Cross Section 8.5m Residential Road | R1 |
| Typical Road Cross Section | R2 |
| Typical Location of Works 20m R/W | R3 |
| Typical Cul-de-sacs | R4 |
| Temporary Turn-around Details | R5 |
| Driveway Grades | R6 |
| Vertical Curves for Minimum Stopping Sight Distance | R7 |
| Superelevation | R8 |
| Mountable Curb (Wide Section) & Invert Gutter | R9 |
| Mountable Curb (Narrow Section) & Curb Reinforcing at Catch Basins | R10 |
| Non-mountable Curb | R11 |
| Concrete Sidewalk | R12 |
| Asphalt Sidewalk | R13 |
| Sidewalk Driveway Crossing | R14 |
| Sidewalk Corner Ramp | R15 |
| Barricades | R16 |
| Chain Link Fence | R17 |
| Sidewalk Handrails | R18 |
| Concrete Gravity Retaining Wall | R19 |
| Rock Masonry Retaining Wall | R20 |
| Concrete Cantilever Retaining Wall Type A | R21 |

| Standard Drawings | Drawing Number |
|---|---|
| Concrete Cantilever Retaining Wall Type B | R22 |
| Street Light Standard | R23 |
| Street Light & Traffic Signal Standard Bases | R24 |
| Street Name Standard | R25 |
| Standard Road Closure | R26 |
| Major Street Driveway Signing | R27 |
| Traffic Signal Standard | R28 |

**TOWN OF PORT MCNEILL**

**BYLAW NO. 414**

A Bylaw to regulate the subdivision and development of land
within the Town of Port McNeill

**AND WHEREAS** Sections 989, 990, 991, 992, 993, 994, 995 and 996 of the Municipal Act, Chapter 290 of the Revised Statutes of British Columbia 1979, as amended, empower the Council to regulate the subdivision and development of land;

**AND WHEREAS** the Land Title Act, Chapter 219, Revised Statutes of British Columbia 1979, as amended, provides for the subdividing of land;

**AND WHEREAS** it is deemed expedient and in the public interest to regulate the subdivision of land, and to define the works and services required as a condition of issuance of a building permit;

**NOW THEREFORE** the Council of the Town of Port McNeill, in open meeting assembled, enacts as follows:

**SECTION 1 INTERPRETATION**

**101 Title**

This bylaw may be cited as the "Subdivision and Development Bylaw", and is further referred to herein as "this bylaw".

**102 Definitions**

(1) In this bylaw, unless the context otherwise requires, the following words and phrases shall have the following meanings:

**"Applicant"** means the person applying for the approval of a subdivision whether as the owner of the property proposed to be subdivided or as a duly authorized agent for the owner and with the owner's permission.

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

**"Approval, Preliminary Layout"** means written notification of a review of information presented to the Approving Officer previous to submission of a subdivision plan for final approval.

**“Approving Officer”** means any person duly authorized by the Town Council to act as Approving Officer pursuant to the provisions of the Land Title and Municipal Acts.

**“Area”** means the total horizontal area within the boundaries of a lot created by subdivision.

**“Boulevard”** means that portion of a highway between the curb lines or the lateral boundary lines of a roadway and the adjoining property or between curbs on median stripes or islands, but does not include curbs, sidewalks, ditches or driveways.

**“Clerk”** means the Clerk of the Town of Port McNeill.

**“Community Sewer System”** means a common sewer or system of sewerage or sewage disposal which serves two or more parcels and is owned, operated and maintained by the Town under the Municipal Act.

**“Community Water System”** means a system of waterworks which serves two or more parcels and which is owned, operated and maintained by the Town under the Municipal Act.

**“Consulting Engineer”** means a professional Engineer, registered in the Province of British Columbia, who is retained by the Owner or Applicant.

**“Construction”** shall mean the construction or installation of all works required by this bylaw.

**“Contractor”** means a subdivider or his contractor who constructs services and roads for a parcel or parcels of land.

**“Corporation, Town, or Municipality”** means the Town of Port McNeill, or the area within the town boundaries thereof or amended boundaries as the context may require.

**“Council”** means the Municipal Council of the Town of Port McNeill.

**“Cul-de-sac”** means a street having access to another street at one end only.

**“Developer”** means the subdivider or the holder of a building permit or his contractor or his agent appointed in writing.

**"Development"** means a change in the use of land or in the nature of the use of land, and may include, but is not limited to,

(a) Subdivision of land under the Land Title Act;

(b) Construction or placement of buildings and structures on land pursuant to a building permit; or

(c) Both.

**"Frontage"** means that boundary of a parcel boundary which immediately adjoins a highway other than a lane or walkway.

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

**"Land Surveyor"** means a person qualified to carry out legal land surveys who are registered as a British Columbia Land Surveyor.

**"Lane"** means a road allowance more than 6 meters (19.69 feet) and less than 10 meters (32.81 feet) in width used exclusively for the collection of garbage, loading and unloading of vehicles.

**"Local Street"** means any street other than a collector street or arterial street intended to serve properties abutting it, not intended to carry traffic from one neighbourhood to another neighbourhood or from one use area to a similar use area.

**"Lot"** means a parcel of land registered in the Land Title Office.

**"Lot Depth"** means the mean average horizontal distance between the front and rear lot lines.

**"Lot Line"** means the legally defined boundary of any lot.

**"Lot Width"** means the mean horizontal distance between side lot lines measured at right angles to the lot depth.

**"Medical Health Officer"** means the Medical Health Officer appointed pursuant to the Health Act.

**"Municipal Engineering Advisor"** means a professional engineer, registered in the Province of British Columbia, who is retained by the Town of Port McNeill.

**"Owner"** and "Registered Owner" where used in the bylaw and in addition to its accepted meaning as set out in the Land Title Act, Chapter 219, RSBC 1979 as

amended, includes an individual, an association, a partnership or an incorporated company or corporation and whenever the singular is used herein, it shall be construed as including the plural.

**"Panhandle Lot"** means any lot which is serviced and gains highway frontage through the use of a narrow strip of land which is an integral part of the lot.

**"Parcel"** means any lot, block or other area in which land is held or into which land is subdivided and for which a separate Certificate of Title might be issued.

**"Potable Water"** means water which is approved for drinking purposes by the Medical Health Officer in accordance with the Health Act.

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

**"Roadway"** means the portion of the highway that is improved, designed or ordinarily used for vehicular traffic.

**"Services"** means works required to service a subdivision in accordance with Schedule "A".

**"Slip"** means the downward and outward movement of slope-forming materials composed of natural rock, soils, artificial fills, or combinations of these materials, which movement may proceed by any of the three principal types of movement - falling, sliding or flowing- or by their combinations.

**"Street"** means a public highway having a right-of-way width of ten meters or more.

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

**"Utility"** means any water main, sewer main, pipeline, power line, underground conduit or drainage facility.

**"Walkway"** means a public way restricted to pedestrian use.

**"Watercourse"** means any natural or man-made depression with well-defined banks and a bed zero point six (0.6) meters or more below the surrounding land serving to give direction to a current of water at least six months of the year, or having a drainage area of two square kilometers or more upstream of the point of consideration, or as required by a designated official of the Ministry of Environment of the Province of British Columbia.

**"Works"** means all construction or installation necessary to comply with this bylaw.

**"Zone"** means a zone established under Section 963 of the Municipal Act.

**"Zoning Bylaw"** means a bylaw governing the use of land adopted by the Council pursuant to the Municipal Act.

(2) All other words, terms and expression in this bylaw shall be as defined by the Land Title Act, the Municipal Act and the Interpretation Act.

## SECTION 2 ADMINISTRATION

### 201 Approving Officer

(1) The Approving Officer shall refuse to approve the subdivision of any parcel of land unless all the relevant requirements of this bylaw, the Municipal Act and the Land Title Act and other relevant statues have been observed.

(2) The Approving Officer or such other person as the Council may Designate, may enter at all reasonable times upon the land for which an application to subdivide has been made for the purpose of administering or enforcing this bylaw.

(3) No person shall prevent or obstruct any such official from the carrying out of his duties under this bylaw.

(4) The Approving Officer shall maintain a permanent record of all subdivision applications submitted under this bylaw.

(5) Where improvements have been required, the Approving Officer shall satisfy himself that such improvements have been made in conformity with Town specifications and that the drawings of the complete improvements truly represent the improvements installed or adequate security has been made as required under this bylaw.

(6) The authority of the Approving Officer to approve applications for the subdivision of land is governed by Sections 85, 86 and 87 of the Land Title Act.

### 202 Approval Procedure

The subdivision approval procedure of this bylaw is briefly summarized as follows:

(a) An application is submitted by the owner for preliminary layout approval;

(b) Approving Officer issues a preliminary layout approval;

(c) Consulting engineer provides a letter of assurance;

(d) Engineering drawings for all works and services, prepared by a Professional Engineer, submitted by the owner for approval;

(e) Municipal Engineering Advisor or Approving Officer approves engineering drawings;

(f) Either construction is completed of works and services, "as constructed" drawings are submitted by the owner, and acceptance of the work given by the Town, or the owner deposits a security with the Town and signs a Section 991 Agreement with the Town;

(g) Legal survey is posted on the ground and legal survey plans prepared by a registered British Columbia Land Surveyor;

(1) Plan of subdivision submitted by owner for final approval;

(2) Plans of Statuary rights-of-way and agreements submitted by owner for signature.

(h) Warranty agreement and security submitted by owner;

(i) Approving Officer gives Final Approval by signing plan of subdivision

(j) Owner submits legal plans and agreements to the Land Title Office for registration;

(k) Town releases securities in accordance with Agreements.

**203 Application for Preliminary Layout Approval for Subdivision**

(1) The applicant may request a preliminary layout approval of any proposed alteration of lot lines or subdivision of any existing parcel before applying for final approval.

(2) Every application for Preliminary Layout Approval shall be tendered in writing in the applicable form prescribed in Schedule "E" and forming part of this bylaw, and shall contain the following information:

(a) The name and postal address of the applicant and the full legal description and location of the lands to be subdivided;

(b) Four copies of a sketch plan drawn to a scale of not less than 1:1000, clearly indicating:

(i) The location, dimensions, areas and boundaries of existing parcels to be subdivided and the boundaries, dimensions and areas of the lots to be created;

(ii) The arrangement of the parcels of land and of the streets which will be created by the subdivision, including the widths of the proposed streets and the approximate dimensions of the proposed parcels of land;

(iii) The relationship of the proposed subdivision to adjoining or adjacent streets and the connections of proposed new streets thereto;

(iv) The scale of the plan and the direction of north thereon;

(v) The anticipated use of the lands being subdivided;

(vi) The locations and dimensions of all buildings and structures, showing setbacks from property lines; and

(vii) The location of creeks, water courses, swamps, ravines, steep slopes and other pertinent topographic features;

(c) A certificate of approval in accordance with Clause 9.0 of Section A-2 of Schedule "H" for lands proposed to be serviced by ground disposal of sewage; and

(d) Evidence that the applicant is the owner of the land or that he has been authorized by the owner to make an application under this bylaw.

(3) Where the parcels of land created by a proposed subdivision do not adjoin existing municipal services, the owner shall be required to submit to the Approving Officer a feasibility report prepared by a qualified engineer or other person acceptable to the Approving Officer setting out all improvements for servicing the parcels of land pursuant to the standards prescribed in Schedule "D" and forming part of this bylaw.

**204 Preliminary Layout Approval**

(1) The Approving Officer shall examine the preliminary application and shall advise the applicant in writing within 60 days of the date of tender:

(a) That the proposed subdivision will be approved subject to the provisions contained in this bylaw governing an application for final approval; or

(b) That the proposed subdivision may be approved subject to such conditions or modifications as the Approving Officer may prescribe; or

(c) That the preliminary approval cannot be considered until the owner supplies to the Approving Officer such additional information or assurance as the Approving Officer shall require; or

(d) That the proposed subdivision is rejected, setting out the reasons for his decision.

(2) Approval given to a preliminary application shall be known as Preliminary Layout Approval.

(3) Preliminary layout approval shall not be construed as:

(a) Approval for land registration; or

(b) Application for subdivision under Section 993 of the Municipal Act; or

(c) Final approval of such subdivision; or

(d) Acceptance by the Town or its Approving Officer of anything except the general layout of the proposed subdivision and a list of minimum conditions which would be taken into consideration on an application for approval under Section 83 through 90 of the Land Title Act.

(4) Preliminary layout approval shall expire 180 days from the date such approval was granted, unless upon application of the owner or his agent, an extension is granted by the Approving Officer for further periods each of not more than 90 days.

(5) If the Approving Officer has reason to anticipate a further subdivision of the relevant lands, the applicant, at the request of the Approving Officer, shall furnish a sketch plan showing the ultimate method of subdivision and showing how the present step fits into such ultimate subdivision.

(6) The Approving Officer may require the applicant to furnish a conceptual design of trunk water main, sanitary sewer and drain facilities if the subdivision is the first or intermediate step of an ultimate subdivision of the relevant land.

(7) The Approving Officer may require the applicant to furnish profiles of every proposed new street and such topographical details as necessary to indicate the engineering problems to be dealt with in designing or constructing streets or lanes.

(8) Where unusual soil or drainage conditions exist on part or all of the lands to be subdivided, the Approving Officer may require the applicant to furnish such information as will enable the Approving Officer to determine the area, shapes and orientations of parcels which will be adequate in view of the nature of the ground and anticipated use of the land.

(9) If the expressed or obvious intention of the application for approval involves the established of a boundary or boundaries in reconciliation with the existing buildings on the affected parcels or where the position of a proposed new boundary is controlled by the location of such buildings and in all cases where the proposed boundary establishment cannot be sufficiently identified on the ground by inspection, the Approving Officer may on the ground by inspection, the Approving Officer may require the owner to produce a plan or sketch, verified by a Land Surveyor, showing the proposed new boundary or boundaries in relation to the affected parcels and to the buildings thereon.

(10) The Approving Officer may require the owner to produce a plan or sketch, verified by a Land Surveyor to show any:

(a) building;

(b) structure;

(c) water course; and

(d) high bank which is located on the lands to be subdivided, or adjacent lands. The sketch or plan will show the location in relation to the lot line of the parcel in which they are situated.

(11) Where a proposed subdivision borders on a Controlled Access Highway, the Approving Officer shall notify the Regional Engineer for the Ministry of Transportation and Highways of the proposal at the time of application for preliminary layout approval.

**205 Design Approval**

(1) The applicant shall tender the design drawings and specifications together with an application in writing in the applicable form prescribed in Schedule “F” and forming part of this bylaw. These shall be accompanied by the letter required by Clause 4.04 of Section A-2 of Schedule “H” of this bylaw, any applications to Senior Governments requiring the signature of the Municipality, and the Town’s fees for having the design drawings and specifications examined by the Municipal Engineering Advisor.

(2) The Approving Officer shall examine the design drawings and specifications and shall advise the applicant in writing within 60 days of the date of tender:

(a) That the design drawings and specifications are approved or

(b) That the design drawings and specifications require amendment and resubmission.

## 206 Application for Final Approval

(1) The final subdivision shall conform substantially to the approved preliminary plan, but the application for final approval need not necessarily cover the whole project in one application. If the subdivision project is submitted in sections, a separate application may be made covering each section.

(2) An application shall be made on the applicable form prescribed in Schedule "G" and forming part of this bylaw.

(3) Early application for final approval of a subdivision:

(a) Payment to the Town of all fees and applicable Development Cost Charges payable for the subdivision and the costs of all construction work required to be done by the Town.

(b) Payment to the Town of all the Town's costs of connecting all utilities to serve the proposed subdivision;

(c) A Certificate from the Town that all taxes which have been assessed on the lands to be subdivided have been paid;

(d) All legal subdivision plans;

(e) The as-constructed drawings, duly certified as required by Clause 2.03 of Section B-2 of Schedule "H";

(f) Schedule "K", the Warranty Agreement.

(g) The security required by the Warranty Agreement;

(h) Any Statutory right-of-way plans and Agreements required;

(i) Copies of all senior government certificates, permits, instructions and comments.

(j) All other documents required by Schedule "G".

(5) Where a subdivision plan is tendered for examination and approval after the expiration of three months from the date of the completion of the survey, the Approving Officer may require that the surveyor inspect the survey and satisfy himself that all posts and monuments are in place and that the survey has not been affected by any intervening survey or right-of-way location, and certify that same on the plan by the work "inspected" with the date and his signature. The surveyor may so inspect and certify before the plan is tendered for approval.

(6) No person shall amend any approved plan of subdivision or any approved design drawings or specifications without first having obtained the approval therefor in writing from the Approving Officer.

## Section 3 DESIGN AND CONSTRUCTION REQUIREMENTS

### 301 Service Levels

All subdivisions shall be provided with services as prescribed in Schedule "D" of this bylaw.

### 302 Design

(1) Lot size, width, depth, shape and orientation shall be appropriate for the location and contemplated use of the subdivision, shall conform to the minimum requirements for the respective zones as listed in the Zoning Bylaw and amendments thereto.

(2) Notwithstanding Subsection (1), pursuant to Section 994 of the Municipal Act the Approving Officer may exempt a parcel from the prescribed minimum frontage requirements.

### 303 Construction Requirements

(1) Where any parcel is to be subdivided, all works and services to be provided shall be located and constructed as prescribed in Schedule "H", Development Works Specifications, and at the sole expense of the owner including:

(a) Roadways and widening of existing roadways immediately adjacent to the subdivision and up to the centre line of the existing highway;

(b) Sidewalks;

(c) Boulevards;

(d) Boulevard crossings;

(e) Transit bays;

(f) Street lighting;

(g) Underground wiring;

(h) Water distribution and fire hydrant system;

(i) Sewage collection and disposal system; and

(j) Drainage collection and disposal system.

(2) All new highways within the subdivision, including widening strips of existing highways, cul-de-sacs, lanes and walkways shall have the dimensions, locations, alignment and gradient prescribed by Schedule “H”, Development Works Specifications and:

(a) The arrangement of streets shall conform in general alignment to any applicable municipal bylaw and the Official Community Plan;

(b) Proposed street alignment shall be sufficient and suitable as determined by the Approving Officer for the anticipated traffic volume and land contours, not only within the area being subdivided, but to the street system already established or which may be required to provide access to the lands lying beyond or around and to the general street pattern of the Town;

(c) Where a subdivision borders on a Controlled Access Highway, as defined in the Highway Act, the Approving Officer shall withhold approval until it has first been approved by the Ministry Approving Officer for the area;

(d) Necessary and reasonable access is to be provided to all new parcels created and through the land being subdivided to lands lying adjacent and beyond the land being subdivided;

(e) The Approving Officer may, at his discretion, approve the creation of a portion of a lane where there is reasonable expectation that the additional width may be acquired through subdivision of contiguous parcels;

(f) The Approving Officer may require that in lieu of a lane, a statutory right-of-way of not less than 3 meters in width for utility purposes be granted in favor of the Town;

(g) Walkways shall be dedicated where necessary with a minimum width of 3 meters to provide convenient pedestrian circulation or access to and from schools, playgrounds, shopping area, watercourses, community facilities and other transportation routes such as cul-de-sacs; and

(h) All structures encroaching upon, and obstructions of any kind to the free and uninterrupted use by the public of the full width and extent of all streets, lanes, walks and utility easements shall be removed.

(3) The water distribution system, sewer system or drainage system required by Schedule “H” shall be connected by trunk mains to the existing Town systems.

(4) Installation of any works and services required for a subdivision shall not commence until:

(a) the Approving Officer has issued a Preliminary Layout Approval; and

(b) the Approving Officer has approved engineering drawings completed by a professional engineer in accordance with Schedule "H" Development Works Specifications.

(5) The Approving Officer or his agent may inspect all construction and installation of all improvements authorized and upon completion of all such improvements, the owner shall submit certified as-constructed drawings consisting of three sets of paper copies and one film copy of the as-constructed drawings to the scale required in Schedule "H", Development Works Specifications.

**304 Storm Water Drainage**

The Approving Officer may require the preparation of a conceptual drainage plan for the proposed subdivision or development in accordance with Section 2.3. of Schedule "H".

**305 Provision of Parkland at Time of Subdivision**

In the case of residential subdivisions where three or more lots are created and the smallest lot created is less than 2 hectares in size, the owner of the land being subdivided shall provide, at Councils option, a public parkland dedication or cash-in lieu payment pursuant to Section 992 of the Municipal Act before final approval of the plan.

**SECTION 4 DEVELOPMENT OF LAND**

**401 Conditions of Issuance of a Building Permit**

As a condition of the issuance of a building permit on a site being either (a) developed but not subdivided, or (b) subdivided under the Condominium Act, the Town may require the owner to provide, at his own expense, works and services which are attributable to the development.

**402 Works and Services**

(1) The Town may require that the owner of a site being developed in accordance with this Section provide the following services:

(a) Paved access roads and parking areas;

(b) Water system and fire hydrants with connection to the community water system;

(c) Sewer system with connection to the community sewer system; and

(d) Drainage system with connection to the community drainage system.

(2) The Town may require that the owner of the site being developed provide improvements on that portion of the highway immediately adjacent to the site being developed, up to the centre line of the highway including:

(a) Highway improvements including sidewalks, boulevards, boulevard crossings, street lighting and underground wiring;

(b) Water system or improvements;

(c) Sanitary sewer system or improvements; and

(d) Drainage system or improvements.

(3) All works and services shall be indicated on a site servicing plan to be submitted as part of the application for a building permit including the following:

(a) the works and services required under Section 402 (1) and 402 (2);

(b) site drainage to show site grading, existing and post-development land contours and method of onsite collection and method of disposal.

(4) All works and services shall be designed and constructed in accordance with Schedule "H", Development Works Specifications.

**403 Design Approval**

(1) The applicant shall tender the design drawings and specifications together with an application in writing in the applicable form prescribed in Schedule "F" and forming part of this bylaw. These shall be accompanied by the letter required by Clause 4.04 of Section A-2 of Schedule "H" of this bylaw and applications to Senior Governments requiring the signature of the Municipality, and the fees for having the design drawings and specifications examined by the Municipal Engineering Advisor.

(2) The Approving Officer shall examine the design drawings and specifications and shall advise the applicant in writing within 60 days of the date of tender:

(a) That the design drawings and specifications are approved or

(b) That the design drawings and specifications require amendment and resubmission.

**404 Application for Building Permit**

Where the construction of works and services is required by the Town as a condition for issuance of a building permit, an application for same shall include:

(a) Payment to the Town of all fees and applicable Development Cost Charges payable for the development and the costs of all construction work required to be done by the Town.

(b) Payment to the Town of all the Town's costs of connecting all utilities to serve the proposed subdivision;

(c) The As Constructed drawings, duly certified as required by Clause 2.03 of Section B-2 of Schedule "H";

(d) Schedule "K", the Warranty Agreement;

(e) The security required by the Warranty Agreement;

(f) Any statutory right-of-way plans and agreements required.

(g) Copies of all senior government certificates, permits, instructions and comments.

(h) All other documents required by Schedule "G".

## SECTION 5 GENERAL PROVISIONS

### 501 Application

The provisions of this bylaw apply to the territorial area of the Town.

### 502 Prohibition

No person shall subdivide or develop land in the Town contrary to the provisions of this bylaw.

### 503 Subdivisions Where Servicing Requirements May be Waived

Notwithstanding Sections 501 and 501, the serving requirements of this bylaw may be waived where the parcel being created is to be used solely for unattended equipment necessary for the operation of:

(a) a community water system;

(b) a community sewer system;

(c) a community gas distribution system;

(d) a radio or television receiving or broadcasting antenna;

(e) a telecommunication relay station;

(f) an air navigational aide;

(g) an automatic telephone exchange;

(h) an electrical substation or power generating station;

(i) parks and playgrounds; or

(j) any other similar public service facility.

**504 Cost of Services**

Unless otherwise provided in this bylaw, 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.

**505 Completion of Works and Services**

(1) All works and services required to be constructed for a subdividion or development shall be constructed and installed to the standards prescribed in Schedule "H", Development Works Specifications, before the Approving Officer approves the subdivision or the Building Inspector issues a permit, unless the owner of the land:

(a) deposits with the Town a security in the form prescribed in Section 505 (2) and,

(b) enters into an agreement with the Town substantially in the form of a Section 991 Servicing Agreement attached hereto as Schedule "E" and forming part of this bylaw.

(2) The security required in Section 505 (1) shall be cash or certified cheque or irrevocable letter of credit in the form attached hereto as Schedule "I" and forming part of this bylaw, and shall be in the amount of 110% of the cost of engineering, construction, installation and completion of the works and services as estimated by the Municipal Engineering Advisor.

(3) Release of the security may be made as follows:

(a) 25% release on satisfactory completion of 25% of the work;

(b) an additional 25% release on satisfactory completion of 50% of the work;

(c) an additional 25% release on satisfactory completion of 75% of the work;

(d) an additional 30% release on satisfactory completion of 100% of the work;

(e) the remaining 5% released within one year after satisfactory completion of the work; and

(f) satisfactory completion of the various stages shall be determined by the Town.

(4) Where an owner of land proposed to be subdivided or developed provides, locates and constructs the works and services required by the bylaw to serve the proposed subdivision or development without entering into a Warranty Agreement with the Town, the owners shall not connect such works or services to any of the sewage, drainage or water works of the Town and the Town shall not accept the works constructed and installed by the owner or any part thereof, until:

(a) The Approving Officer has accepted the works and services;

(b) The proposed subdivision, if any, has received final approval by the Approving Officer;

(c) The owner has deposited with the Approving Officer the as-constructed drawings required by Clause 2.03 of Section B-2 of Schedule "H" of this bylaw;

(d) The owner has caused the approved subdivision plan and Statutory Rights-of-Way plans and agreements to be registered in the Land Title Office. Rights-of way plans and agreements are required where such works and services cross private property, and such Right-of-Way plans and agreements shall be in the form of the Statutory Right-of-way Agreement attached hereto as Schedule "L" and forming part of this bylaw and shall be executed and attested in a form registerable in the Land Title Office.

(e) The owner has entered into an agreement with the Town substantially in the form of Schedule "K", Warranty Agreement.

(5) All works and services constructed for any subdivision or for any land to be developed shall become the property of the Town, free and clear of all encumbrances after:

(a) The Municipal Engineering Advisor has issued his Initial Certificate of Satisfaction.

(b) Final approval of the Approving Officer; and

(c) Completion of registration of the approved plans and Statutory Right-of-Way Plans and Agreements in the Land Title Office.

(6) Upon completion of the work, the owner shall remove from his property and from all public and private property, at his own expense, all materials, supplies, equipment, temporary structures, debris, and materials resulting from his operations.

**506 Excess or Extended Service and Latecomer Payments**

(1) Where the Town requires an owner of land being subdivided or developed to provide a highway, water system, sewer system or drainage system that constitutes excess or extended services as defined in Section 990 of the Municipal Act, the cost of providing the excess or extended service shall be paid for by

(a) The Town, or

(b) The owner, where the Town considers its cost to provide the services to be excessive, and the Town shall require, as a condition of an owner connecting to or using the excess or extended services, the payment of a latecomer charge related to the benefit that the Town determines that the owner's parcel derives from the excess or extended service.

(2) For the purposes of Section 990 (8) of the Municipal Act, the rate of interest included in the charge payable as a condition of an owner connecting to or using an excess or extended service shall be 10% per annum.

**507 Violation and Penalty**

(1) Any person who violates any of the provisions of this bylaw shall, upon summary conviction, be liable to the penalty determined by the Court.

(2) Should any person fail to do anything required to be done by them, pursuant to this bylaw, the Council may direct that such thing be done at the expense of the person in default and that all costs shall be recovered under the security the Town holds under Section 505 of this bylaw, or in the same manner as municipal taxes pursuant to Section 299 of the Municipal Act.

**508 Indemnification**

The owner of lands to be subdivided or developed shall indemnify and save harmless the Town against:

(a) All actions and proceedings, costs, damages, expenses, claims and demands whatsoever and by whomsoever brought by reason of the construction of the said works;

(b) All expenses and costs which may be incurred by reason of the execution of the said works resulting in damage to any property owned in whole or in part

by the Town or which the Town by duty or custom is obliged, directly or indirectly, in any way or to any degree, to construct, repair or maintain, and

(c) All expenses and costs which may be incurred by reason of liens for non-payment of labour or materials, Workers' Compensation assessments, unemployment insurance, Federal or Provincial Tax, checkoff and for encroachments owing to mistakes in survey.

**509 Schedules Form Part of Bylaw**

Schedules "A" through "L" are attached to and form part of this bylaw.

**510 Repealing Bylaws**

Subdivision Control Bylaw No. 26, 1968 and Subdivision Control Bylaw No. 87, 1973 are hereby repealed.

**511 Effective Date**

(1) This bylaw shall come into force and be effective upon date of adoption.

Read a first time the 17th day of January, 1995
Read a second time the 4th day of April, 1995

Read a third time the 4th day of April, 1995

Reconsidered, finally passed and adopted on the 18th day of April 1995

---------- Mayor

---------- Municipal Clerk

Certified to be a true and correct copy of Bylaw No. 414 as adopted April 18, 1995

---------- Municipal Clerk

**TOWN OF PORT MCNEILL**

**SECTION 991 DEVELOPMENT SERVICING AGREEMENT**

**Schedule “A”**

**----------**
(Insert “Subdivision” or “Development”)

**LIST OF APPROVED DESIGN DRAWINGS**

(name them)

**TOWN OF PORT MCNEILL**

**SECTION 991 DEVELOPMENT SERVICING AGREEMENT**

**SCHEDULE “B”**

---
(Insert “Subdivision” or “Development”)

**CERTIFICATE OF COMPLETION**

I hereby certify that the owner has constructed the works and services shown on the following design drawings approved by the Town _____
_____ (name them)
in general conformity with these drawings and the Development Works Specifications of the Town of Port McNeill Subdivision and Development Bylaw No. 414. The “as constructed” drawings of the above works and services are submitted herewith.

_____

**Consulting Engineer** **SEAL**

_____

Date

**TOWN OF PORT MCNEILL**

**SECTION 991 DEVELOPMENT SERVICING AGREEMENT**

**SCHEDULE “C”**

---
(Insert “Subdivision” or “Development”)

---
(Insert “Initial” or “Final”)

**CERTIFICATE OF SATISFACTION**

I hereby certify that the works shown on the following design drawings have been completed to my satisfaction.

Design Drawings: ---------- (name them)
---
---

(For final certificate add: “The warranty obligations of the owner have been satisfied.”)

---
Municipal Engineering Advisor

**SEAL**

---
Date

## SERVICING LEVELS

The following minimum level of services shall be provided in all subdivisions or developments within the Town of Port McNeill.

(1.) A highway with right-of-way width of 20.00 meters including:

- (a) Asphaltic concrete paving on roadways, walkways and lanes.
- (b) Overhead electric power, telephone and cablevision utilities. Where a new highway is not created or where the roadway is to be constructed within an existing right-of-way and the existing or adjoining roads have gravel shoulders, the requirement of curb and gutter may be waived.

(2.) A water distribution system in accordance with Schedule “H”, which is connected to the municipal water system.

(3.) A sewage collection system in accordance with Schedule “H”.

(4.) A drainage system in accordance with Schedule “H”.

(5.) The following servicing requirements may be waived for any new subdivision or development through the issuance of a Development Variance Permit pursuant to Section 974 of the Municipal Act:

- (a) Curb and gutter.
- (b) Drainage system.

**APPLICATION FOR PRELIMINARY LAYOUT APPROVAL FOR SUBDIVISION**

Reference Number: _____

Date: _____ ___, 19__

Applicant' Name: _____

Applicant's Postal Address: _____

Legal description of property _____

Street address of property _____

Type of subdivision: (Check one)

[ ] Conventional
[ ] Section 996, Municipal Act
[ ] Bare Land Strata
[ ] Metes and bounds
[ ] Other _____ (specify)

The proposed water supply is: (Check one)

[ ] By Town water system
[ ] Wells
[ ] Other _____ (specify)

The proposed method of sewage disposal is: (Check one)

[ ] By Town sewer system
[ ] By ground disposal

**I/we hereby apply for Preliminary Layout Approval of a subdivision of the above described property as shown on the attached sketch plan. This subdivision will be in accordance with Bylaw No. 414 and any amendments thereto. The following are submitted as part of this application:**

1. Preliminary plan
2. Copy of Certificate of Indefeasible Title
3. Copy of owner's authorization to applicant (where applicable)

---
Signature of Applicant

## INSTRUCTIONS FOR PREPARATION OF PRELIMINARY PLANS

### 1. THE PLAN

The following should be shown on your preliminary plan:

(a) Date it was drawn

(b) Scale

(c) North Direction

(d) Approximate dimensions and area of all proposed parcels, remainders, parks, and rights-of way.

(e) Unique number or letter identifying each lot to be created.

(f) Outline of your proposal in red or bold line

(g) Legal descriptions of adjacent properties

(h) Any existing property lines or roads proposed to be removed

(i) Any existing or proposed easements or rights-of-way

(j) Existing access roads and other roads or trails on the property (e.g., logging roads, etc)

(k) Location and name of all existing and proposed public roads

(l) All steep banks or slopes within or adjacent to your proposal that exceed 2 m in height, and all slopes that are 25% or greater (It may be more practical to provide overall 2 m contours of such areas)

(m) Elevation with grades and/or contour intervals as required above

(n) All watercourses within or adjacent to the land to be subdivided, and all proposed drainage routes

(o) Approximate location of all existing and proposed utility services

(p) Location of all existing buildings, sources of domestic water, and sewage systems with their offset distances from the lot lines.

(q) Site locations of the soil inspection test holes and the percolation tests each parcel

(r) Approximate extent of area available for sewage disposal surrounding the test holes.

(s) Locations of any on-site water sources to be developed.

(t) Locations of sewage-disposal systems on adjacent properties within 30 m of any external lot line of the proposal.

(u) Other natural or man-made features, such as tree lines, ponds, bridges, traverse lines with hub numbers, etc.

**2. Field Work**

1. Except when identification is obvious, the following should be flagged in the field; the corners of your property, the proposed lot lines, the proposed roads, and the percolation test and soil inspection holes.

2. Soil depth and percolation test holes and rate data will be required for all new parcels less than 2 hectares in area. For larger lots, please check for local Medical Health Unit policy.

**FOR OFFICE USE ONLY**

A. Fees collected: $_____ Receipt No.: _____ By _____
Date: ____, 19__

B. Zoning allows subdivision Yes: _____ No: _____

C. Public Works Department report received
Yes: ____ No: ____ Date: ____ , 19__

D. Municipal Engineering Advisor’s report received
Yes: ____ No: ____ Date: ____, 19__

E. Medical Health Officer’s report received
Yes: ____ No: ____ Date: ____, 19__

F. Evaluation by Approving Officer
Approval___ Rejected ___ Date ___, 19__

G. Applicant advised By: _____ Date____, 19__

**APPLICATION FOR**
**APPROVAL OF DESIGN DRAWINGS (SUBDIVISION OR DEVELOPMENT)**

Reference Number _____

Date _____

Applicant’s Name _____

Applicant’s Address _____

Legal Description of Subdivision _____

Street Location _____

I/we hereby apply for approval of the design drawings (and specifications where applicable) for the above subdivision. The following are submitted as part of this application:

1. 3 paper copies of subdivision plan (for subdivisions only)
2. 3 sets of paper copies of design drawings & specifications.
3. Letter from Consulting Engineer
4. Drain design calculations
5. Senior government permit applications requiring the Town’s signature
6. Fees for Municipal Engineering Advisor studies. ($100.00 plus $100.00 per lot)

_____
Signature of Applicant

**FOR OFFICE USE ONLY**

A. Fees for Municipal Engineering Advisor’s Studies Collected:

$ _____ Receipt No. _____ By: _____ Date: _____

B. Consulting Engineer’s letter received: Date: _____

C. Municipal Engineering Advisor’s report received: Yes:__ No: __ Date: _____

D. Subdivision Plan conforms to PLA: Yes: __ No: __

E. Permit applications signed: By _____ Date: _____

F. Comments:

G. The design drawings (describe them ) were approved by: _____ Date _____

H. Applicant advised by: _____ Date _____

_____
Approving Officer

**APPLICATION FOR FINAL APPROVAL OF SUBDIVISION PLAN**

Reference Number: _____

Date: _____, 19___

Applicant's Name: _____

Applicant's Address: _____

Legal description of Subdivision _____

Street Address of Subdivision: _____

I/we hereby apply for final approval of the above subdivision. The following are submitted as part of this application:

1. Approval fee ($250.00 plus $250.00 per lot) $_____
2. Development cost charges in the amount of: $_____
3. Payment Submitted herewith for construction work to be done by the town: $_____
4. Payment submitted herewith for Town's costs of connecting up utilities: $_____
5. Certificate from the Town that all current taxes have been paid.
6. Plan of subdivision.
7. Three paper copies of plan of subdivision.
8. Three sets of paper copies and one film copy of as-constructed drawings.
9. Warranty agreement.
10. Warranty security.
11. Consulting Engineer's certificate of completion.
12. Municipal Engineering Advisor's Initial Certificate of Satisfaction.
13. The total cost of construction of the works, inclusive of the Consulting Engineer's fees is certified to be: $_____
14. Copy of lawyer's undertaking to register plans and SRW agreement.
15. Copy of Construction certificate issued under Health Act.
16. Copy of Highways permit.
17. Copies of all other senior government certificates, permits, instructions and comments.

_____
Signature of Applicant

**FOR OFFICE USE ONLY**

| | | |
|---|---|---|
| A. | Taxes paid per Sec. 83, Lt Act. | Yes__ No__ |
| B. | Municipal Engineering Advisor's Report Received: | Yes__ No__ Date:____ |
| C. | Evaluation by Approving Officer: | Approved__ Rejected__ |
| D. | Applicant advised | By:____ Date: ____ |
| E. | Approval fees paid | $_____ |
| F. | Town's costs of connecting utilities paid: | Yes __ No __ Amount: _____ Date: _____ |
| G. | Town's costs of construction paid: | Yes __ No __ Amount: _____ Date: _____ |
| H. | Development cost charges paid: | Yes __ No __ Amount: _____ Date: _____ |
| I. | Consulting Engineer's Certificate of Completion received | Yes __ No __ Date: _____ |
| J. | Municipal Engineering Advisor's Initial Certificate of Satisfaction received: | Yes __ No __ Date: _____ |
| K. | As-Constructed Drawings accepted. | By: _____ Date: _____ |
| L. | Applicant advised | By: _____ Date: _____ |
| M. | SRW Plan and Agreement executed | By: _____ Date: _____ |
| N. | Warranty Agreement executed. | By: _____ Date: _____ |
| O. | Warranty Security accepted | By: _____ Date: _____ |
| P. | Lawyer's undertaking received: | Yes __ No__ Date: _____ |
| Q. | Health Act certificate received | Yes __ No __ Date: _____ |
| R. | Highways permit received | Yes __ No __ Date: _____ |
| S. | Building Permits issued | By: _____ Date: _____ |
| T. | Subdivision Plan Deposited: Number: | VIP _____ Date: _____ |
| U. | SRW plans and agreement deposited: | Yes __ No __ |

Particulars: _____ Date: _____

_____
Approving Officer

TOWN OF PORT MCNEILL

# DEVELOPMENT WORKS SPECIFICATIONS
# SCHEDULE “H” BYLAW NO. 414

## 1.0 Scope

1.01 These specifications shall apply to the design and installation of development works within the Town of Port McNeill. They apply to the design and installation of sewers, drains, waterworks, roads and street lighting together with their respective service connections and appurtenances, and any other works which are required to serve developments.

1.02 The Standard Drawings shall form an integral part of these specifications.

1.03 These specifications do not cover the design of installation of ornamental lighting, electric power, telephone or television services, but include the preparation of design and as-constructed drawings for these works.

## 2.0 General

2.01 The following specifications shall apply to all works:

Section A-1 General Introduction
A-2 Development Procedures and Policies
B-1 Preparation of Design Drawings
B-2 Preparation of As-Constructed Drawings
SD-1 Design of Sewers and Drains
SD-2 Installation of Sewers and Drains
W-1 Design of Waterworks
W-2 Installation of Waterworks
T-1 Trenching, Excavating and Backfilling
R-1 Design of Roads
R-2 Construction of Roads
Appendices 1 to 8 inclusive
Standard Drawings

## 1.0 Introduction

1.0 This section described the development procedures and policies of the Town of Port McNeill.

## 2.0 General Information

2.01 The entire cost of design and construction of all works required to serve developments shall be at the expense of the Developer.

2.02 Preparation of all contract drawings and documents shall be carried out by the Consulting Engineer retained by the Developer.

2.03 No building permits shall be issued in relation to any development until:

- The subdivision plan (if any) is deposited.
- The water, sewer and drain works and a road capable of supporting emergency and service vehicles have been installed and recommended for acceptance by the Consulting Engineer.
- The as-constructed drawings for the water, sewer, drain and road works have been delivered to and accepted by the Municipality.

2.04 All works shall be designed and installed as detailed in these specifications and in accordance with the procedure set out herein.

2.05 Where strict compliance with these specifications is impractical or unreasonable, the Municipality may permit a minor deviations shall be included in the Consulting Engineer's as-constructed drawings.

## 3.0 Statutory Rights-of-way and Easements

3.01 All works constructed by the Developer which lie outside of highways ad defined in the Land Title Act shall be within Statutory Rights of way or easements.

3.02 The costs of having the appropriate Statutory Right-of-Way plans and agreements, and easement plans and agreements, and registration of same, shall be borne by the Developer.

3.03 Statutory Right-of-Way [plans and agreements shall be submitted by the Owner to the Municipality for execution. Following execution, the Municipality shall release such documents to the Owner's solicitor on his undertaking to register same.

3.04 Right-of-way documents for electric power, telephone and cablevision facilities shall be prepared and registered by the respective utility companies.

3.05 Where a single sewer, drain or water right-of-way is required, the minimum acceptable width is 3.1 meters.

3.06 Where more than one sewer, drain or water pipe is installed in a right-of-way, the width of the right-of-way must be increased sufficiently to accommodate the pipes required together with no less than 1.2 meters of clearance between the pipes and the right-of-way limit. The minimum acceptable width in this case is 3.7 meters.

3.07 Rights-of-way shall be located within a single property adjacent and parallel to adjacent property boundaries and shall not encumber proposed building sites.

3.08 Rights-of-way shall be provided by the Owner for the future extension of the sewer or drain as required by the Municipal Engineering Advisor.

3.09 Copies of all Statutory Right-of-way plans and agreements, and all easement plans and agreements, showing the particulars of registration in the Land Title Office, shall be submitted by the Owner to the Municipality immediately following registration.

## 4.0 Responsibilities of Consulting Engineer

4.01 The Consulting Engineer shall be appointed and paid by the Owner and shall render his services pursuant to a contract with the Owner.

4.02 The Consulting Engineer shall be responsible for the design of the works, approval of material used, layout of the works upon the ground, field observation of construction, field measurements of works constructed and the preparation of as-constructed drawing.

4.03 Field observation of construction shall consist of applying such selective sampling procedures at the site as the Consulting Engineer, in his sole professional discretion considers necessary to enable him to ascertain whether the contractor is constructing the works in general conformity with the design drawings for the project and this specification. When requested, the Consulting Engineer shall submit copies of his reports of field observations to the Municipality.

4.04 The Consulting Engineer shall submit to the Municipality a letter confirming that he has entered into a contract with the Owner which authorizes him to provide the level of professional engineering services required by Clauses 4.02 and 4.03 above.

4.05 The Consulting Engineer shall notify the municipality in writing as soon as possible if his contract is terminated at any time prior to the completion and acceptance of works for which he has prepared design drawings.

4.06 The design drawings shall conform to all the Preliminary Layout Approval, this specification, all applicable by-laws of the Municipality and all acts of senior governments.

4.07 If the Consulting Engineer wishes to make any changes in approved design drawings following the approval by the Municipality, he shall submit the changed design drawings to the Municipality in the same manner as the original design drawings.

4.08 In addition to the field observations by the Consulting Engineer, representatives of the Municipality may periodically inspect the works. They shall bring to the attention of the Consulting Engineer the use of unacceptable materials or the performance of unacceptable work or other objections. If remedial action is not taken to the satisfaction of the approving Officer, the Engineer that construction is to cease until remedial action is taken.

## 5.0 Approval of Design Drawings

5.01 Three sets of paper prints of the design drawings shall be submitted to the Municipality, together with the application in Schedule “C”.

5.02 After review of the drawings, the Consulting Engineer will be advised if they are acceptable, or if amendments are required.

5.03 When any requested amendments have been made, the Consulting Engineer shall resubmit two sets of paper prints of drawings as amended.

5.04 Upon it being satisfied with the design drawings and specifications, the Municipality shall issue an approval in the form of Schedule “C”.

5.05 No construction of the works shall be commenced before the design drawings have been approved. A copy of these specifications and the approved Design Drawings shall be retained by the Contractor at the site during construction of the works.

5.06 No sewer, drain or water main within a development shall be permitted to operate as part of the related Municipal systems until the works have been accepted by the Municipality.

## 6.0 Approval by Senior Governments

6.01 Where permits or authorizations are required from senior governments, the Applicant shall apply for these Developments adjacent to, affected by, or affecting the following, will require the appropriate applications to the appropriate senior government agency.

Ministry of Transportation and Highways
(Access and Construction Permits)
Ministry of Health (Waterworks Construction Permits)
Ministry of Environment (Waterworks Approvals)
Navigable Water Protection Act
(Permits for Work in Navigable Waters)
Canada Post (Super Mail Box Locations)

The appropriate applications shall be prepared by the Applicant and submitted to the Municipality for signature prior to submission to the senior government agency. Copies of all permits and approvals issued by those agencies shall be forwarded by the Owner to the Municipality.

## 7.0 Warranty of Construction

7.01 Pursuant to Section 2.06 of the Subdivision and Development By-law, the Owner shall enter into an agreement in the form Schedule “G”.

7.02 The Owner shall be responsible for and at his own expense execute all work, repair, alteration, reconstruction or replacement required to remedy any defect, fault or deficiency in or developing in the completed work not only up to the receipt and acceptance of the Consulting Engineer’s as-constructed drawings but also during the period of warranty of twelve months after the date of acceptance of the as-constructed drawings..

7.03 The Owner shall guarantee the workmanship and the performance of the required work by the submission to the Municipality of a certified check or an Irrevocable Letter of Credit for five percent of the total cost of construction of the works as certified by the Owner in the form in Schedule “D” to the Subdivision and Development By-law, or five hundred dollars, whichever is greater.

7.04 All such work of rectification, repair and warranty shall be executed upon the written request of the Municipality. Should the Owner neglect or fail to commence execution of such work within the time set by the Municipality, the Municipality shall complete the remedial work according to the terms of the Warranty

Agreement. The Municipality shall cash the security deposit and deduct its costs of performing the required work from the proceeds thereof.

7.05 If no defects or deficiencies have developed during the period of warranty, the security deposit shall be returned to the owner.

## 8.0 Approval of As-Constructed Drawings

8.01 Upon it being satisfied with the as-constructed drawings, the Municipality shall issue an approval in the form of Schedule "D".

## 9.0 On-Site Sewage Disposal

When on-site sewage effluent disposal is permitted, the design and installation of such system shall be in compliance with the regulations of the Ministry of Health, the Upper Island Health Unit, or the Ministry of Environment depending on the required capacity of the proposed system and a certificate approval or other proof of compliance obtained from the relevant authority.

## 1.0 Scope

1.01 This specification shall govern the preparation of all engineering drawings for design of services within the Municipality.

## 2.0 General

2.01 Any information received from the Municipality on existing services shall be used as a general guide only. Locations and elevations must be checked by actual survey. The Municipality assumes no responsibility for the exactness of works information obtained from municipal drawings. Underground locations shall be confirmed with utility companies.

2.02 Vertical control shall be shown in metric to the Port McNeill datu. Bench mark numbers, locations and elevations can be obtained from the Municipality. The reference bench mark and elevation shall be shown on the design drawing.

2.03 Show the elevation of all; iron survey posts, existing basement floors and, where the building site is less than 1 m above the road level, any proposed basement floor elevation. This information and connection information may be in pencil at the design stage but shall be in ink for as-built drawing submission. For subdivisions, indicate by shading the potential building envelope and, where land is below the calculated minimum floor elevation, show elevations at corners of the envelope or show a centre of lot profile to determine the amount of fill required for building.

2.04 All existing statutory rights-of-way or easements and their permitted uses must be checked through the Land Title Office and be shown lightly shaded on the design drawing. Registration and plan numbers shall be shown.

2.05 All proposed rights-of-way for new works are to be shown as a dashed line. Theses shall be tied to the iron pin in each lot, together with their width, permitted use, and the note “to be acquired” or “proposed”. Statutory Right-of-way documents shall be prepared as detailed in these specifications.

2.06 A north arrow, existing and proposed street names shall be shown on the design drawing. The north shall be generally oriented towards the top of the sheet.

2.07 All works shall generally be shown on one plan with curbs (mountable or non-mountable), sidewalks, sewers, drains, gas, water, and underground wiring and poles identified as MC or NMC, S/W, S, D, G, W and U/G, H or T respectively. Other services shall be clearly designated on the drawing.

2.08 Existing water mains, sanitary sewer mains, storm drains (including all appurtenances), ditches, pavement, curbs, sidewalks, underground wiring, gas, poles, trees, service connections and other underground utilities shall be indicated in plan and profile where applicable.

2.09 All proposed works shall be fully dimensioned as specified.

## 3.0 Drawing Information

3.01 Standard sheet size is A1 metric size is 594 mm x 841 mm.

3.02 Use transparent plan/profile paper. Personalized company plan/ profile paper may be used provided it meets the following requirements:

1) Plan view shall be in the lower half of the page.

2) Profile view shall be 1 x 5 lines to the centimetre and occupy the upper half of the page.

The use of plan on one sheet and profile on a second sheet shall not be allowed.

3.03 Dimensioning of the drawing shall be given from an existing or proposed iron pin or lot line.

3.04 Proposed construction shall be shown as solid lines and the existing shown as dashed lines.

3.05 Lines printing shall be of uniform size using the following weights for: Lot lines #.25; Road lines #.5; sewer, drain, water lines #.35. Construction notes shall be confined to a separate “note” column, wherever possible, with numbered references in plan or profile.

3.06 Road Chainage shall be tied to an iron survey post at the start of construction.

## 4.0 Scales

| | | |
|---|---|---|
| Normality: | Horizontal 1:500 | Vertical 1:100 or 1:50 |
| Details: | Horizontal 1:200 | Vertical 1:20 or 1:50 |
| Cross Sections: | Horizontal 1:000 | Vertical 1:100 |
| Structural Details | 1:20 | |

* e.g.: a detail of piping around two closely spaced manholes

## 5.0 Requirements for Subdivision Key Plan

5.01 A key plan, shall be included on the right side of the design drawing and shall include the following information:

a) Plan of adjacent streets and existing lots with streets named and legal description of adjacent lots given:

b) Civic address with the property being subdivided shown shaded;

c) North arrow;

d) The location of existing and proposed hydrants:

e) Title: “Proposed Subdivision of (give full legal description”;

f) If the subdivision is to be developed in stages, each proposed stage shall be clearly outlined and order of development indicated.

## 6.0 Requirements for Roads or Parking Areas.

6.01 Show all iron posts adjacent to the works and the existing ground elevation at each post or proposed post.

6.02 Both plan and profile shall be tied to an iron post, preferably near or at 0 +) chainage. If the chainage exceeds 120 m, a second tie shall be shown.

6.03 Show the road width, curb and sidewalk offsets measured from the property line.

6.04 Road profiles shall show gutter elevations, except centre line profiles will be used where thee are no curbs.

6.05 Detail the road construction with a cross sectional view of construction when circumstances require special consideration. In all cases the standard drawing section shall be referenced on the drawing.

6.06 The profile shall be shown at true centerline length and provided in as close relationship as possible to the plan.

6.07 Locate catch basins.

6.08 Locate barricades.

6.09 Locate ditches and centre of pavement in minimum road construction by offsetting to property line.

6.10 Existing and proposed critical driveway locations within the subdivision shall be shown as well as a profile of each driveway from the road centerline to the end of the driveway within the property.

6.11 Chainage of the BC and EC of horizontal curves shall be shown together with the internal angle, tangent length, arc and centerline radius. Curb radii shall be shown.

6.12 The percent grade to two decimal places shall be shown on the profile together with the following information on vertical curves:

a) The chainage and elevations of BVC, EVC, and VPI;

b) The value, the external, e;

c) The length of vertical curve;

d) The elevation and chainage of the low spot of sag curves.

6.13 On superelevated curves and cul-de-sacs on vertical and horizontal curves, show a gutter profile (no centerline profile).

## 7.0 Requirements for Sewer and Drain

7.01 The following information shall be shown on the profile:

a) Size, type, class of pipe, class of bedding:

b) Percent grades to two decimal places. If critical, mark “CR” after the grade, if not critical, show the minimum grade thus: (1.08% min.);

c) Invert elevations at both inlet and outlet of manholes;

d) Information on vertical curves as detailed in paragraph 6.12);

e) Existing utilities.

7.02 The following information shall be shown on the plan;

a) Information on horizontal curves as detailed in paragraph 6.11;

b) Pipe offsets from property line:

c) The grade of the service connection pipe from the upper end to the drop to the main if other than two percent.

7.03 The following additional information shall also be shown on the appropriate part of the drawing:

a) Letter sanitary sewer manholes and cleanouts;

b) Number storm drain manholes, cleanouts and silt traps;

c) Structural detail of all manholes not covered by Municipal Standard Drawings SD1 and SD2.

## 8.0 Requirements for Water

8.01 Drawings shall indicate whether the water main passes over or under other underground utilities which it is crossing, shown or .

8.02 The following information shall be shown on the profile:

The size, type and class of pipe, and class of bedding.

a) The size, type and class of pipe, and class of bedding.

b) For mains 200 mm and larger, profile grades to 2 decimal places.

8.03 The following information shall be shown on the plan;

a) The offset of the main centerline from the property line.

b) Where short pipe lengths are required on curves, refer to paragraph 3.11 of Section W1.

c) Extent of work required of the Municipality, if any, in making the connection to the existing water main.

## 9.0 Requirements for Other Utilities

9.01 Complete details of other utilities shall be obtained from the appropriate utility company.

9.02 The following information shall be shown on the plan:

a) Existing utilities.

b) Utility offset from property line and/or iron pin.

c) Lot connections and other appurtenances.

d) Existing and proposed poles shall be dimensioned from the pole road face to property line and/or survey post.

9.03 Underground hydro, telephone and gas shall be shown schematically.

## 10.0 Requirements for Street Lighting

10.01 The following information shall be shown on the plan:

a) Location of existing luninaries.

b) Location, type and wattage or proposed luminaires.

c) Line diagram and junction boxes.

## 1.0 Scope

1.01 This specification shall govern as-constructed drawings of the following services; drains, sewers, water, roads, curbs, lighting, side-walks, overhead power, telephone and cablevision, culverts, bridges, and other miscellaneous permanent structures.

## 2.0 General

2.01 As-constructed drawings shall consist of one mylar copy of the approved design drawing with changes or corrections made as required in Section 2.02.

2.02 The as-constructed drawings shall clearly show the location of all services as installed using offsets from survey posts. The locations will be shown with the current dimensions. In addition, the location to the end of underground pipe shall be shown.

2.03 For each run of pipeline, the Engineer shall assign a station 0+000 to some surface box or other component and shall give the chainage for each component or fitting along the axis of the pipe from the assigned station 0+000 to the end of that run.

2.04 Within two weeks of completion of water and within four weeks of completion of all other services to be installed by the Applicant, the Consulting Engineer shall deliver "as-constructed" drawings to the Municipal Engineering Advisor. These drawings shall be in the form of mylar copies and shall include the following statement signed, sealed and dated by the Consulting Engineer:

> "I certify that the following services (name them) were inspected during construction and to the best of my knowledge, were installed in general conformity with the Municipal Development works Specifications and Standard Drawings and as shown on this drawing."

## 3.0 Tolerances

3.01 a) All horizontal dimensions shall be to the nearest 150 mm;

b) All vertical elevations to the nearest 3 mm except that ground elevations and service connection inverts at property line shall be to the nearest 30 mm;

c) Road horizontal locations shall be to the nearest 30, mm;

d) Road vertical locations shall be to the nearest 15 mm.

e)

## 4.0 Additional Required Details

4.01 Drain and sewer

a) Location of rock cuts and hardpan requiring blasting, and depth of rock excavation;

b) The invert elevation at both inlet and outlet of manholes:

c) Tie locations of manholes, cleanouts and other appurtenances to survey posts.

d) Locate catch basin leads at the main by measurement from the center of the downstream manhole:

e) Locate service connections at property line showing distance from the nearest survey post and at the main by chainage from the centre of the downstream manhole.

f) Show ground and invert elevations of sewer and drain service connections at the property line or edge of right-of-way.

4.02 Water

a) Show water service and tie to corner survey post;

b) Location of rock cuts and maximum depth of rock excavation;

c) Profile of main indicating numerically the invert at 15 m stations;

d) Tie locations of fire hydrants to main valve and survey post;

e) Locate all valves and tie to iron poles.

4.03 Road, Curb and Sidewalk

a) Location and dimensions of service connections and all surface appurtenances, tied to survey posts.

4.04 Underground Power, Telephone and Cablevision

a) Location and dimensions of service connections and all surface appurtenances, tied to survey posts.

4.05 Bridges, Etc.

a) Location of structure;

b) Elevation of deck.

4.06 Lighting and Traffic Control

a) Location of luminaires tied to a survey post.

b) Line diagram;

c) Connection points to B.C. Hydro and photo electric controllers.

## 1.0 Scope

1.01 This specification shall govern the design of all sewers and drain pipes and their appurtenances within the Municipality.

## 2.0 General

2.01 The Municipality reserves the right to make all connections or alterations to existing sewer and drain systems at the expense of the Applicant where it can be demonstrated that such works are necessary to accommodate the Applicant's development.

2.02 Upstream sewerage areas and other criteria required to accommodate upstream sewerage is normally specified by the Municipality.

2.03 Sewer design shall conform with the current "Guidelines for Assessing Sewerage Works" as prepared by the Ministry of the Environment of the Province of British Columbia.

2.04 In area subject to excessive overland flows, or in seepage areas, french drains, diversion ditches, catch basins, etc. as required shall be installed and connected to acceptable outlets.

2.05 Only one single catch basin shall be connected to each 150 mm lead.

2.06 Catch basins shall be located in accordance with Regional Specification R-1 and installed in accordance with Regional Specifications R-2.

2.07 Discharges from commercial garages shall be intercepted by combination silt trap/grease interceptors prior to entering the Municipal storm drain system.

2.08 Open ditches shall enter an enclosed storm drain system through a silt trap.

2.09 Driveway culverts shall be a minimum 300 mm diameter and 6.0 m in length.

## 3.0 Drainage Design Criteria: Runoff Prediction

3.01 Upstream drainage areas and other criteria required to accommodate upstream drainage will be specified by the Municipal Engineering Advisor upon application from the Consulting Engineer.

3.02 It shall be the responsibility of the Consulting Engineer to summarize drainage computations pertaining to that project and submit this data to the Municipality for approval together with a contour plan (scale 1:2500 where available) showing the drainage boundaries.

3.03 Subject to the approval of the Municipality, the principles of stormwater management – "zero increase in runoff" may be incorporated into the design of storm drains.

3.04 The recurrence interval used in designing storm drains up to and including 900 mm shall be ten years. Drains greater than 900 mm shall be designed to 25 years.

3.05 The intensity-duration curve to be used will be that included in these specifications.

3.06 Drain pipes shall be designed according to the following version of Rational Formula, Q=1.3AIR where Q=flow in cfs, Area = tributary area in acres, R = the coefficient of runoff from clause 3.07 below.

3.07 The following minimum values shall be used for the inlet time to the upstream end of nonextendable storm drain lines and for the coefficient of runoff (R)

a) Unimproved areas, parks, playgrounds, cemeteries, etc – inlet time to be determined using standard engineering practice and R = 0.35.

b) Residential areas – low density, single family dwelling neighbourhoods – inlet time = 10 minutes and R = 0.60.

c) High density and largely impervious areas – inlet time = 5.0 minutes and 0.90 <R <1.0.

The above standards are minimum values only. Composite values based on percentages of different types of contributory areas may be established from the above figures. Future land use, as detailed in the Community Plan, shall be incorporated in the design.

## 4.0 Sewer and Drain Design Criteria: Pipe Capacity

4.01 Pipes shall be designed to carry the required design flow when flowing full except for pipes carrying flows less than that required for the minimum pipe size.

4.02 Pipe capacity shall be determined by the Manning Formula using the following roughness coefficients:

n = 0.013 for concrete pipes
n = 0.011 for P.V.C pipe.

4.03 The minimum grade for drains shall be that which produces a velocity of 0.9 metres per second in the pipe when flowing full.

The minimum grade of sewers shall be that which produces a minimum velocity of 0.61 metres per second in the pipe. However, a velocity of 0.9 metres per second must be obtained in the pipe above the last manhole of a non-extendable system.

4.04 Drain service connections for other than single family dwellings shall be sized according to the criteria contained in the B.C Plumbing Code. Manholes shall be installed at the junction with the main line of all service connections greater than 150 mm in diameter.

4.05 Sewer service connections for other than single family dwellings shall be designed according to criteria contained herein for main lines.

4.06 Main sewers shall not be less than 150 mm in diameter and main drains shall not be less than 300 mm in diameter,

## 5.0 Materials

5.01 The following pipe is permitted for sanitary sewers and drains.

| Diameter | Material and Class | Use | Current Standard |
|---|---|---|---|
| 200mm to 900mm | Concrete- non reinforced class 3 | main drains<br>main sewers | ASTM C14 |
| 300mm to 3600 | Concrete-reinforced | main drain<br>Driveway culverts<br>main sewers | ASTM C76 |
| 250 mm and up | CMP (galvanized) | Driveway culverts | CGSB 34GP-96 |

| | | | |
|---|---|---|---|
| 150mm to 400 mm | Ductile Iron – 1035 kPa | for main drains or catch basin leads main sewer | AWWA C151-76 |
| 100mm and 150mm | PVC Gravity Sewer Pipe DR 28, pipe stiffness of not less than 690 KPa with rubber gasket and integral bell. | 100mm and 150mm for service connections 150mm for catch leads | CSA B182.1 ASTM D2412-73 |
| 200mm to 375mm | PVC Gravity Sewer Pipe DR 35, pipe stiffness of not less than 320 KPa with rubber gasket and integral | main drains 200mm for double catch basin leads main sewers | ASTM D3034 CSA B182.2 ASTM D2412-73 |
| 200mm to 1200mm | Ribbed PVC gravity sewer pipe with rubber gasket, pipe stiffness of not less than 320 KPa | main drains | CSA B182.4 ASTM F-794 UNI-B-9-82 |

## 6.0 Field Support Strength

6.01 The class and type of pipe and fittings, together with required class of bedding and trench widths shall be so selected that the pipe will support the anticipated gravity earth and any surface dead and live loads with a safety factor 1.5.

6.02 Minimum cover for PVC pipe shall be 750mm. For installations under areas used for vehicular traffic, minimum cover shall be 1.0 m. Minimum cover for rigid pipe shall be 500 m. For installations under areas used for vehicular traffic, minimum cover shall be 1.0 m., except for catch basin leads.

## 7.0 Alignment and Grade

7.01 Pipe lines shall normally be designed to follow a straight alignment and constant grade between manholes.

7.02 a) Curves will normally only be acceptable when a straight alignment and Constant grade between manholes is not feasible.

constant grade between manholes is not feasible.

b)

b) The radius of a horizontal curve shall be not less than 60 m, or that radius recommended by the pipe manufacturer, whichever is the greater.

c) A vertical curve must not be less than 30 m in length. The curve must be designed so that the pipe deflection does not exceed the manufacturer's specifications.

d) Only one curve, either horizontal or vertical, will be permitted between manholes, unless approved by the Municipal Engineer.

## 8.0 Location of Services

8.01 Sewers and drains should be located within the road allowance where possible. Service connections shall be installed to each proposed lot, connected to the main, and where feasible in a common trench with other services. Connections shall be made at right angles to the main within the frontage of the lot being served.

8.02 Service connections shall be extended to the edge of any right-of-way.

8.03 Where sewers or drains can be extended to accommodate future subdivisions upstream, the main shall be extended to the limits of the subdivision, and cleanouts installed at those locations.

## 9.0 Manhole and Cleanouts

9.01 The maximum distance between sewer and drain manholes may vary according to the pipe diameters as shown in the table below:

| Pipe diameter | Maximum Spacing |
|---|---|
| 200 mm up to and including 375 mm | 120 metres |
| 400 mm up to and including 1200 mm | 180 metres |
| Over 1200 mm | 300 metres |

9.02 Manholes shall be provided at the following additional locations:

a) At all changes of grade and/or alignment, except as provided in section 7.0 of this specification;

b) At all changes of pipe size;

c) At all pipe junctions other than service connections and catch basin leads. See 4.04 for exception.

d) Where service connection is the same size as the main.

9.03 Drop manholes will be allowed only where particular circumstances preclude the use of normal manholes. These shall be constructed wherever the change in invert elevations through the manhole is greater than 600 mm.

Allowance shall be made in the design for the effect of the resulting turbulence on the hydraulic capacity of the system.

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

a) Allowances for energy losses or changes in velocity are to be determined in accordance with sound hydraulic principles.

b) Junctions will require special treatment as will all situations involving a pipe flowing into a smaller pipe at a steeper grade.

9.05 All manholes with pipes 450 mm or larger shall be individually designed.

9.06 Stubs shall be placed in manholes to allow for future connections. The length of the stubs shall be 600 mm maximum from the outside of the manhole. The end shall be securely capped.

9.07 Cleanouts shall be installed at the upstream end of all sewer and storm drain lines.

## 1.0 Scope

1.01 This specification shall govern the installation of all sewer and drain pipes and their appurtenances within the Municipality.

## 2.0 General

2.01 Provision shall be made to maintain the flow of all drains, ditches, watercourses, and service connections which may be encountered with during the progress of the work. Where substandard systems are anticipated or located during construction, the substandard system shall be connected to the new installation or replaced. In every case the contractor or Consulting Engineer shall notify the Municipality when substandard systems are found. The contents of any sewer, drain or service connection shall not be allowed to flow into the trench or into the main. All offensive matter shall be immediately removed from the proximity of the work.

2.02 The Contractor shall ensure debris and mortar droppings do not enter any part of the sewer or drain system and shall leave all pipe lines, manholes, cleanouts, silt traps, catchbasins, and other appurtenances in a thoroughly clean condition.

## 3.0 Bedding

3.01 The class of bedding shall be as indicated on the approved design drawing.

3.02 All small diameter non-rigid (PVC) pipe to be provided with minimum Class B bedding compacted to 95% Standard Proctor Density.

3.03 All non-rigid (PVC) catch basin leads must be bedded according to the latest ASTM D 2321 Class II or better, compacted to 95%. Standard Proctor Density.

3.04 Ribbed PVC pipe must be bedded in accordance with the latest ASTM D2321, Class II or better.

## 4.0 Installation

4.01 Pipes shall be handled, stored and laid in accordance with the recommendations of the pipe manufacturer. In all cases gaskets shall be installed unless otherwise specified by the Municipal Engineering Advisor.

4.02 All pipe shall be laid to the designed grades and alignment within the following tolerances:

a) Horizontal tolerance from true alignment shall not be greater than 60 mm from the designed location and the rate of deviation shall not exceed 40 mm in 10 m.

b) Vertical tolerance from true grade shall not exceed the limitations as detailed in the table below:

| Grade | Maximum departure from design elevation | Maximum departure from rate of deviation |
|---|---|---|
| over 5% | 30 mm | 6 mm in 3 m |
| 2% to 5% | 15 mm | 3 mm in 3 m |
| less than 2 % | 6 mm | 3 mm in 3 m |

4.03 Where a sewer is being constructed as an extension to an existing Municipal system, the end of the existing pipe shall remain sealed until the sewer extension is completed, flushed, tested and accepted by the Municipality. Upon acceptance, the seal may be removed and one length of pipe installed to connect the extension to the existing system.

4.04 Service connections over 26 m in length shall be provided with a buried cleanout ever 26 m. A buried cleanout shall be provided when the service crosses a street boundary.

4.05 Where drains and sewers are installed in a common trench, there shall be a minimum 150 mm lateral clearance between the walls of adjacent pipes and between the walls of the pipes and the trench walls.

## 5.0 Manhole, Cleanout, Silt Trap and Catch Basin Construction

5.01 Manholes other than standard manholes shall be constructed as shown on the approved design drawings.

5.02 Cast-in-place manholes shall be allowed provided that the following criteria are observed:

a) Concrete shall attain a minimum strength of 20 MPA at 28 days;

b) Minimum wall thickness shall be 150 mm;

c) Minimum internal dimensions shall be as detailed on Municipal Standard Drawings for standard manholes.

5.03 The manhole frames shall sit on at least one course of mortared concrete brick or approved alternate which shall be parged on both sides with a mortar paste composed of one part cement and three parts of sand and only sufficient water for workability.

a) Grade adjustment of this type shall not exceed 250 mm. Bricks laid for adjustment shall be laid in headers.

5.04 Within the travelled portion of the road, heavy duty 200 mm frames and covers shall be installed on manholes, silt traps and cleanouts.

5.05 Within sewer or drain rights-of-way:

a) Heavy duty 200 mm frames and covers shall be installed on manholes, silt traps and clean outs in travelled areas where it is known at the time of construction.

b) Medium duty 100 mm covers shall be used in non-travelled areas.

5.06 All manholes and cleanouts not within the travelled portion of the road shall be set to finished landscaped elevation or 75 mm above existing grade if landscaped elevation is not available.

5.07 The area around silt trap shall be graded so that surface runoff enters the grilled lid. The ditch sides and bottom around an inlet or outlet shall be rip-rapped for a minimum length of 1.5 m beyond the end of the pipe.

## 6.0 Testing

6.01 Sewer pipe other than P.V.C shall be tested at an average internal air pressure of 3.0 pounds per square inch greater than the back pressure of any ground water that may submerge the pipe. Ground water pressure shall be measured at the crown of the pipe at the lower end of the section under test. The maximum rate of air loss shall not be greater than 0.0030 cubic feet of free air per minute per square foot of internal pipe surface.

6.02 The requirement of paragraph 6.01 shall be considered satisfied if the time, in seconds, required for the pressure to decrease from 3.5 pounds to 2.5 pounds per square inch greater than the back pressure of ground water as measured in paragraph 6.01 is not less than the allowable time calculated as follows:

a) List diameters and lengths of all pipes under test.

b) Calculate for $K = 0.011d^2 L$ where d = diameter of pipe in inches and L = length in feet of pipe of diameter "d".

c) Calculate a value for $C = 0.0003882dL$ where d = diameter of pipe and L = length of pipe of diameter "d".

d) Add all up to values of K

e) Add up all the values of C.

f) If the total off C values is less than one, the total of all K values is the allowable time in seconds.

g) If the total of all C values is great than one, divide the total of all K values by the total of all C values. The result is the allowable time in seconds.

6.03 Alternate Tests – Sewer

a) Infiltration – The maximum allowable amount of infiltration from ground water or other sources into the section under test shall be 100 gallons per inch of pipe diameter per mile per 24 hours.

b) Exfiltration – The maximum allowable amount of exfiltration from section of sewer under test shall be a rate not greater than the manufacturer's specification for the pipe being tested.

c) Modified Air Test – The test length shall be subjected to air pressure equivalent to a four-inch head of water. Leakage from the pipe shall be considered acceptable if, after disconnecting the air source, the pressure drop in five minutes is not more than one-inch head of water.

6.04 Air Test for P.V.C Sewer Pipe

The air test shall conform to the procedures outlined in Uni-Bell Plastic Pipe Association "Handbook for P.V.C Pipe" – Appendix Uni-B-6-79 or subsequent issues and is generally as follows:

The duration permitted for a prescribed low pressure air exfiltration pressure drop between two consecutive manholes shall be not less than that shown in Table A. The prescribed drop shall not exceed 0.5 psi from 3.5 to 3.0 psi in excess of the ground water pressure above the top of the sewer.

Table A

Minimum Duration for Air Test Pressure Drop

| Pipe Size | | Time |
|---|---|---|
| Inches | mm | Minutes |
| 4 | 100 | 2 ½ |
| 6 | 150 | 4 |
| 8 | 200 | 5 |
| 10 | 250 | 6½ |
| 12 | 300 | 7½ |
| 15 | 380 | 9½ |

6.05 It is to be noted that the foregoing calculations are made using Imperial units of measurement.

6.06 Video Camera inspection, Sewer or Drain.

If the Municipal Engineering Advisor has reason to question the quality of the construction of any sewer or drain prior to acceptance of it, the Consulting Engineer shall arrange for a video camera inspection of the line. The recording tape shall be provided to the Municipal Engineering Advisor complete with the camera operator's written report. If any unacceptable work is noted during the camera work, the work shall be repaired and re-tested.

Where blasting is required in proximity to existing mains, a video camera inspection of the existing main may be required prior to and after blasting as detailed for new mains.

## 1.0 Scope

1.01 This specification shall govern the design of all water pipe and waterworks appurtenances within the Municipality.

## 2.0 General

2.01 Connection of a new pipe line to an existing water main shall be done by Contractor under the direction of the Municipal forces.

2.02 Where a water main is to be extended, the water main and service connections shall be installed by the Applicant.

2.03 Water mains shall not be extended unless the residual pressure will be greater than 240 kPa during average daily demand. The main shall be capable of delivering a minimum dynamic pressure at the building (top floor) of not less than 240 kPa (35 psi).

2.04 Fire flows for single family residential areas shall not be less than 2000 l/m (400 gpm) for one hour duration in addition to domestic consumption at maximum daily rate. Residual pressure shall not be less than 140 kPa (20 psi).

## 3.0 Location

3.01 The water main shall be located within a road allowance parallel to the property lines in accordance with Standard Drawing R3.

3.02 The water service connection shall be located in the road allowance fronting the lot to be served.

3.03 When the water main is located in a Municipal right-of-way, it shall be PVC pipe or ductile iron pipe.

3.04 The water main shall be installed along at least the full frontage of each lot to be served. The water main shall be extended to the most convenient existing water main that will provide an adequate supply of water. The water main shall extend at least 1.25 m beyond the pavement for extendible roads but shall terminate 1.25 m inside the curb line of the extreme end of a permanent cul-de-sac.

3.05 The water main shall not be located within 1 m of any utility pole.

3.06 Where it is necessary for the water main to cross other underground services the crossing shall be made at an angle greater then 20º and the vertical clearance between services at the crossing point shall be not less than 75 mm.

3.07 At any location there shall be a minimum linear horizontal clearance of 1 m between the water main and other existing or proposed underground services or open ditches, except sanitary sewers, unless an approved construction technique is employed. A minimum linear horizontal clearance of 3 m shall be maintained between the water main and a sanitary sewer with the exception that in rock or hardpan the water main may be located on a bench with continuous support and having a horizontal separation of 300 mm minimum and the invert of the water main a minimum of 300 mm above the crown of the sanitary sewer.

3.08 At all intersections the pipe shall connect to existing mains, with a minimum of two valves.

3.09 When the new pipe line is connected to more than one existing main, the larger existing main shall be considered upstream; in the case of identical size mains, flow direction is optional.

3.10 Where the final road pattern creates a weak water main network, a supplementary connection of a minimum of 150 mm diameter to an existing main shall be required and may necessitate the provision of a 3.1 m right-of-way in favor of the Municipality.

3.11 a) On a curve the minimum permissible pipe line radius with a 5.5 m length of ductile pipe shall be 60 m. A shorter radius shall be allowed with shorter pipe lengths provided the radius is not less than the manufacturer's minimum.

b) For P.V.C. pipe in 6.1 m lengths the minimum radius of curvature shall be as follows

150 mm pipe – 70 m
200 mm pipe – 91 m

3.12 At all dead ends, provision shall be made for flushing the completed main prior to filling and testing. Provision shall also be made for expelling air during filling by the installation of double acting air valves or main cocks where necessary. The initial flush shall be through a port which shall be a minimum of ½ the diameter of the main.

3.13 All water mains 200 mm diameter and larger shall be installed to a designed grade.

## 4.0 Pipe Size

4.01 Water mains shall be a minimum of 150 mm diameter.

4.02 Water service connections for single family residences or duplexes shall be 19 mm or 25 mm.

## 5.0 Materials

5.01 All pipe and fittings shall conform to the current C.S.A, A.W.W.A, or A.S.T.M. specifications for a working pressure of 1030 kPa. Where working pressure exceeds 1030 kPa, materials shall be subject to special design.

5.02 Ductile Iron pipe shall have a gasketed push-on joint and a cement mortar lining conforming to A.W.W.A. Standard C151. Pipe shall have coal tar lining inside and out.

5.03 P.V.C. pipe shall conform to A.W.W.A. Standard 900-75 “Poly Vinyl Chloride” (P.V.C.) Pressure Pipe 150 mm through 300 mm for water. The pipe is to be minimum class 150 [Dimensional Ratio (DR) of 18 maximum] with Ductile Iron outside diameter and Integral Bell Gasketed Joint. The pipe shall be supplied in 6.0 m nominal lengths.

5.04 19 mm and 25 mm water service tubing shall be series 160 Pacific “goldenflo” or approved equal, and 39 mm and 50 mm water service tubing shall be Type K soft copper tubing (ASTM B.88-80) or approved equal.

5.05 Corporation stops and curb stops shall have compression type end fittings with rigid stainless steel liners.

5.06 Single broad strap service clamps and bushings to match the pipe and connection sizes shall be provided for each water service connection wherever asbestos cement pipe or PVC pipe is used.

5.07 Gate valves shall be standard, 860 kPa iron body, bronze mounted solid wedge or double disc, parallel seat type with N.R.S turning counter-clockwise to open with 32 mm square operating nut. Resilient seat valves may be used for valves up to 50 mm in diameter.

5.08 A valve box shall be provided with each gate valve and as required for other appurtenances.

5.09 Fire hydrants shall be 150 mm, tested for a working pressure of 1725 kPa and having one 4 5/8 inch pumper port with 6 threads per inch and two 2 ½ inch hose ports set diagonally, with independent cut-off valve. The ports are to be threaded to the B.C. Standard and provided with caps. The operating nut is to be pentagonal with 25 mm sides turning counter-clockwise to open and the port caps shall have matching nuts. A drain valve shall be incorporated in the base of the hydrant.

## 6.0 Fire Hydrants

6.01 Hydrants shall be located in the boulevard and should preferably be located at or near a street intersection; otherwise they may be located on the projection of the property line dividing two lots. In selecting the location for a hydrant, the probable route of the fire engine shall be considered.

6.03 A hydrant shall not be located within 3 m of a utility pole or light standard, within 1 m horizontally of underground service pipes or open ditches, or within 2.2 m of the curb line.

6.04 Hydrants shall be located so that every home is within 120 m but with due regard to the location of existing hydrants. Whenever practical, hydrants shall be near the highest and/or lowest point of the water main.

6.05 Additional hydrants may be required at school, apartment, commercial, or other high valve properties.

6.06 There shall be a gate valve on the branch pipe to each fire hydrant.

6.07 All hydrants shall be set to finished grade. Any adjustments will be made by Municipal forces at the Applicant’s expense.

## 7.0 Valves

7.01 Line valves shall be not more than 365 m apart. For convenience of operations, line valves should be located adjacent to a hydrant if there are no connecting mains within 120 m.

7.02 Line valves or hydrant valves shall not be located within 600 mm of a curb line, in a ditch, or above another service.

7.03 A line valve of the same diameter as the pipe shall be placed on each downstream branch of all “tee” and “cross” fittings.

7.04 Double acting air valves shall be installed at all high points on water main 200 m and larger.

7.05 On service connections greater than 25 mm, a valve shall be placed on the connection adjacent to the main.

## 8.0 Fittings

8.01 All fitting and appurtenances shall have standard hub ends or flanges where approved.

8.02 Standpipes shall be installed on all dead ends.

## 1.0 Scope

1.01 This specification shall govern the installation of all water pipe and waterworks appurtenances within the Municipality.

1.02 Water Services shall include that portion of the installation from, and including the main stop up to and including the curb stop,

## 2.0 General

2.01 The installation, including jointing, shall be in accordance with the current A.W.W.A. Standards.

2.02 Ductile iron pipe shall be installed without joint conductance unless specifically required for corrosion protection.

2.03 When the water main is under construction in a trench, water and debris shall be prevented from entering openings in the water main by keeping the excavation sufficiently dewatered and also by capping or plugging such openings with watertight fittings. Pipe and fittings shall be protected from contamination during construction.

2.04 The 19 and 25 mm water service tubing shall be of one continuous piece between the corporation stop and curb stop.

2.05 Existing valves shall not be opened or closed by unauthorized persons.

2.06 For existing 100 mm diameter pipe; 19 mm and 25 mm services shall be tapped a minimum 600 mm apart, (and 600 mm from a collar) and rotated a minimum 100 mm on the circumference of the pipe. Larger services into pipes greater than 100 mm diameter shall be a minimum of 1.25 m apart. Service saddles shall be installed in all cases.

2.07 Where installation of other services cross under Asbestos Cement water mains, a section of the A.C. main shall be replaced with Ductile Iron pipe such that the full trench width is bridged by Ductile Iron. This work shall be done by Municipal Crews at the applicant’s expense.

2.08 Blocking shall be installed as required. Concrete used for precast or in place blocking shall have a minimum 20 MPa compressive strength.

2.09 The pipe shall not be backfilled until it has been inspected, approved, and the horizontal and vertical alignment recorded by the Consulting Engineer.

2.10 Curb stops shall be left exposed until testing and flushing is completed, then buried.

## 3.0 Location

3.01 The main and appurtenances shall be located to within 60 mm horizontally of the position shown on the approved plan.

3.02 The curb stop shall not be more than 400 mm outside of the front property line and a minimum of 1.0 m from an iron pin.

3.03 Water service connections shall be installed from the water main to the property line, using the shortest and straightest route.

3.04 All pipe shall be laid to designed alignment and grade with the following tolerances:

a) Horizontal tolerance shall not be greater than 60 mm from designed location. The rate of deviation from the required alignment shall not exceed 30 mm in 7.5 m.

b) Vertical tolerances shall not be greater than 10 mm from designed grades on 200 mm and greater water mains.

3.05 The ditch excavation shall be deep enough to allow a minimum of 1 m of cover material to be placed over the water main and water service except the curb stop which shall have 250 mm cover.

3.06 When the water main is within the road allowance, it shall be a minimum of 1 m below the final road grade.

## 4.0 Bedding

4.01 Bedding for all water pipe shall conform to Class B bedding.

## 5.0 Testing

5.01 All water service connections shall be installed prior to pressure testing of the water mains.

5.02 After the pipe has been laid and backfilled or partially backfilled, all newly laid pipe and hydrants shall be subjected to a hydrostatic pressure of 1030 kPa for 1 hour duration. Before applying the specified test pressure, all air shall be expelled from the pipe. If permanent air vents are not located at all high points, the Contractor shall install main stops at such points as to allow air to expel as the line is filled. After the air is expelled, the main stops shall be closed and the test pressure applied using a pump connected to the pipe. The test pressure shall be corrected based on the elevation of the lowest point of the section under test and the elevation of the test gauge. The pump, pipe connection including any necessary taps, and all necessary apparatus, shall be furnished by the Contractor.

All exposed pip, fitting, valves, hydrants, and joints shall be carefully examined during the open trench test. All defects shall be remedied or replaced by the Contractor. The test shall be repeated until satisfactory results are achieved.

5.03 A leakage test shall be conducted after the pressure test has been satisfactorily completed. Preliminary tests shall be done by the Contractor at his own expense. After a satisfactory test has been achieved, the Contractor shall notify the Municipality for a final test. The Contractor shall furnish the pump, pipe, connections and all other necessary apparatus and shall furnish the necessary assistance to conduct the test. A minimum pressure of fifty percent greater than the operating pressure at the lowest elevation of the system being tested shall be maintained during the test.

No pipe installation will be accepted if the leakage is greater than that shown in Table A.

The Contractor shall, at his own expense, locate and repair defective joints until the leakage is within the specified limits.

5.04 Upon completion of the backfilling and satisfactory test results the water system shall be flushed clean of any debris.

## 6.0 Chlorination

6.01 Chlorination shall be performed by the Contractor.

6.02 Chlorination shall be in accordance with AWWA Standard C601, generally as follows:

- The initial chlorine concentration within the water main to be not less than 50 mg/l.
- After minimum of 24 hours the chlorine residual shall not be less than 10 mg/l.
- All valves and hydrants in the test section are to be separated during the disinfection period.

On completion of Chlorination, the entire pipe system shall be thoroughly flushed to remove all chlorinated water. Chlorinated water shall be disposed of away from water courses occupied by fish.

Table A

ALLOWABLE LEAKAGE FOR MECHANICAL JOINT OR PUSH JOINT DUCTILE IRON PIPE OR PUSH JOINT PVC PIPE

| Av. Test Pressure | Nominal Pipe Size – Millimeters | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KPa | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 750 | 900 | 1050 | 1200 |
| 1725 | 0.35 | 0.71 | 1.06 | 1.42 | 1.77 | 2.12 | 2.47 | 2.83 | 3.19 | 3.54 | 4.25 | 5.31 | 6.37 | 7.43 | 8.50 |
| 1550 | 0.34 | 0.67 | 1.01 | 1.34 | 1.68 | 2.01 | 2.35 | 2.68 | 3.02 | 3.36 | 4.03 | 5.03 | 6.04 | 7.04 | 8.05 |
| 1375 | 0.32 | 0.63 | 0.95 | 1.26 | 1.58 | 1.90 | 2.21 | 2.53 | 2.84 | 3.16 | 3.79 | 4.74 | 5.69 | 6.64 | 7.58 |
| 1200 | 0.29 | 0.59 | 0.89 | 1.18 | 1.48 | 1.77 | 2.07 | 2.36 | 2.66 | 2.95 | 3.54 | 4.43 | 5.31 | 6.20 | 7.09 |
| 1035 | 0.27 | 0.55 | 0.82 | 1.10 | 1.37 | 1.64 | 1.92 | 2.19 | 2.47 | 2.74 | 3.29 | 4.11 | 4.93 | 4.93 | 6.58 |
| 965 | 0.26 | 0.53 | 0.79 | 1.06 | 1.32 | 1.59 | 1.85 | 2.12 | 2.38 | 2.64 | 3.17 | 3.97 | 4.76 | 5.56 | 6.35 |
| 900 | 0.25 | 0.51 | 0.77 | 1.02 | 1.28 | 1.53 | 1.79 | 2.04 | 2.30 | 2.55 | 3.07 | 3.83 | 4.60 | 5.37 | 6.13 |
| 825 | 0.24 | 0.49 | 0.73 | 0.98 | 1.22 | 1.47 | 1.71 | 1.96 | 2.20 | 2.45 | 2.94 | 3.67 | 4.41 | 5.14 | 5.87 |
| 750 | 0.23 | 0.47 | 0.70 | 0.93 | 1.17 | 1.40 | 1.63 | 1.87 | 2.10 | 2.33 | 2.80 | 3.50 | 4.20 | 4.90 | 5.60 |
| 700 | 0.22 | 0.45 | 0.68 | 0.90 | 1.13 | 1.35 | 1.57 | 1.80 | 2.03 | 2.25 | 2.71 | 3.38 | 4.06 | 4.73 | 5.41 |
| 625 | 0.21 | 0.43 | 0.64 | 0.85 | 1.07 | 1.28 | 1.49 | 1.70 | 1.91 | 2.13 | 2.56 | 3.19 | 3.83 | 4.47 | 5.11 |
| 550 | 0.20 | 0.40 | 0.60 | 0.80 | 1.00 | 1.20 | 1.40 | 1.60 | 1.80 | 2.00 | 2.40 | 3.00 | 3.60 | 4.20 | 4.80 |
| 475 | 0.18 | 0.37 | 0.56 | 0.74 | 0.93 | 1.11 | 1.30 | 1.49 | 1.67 | 1.86 | 2.23 | 2.79 | 3.34 | 3.90 | 4.46 |
| 400 | 0.17 | 0.34 | 0.51 | 0.68 | 0.85 | 1.02 | 1.19 | 1.36 | 1.53 | 1.70 | 2.05 | 2.56 | 3.07 | 3.58 | 4.09 |
| 325 | 0.15 | 0.31 | 0.46 | 0.61 | 0.77 | 0.92 | 1.07 | 1.23 | 1.38 | 1.54 | 1.84 | 2.30 | 2.76 | 3.22 | 3.69 |

**FORMULA** $L = \frac{N\ D\ \sqrt{P}}{106{,}660}$ L = Allowable leakage/hr. N = Number of Joints D = Diameter in mm P = Pressure KPa

These tables were derived from Table 7 – A.W.W.A. Standard C600-77.
For A.C. pipe tables, see A.W.W.A. C603-77.

## 1.0 Scope

1.01 This specification shall govern the excavation, backfilling and clean up for utility trenches within the Municipality. This relates to backfill above the pipe zone and below the finished surface.

## 2.0 Excavation

2.01 The trench shall be excavated to the required alignment, width, depth, and grade as shown on the approved design drawings.

2.02 Excavated material shall not be stockpiled on the roadway.

2.03 Where the maximum trench width is exceeded, reference must be made to the Consulting Engineer who shall obtain the approval of the Municipal Engineering Advisor before further construction may continue.

2.04 If the bottom of the trench is organic or other unsuitable material, the trench shall be over excavated to firm ground and backfilled with suitable compacted material for pipe support, unless otherwise specified by the Consulting Engineer.

2.05 Trench water must be removed.

2.06 All solid rock boulders and large stones shall be removed to provide a minimum clearance of 150 mm around the pipe.

2.07 Where an existing structure or underground installation may be affected by the works, it is the responsibility of the Consulting Engineer to inform the owner of such utility sufficiently in advance to enable the owner to specify what protective measures must be taken.

## 3.0 Backfill

3.01 Where a pipe or conduit is installed beneath an existing or foreseeable future pavement, sidewalk, driveway or gravel shoulder, and the backfill shall be pitrun gravel or equal, compacted to a minimum 95% Standard Proctor Density, except for the top 300 mm which shall be 100 %.

3.02 Suitable native materials may be used as backfill where the pipe or conduit is installed in non-travelled areas. Backfill in these cases shall be free of stones over 150 mm size, frozen material, organic, or other perishable or objectionable material that would prevent proper consolidation or which might cause subsequent settlement.

3.03 Controlled density backfill may be used in lieu of compacted gravel backfill. Controlled density or unshrinkable fill shall be manufactured and placed in accordance with Canadian Portland Cement Association publication CP004.01P.

3.04 Where it is required to replace topsoil it shall occupy the upper 300 mm of the trench and shall be mounded on top to allow for settlement. If the installation is under a developed lawn, the soil shall be fine raked during the appropriate season and sown with a top quality grass seed at the rate of 50 grams of seed per square metre and rolled.

## 4.0 Cleanup

4.01 Gravel filled trenches shall be maintained to within 25 mm of the original surface prior to final paving.

4.02 Patching cuts in existing pavement.

a) Cuts must be hot mix paved within 3 days of backfilling.

b) If weather conditions do not permit hot-mix asphalt, cuts shall be paved within 3 days of backfilling using cold-mix asphalt and replaced as weather permits.

c) Where the excavation is on the shoulder or under the travelled portion of the street, the surface material shall be cut in neat straight lines at the edges of the trench by means of an asphalt cutting wheel, milling machine or pneumatic pavement breaker. Where the edges of any area requiring repaving extend outside the straight lines cut; further cuts shall be made so that the final patch will have a neat appearance.

d) Any area of pavement adjacent to the excavation which has become undermined or deformed due to excavation practices or blasting shall be removed and repaved as above.

e) The pavement of cuts which have settled shall be removed, the trench shall be recompacted and repaved.

## 5.0 Testing

5.01 The Consulting Engineer shall, at his direction, arrange for periodic compaction testing within the trench where trenchs are over 1.5 metres deep. Test results shall be submitted to the Municipality.

## 1.0 Scope

1.01 This specification shall govern the design of all roads, sidewalks, and appurtenances within the Municipality.

## 2.0 Classification and Width

2.01 Prior to design, the Municipality will classify and stipulate widths for the particular road under consideration.

2.02

| | **Road Width** | **Design km/h** | **Minimum R/W Width** | **Water Control** | **Shoulders/ Boulevards** |
|---|---|---|---|---|---|
| Cul-de-sac | 8.5m | 50 | 20m* & gutter | Conc. curb | 2.5m |
| Residential Urban | 8.5m | 50 | 20m | Conc. curb & gutter | 2.5m |
| Collector | 11.0m | 50 | 20m | Conc. curb & gutter | 2.5m |

Major Road Special Design

* Right-of-way for cul-de-sacs or non-extendible roads not greater than 150m in length.

## 3.0 Vertical Alignment

3.01 The vertical alignment of the road shall be set to serve adjacent properties with access driveways at a grade not steeper than 15% and conforming to the requirements as shown in Municipal Standard Drawing R10.

3.02 The length of a vertical curve shall be calculated using Municipal Standard Drawing R7.

3.03 Vertical Control

| | |
|---|---|
| Maximum grade – Residential | 15.0% |
| Maximum grade – Collector | 12.0% |
| Minimum grade | 0.5% |

| | | |
|---|---|---|
| Minimum grade at curb returns | 0.5% | |
| Maximum grade on turn around at cul-de-sac | 8.0% | |
| Maximum grade at residential approach to collector | 5.0% | for 15m tangent length back from intersecting road edge |
| Maximum grade at residential collector approach to major road | 3.0% | for 15m tangent length back from intersecting road edge. |
| Normal Crown | | 2.0% |

3.04 Crossfall – the practice of cross falling a road is acceptable at intersections and where required because of topographical features.

3.05 Superelevation – horizontal curves on residential roads are not to be superelevated. Collector and arterial roads shall be superelevated in keeping with the requirements of Municipal Standard Drawing R8.

3.06 Transition – the length of a transition from a normal cross-sectioned road to a section of road where there is superelevation shall in no case be less than 45 metres.

3.07 Extensions – evidence that vertical alignments are satisfactorily extendible will be required.

## 4.0 Horizontal Alignment

4.01 The horizontal alignment of the road shall be centred in the road allowance. Typical locations of services for new residential and collector roads are shown on Municipal Standard Drawing R3.

4.02 Centerline chainage stations shall be referenced and dimensioned from an identifiable survey post.

4.03 Minimum radius of curve and maximum super elevation:

| | DESIGN SPEED km/h | MINIMUM CENTERLINE RADIUS | MAXIMUM SUPERELEVATION |
|---|---|---|---|
| Residential | 50 | 90m* | Normal Crown |
| Collector | 50 | 100m* | 0.06** |
| Major Road | Special Design | | |

* Subject to the approval of the Municipal Engineering Advisor, curves on crescent shaped residential roads may be reduced to a minimum centerline radius equal to 30m.

** Refer to Municipal Standard Drawing R8.

4.04 A horizontal curve shall be fully described showing: internal angle, radius, tangent length, and arc.

4.05 Curb returns of 8m radius are required for residential road intersections. Curb returns located on bus routes and on roads within industrial and commercial districts require a 10m or larger radius to facilitate trucks and bus traffic.

4.06 When a new residential road with curbs intersects an existing road without curbs, the curb returns shall not be constructed. However, curb returns shall be constructed at the intersection of two curbed roads.

## 5.0 Cross Section

5.01 The cross section of roads shall be designed in accordance with the dimensions and requirements shown on the following Municipal Standard Drawings:

| TYPICAL SECTION | STANDARD DRAWING |
|---|---|
| 8.5m Residential Road (with curb and Gutter) | R1 |
| 8.5m Residential Road (no curb & gutter) | R2 |

5.02 Reference to or details of the cross-section dimensions and requirements must be shown on each design drawing.

5.03 The toe of a fill slope or top of a cut slope shall not encroach on private property. The containment of these slopes within the road allowance may require the design of a retaining wall or the widening of the right-of-way to contain the cut or fill slope.

5.04 Where cut slopes are to be made into ground seepage zones or where the extent of the slope would generate surface runoff, curtain drains shall be required at the base of the slopes and connected to the road drainage system or other suitable point of discharge.

## 6.0 Geometric Layout of Turn-Arounds

6.01 The design of the turn-around shall conform to Municipal Standard Drawing R4. The dimensions may be increased to meet traffic and vehicular requirements, or where the turn-around is skewed. Under special circumstances the Municipal Engineering Advisor may permit a temporary turn-around type of design.

6.02 The landscape design of the turn-around shall conform to Municipal Standard Drawing R4.

6.03 The design of a temporary turn-around shall conform to Municipal Standard Drawing R5.

## 7.0 Curb and Gutter and Sidewalks

7.01 Mountable concrete curb and gutter shall conform to Municipal Standard Drawing R9 or R10.

7.02 Non-mountable concrete curb and gutter shall conform to Municipal Standard Drawing R11.

7.03 Asphalt water control shall be constructed as necessary to direct flows into private outlets.

7.04 Concrete invert gutter shall conform to Municipal Standard Drawing R9.

7.05 Mountable curbs and non-mountable curb returns shall be specified for residential streets and non-mountable curbs elsewhere, except as required by the Municipal Engineering Advisor.

7.06 Sidewalks, where required, are normally located adjacent to the curb and shall be 1.5m wide. Sidewalks are to be crossfalled towards the road at 2%.

7.07 Gutters having widths less than those shown on Standard Drawings R9 and R10 will be permitted for hand formed curbs, providing two #4

reinforcing bars are installed. In this case the curb shall conform to Standard Drawing R9 or R10 with a 200mm gutter width.

## 8.0 Catch Basins

8.01 Catch basins shall be constructed as shown on Municipal Standard Drawings SD10, SD11, and SD12.

8.02 Double catch basins should be installed at locations of high runoff and sag curves.

8.03 Catch basins shall be located at the higher end of the curb returns of intersections, at the lowest point of the sag vertical curves, and at a spacing not greater than the following:

MAXIMUM SPACING OF CATCH BASINS

| ROAD WIDTH | SPACING |
|---|---|
| 8.5m | 90m |
| 11.0m | 75m |

On roads with superelevation crossfall the maximum spacing shall be one-half of the above figures. Adequate allowance shall be made to handle runoff from turn-arounds.

Exceptions to the above maximum spacing of catch basins may be allowed, where paving is to be installed on existing streets and where houses are drained in a manner satisfactory to the Municipal Engineering Advisor.

## 9.0 Appurtenances

9.01 a) The Consulting Engineer shall detail on the design drawing the location of all retaining walls, guardrails, handrails, and fences. These structures shall be designed in keeping with good engineering practices.

b) The design of barricades, chain link fence and sidewalk handrails shall conform to Municipal Standard Drawings R16, R17, and R18, respectively.

9.02 The Consulting Engineer shall indicate utility poles which must be relocated prior to road construction and he shall confirm with the appropriate utility representatives the feasibility of their relocation prior to design completion.

9.03 Underground Wiring – the Consulting Engineer shall indicate on his design drawing the designs supplied by B.C. Hydro or B.C. Telephone for all underground wiring which require relocation or are proposed including the connection to properties.

## 10.0 Structural Design of Roads

10.01 All road base and paving design shall be in accordance with Appendices 1 to 8 inclusive of these specifications.

10.02 The compacted gravel base and asphalt pavement thickness requirements for various road classifications are shown on the following Municipal Standard Drawings.

| Classification | Standard Drawing |
|---|---|
| 8.5m Residential Road (with curb & gutter) | R-1 |
| 1.0m Collector Road (with no curb & gutter) | R-2 |

10.03 The following criteria shall be followed for structural design of roads.

Asphalt Pavement Design – accepted references

"A Guide to the Design of Flexible and Rigid Pavements in Canada" – RTAC 1971

"Asphalt Overlays and Pavement Rehabilitation."
The Asphalt Institute 1977 MS – 17.

10.04 The structural design of the road pavement shall be adequate for a 20 year life under the expected traffic conditions.

10.05 Regardless of the method of design used, the maximum Benkelman Beam deflection (corrected for seasonal variation) on the finished pavement when tested for final acceptance by the Consulting Engineer shall be not greater than 1.8 mm for subdivision roads.

10.06 The minimum total flexible pavement structure thickness for any local road shall be in accord with Standard Drawings regardless of the structural design requirements determined by the Benkelman Beam or CBR method of design.

10.07 Other than for isolated shoulder widening, whenever a pavement is being widened, a minimum overlay of 25 mm of asphalt for blending and levelling purposes shall be required over the full pavement width to the centerline of the pavement.

10.08 Deep strength asphalt designs are acceptable provided the minimum thickness for the pavement structure as shown in Standard Drawings is met.

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

10.10 The design for new roads shall be based on the analysis of the results of Benkelman Beam tests and test holes carried out on adjacent roads having similar subgrade soil conditions as the proposed road or by the CBR asphalt pavement design method. The results shall be supplemented by analysis of material taken from test holes dug on the

proposed road site at intervals of approximately 80 metres, including soils classification, carried out by a qualified soils testing company.

10.11 Benkelman Beam tests shall be carried out in accordance with the procedures outlined in the "Roads and Transportation Association of Canada Technical Publication No. 12"

Seasonal variation of Benkelman Beam results is not normally a factor in the Municipality. In the event of readings in freeze – thaw or extended wet periods of weather, a seasonal correction factor of 1.2 should be applied to produce most probable spring rebound (MPSR) values for design.

## 1.0 Scope

1.01 This specification shall govern the construction of roads, sidewalks, and appurtenances within the Municipality.

## 2.0 Clearing

2.01 The full width of the roadway and shoulders shall be cleared of timber and bush which shall be removed. All topsoil will be removed to at least 2.5m clear of the curbs. Sufficient topsoil must be retained on site for 200mm of topsoil on the boulevard. Surplus topsoil which may have to be removed from an existing road allowance is the property of the Municipality and shall be deposited at a stock pile site approved by the Municipality.

2.02 The remaining portion of road allowance will be cleared of stumps, rubble, and loose rock and rough graded to the satisfaction of the Consulting Engineer. Finished grading, seeding of grass and rolling adjacent to any road construction on established boulevards or where otherwise required by the Consulting Engineer shall be done upon completion of all construction.

## 3.0 Setting of Grades

3.01 Grade hubs will be set at not more than 10m intervals on tangents and 5m intervals on curves on both sides of the road and at the same chainage points. Hubs will be located so that they are not disturbed by the construction equipment.

3.02 On horizontal curves the increased or decreased arc shall be calculated to compensate for the radius so that the hubs on both sides of the road will bear the same center line chainage.

3.03 Where the road is to be superelevated it may be necessary to calculate the difference in elevation due to the offset of the hub to enable the sub-base to be graded. Care should be taken to ensure that this compensated elevation is not used when the concrete curbs are being formed.

3.04 Sturdy hubs of sufficient length to give firm footing shall be used with nails driven in the top for fine alignment, and suitably identified which chainage, cut or fill, and offset to curb face. Cut or fill information will face the hub and will be related to the elevation to the top of curb.

3.05 Cross heads may be erected at a suitable height at every station, clearly marked for the amount of cut or fill required to finish grade. Cuts or fills should be adjusted to even vertical intervals above required grade. Grades should be checked with a boning rod by sighting across these cross heads.

3.06 Alternate methods of layout and construction may be used providing the curbs or centerline is within 15mm of the design elevation and 30mm of the design horizontal alignment.

## 4.0 Sub grade Construction

4.01 All topsoil, trees, stumps, soft material and soil containing organic matter shall be stripped from all areas to be occupied by fills, road shoulders, road surfaces, and side ditches.

4.02 Where required by the Consulting Engineer, the stripped areas shall be excavated to remove all soil not capable of accepting the loads to be imposed upon it by the road embankment.

4.03 The sub grade shall be constructed of granular or other material approved by the Consulting Engineer, placed in layers not exceeding 150mm and compacted to 95% of the laboratory density obtained by the following A.S.T.M Specification 698. Method C, or latest revision thereof with exception of the top 300mm which shall be compacted to 100%. The fill section shall conform to Municipal Standard Drawing R1, R2, R3, and R4.

4.04 In cuts, the top 300mm of the sub grade will be compacted to 100% of the laboratory density obtained by following A.S.T.M Specification 698, Method C, or latest revision thereof, when required by the Consulting Engineer. The cut section shall conform to Municipal Standard Drawings R1, R2, R3, and R4.

4.05 The toe of the fill slope or the top of a cut shall not extend outside the right-of-way. The containment of these slopes may require the construction of retaining walls, rip-rap, or the right-of-way could be widened.

4.06 No topsoil, trees, stumps or any organic matter will be buried in the subgrade, sub-base or base course.

4.07 Rock shall be excavated to depths shown on Municipal Standard Drawings R1, R2, R3, and R4.

## 5.0 Base Course and Sub-Base Preparation

5.01 Where native material is unacceptable to the Consulting Engineer for constructing a compacted subgrade in cuts or fills, a sub-base of acceptable granular materials will be placed between the subgrade and base course. Select granular material from road cuts or 80mm minus pit run gravel either being acceptable to the Engineer may be used as sub-base material.

5.02 The sub-base will be constructed of granular or other approved material placed in layers not exceeding 150mm and compacted to 95% of the laboratory density obtained by following A.S.T.M. Specification 698, Method C, or latest revision thereof with exception of the top 300mm which shall be compacted to 100%. The fill section shall conform to Municipal Standard Drawings R1, R2, R3 and R4.

5.03 Granular surfacing, base course and sub-base preparation shall conform to Appendix 2 of these Specifications.

5.04 In addition to the requirements of Appendix 2 the field density of soils shall be determined by A.S.T.M designation D2922, determining density of soil and soil aggregate in place by nuclear methods (shallow depth).

For spot checks, the following methods are also acceptable:

| | |
|---|---|
| A.S.T.M Designation D 1556 - | Density of soils in place by sand cone method. |
| A.S.T.M Designation D 2167 - | Density of soils in place by rubber balloon method. |

5.05 No base course gravel shall be placed until all underground services have been installed unless otherwise approved by the Consulting Engineer.

5.06 The 80mm crushed pit run as described in Appendix 2, Section 2.02 may be specified by the Consulting Engineer for the road base course and/or sub-base, on slopes of large embankments, on areas of poor sub-grades, and special conditions where increased stability is required.

## 6.0 Sidewalks, Curbs and Gutters and Catch Basins

6.01 Concrete – concrete shall conform to the requirements outlined in Appendix 8 of these Specifications.

6.02 Concrete sidewalks, curb and gutter, and driveway crossings will be constructed in accordance with the following Standard Drawings:

| | |
|---|---|
| Curb and Gutter – Mountable | R9 or R10 |
| Curb and Gutter – Non Mountable | R11 |
| Curb, Gutter and Sidewalk – Combined | R12 |
| Sidewalk – Concrete | R12 |

The type of construction to be used and the location will be as shown in the construction design drawings or as directed by the Consulting Engineer.

6.03 Extruded Sidewalk, Curb and Gutter

a) The Contractor will be given the option of constructing extruded curb and gutter. Prior to use, the specifications for the extrusion equipment shall be submitted for written approval from the Consulting Engineer. Automatic grade and line control will be required.

b) Extruded concrete shall be finished as shown in the applicable drawings, with a surface grade brush finish; a dense uniform surface will be required on curb and gutter.

6.04 Placing of Concrete

a) After mixing, the concrete shall be transported rapidly to the job site, and shall be delivered as close as possible to the point of deposit. Rehandling of concrete will not be permitted.

b) Concrete operations shall be continuous until the section, panel, or scheduled pour is completed. Should the operation be unavoidably interrupted, fully depth construction joints shall be formed at the proper locations as herein specified.

c) The concrete shall be placed in such a manner as to prevent separation of the ingredients. Special care shall be taken to place the concrete against the forms, particularly in corners, in order to prevent voids, rough areas, and honeycombing.

d) The concrete shall be placed to the full specified depth. After spreading, the concrete shall be struck-off and compacted by means of an approved screed. Vibrators or vibrating screeds are recommended and shall be operated at a

minimum of 5000 cycles per minute. The technique and use of vibrators of vibrating screeds shall be at the discretion of the Consulting Engineer.

e) Freshly placed concrete shall be protected in an approved manner against damage from the elements, and construction operations harmful to concrete.

6.05 Trowelling and Brushing Finish

a) After placing, the concrete shall be adequately worked with wood and steel trowels to a smooth finish with the required edges neatly rounded. Excessive troweling is to be avoided.

b) The use of grid tampers or “Bird Cages” will not be allowed.

c) If there is evidence of concrete bleeding, finishing shall cease until the excess water has evaporated to the satisfaction of the Consulting Engineer. Failure to comply with the above will result in complete replacement of the sections involved.

d) Brush finish shall be applied with a nylon bristle brush approved by the Consulting Engineer. The brushing shall be carried out in accordance with applicable drawings and in such a manner and at such a time as to minimize the depth and quantity of brush marks. All surplus water must be removed from the bristles before brushing commences. No mortar coat or water wash shall be used.

e) Catch basin gutter grates shall be removed while finishing the adjacent gutter, and replaced following completion of finishing.

f) After troweling, the surface grade along the lip of gutter shall be checked by the Contractor with straights edges, to an accuracy of plus or minus 10mm in 3 meters. The maximum allowable variation across the gutter shall be 3mm.

6.06 Forms

6.06.1 Construction of Formwork – Forms shall be of metal or timber properly seasoned and free from warps or other defects. The type and section of the metal forms shall require the approval of the Municipal Engineer. The face of curb forms shall be removable without disturbing back and gutter forms. The forms shall be smooth and clean on the surface(s) next to the concrete and shall be oiled with Parvelube No. 30 or approved equal. The forms shall be rigidly held true to the established lines and grades.

6.06.2 Stripping of Forms

a) Face of curb forms shall be removed after the initial set. Adequate care shall be taken in removing forms to avoid spoiling or marring the concrete. Such patching as may be necessary shall be started immediately after removal of the forms.

b) Immediately after form removal and/or patching, the exposed surfaces shall be sprayed with the membrane curing material.

6.07 Joints

6.07.1 Contraction Joints

a) Contraction joints shall be cut at every 3m by means of a marking tool or other approved method. Joints shall not be less than 30mm in depth and 7mm in width.

b) The edges of the joint shall be rounded off with an edger having the arc of a circle of 7mm radius.

c) Contraction joints in a monolithic sidewalk must extend through the full width of the side walk and curb and gutter.

d) Contraction joints at catch basins shall be cut through the full width of the sidewalk in line with both outside edges of the catch basin gutter frame.

6.07.2 Expansion Joints – Lateral expansion joints are required at the beginning and end of every corner. The joint shall consist of an approved mastic preformed material, 13mm, 90mm cross-section, laid plumb and straight, 7mm below the finished sidewalk grade.

6.07.3 Surface Joints – Surface joints 13mm in depth and 7mm in width will be cut in the sidewalk sections only every 3 meters in between the contraction joints. The edge of the joint shall be rounded off with an edger having an arc or a circle of 7mm radius.

6.07.4 Sawed Joints – Saw cuts as specified are to be made with a special concrete saw capable of producing a true straight joint of constant depth as required

6.07.5 Breaking Out – All breakout shall end at a contraction, expansion or surface joint. The edge of a surface joint is to be sawn to a depth of 22mm minimum, while contraction joints may be neatly hand chiseled.

6.07.6 Obstructions

a) The contractor will be required to carefully fit, cut and mark a surface joint in the sidewalk around all openings, iron covers, manholes, vaults, valves or meter boxes, lamp standards, hydrants, poles and other surface installations. The surface joint must be neatly tooled to the satisfaction of the Consulting Engineer.

b) Expansion joints material, 13mm thick and the full depth of the sidewalk, shall be placed around the base of all poles, hydrants, and where the work abuts existing buildings or other structures, including existing sidewalks.

6.08 Reinforcing

6.08.1 General

a) Reinforcing shall be clean and free from defects, kinks, loose rust of mill scale at the time the concrete is places. Any coatings of hardened mortar shall be removed from the steel.

b) Bar reinforcing shall meet A.S.T.M. Specification A184 and A.S.T.M. Specification A304, intermediate grade new billet deformed steel.

c) Cold-drawn steel wire shall meet the requirements of A.S.T.M. Specification A82 and the wire mesh shall meet the requirements of A.S.T.M. Specification A185.

6.08.2 Reinforced Driveway Crossings

a) In separate sidewalk, combined sidewalk, and curb and gutter, a single layer of 150mm by 150mm by 10/10 gauge wire mesh, in a minimum concrete depth of 150mm, as shown on Municipal Standard Drawings R12 shall be placed at public lanes, and all driveway crossings. The mesh shall extend to the full width of the crossing.

b) In separate curb and gutter, two No. 4 reinforcing bars, as shown on Municipal Standard Drawing R12, shall be placed at apartments and commercial driveways.

6.08.3 Reinforcing in Fill Areas – where the sidewalk, curb and gutter, combined sidewalk curb and gutter, is constructed on more than 300mm of fill, or where poor soil conditions are evident, reinforcing steel shall be used.

a) In separate curb and gutter, two No. 4 reinforcing bars shall be placed, as shown on Municipal Standard Drawing R11.

b) In separate sidewalk, a single layer of 150mm by 150mm by 10/10 gauge wire mesh shall be placed as shown on Municipal Standard Drawing R12.

c) In combined sidewalk, curb and gutter, a single layer of 150mm by 150mm by 10/10 gauge wire mesh shall be placed as shown on Municipal Standard Drawing R12.

6.08.4 Placing of Reinforcement – Reinforcing mesh shall be rolled or otherwise straightened to make a perfectly flat surface before placing. The mesh or bar reinforcing shall be supported above the compacted gravel base so as to ensure a 50mm cover of concrete. The manner of supporting the reinforcing shall be approved by the Consulting Engineer. Overlapping of mesh reinforcing shall be a minimum of 300mm and shall be wired together. Overlapping of bar reinforcing shall be thirty (30) bar diameters and shall be wired together.

6.08.5 Reinforcing Markings – All sections containing reinforcing shall be marked at their extreme limits with a marking tool showing the letter R and arrow pointing in the direction of reinforcing. This letter shall be 4cm high.

6.09 Protection of Work

6.09.1 Covering- The Contractor shall supply and place all tarpaulins, or other necessary materials to protect the work from in, dust, frost, or other similar weather action, for such time as the Engineer may consider necessary. Failure of the Consulting Engineer to order protection does not relieve the Contractor of the responsibility.

6.09.2 Barricades – The Contractor shall also barricade the work and keep all humans, animals, and vehicles off the work for a period of five (5) days after the finishing of the concrete has been completed. Any damage occurring to the work during this five (5) day period regardless of origin shall be repaired by the Contractor to the

satisfaction of the Consulting Engineer within one (1) month after notice is given to the Contractor.

6.09.3 Pedestrian and Vehicular Access – The Contractor shall ensure that affected property owners are notified at least one day prior to the pouring of concrete and that alternate pedestrian access is provided. With respect to commercial properties, access must be maintained as directed by the Consulting Engineer. Inconvenience to the public shall be minimized.

6.10 Catch Basins

a) Construction of catch basins in the locations shown on the design drawing shall be undertaken prior to the construction of curbs.

b) Mountable concrete curb will have two #4 reinforcing bars placed as shown in Standard Drawing R10 behind catch basins.

6.11 Curb and Gutter Transitions – Where dissimilar sections join, a uniform gutter grade shall be maintained and a suitable transition effected by adjusting the height of the curb within one metre.

## 7.0 Asphalt Paving

7.01 Asphaltic Materials – Asphaltic materials shall conform with the requirements in Appendix 1 – Asphaltic Materials.

7.02 Surface Preparation for Asphalt Paving – The surface for asphalt paving shall be prepared in accordance with Appendix 3 – Surface Preparation for Asphalt Paving.

7.03 Asphaltic Concrete Paving – Asphaltic Concrete Paving shall be placed in accordance with Appendix 4 – Asphaltic Concrete Paving.

7.04 Surface Treatment – Aggregate Seal Coats, Sand Seal Coats, Fog Seal Coats and Slurry Seal Coats shall be placed in accordance with Appendix 5 – Surface Treatments.

7.05 Inspection and Testing – All asphalt paving shall be tested by a qualified laboratory in accordance with Appendix 6 – Inspection and Testing and Appendix 7 – Asphalt Methods of Test. The testing laboratory shall be retained by the Consulting Engineer and shall send reports to the Municipality within 30 days of the test commencement.

## 8.0 Appurtenances

8.01 Retaining walls, guardrails, handrails, fences, and barricades shall be installed in accordance with the design drawing and these specifications.

8.02 Handrails will be used on retaining walls with greater than 0.5m drop.

## 9.0 Cleaning Up

9.01 All surplus material, tools, temporary structures, debris, dirt and rubbish shall be promptly removed by the Contractor immediately following completion of the construction work.

9.02 The site shall also be left clean and tidy to the satisfaction of the Works Inspector.

## 10.0 Traffic Control

Appropriate traffic control shall be arranged by the Contractor.

## 11.0 Test Reports

Copies of all reports of tests required by this Section shall be submitted by the Consulting Engineer with the as-constructed drawings.

## 1.0 Preliminary and General

1.01 Scope

a) This Specification describes the requirements for the different types and grades of asphaltic materials and additives to be supplied for highway use.

b) The materials so described are generally classified as follows:

Asphalt Cements; Liquid Asphalt; Emulsified Asphalt and Cationic Emulsified Asphalt.

1.02 Quality Control Requirements

a) Quality Control System

1. The supplier shall develop and maintain an effective quality control system in accordance with the provisions of this Specification. The system shall ensure that adequate inspection coverage is maintained throughout the entire process of manufacture and shipping.

2. Supplies not conforming to these requirements shall not be offered for use until the deviations have been authorized by the Consulting Engineer.

b) Quality Control Procedure – The supplier may be required to furnish the Consulting Engineer with an outline of his quality control procedures detailing his method of implementing the requirements of this specification. This outline shall include the following operations: receiving, blending and processing, sampling and testing, storage and handling, shipping, recording and reporting.

1.03 Sampling and testing

The supplier shall possess adequate sampling equipment, employ satisfactory sampling procedures and maintain a suitable sampling program. Representative samples from filled shipping containers shall be examined by the Consulting Engineer to ensure quality. (Refer to Appendix 7 for Methods of Test.)

1.04 Delivery of Asphaltic Materials

Temperature of Shipment – Where specified, bituminous material shall be shipped hot. The temperature for shipment shall be subject to arrangement between the Contractor and supplier but generally the supplier should endeavour to ship bituminous materials at such temperatures that on arrival its temperature shall be such that the Kinematic Viscosity of material shall be as below:

| Class of Materials | Kinematics Viscosity, Centistokes |
|---|---|
| liquid bitumen materials for surfacing spraying | 100 – 200 |
| Liquid bituminous material and asphalt cements for plant mixing purposes | 150 – 400 |

Subject to the above requirements, asphalt shall normally be shipped within the temperature ranges given in the following table. In no case shall asphalt be shipped at a temperature greater than the designated maximum.

| Loading Temperatures | Min. C | Max. C |
|---|---|---|
| Paving Asphalt Cements | 145 | 205 |
| RC-70 | 50 | 80 |
| RC-250 | 65 | 90 |
| RC-800 | 80 | 105 |
| RC-3000 | 105 | 135 |
| MC-30 | 35 | 80 |
| MC-70 | 50 | 80 |
| MC-250 | 65 | 90 |
| MC-800 | 80 | 105 |
| MC-3000 | 105 | 135 |
| SC-70 | 50 | 80 |
| SC-250 | 65 | 120 |
| SC-800 | 80 | 135 |
| SC-3000 | 105 | 160 |
| Special Prime | 25 | 65 |

| | | |
|---|---|---|
| RS-1 | 15 | 55 |
| SS-I | 15 | 55 |
| SS-1h | 15 | 55 |
| CRS-1 | 15 | 55 |
| RS-2 | 45 | 70 |
| MS-2 | 45 | 70 |
| MS-2h | 45 | 70 |
| CRS-2 | 45 | 70 |

## 2.0 Asphalt Cements

2.01 Asphalt Cements shall

a) be products prepared by the refining of crude petroleum.
b) be homogenous, free from water and shall not foam when heated to 175ºF.
c) be supplied in such grades as may be specified.
d) comply with the following detailed requirements and the requirements of A.S.T.M Specification D-946

| Grade | 60-70 | | 85-100 | | 120-150 | |
|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max |
| Penetration at 25 C 100g, 5 seconds | 60 | 70 | 85 | 100 | 120 | 150 |
| Flash point C (Cleveland open cup) | 232.2 | | 232.2 | | 218.3 | |
| Ductility at 25C 50mm per min, mm | 1000 | | 1000 | | 1000 | |
| Retained penetration after this-film over test, percent | 52+ | | 47+ | | 42+ | |
| Solubility in trichloroethylene percent | 99.0 | | 99.0 | | 99.0 | |
| Ductility at 25 C 50 mm/min., mm after thin-film oven test | 500 | | 750 | | 1000 | |

## 3.0 Liquid Asphalts

3.01 General Description

a) Liquid asphalts shall consist essentially of petroleum derivatives and shall be substantially free from water and other impurities.

b) Liquid asphalts shall be of the type and grade described in the following tables, and shall comply with the requirements of A.S.T.M Specification

D-2026 (slow-curing type), A.S.T.M. Specification D-2027 (medium-curing type) and A.S.T.M Specification D-2028 (rapid-curing type).

1. Slow Curing Type Liquid Asphalt.

| **Designation** | SC-70 | | SC-50 | | SC-800 | | SC-3000 | |
|---|---|---|---|---|---|---|---|---|
| **Requirements** | Min | Max | Min | Max | Min | Max | Min | Max |
| **Kinematic Viscosity at 60 C, cSt.** | 70 | 140 | 250 | 500 | 800 | 1600 | 3000 | 6000 |
| Flash point (Cleveland open cup) C<br>Flash point (Cleveland open cup) C | 65.5 | | 79.4 | | 93.3 | | 107.2 | |
| **Distillation Test:**<br>Total Distillate to 360 C<br>Percent by volume | 10 | 30 | 4 | 20 | 2 | 12 | | 5 |
| **Kinematic viscosity on distillation resideue to 60 C stokes** | 4 | 70 | 8 | 100 | 20 | 160 | 40 | 350 |
| **Asphalt Residue:**<br>Residue to 100 penetration, percent | 50 | | 60 | | 70 | | 80 | |
| * Ductility of 100 penetration residue at 25° C mm | 1000 | | 1000 | | 1000 | | 1000 | |
| Solubility in trichloroethylene | 99.9 | | 99.0 | | 99.0 | | 99.0 | |
| Water, percent | | 0.5 | | 0.5 | | 0.5 | | 0.5 |

*Note:
If the ductility at 25 C is less than 1000, the material will be acceptable if its ductility at 15.5 C is more than 1000 mm.

2. Medium-Curing Type Liquid Asphalt:

| **Designation** | MC-30 | | MC-70 | | MC-250 | | MC-800 | | MC-3000 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Requirements** | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| Kinematic viscosity at 60 C: | 30 | 60 | 70 | 140 | 250 | 500 | 800 | 1600 | 3000 | 6000 |
| Flash point (Tag open cup), C: | 37.8 | | 37.8 | | 65.5 | | 65.5 | | 65.5 | |
| **Distillate Test:**<br>Distillate, percent by volume of total distillate to 360 C: | | | | | | | | | | |
| to 225 C<br>to 260 C<br>to 316 C | <br>40<br>75 | 25<br>70<br>93 | <br>20<br>65 | 20<br>60<br>90 | <br>15<br>60 | 10<br>55<br>87 | <br><br>45 | <br>35<br>80 | <br><br>15 | <br>15<br>75 |
| Residue from distillation to 360 C percent volume by difference | 50 | | 55 | | 67 | | 75 | | 80 | |
| **Tests on residue from distillation:**<br>Penetration at 25 C, 100g, 5 sec. | 120 | 250 | 120 | 250 | 120 | 250 | 120 | 250 | 120 | 250 |
| Ductibility at 25 C, mm: | 1000 | | 1000 | | 1000 | | 1000 | | 1000 | |
| Solubility in trichloroethylene, percent: | 99.0 | | 99.0 | | 99.0 | | 99.0 | | 99.0 | |
| Water, percent | | 0.2 | | 0.2 | | 0.2 | | 0.2 | | 0.2 |

* Note:
If the ductility at 25 C is less than 1000, the material will be acceptable if its ductility is at 15.5 C is more than 100 mm.

3. Rapid Curing Type Liquor Asphalt

| **Designation** | MC-70 | | MC-250 | | MC-800 | | MC-3000 | |
|---|---|---|---|---|---|---|---|---|
| **Requirements** | Min | Max | Min | Max | Min | Max | Min | Max |
| Kinematic viscosity at 60° C, cSt.: | 70 | 140 | 250 | 500 | 800 | 1600 | 3000 | 6000 |
| Flash point (Cleveland open cup), C: | | | 26.7+ | | 26.7+ | | 26.7+ | |
| Distillate Test:<br>Distillate, percent by volume of total distillate to 360° C: | | | | | | | | |
| to 190<br>to 225<br>to 260<br>ro 316 | 10<br>50<br>70<br>85 | | <br>35<br>60<br>80 | | <br>15<br>45<br>75 | | <br><br>25<br>70 | |
| Residue from distillation to 360° C percent volume by difference | 55 | | 65 | | 75 | | 80 | |
| Tests on residue from distillation:<br>Penetration at 25° C, 100g, 5sec. | 80 | 120 | 80 | 120 | 80 | 120 | 80 | 120 |
| * Ductibility at 25° C, mm: | 1000 | | 1000 | | 1000 | | 1000 | |
| Solubility in trichloroethylene, percent: | 99.0 | | 99.0 | | 99.0 | | 99.0 | |
| Water, percent | | 0.2 | | 0.2 | | 0.2 | | 0.2 |

* Note:
If the ductility at 25° C is less than 1000, the material will be accewptable if its ductility at 15.5° C is more than 1000 mm.

3.02 Special Primer

| DESIGNATION | Min. | Max. |
|---|---|---|
| Kinematic Viscosity at 60º C- Centistokes | 20 | 35 |
| Distillate % by Volume of total distillate<br>to 190 C<br>to 225 C<br>to 250 C<br>to 315 C | <br><br>40<br>70<br>85 | <br>50<br><br><br> |
| Residue from distillation to 360º C,volume % by difference | 50 | |
| Tests on residue from distillation to 360<br>Penetration at 25 C, 100g, 5 sec | <br>80 | <br>200 |
| * Ductility at 25 C, mm | 1000 | |
| Solubility in Carbon Tetrachloride | 99.5 | |
| Water, percent | | 0.2 |

* Note: If the ductility at 25º C is less than 1000, the material will be acceptable if its ductility at 15.5º C is more than 1000 mm.

Note: Viscosity of residue from distillation to 360º C will be measured at 60º C and reported in stokes on each batch analysis report.

3.03 Rubberized Cutback Asphalt R.R.C.

a) General Description – Rubberized Cutback Asphalt shall consist of a selected vacuum reduced asphalt containing a matched synthetic rubber, dispersed colloidally or in molecular solution at the refinery, and cutback with naphtha solvent to produce a range of cutback material having substantially similar properties to R.C. Cutback, except that the rubberized asphalt residue shall have considerable increased tenacity and toughness characteristics.

b) Tests- The rubberized asphalt residue shall, when tested by the Benson Method and compared with the original asphalt base stock, show a minimum toughness of 200 percent and minimum tenacity of 1000 per cent.

c) Acceptance – The acceptance of any rubberized asphaltic material shall be at the sole discretion of the Municipal Engineering Advisor.

## 4.0 Emulsified Asphalts

4.01 Types – Liquid bituminous materials in the form of aqueous emulsions shall be of the following:

a) Emulsified Asphalt

1. The emulsified asphalt shall be homogenous. It shall show no separation of asphalt after thorough mixing within thirty (30) days (crack filler twenty (20) days) after delivery, provided separation has not been caused by freezing.

2. The emulsion shall conform to the detailed requirements of the following table, and the requirements of the A.S.T.M. Specification D-977.

| TYPE | RAPID-SETTING | | | | MEDIUM SETTING | | | | | | SLOW-SETTING | | | | CRACK FILLER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GRADE | RS-1 | | RS-2 | | MS-1 | | MS=2 | | MS=2h | | SS-1 | | SS-1h | | |
| REQUIREMENTt | Min. | Max | Min. | Max | Min. | Max | Min. | Max | Min. | Max | Min. | Max | Min. | Max | |
| Tests on Emulsions: | | | | | | | | | | | | | | | |
| Viscosity, Saybolt Furol at 25 C, s | 20 | 100 | | | 20 | 100 | 100 | | 100 | | 20 | 100 | 20 | 100 | 50-200 |
| Viscosity, Saybolt Furol at 50° C, s | | | 75 | 400 | | | | | | | | | | | |
| Settlement, 5 days, percent | | 5 | | 5 | | 5 | | 5 | | 5 | | 5 | | 5 | 3- |
| Storage stability test, 1 day | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| Demulsibility, 35 ml, 0.02 N CaCl, percent | 60 | | 60 | | | | | | | | | | | | |
| Coating ability and water resistance: | | | | | | | | | | | | | | | |
| Coating, dry aggregate | | | | | good | | good | | good | | | | | | |
| Coating after spraying | | | | | fair | | fair | | fair | | | | | | |
| Coating, wet aggregate | | | | | fair | | fair | | fair | | | | | | |
| Coating, after spraying | | | | | fair | | fair | | fair | | | | | | |
| Cement mixing test, percent | | | | | | | | | | | | 2.0 | | 2.0 | |
| Sieve test, percent | | 0.1 | | 0.1 | | 0.1 | | 0.1 | | 0.1 | | 0.1 | | 0.1 | |
| Residue by distillation, percent | 55 | | 63 | | 55 | | 65 | | 65 | | 57 | | 57 | | |
| | | | | | | | | | | | | | | | |
| Tests on Residue from Distillation Test: | | | | | | | | | | | | | | | |
| Penetration, 25 C, 100g. 5 s | 100 | 200 | 100 | 200 | 100 | 200 | 100 | 200 | 40 | 90 | 100 | 200 | 40 | 90 | 60-100 |
| Ductility, 25 C 50mm/min. mm | 400 | | 400 | | 400 | | 400 | | 400 | | 400 | | 400 | | |
| Solubility in trichloroethylene, percent | 97.5 | | 97.5 | | 97.5 | | 97.5 | | 97.5 | | 97.5 | | 97.5 | | |

b) Cationic Emulsified Asphalts – Cationic emulsions shall comply with the requirements given in the methods designated with each requirement, and shall comply with the requirements of A.S.T.M Specification D-2397.

| TYPE | RAPID-SETTING | | | | MEDIUM SETTING | | | | SLOW-SETTING | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GRADE | CRS-1 | | CRS-2 | | CMS-1 | | CMS-2h | | CSS-1 | | CSS-1h | |
| REQUIREMENTt | Min. | Max | Min. | Max | Min. | Max | Min. | Max | Min. | Max | Min. | Max |
| Tests on Emulsions: | | | | | | | | | | | | |
| Viscosity, Saybolt Furol at 25° C, : | | | | | | | | | 200 | 100 | 20 | 100 |
| Viscosity, Saybolt Furol at 50° C, : | 20 | 100 | 100 | 400 | 50 | 450 | 50 | 450 | | | | |
| Settlement, 5 days, percent | | 5 | | 5 | | 5 | | 5 | | 5 | | 5 |
| Storage stability test, 1 day percent | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 |
| Classification test or | passes | | passes | | | | | | | | | |
| Demulsibility, 35 ml, 0.8 percent sodium dioctyl sulfosuccinate, percent | 40 | | 40 | | | | | | | | | |
| Coating ability and water resistance: | | | | | | | | | | | | |
| Coating, dry aggregate | | | | | good | | good | | | | | |
| Coating, after spraying | | | | | fair | | fair | | | | | |
| Coating, wet aggregate | | | | | fair | | fair | | | | | |
| Coating, after spraying | | | | | fair | | fair | | | | | |
| Particle charge Test | positive | | positive | | positive | | positive | | positive | | positive | |
| Sieve test, percent | | 0.10 | | 0.10 | | 0.10 | | 0.10 | | 0.10 | | 0.10 |
| Cement Mixing Test, percent | | | | | | | | | | 2.0 | | 2.0 |
| Distillation: | | | | | | | | | | | | |
| Oil distillate, by volume or emulsion, percent | | 3 | | 3 | | 12 | | 12 | | | | |
| Residue, percent | 60 | | 65 | | 65 | | 65 | | 57 | | 57 | |
| | | | | | | | | | | | | |
| Tests on Residue from Distillation Test: | | | | | | | | | | | | |
| Penetration, 25° C, 100g. 5 s | 100 | 250 | 100 | 250 | 100 | 250 | 40 | 90 | 100 | 250 | 40 | 90 |
| Ductility, 25 C 50mm/min. mm | 400 | | 400 | | 400 | | 400 | | 400 | | 400 | |
| Solubility in trichloroethylene, percent | 97.5 | | 97.5 | | 97.5 | | 97.5 | | 97.5 | | 97.5 | |

TABLE 2

| Grade | RS-1K | | RS-2 | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| Saybolt Furol Viscosity at 50º C | 30 | 125 | 174 | 400 |
| % Residue by Distillation | 62 | | 68 | |
| Settlement 1 day, % | | 1.5 | | 1.5 |
| Sieve Test, % retained on 1 mm mesh volume | | 0.1 | | 0.1 |
| Volume | 0 | 3 | 0 | 3 |
| Particle Charge | Positive | | Positive | |
| | | | | |
| Test on Residue: | | | | |
| Penetration @ 25° C, 100g/5s | 100 | 250 | 100 | 150 |
| Solubility in Trichloroethylene, % | 97.5 | | 97.5 | |
| Ductility (cm) @ 25° C | 65 | | 65 | |

c) High Float Emulsified Asphalt

Storage stability – High float emulsified asphalt shall show no separation of asphalt within 30 days after delivery and shall be homogenous after thorough mixing.

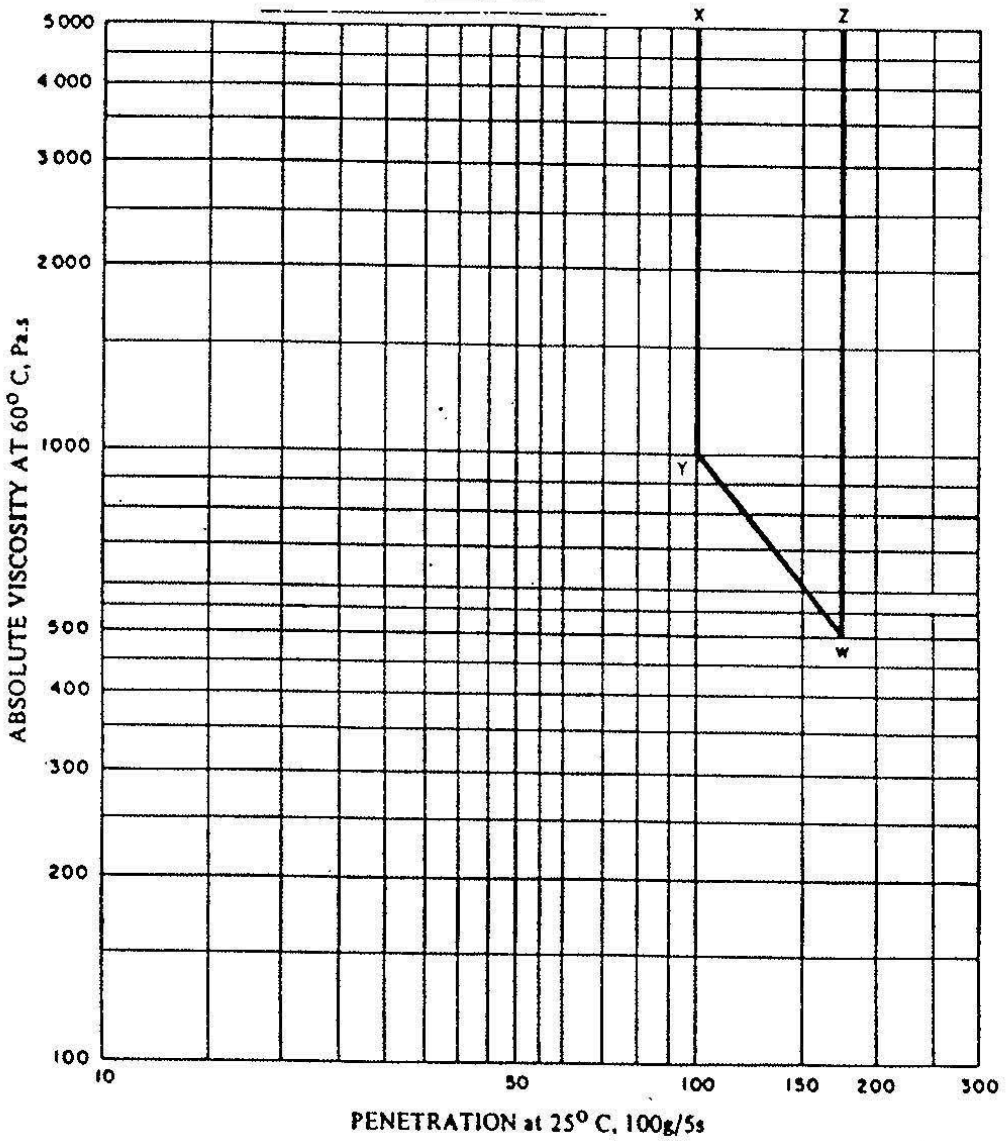
| Grade: | HF-100s | | HF-150S | | HF-250S | | HF-350S | | HF-500M | | HF-1000M | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Requirements | Min. | Max | Min. | Max | Min. | Max | Min. | Max | Min. | Max | Min. | Max |
| Residue by Distillation, | | | | | | | | | | | | |
| % by Mass | 62 | | 62 | | 62 | | 65 | | 65 | | 65 | |
| Oil Distillate | | | | | | | | | | | | |
| % by volume | 1 | 4 | 0.5 | 4 | 1 | 6 | 1.5 | 6 | 1 | 6 | 1 | 7 |
| Saybolt Viscosity | | | | | | | | | | | | |
| Furol Seconds at 50 C | 35 | 150 | 35 | 150 | 35 | 150 | 75 | 400 | 50 | | 50 | |
| Sieve Test, % Retained | | | | | | | | | | | | |
| On 1 mm Sieve | | 0.10 | | 0.10 | | 0.10 | | 0.10 | | 0.10 | | 0.10 |
| Coatings Test % | 90 | | 90 | | 90 | | | | | | | |
| Settlement 1 day, | | | | | | | | | | | | |
| % by Mass | | 1.5 | | 1.5 | | 1.5 | | 1.55 | | 1.5 | | 1.5 |
| Demulsibility: | | | | | | | | | | | | |
| 50 ml 5.55 g/L CaC12, | | | | | | | | | | | | |
| % by Mass | 75 | | 75 | | | | | | | | | |
| Workability @ 10 C | | | | | | | | | | | Pass | |
| Test on Residue | | | | | | | | | | | | |
| Penetration at 25 C, 100 g/5s | * | | ** | | ** | | ** | | | | | |
| Viscosity at 60 C, Pa/s | * | | ** | | ** | | ** | | 8 | 20 | 2 | 8 |
| Float Test at 60 C,s | 1200 | | 1200 | | 1200 | | 1200 | | 1200 | | 1200 | |
| Solubility in Trichloroethylene, % | 97.5 | | 97.5 | | 97.5 | | 97.5 | | 97.5 | | 97.5 | |

* See Figure I – Next Page

** See Figure II – Following

c) High Float Emulsified Asphalt (cont'd)

FIGURE I

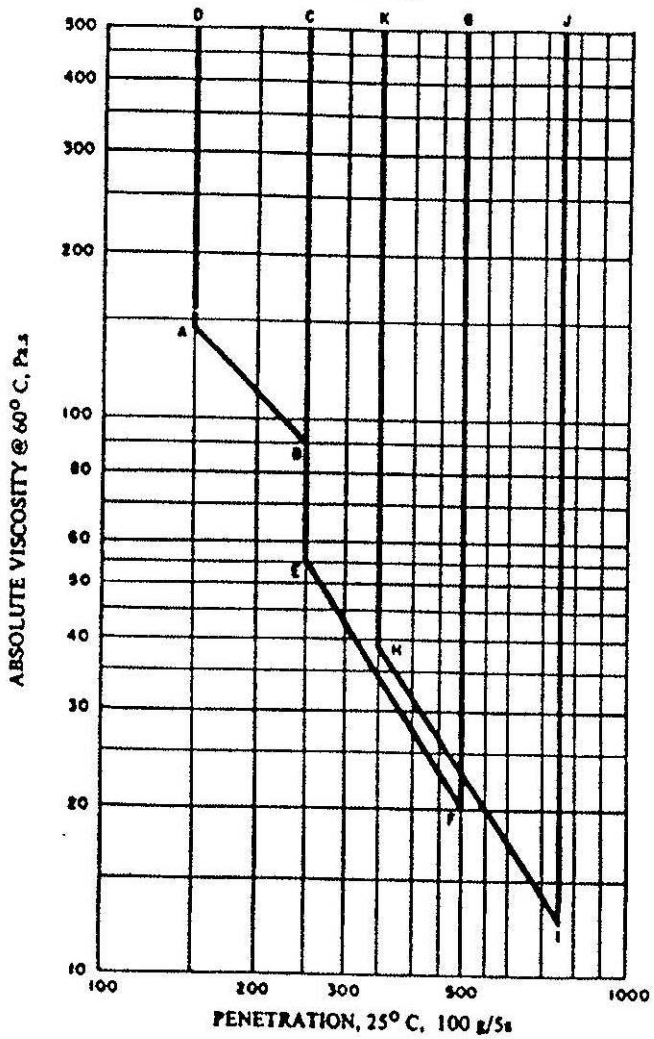



VISCOSITY REQUIREMENTS FOR DISTILLATION RESIDUES FROM HIGH FLOAT EMULSIFIED ASPHALT, HF-100S

Viscosity shall be within graphic regions described by the letter co-ordinates X, Y, W, Z.

c) High Float Emulsified Asphalt (cont'd)

FIGURE II




| Gradation of High Float Emulsified Asphalt | HF-150S | HF-250S | HF-350S |
|---|---|---|---|
| Viscosity and Penetration shall be within graphic regions described by the letter co-ordinates | A, B, C, D | E, F, G, C | H, I J, K |

## 1.0 Scope

1.01 General

This specification describes the materials, equipment and workmanship required for construction of granular surfacing, bases and sub-bases, using crushed granular or pit-run aggregates.

1.02 Description of Work – The aggregates for granular surfacing, bases and sub-bases shall be supplied by the Contractor. All materials shall be from an approved source and shall be free from lumps of clay, silt, decomposed rock, organic or other deleterious matter. Material that is stock-piled prior to use shall be handled in a manner to avoid segregation. Such care shall be used subsequently in hauling to the area of accurately, and thoroughly compacted to the line and grade designated. Surfacing aggregate intended for surface-stabilization to be done in place on the road, shall be placed on the untreated base only as fast as it can be incorporated in the road mixed stabilizer base. Unless otherwise provided in the Special Provisions, the Contractor shall maintain the prepared surface of the untreated surfacing, until it has been treated or covered with stabilized surface material.

## 2.0 Materials

2.01 Aggregate shall be composed of inert, durable fragments, free from an excess of flat or elongated particles, and uniform in quality. Soundness testing may be requested by the Consulting Engineer in the absence of satisfactory performance records for the aggregates particular source. Such testing shall be in accordance with A.S.T.M. Specification C88, using Magnesium Sulphate. Aggregates so tested, shall be considered satisfactory, if the loss over five (5) cycles does not exceed twenty (20) percent for coarse aggregate or twenty-five (25) percent for fine aggregate.

2.02 Crushed Surfacing, Crushed Pit-Run and Pit Run

a) Crushed surfacing, crushed pit-run and pit run and when tested in accordance with A.S.T.M. Specification C136 shall have a gradation falling within the following limits.

| MATERIAL DESCRIPTION | | PERCENTAGE PASSING | | EACH TYPE OF AGGREGATE |
|---|---|---|---|---|
| Aggregate size: | | 20mm | 80mm | 80mm |
| Type of aggregate: | | crushed | crushed pit-run | pit-run |
| Aggregate use: | | surfacing | base course | sub-base |
| U.S. Standard Sieve Size | CGSB 8 – GP – 2M Sieve Size | | | |
| 3'' | 80mm | | 100- | 100 |
| 1 ½'' | 40mm | | 60-100 | |
| ¾'' | 19mm | 100 | 40-80 | 15-100 |
| 3/8 | 9.5mm | 60-100 | 30-60 | 0-100 |
| No.4 | 4.75mm | 40-80 | 20-45 | 0-100 |
| No.8 | 2.36mm | 30-60 | 15-35 | |
| No.16 | 1.18mm | 20-45 | 10-25 | |
| No.50 | 300um | 8-20 | 4-16 | 0-15 |
| No.100 | 150um | | | |
| No.200 | 75um | 2-9 | 2-9 | 0-5 |

b) Should the Contractor supply aggregate with a gradation coarser than paragraph 2.02a), and can satisfy the Consulting Engineer that the compaction and stability requirements can be met, the Engineer may direct, in writing, that such aggregate may be used.

c) In the crushed material, at least fifty (50) percent by numerical count of all coarse particles retained on the 4.75 mm sieve shall have at least one fractured face or shall be naturally angular with sharp edges.

## 3.0 Construction Method

3.01 Weather and Job Conditions

a) No construction shall be undertaken during heavy rain, snow or freezing conditions.

b) Granular aggregate shall not be placed upon a frozen, wet, muddy or rutted sub-grade, sub-base, or surface, unless directed by the Engineer, in writing.

c) When the sub-grade or base is soft due to excessive moisture conditions, granular materials shall be hauled and placed, such that no rutting or displacement of lower layers occurs.

3.02 Construction Thickness of Granular Courses

a) Crushed granular surface course, and crushed granular or pit-run base course and sub-base courses shall be constructed to the thickness and dimensions as shown in the Contract Documents or described in the Special Provisions, unless otherwise directed by the Consulting Engineer, in writing.

b) Aggregate shall be delivered to the road bed as uniform mixtures and shall be spread in layers or windrows without segregation. Granular aggregate shall not be end-dumped from trucks and piles on the road bed.

c) When the sub-grade consists of cohesionless material, the Consulting Engineer may approve in writing, that granular sub-base or base may be dumped in piles and spread in sufficient quantity to stabilize the sub-grade.

d) Fly spreading from the tailgate of trucks may be permitted by the Consulting Engineer, provided that the work is well controlled and that no segregation will occur. Any segregation of materials shall be remixed until uniform.

e) Surfacing materials shall only be laid on a dry base and when weather conditions are suitable, except as directed by the Consulting Engineer.

3.03 Construction of Crushed Granular Base or Pit-Run Sub-Base

a) Where the required thickness is 150 mm or less, the aggregate base or sub-base may be spread and compacted in one layer. Where the required thickness is more than 150 mm, the aggregate shall be spread and compact in two or more layers of equal thickness. The maximum compacted thickness of any one layer shall not exceed 150 mm. Each layer shall be spread and compacted in a similar manner.

b) Following spreading, the materials shall be compacted to 95% of the laboratory density obtained by the following A.S.T.M. Specification 698,

Method C, or latest revision thereof with exception of the top 300 mm which shall be compacted to 100%.

c) The sub-base or base shall be constructed so that the final surface shall conform to the Design Drawing for line, grade and cross-section, or as staked by the Consulting Engineer to an accuracy of ± 15mm.

3.04 Construction of 20 mm Crushed Granular Surfacing

a) Crushed granular surfacing shall not be spread until the base has been approved by the Consulting Engineer. If the Consulting Engineer is of the opinion that the finished surface of the base does not meet the requirements of paragraph 3.03 c) but has been thoroughly and densely compacted and should not be distributed, he may order that the surface of the base be corrected to true cross-section line and grade, within the specified tolerances, by use of a leveling course of 20 mm granular surfacing aggregate.

b) The surfacing aggregate shall be spread in such a manner that the aggregate does not segregate. The thickness of the surfacing shall be uniform and the minimum thickness of the constructed surfacing aggregate shall be not less that the nominal thickness shown in Municipal Standard Drawings R1, R2, and R3.

c) Following spreading, the material shall be compacted to one-hundred (100) percent of the density obtained in the laboratory in accordance with A.S.T.M. Specification D698-Method D.

d) The sub-base or base shall be constructed so that the final surface shall conform to Municipal Standard Drawings R1, R2, and R3, for line, grade, and cross-section, to an accuracy of ± 10 mm.

3.05 Compaction Method and Equipment

a) The compaction and equipment used to obtain the specified density may be selected by the Contractor, but will be subject to review or alteration by the Consulting Engineer, if the Contractor is unable to attain the desired density.

b) For the purpose of the compaction requirements of paragraphs 3.03 b) and 3.04 c), compaction equipment shall meet the following minimum requirements.

1. Three wheel steel rollers shall have a loaded mass of not less than 10.9 tonnes, with a compression at the rear wheels of not less than 60.0 N/mm of width.

2. Segmented steel wheel rollers shall have two rolls side by side each of a minimum width of 750 mm and minimum diameter of 1500 mm. The minimum loaded rolling mass shall be 13.6 tonnes.

3. Vibratory rollers shall have a minimum steel drum diameter of 1150 mm a minimum drum width of 1500 mm and shall be capable of being loaded so as to have a load of 17.5 N/mm of drum width.

4. Pneumatic tired rollers shall be equipped with wheels which carry 13.00 x 24 pneumatic tired capable of being inflated to a minimum pressure of 825 kPa, and shall have a loaded mass such that all wheels carry a minimum proportional load of 31.14 kN.

c) Notwithstanding paragraph 3.05 b), the Consulting Engineer may give approval for the use of new or alternative compaction equipment, if he is satisfied that such equipment will provide equal or superior compaction performance.

d) Subject to the approval of the Consulting Engineer, base, sub-base and surfacing aggregates may be watered by the Contractor, as required to aid in attaining the specified density.

3.06 Responsibility for Base

It shall be the Developer's responsibility to examine the base immediately prior to commencing paving operations and satisfy himself that it is properly prepared to receive the pavement.

3.07 Adjustment of Service Structures

Existing manholes, catch basins, valve boxes and other service structures, within the area to be paved, shall be adjusted to the property finished grade at the time of paving.

## 1.0 General

1.01 All contact surfaces that are to receive asphaltic concrete paving shall be prepared as set out in this Specification. Surface preparation may be generally described as being either priming of non-asphaltic granular bases or tack-coating of existing asphaltic pavement, which are to receive an overlying surfacing course.

## 2.0 Materials

2.01 Prime or tack-coat asphalts shall be those specified by the Municipal Engineering Advisor. The asphalt specified shall conform to Appendix 1 – Asphaltic Materials.

2.02 Primer shall be used at the Engineer's discretion. Primer shall be applied on the granular base when the surface is dry or slightly damp and the air temperature above 10º C. The primer shall be uniformly applied with an approved pressure distributor at a rate of 1.0 to 1.5 liters per square meter, and the temperature of the material shall be such that the kinematic viscosity will be between 50 and 150 square millimetres per second.

Primer shall be allowed to cure for a minimum of 4 hours. Traffic shall be kept off primed areas until the primer has been allowed to cure. Additional primer shall be applied to areas requiring priming to fill voids, to coat and bond particles, or as directed by the Engineer. If the primed surface is loose, rolling of the surface with a pneumatic-tired roller may be required.

2.03 Tack coat shall be applied to all existing asphaltic concrete which is to be overlain, the edge of curbs, existing asphaltic concrete and structures, where the surface of these structures will in contact with new asphaltic concrete pavement.

## 3.0 Equipment

3.01 Rotary Power Brooms shall be used for all brooming work. The brooms shall be mounted on self-propelled pneumatic-tired tractor units, and shall be capable of vertical adjustment and shall have sufficient power and brushing capacity to completely clean the surface to be paved within three (3) coverage. Hand brooms shall be used to clean all depressions not reached by the rotary broom.

3.02 Pressure Distributors shall be designed and operated to distribute the asphaltic material in a uniform spray

3.03 Pressure Distributors shall be designed and operated to distribute the asphaltic material in a uniform spray without atomization, in the amount and between the limits of temperature specified.

a) They shall be equipped with a bitumeter having a dial registering metres per minute. The dial shall be visible to the truck driver so he can maintain the constant speed required for application at the specified rate.

b) The pump shall be equipped with a tachometer, having a dial registering litres per second passing through the nozzles. The dial shall be readily visible to the operator.

c) Means for indicating accurately the temperature of the asphaltic material at all times shall be provided. The thermometer well shall not be in contact with a heating tube.

d) The normal width of application of the spray bar shall be not less than 3.5m, with provisions for the application of lesser width when necessary. A hose and spray nozzle attachment shall be provided for applying asphaltic material to patches and areas inaccessible to the spray bar.

e) The distributor shall be provided with eating attachments and the asphaltic material shall be circulated during the entire heating process.

## 4.0 Cleaning of Surfaces

4.01 All surfaces, both horizontal and vertical, which will be in contact with the new asphalt mix shall be thoroughly cleaned of all dirt and debris. Cleaning will normally be done using rotary brooms and hand brooms, however, washing of flushing may be necessary to remove coatings of clay or dirt on old pavement.

## 5.0 Preparation of Vertical Surfaces

5.01 Vertical faces of existing pavements, curbs, gutters, drainage gratings, manholes, or other contact surfaces shall be sprayed or painted with a uniform coating of hot asphalt or asphalt emulsion. Sufficient material shall be used to provide closely bonded water-tight joints. This work shall be done in such a way as to not stain exposed curb or gutter surfaces.

## 6.0 Priming Non-Asphalt Base

6.01 Prior to priming, the granular base, unless constructed by the paving contractor immediately prior to paving, shall be prepared by blading, dragging, spraying with water and compacting with rollers as required, so as to provide a uniform tight compacted surface, correct to line, grade, and crown or superelevation. All surplus loose aggregate shall be bladed clear on the shoulders for use in shouldering. Care shall be exercised in removing loose aggregate, to guard disturbing the bond of the aggregate in the surface of the base.

6.02 Asphaltic priming shall take place when the granular base is dry or slightly damp and the ambient temperatures are over 10º C.

6.03 The selected asphaltic primer shall be uniformly sprayed by an approved distributor at the rate specified by the Consultant Engineer.

6.04 The primer shall be sprayed within a temperature range which will cause the kinematic viscosity to be between fifty (50) and one hundred and fifty (150) centistokes.

6.05 Care shall be exercised, however, to prevent over priming. Prime that is not absorbed into the base within twenty-four (24) hours after application, or over-priming, shall be corrected by the application of selected cover sand.

6.06 Any spraying faults shall be corrected by hand spraying, brooming or the subsequent removal of cover sand placed on over-primed areas. The asphaltic primer shall be entirely absorbed by the base course.

6.07 All traffic, where possible, shall be kept off the prime base until the primer has been absorbed. Where it is not possible to keep traffic off wet primer, the surface shall be blinded with a cover sand or fine aggregate.

6.08 The Contractor shall maintain the base as may be necessary to keep the surface prime intact.

## 7.0 Tack Coating of Existing Asphaltic Pavements

7.01 Prior to tack coating, deficiencies in the existing pavement shall be treated as follows:

a) Joints and cracks, 15mm or more in width, should have the existing filler removed to a depth of at least 25 mm. They shall be refilled with a dense, fine-graded mixture thoroughly tamped into place. Any excess shall be removed level with the pavement surface.

b) Rigid-type pavements that have transverse pre-molded expansion and longitudinal joints shall be cleaned out to a depth of 50 mm and refilled as noted in paragraph 7.01 a).

c) Asphaltic patches which appear to contain an excess of asphalt or may appear to be unstable shall be removed from the pavement.

d) Surface cracks wider than 5 mm shall be treated as in paragraph 7.01 a).

e) Surface cracks less than 5 mm in width shall be treated with the same asphaltic material as used in the tack coat.

7.02 After all repairs have been completed, the surface shall be cleaned as noted in paragraph 4.01 immediately prior to application of the tack coat.

7.03 Tack coating shall take place when the ambient temperature is over 10º C.

7.04 The selected asphaltic tack coat shall be uniformly sprayed by an approved distributor at the rate specified by the Consulting Engineer.

7.05 Extreme care shall be exercised in the application of the tack coat so as to avoid a surplus of asphalt which may flush into the overlying course.

7.06 In places where the distributor bars cannot reach, the tack coat shall be applied with a hand sprayer attached to the distributor by a hose. When hand spray methods are use, care shall be taken to avoid over-coating of the surface.

7.07 Nor more tack coat than is necessary for the day's operation shall be places on the surface. All traffic not essential to the work shall be kept off the tack coat.

## 1.0 Scope

1.01 General

a) This Specification describes the materials, plant equipment and workmanship required for the construction of hot mixed, hot laid asphaltic concrete pavement.

b) This Specification shall be read and construed with the Special Provisions of the Contract, as prepared by the Consulting Engineer, and the approved Design Drawings.

1.02 Description of Work

Under this Specification, asphaltic concrete consisting of mineral aggregate and asphaltic binder, shall be combined and hot mixed in an approved mixing plant, spread on a prepared base and compacted to an approved density, all as shall be described in this Specification.

1.03 Pavement Types and Design Criteria

a) There shall be three (3) types of mixes for pavement construction:

1) Coarse Mix, for base and surface courses where specified.
2) Medium Mix, which shall be the normal mix for pavement construction.
3) Fine Mix, for light surface courses and special levelling purposes.

b) There shall also be three (3) strength classifications for asphaltic concrete pavement, based on design traffic criteria in accordance with the Asphalt Institute Specification Series No. 9 (SS-1) Manual:

Class A – Light Traffic Classification – Residential Road/
Class B – Medium Traffic Classification – Collector Road.
Class C Heavy Traffic Classification – Major Road

Mixes for each class of pavement shall meet Marshall Test design criteria as specified in the following table.

c) The type and class of pavement required shall be specified by the Municipal Engineering Advisor.

| PROPERTY OF LABORATORY COMPACTED PAVING MIXTURE | PAVEMENT CLASS A | B | C |
|---|---|---|---|
| Number of flows each face of test specimen | 35 | 50 | 75 |
| Stability, all mixtures, N. | 2250 | 2250 | 3350 |
| Flow index, all mixtures, units of 0.25 mm | 8-20 | 8-18 | 8-16 |
| Percent Air Voids | | | |
| Surface or levelling course | 3-5 | 3-5 | 3-5 |
| Base course | 3-8 | 3-8 | 3-8 |
| Minimum Percent Voids in Mineral Aggregate for nominal maximum particle size | | | |
| 20 mm | 14 | 14 | 14 |
| 15 mm | 15 | 15 | 15 |
| 10 mm | 16 | 16 | 16 |
| Minimum index of retained stability after immersion in water at 60º C for 24 hours. | 80% | 80% | 80% |

d) Mixes shall be designated as to mix type number followed by class strength classification. Thus, coarse mixes will be designated as Mix 1A, Mix1B, and Mix 1C. Medium mixes will be designated as Mix 2A, Mix19, and Mix 2C. Fine mixes will be designated as Mix 3A, Mix 3B, and Mix 3C.

1.04 Final compaction Requirements

a) If required by the Municipal Engineering Advisor, cores will be drilled from the road surface after final rolling is completed. The cores shall be used to measure thickness of the pavement and to test the density of the compacted mix, as required under paragraph 1.04 b).

b) The compacted asphalt concrete pavement shall have a density equal to or greater than ninety-seven (97) percent of a laboratory specimen prepared by the Marshall Test Method in accordance with paragraph 1.03 b), from a sample taken from a truck delivering the mixture on the job site. The laboratory density shall be compared with the filed density at the location of the same truckload mixture from which the laboratory specimen was made.

c) The compacted base and surface course shall have average thickness no less than that specified by the approved Design Drawings. Any deficiency in base course thickness shall be made up with surface mixtures when the surface course is placed.

## 2.0 Materials

2.01 Methods of Test

a) Asphaltic materials shall be tested in accordance with methods of test designated on Appendix 7 – Methods of Test.

b) Mineral aggregates shall be tested in accordance with methods of test designated in Appendix 7 – Methods of Test.

2.02 Asphaltic Material

a) Asphaltic cement to be used in preparation of asphaltic concrete paving mixtures shall be penetrating asphalt as described under Appendix 1 – Asphaltic Materials and of the grade specified in the Special Provisions. Such material shall at no time be heated to a temperature in excess of that which will cause the material to have a kinematic viscosity of less than one-hundred (100) centistokes.

b) The bituminous cement content of the mix as determined by the Consulting Engineer shall not vary from the selected job mix content by more than 0.3 percent by mass of the total mix.

2.03 Coarse Aggregate

a) For purpose of standard A.S.T.M. tests, coarse aggregate shall be all mineral material retained on the 4.75 mm sieve. It shall consist of stone, crushed slag, crushed gravel or combinations thereof, or materials naturally occurring in a fractured condition or of a highly angular natural aggregate with pitted or rough surface texture.

b) The coarse aggregate other than slag or naturally occurring rough textured or pitted surface aggregate shall contain at least sixty (60) percent by mass of crushed pieces having two (2) or more surfaces or faces produced by fracture, when the aggregate is required for incorporation in mixes to be used in construction of pavements, types B or C.

c) Aggregate having known polishing characteristics shall not be used in surface coarse mixes except by express permission of the Municipal Engineering Advisor.

d) The maximum absorption of the coarse aggregate when tested in accordance with A.S.T.M. Designation C127 shall be 1.7 percent.

e) All coarse aggregate shall be free from coatings of clay, silt, or other objectionable matter and shall not contain more than 1.5 percent by mass of clay balls or other aggregations of fine material.

f) Coarse aggregate shall be tested for soundness in accordance with A.S.T.M. Specification C88 for which maximum weighted losses for five (5) cycles shall be eighteen (18) percent when magnesium sulphate is used.

g) Crushed slag shall meet the requirements of A.S.T.M. Specification D693.

2.04 Fine Aggregate

a) For purposes of standard A.S.T.M. test, fine aggregate shall be allmineral matter passing the 4.75 mm sieve including mineral fillers. It shall consist of natural and/or manufactured material derived by crushed stone, slag, or gravel.

b) The aggregate particles shall be clean tough, durable, moderately sharp and free from coating of clay, silt, or other objectionable matter, and shall contain no clay balls or other aggregations of fine material.

c) Fine aggregate shall be tested for soundness by A.S.T.M. Specification C88 for which maximum weighted losses for five (5) cycles shall be twenty (20) percent when magnesium sulphate is used.

2.05 Mineral Filler

a) Mineral filler shall consist of all mineral matter which will pass No. 200 sieve.

b) Mineral filler pay consist of fine particles of the coarse or fine aggregate or of finely ground particles of limestone, hydrated lime, Portland Cement, or other selected mineral matter. It shall be dry, free from organic matter, clay particles or lumps.

c) Mineral filler shall be non-plastic when tested by A.S.T.M. Specification D-423 and D-424.

2.06 Paving Mixes

a) paving mixes prepared under these specifications shall be composed of aggregates and paving asphalt meeting the requirements of the following table:

| J.S Standard Sieve Size | CGSB B-GP-2M Sieve Size | Percentage Passing for Each Mix Type Coarse | Medium | Fine |
|---|---|---|---|---|
| ¾'' | 19 mm | 100 | | |
| ½'' | 13.2 mm | 80-100 | 100 | |
| 3/8'' | 9.5 mm | 70-90 | 80-100 | 100 |
| No. 4 | 4.75 mm | 50-70 | 55-75 | 80-100 |
| No. 8 | 2.36 mm | 35-54 | 35-57 | 54-39 |
| No.16 | 1.13 mm | 25-12 | 25-44 | 48-75 |
| No.30 | 600 mm | 18-32 | 18-32 | 32-50 |
| No.50 | 300 mm | 13-24 | 18-23 | 15-42 |
| No.100 | 150 mm | 8-15 | 8-16 | 5-23 |
| No.200 | 75 mm | 2-3 | 4-10 | 4-10 |

b) However, should the Contractor provide an aggregate which will meet the overall maximum size and design requirements of paragraph 1.03, other than Index of Retained Stability After Immersion in Water, such aggregate may be accepted upon approval of the Consulting Engineer, notwithstanding the fact that its grading curve does not fall within the limits prescribed in the above table.

c) If sieve test results indicate that variations in aggregate gradation are exceeding the maximum permissible limits detailed above, the Contractor shall immediately modify his aggregate production procedure to the satisfaction of the Consulting Engineer so as to produce aggregate having a gradation which will consistently fall within the permissible limits specified. Aggregate produced during periods when gradation is out of control may be rejected by the Consulting Engineer and shall be removed or otherwise disposed of as may be directed.

## 3.0 Plant and Equipment

3.01 Paving Plant Essentials

a) The plant used by the Contractor for the preparation of hot mix asphaltic concrete material shall conform to the requirements for mixing plants for hot mix, hot-laid bituminous paving mixtures, A.S.T.M. Specification D9995 and to the recommended procedures of the Asphalt Institute's "Asphalt Plant Manual" Manual Series No.3 (MS-3).

b) The plant shall be so designed and co-ordinated as to produce a uniform mixture within the Specifications.

3.02 Control of Mixing Temperatures

a) The mixing temperature for a particular asphaltic concrete mix shall be that which corresponds to a viscosity range of 150 to 300 centistokes (75 to 150 seconds Saybolt Furol) for the asphalt cement penetration grade specified in the Special Provision. Mixing temperatures generally shall conform to the recommended temperatures of the Asphalt Institute. At no time shall the maximum mixing temperature exceed 175º C. The lowest possible temperature consistent with paragraph 3.02 b) should be used.

b) Mixing temperature shall be consistent with paragraph 3.03 to provide uniform coating of asphalt on all aggregate particles.

3.03 Control of Mixing Time

Mixing time shall be the minimum required to obtain a uniform distribution of aggregate sizes and a uniform coating of asphalt on all aggregate particles. The minimum mixing time shall be that which produces a Ross Count of:

1. 90 percent fully coated for base mixes
2. 95 percent fully coated for surface mixes

as determined by the Ross Count Procedure. The least time needed for the pugmill to produce mixes meeting the minimum coating requirements shall be the minimum mixing time.

3.04 Transporting the Mixture

a) Trucks used to haul the asphalt paving mixture from the plant to the job site shall be in good mechanical condition at all times. Truck bodies that come in contact with the asphalt mixture should be clean and smooth and free from cracks, holes, dents, and shall be clean of all foreign material.

b) Surfaces of the truck coming in contact with the asphalt paving mixture may be lubricated with either a mild lime water, a soap or detergent solution, or an approved commercial solvent in emulsion form suitably diluted as recommended by the manufacturer. After the solution has been painted or sprayed on, the truck beds should be elevated so the excess can drain out. Oil, grease and other similar products shall not be permitted.

c) A canvas or similar covering shall be used to cover the hot mix after loading into the truck regardless of the ambient temperature or haul distance. Hauling trucks in which frame-contact or bed-bearing with the pavers during dumping operation shall not be used.

d) Any load with a paving mix temperature of less than 120º C will be rejected. The lowest acceptable mix temperature may only be varied upon the approval of the Consulting Engineer.

e) No load shall be sent out so late in the day as to interfere with spreading and compacting the mixture during daylight unless artificial light, satisfactory to the Consulting Engineer, is provided.

## 4.0 Asphaltic Concrete paving

4.01 Base preparation

No asphalt paving mixture shall be placed on a base that has not been either primed or tack-coated in accordance with the Specifications and in accordance Appendix 3 - Surface Preparation for Asphaltic paving.

4.02 Paving Equipment

a) Unless otherwise specified, all plant-mixed bituminous mixtures shall be spread by means of mechanical self-powered pavers capable of spreading the mix true to the line, grade and crown indicated on the approved Design Drawing.

b) At the forward end of the machine there shall be hoppers of sufficient capacity to enable the pavers to spread the paving mixture continuously and without interruption during the dumping cycle of the haulage trucks. The pacing mixture shall be transformed from the hoppers to reserving type distributing screws, design to distribute the paving mixture evenly and without segregation, across the full laying with paver screeds.

c) The paver shall be equipped with an activated screed which shall be adjustable as to level and section. A dampened dial level shall be fitted to the machine so that proper pavement crown or cross fall can be produced throughout the finishing operation.

d) The paver shall be fitted with mechanical devices suck as equalizing or straight edge runner, or evener arms or such other compensating devices to prevent minor change in the sub grade elevation from being reflected in the finished surface.

4.03 Placing the Mixture

a) Asphalt paving mixture shall only be laid upon a base, and under weather conditions, approved by the Consulting Engineer. The surface of the base shall be dry. Prior to delivery of the mixture, the prepared base shall be cleaned of all loose or foreign material.

b) Asphalt paving mixture shall only be laid when the ambient temperature is above 5º C and rising.

c) The mixture shall be spread and tamped to the necessary thickness. The paver feed shall be so adjusted to the rate of delivery of the asphaltic mixture, that the paver shall spread mixture at a constant speed and with a minimum of stoppages.

d) The paving mixture shall be spread at the lowest speed compatible with the rate of supply of the paving mixture. The road speed of the paver shall not exceed ten (10) meters per minute for base course mixtures or eight (8) meters per minute for surface course mixtures without the express permission of the Consulting Engineer.

e) Following screeding and prior to roller compaction, the surface shall be checked and any irregularities such as fatty accumulations or other non-uniform surface texture shall be adjusted. Crooked edges on the paving mat shall be straightened by either removing and wasting mix which bows outside the edge of the mat is indented, before the edge is rolled.

f) In places inaccessible to paving machine, hand spreading will be permitted. Placing and spreading by hand shall be done very carefully and the material distributed uniformly so that segregation of the coarse aggregate and asphaltic mortar will be avoided. The asphaltic mix shall be distributed into place using hot shovels shall be spread with hot rakes in a loose layer of uniform density and correct depth. Asphaltic paving mixture for hand spreading shall not be dumped any faster than can be handled by shoveling and raking.

4.04 Joints

Longitudinal and transverse joints shall be carefully prepared, bonded and sealed.

a) Transverse Joints in both base and surface courses shall be carefully constructed and thoroughly compacted to provide smoothness and true alignment. If a bulkhead was not used to form a transverse join, the line of the joint shall be located a sufficient distance back of the rounded edge, to provide a true surface and cross section. Where material is trimmed, a neat and vertical face shall be prepared and this face shall be sprayed or painted with a thin uniform coat of hot asphalt cement, or other asphaltic bonding material as may be directed by the Consulting Engineer.

b) Transverse joints made next to an adjoining lane shall be rolled initially by making a pass along the longitudinal joint for a few metres. The surface shall be checked with a straight-edge and corrections made if necessary. The joint shall then be rolled except for a 150 mm projection of the wheels on the freshly laid material. This procedure shall be repeated with successive passes each covering 150 to 200 mm of fresh material until the entire width of a drive roll is on the new mix. Boards of proper thickness should be placed at the edge of the pavement to provide for off-pavement movement of the roller. Where this is impractical, transverse rolling shall stop 150 to 200 mm short of the outside edge of the pavement, and the outside edge shall be rolled out during longitudinal rolling.

c) Longitudinal Joints shall be planned to provide an offset of at least 150 mm from like joints in a previously laid course. The first lane placed shall be true to line and grade and have a near vertical face. Before compaction, the material along unsupported edges shall be butted and slightly elevated with a tamping tool or pavement shall be trimmed to provide a vertical face and this face shall be sprayed or painted with a thin uniform coat of hot asphalt cement, or other asphaltic bonding material as may be directed by the Consulting Engineer.

d) When paving is done against an abutting lane, the paver shall be positioned so that in spreading, the new mix overlaps the compacted lane of pavement by no more than 75 mm. Coarse aggregate in the material overlapping the cold joint shall be carefully removed and wasted. If another course is to be placed over the course being spread, the excess coarse aggregate may be spread over the unrolled lane with a broom or lute. When placing a surface course excess coarse aggregate shall not be spread over the freshly laid mat.

e) Longitudinal joints shall be rolled directly behind the paving operation. Rolling of joints shall be done with the roller wheels positioned on the previously laid pavement so not more that 150 mm of the rear roller wheel rides on the freshly laid mix. The roller shall continue to roll this line, gradually shifting its position across the joint, until a thoroughly compacted and neat joint is obtained.

## 5.0 Compaction

5.01 General

Compaction of freshly laid asphaltic concrete shall be such that the final compaction requirements of paragraph 1.04 are satisfied and that the finished pavement shall be smooth and accurate to the established grade and crown.

5.02 Surface

The surface of the finished pavement shall be free from objectionable paver ripple and from lumps or depressions exceeding 5 mm from a 3 m straight edge laid thereon parallel to the center line of a camber board laid transversely.

5.03 Compaction Method and Equipment

a) The method of compaction to obtain the specified density, may be selected by the Contractor, but shall be subject to approval by the Consulting Engineer. The equipment should meet the following minimum requirements.

1. Three wheel steel rollers shall have a loaded weight of not less than 10.9 tones, with a compression at the rear wheels of not less than 60 N/mm of width.

2. Steel wheel or segmented steel wheel rollers shall have two rolls side by side each of a minimum width of 750 mm and minimum diameter of 1500 mm. The minimum loading rolling mass shall be 13.6 tonnes.

3. Vibration rollers shall have a minimum steel drum diameter of 1150 mm, a minimum drum width of 1500 mm and shall be capable of being loaded so as to have a loaded mass of 17.5/mm of drum width.

4. Pneumatic tired rollers shall be equipped with wheels which carry 13.00 x 24 pneumatic tires capable of being inflated to a minimum pressure of 825 KPa and shall have a loaded mass such that all wheels carry a minimum proportional load of 31 kN.

b) For pneumatic tired rollers, tire contact pressures shall be as high as possible without causing displacement of the mix that cannot be remedied in the final rolling. The use of small amount of non-foaming detergent or water-soluble oils on the wetting mat of the pneumatic tired rollers at the beginning of the rolling operation will be most helpful in preventing the asphalt from sticking to the tires until they warm up.

c) During rolling, the roller wheels should be kept moist with only enough water to avoid picking up the material. Rollers should move at a slow but uniform speed with the drive roll or wheels nearest the paver. The speed should not exceed 5 km/h for steel wheeled rollers, or 8km/h for pneumatic-tired rollers. Rollers should be in good condition, capable of being reversed without backlash. The line of rolling should not be suddenly changed or the direction of rolling reversed, thereby displacing the mix. Any pronounced change in direction of the roller should be made on stable material, the affected areas should be loosened at once with lutes or rakes and restored to the original grade with loose material before being re-rolled. Heavy equipment, including rollers, should not be permitted to stand on the finished surface before it has thoroughly cooled or set.

5.04 Rolling Procedure

a) When paving in single width, the first lane placed shall be rolled in the following order:

1. Transverse joints.
2. Outside edge.
3. Initial or breakdown rolling, beginning on the low side and progressing toward the high side.
4. Second rolling, same procedure as 3.
6. Finish rolling.

b) When paving in echelon, or abutting a previously placed lane, the mix shall be rolled in the following order:

1. Transverse joints
2. Longitudinal joints.
3. Outside edge.

4. Initial or breakdown rolling, beginning on the low side and progressing toward to high side.
5. Second rolling, same procedure as 4.
6. Finish rolling.

c) When paving in echelon, 50 to 75 mm of the edge which the second paver is following shall be left unrolled, and rolled when the join between the lanes is rolled. Edges shall not be exposed more than fifteen (15) minutes without being rolled. Particular attention shall be given to the construction of transverse and longitudinal joints in both intermediate and surface courses.

5.05 Breakdown Rolling

a) Breakdown rolling shall be accomplished with steel wheel rollers or approved pneumatic rollers. Breakdown rollers shall work as closely as possible behind the paving machine, without cracking the mat or having the mix pick up on the roller wheels.

b) Breakdown rolling shall start on the low side of the spread, which is normally the outside of the lane being paved, and progress toward the high side. When adjoining lanes are placed, the same rolling procedure shall be followed but only after compacting of the fresh mix at the longitudinal joint with 150 to 200 mm of the roller width.

c) A pattern of rolling that will provide the most uniform coverage of the lane being paved shall be used. Normally, this pattern will involve overlapping on successive trips by at least one half the width of the narrowest wheel of the roller.

d) Breakdown rollers shall generally move onto the freshly laid mat with the drive rolls forward in the direction of paving.

5.06 Intermediate Rolling

a) Intermediate rolling shall follow the breakdown rolling as closely as possible while the asphalt mix is still plastic and at a temperature that will result in maximum density.

b) Normally, pneumatic tired rollers shall be used for the intermediate rollings. Pneumatic tired rollers shall be continuous, consisting of at least three (3) complete coverages.

c) Intermediate rolling shall follow the same rolling pattern as used for the breakdown rolling, and shall be continued until the desired compaction is obtained.

5.07 Finish Rolling

Finish rolling shall be accomplished with two-axle tandems while the material is still warm enough for removal of roller marks.

5.08 Correction of Surface Irregularities

If any irregularities or defects remain after compacting is completed, they shall be corrected in lower courses by removing or adding material. In the surface course the entire affected area of the surface shall be removed promptly and sufficient new material placed to form a true and even surface. All minor surface projections, joints, and minor honey-combed areas shall be rolled to a smooth surface. The final surface shall be of a uniform texture conforming to the line and grade as shown on the Design Drawing.

a) For situations where there is evidence of deficient asphalt pavement, a Certified Materials Testing Laboratory will be engaged by the developer to perform additional tests as required to make recommendations for remedial work which will be approved by the Municipal Engineering Advisor. All remedial work will be completed prior to acceptance of the road works.

5.09 Areas Inaccessible to Rollers

When the asphalt mix is spread in areas that are inaccessible to the rollers, compaction shall be obtained by hand tampers, mechanical tampers, or small vibrating-plate compactors.

5.10 Paving to Existing Curb and Gutter

When asphalt paving is being constructed against existing concrete curb and gutter, the finished surface of the asphalt pavement shall not be less than 5 mm above the top of the gutter.

5.11 Traffic Control

No traffic shall be permitted on the finished pavement until it has cooled to such temperature as to ensure that no deformation of the surface will occur.

## 6.0 Levelling Courses

6.01 Asphalt Mix

Asphalt concrete mixes to be used in placing leveling courses, or the placing of levelling wedges to correct sags and depressions shall be Class C.

6.02 Base Preparation

Leveling courses or leveling wedges shall not placed on a base that has not been either primed or tack-coated in accordance with the Special Provisions of the Contract, and in accordance with Appendix 3 Surface Preparation for Asphalt Paving.

6.03 Equipment

a) Self-propelled paving machines may be used. Where construction allows, a long ski riding on an adjacent lane, curb or gutter shall be used. A short ski or shoe grade follower shall be used in instances where a guide-line string is used as a grade reference. A grade reference string line shall be set by the Consulting Engineer to grade references elevation and shall be established parallel to the centre line of the road.

b) Motor graders may be used in laying levelling courses, or levelling wedges using only very skilled and experienced operators. When spreading levelling courses with a motor grader, such spreading shall be done to establish grade reference points as set by the Consulting Engineer.

6.04 Construction

a) In placing the mix in a levelling course with a motor grader it is essential to place the required amount of mix in each station of the work so that there will not be a large excess of material to waste.

b) The asphalt mixture shall be placed in a conventional trapezoidal windrow which shall then be spread by the motor grader in the normal fashion.

c) Ultimately, the asphalt mixture shall be spread from a windrow box to provide a flat spread 100 mm high and from 2 m to 2.5 m wide. The motor grader operator shall then “square blade” the mixture ahead.

d) When an automatic blade control is available on a motor grader, the blade shall be set to the required transverse slope and string line used to maintain longitudinal alignment.

e) Compaction of the asphalt mixture in levelling courses shall be done with a pneumatic tired roller following immediately behind the motor grader or paving machine.

6.05 Levelling Wedges

a) Levelling wedges shall be used to level sags or depressions in an old pavement prior to re-surfacing. Levelling wedges shall be placed in layers of not more than 75 mm in thickness. Where thicker wedges are required, multiple layers shall be used.

b) Where multiple layers are required, the Consulting Engineer shall establish sufficient levels to enable cross-section and profile to be established.

c) In placing multiple layers, the shortest length layer shall be placed first with the successive layer or layers extending over and covering the shortest layer.

6.06 Construction

The method of construction and compaction shall be the same generally as the specified in paragraph 6.04 and following procedural requirements of paragraph 6.05.

## 1.0 Scope

1.01 General

This Specification covers the materials, plant equipment and workmanship required for surface treatments of existing roads.

1.02 Description of Work

Surface treatments usually described as Seal Coats shall be referred to in this Specification as one of the following:

a) Aggregate Seal – single or multiple treatments
b) Sand Seal
c) Fog Seal
d) Slurry Seal

Additionally, Mixed-in-Place Surface Treatment and Plant-Mixed Surface Treatments shall be described under that particular application.

## 2.0 Materials

2.01 Methods of Test

a) Asphaltic materials shall be tested in accordance with methods of test designated in Appendix 7 – Methods of Test.
b) Mineral aggregates shall be tested in accordance with methods of test designated in Appendix 7 – Methods of Test.

2.02 Asphalt Primer

The asphalt primer shall be that specified by the Consulting Engineer. The asphalt specified shall conform to Appendix 1 – Asphaltic Materials.

2.03 Asphalt Binder

The asphalt binder shall be that specified by the Consulting Engineer. The asphalt specified shall conform to Appendix 1 – Asphaltic Materials.

2.04 Aggregates

a) For aggregate seals, the aggregate shall consist of clean crushed rock or gravel of uniform quality throughout. The aggregate shall have a percent wear by the Los Angeles Abrasion Machine Test of not more than forty, and not less than sixty percent by mass of crushed gravel shall have two or more faces produced by fracture.

b) The aggregate shall meet the following gradation requirements:

| Size Number | Nominal Size Square Openings | Amounts finer than each laboratory sieve (square openings), percentage by weight | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 23.75 mm | 19.00 mm | 13.20 mm | 4.75 mm | 2.36 mm | 1.18 mm | 300 mm |
| 5 | 19.0 mm to 9.5 mm | 100 | 90 to 100 | 20 to 55 | 0 to 15 | 0 to 5 | | |
| 7 | 13.2 mm to 4.75 mm | | 100 | 90 to 100 | 40 to 70 | 0 to 15 | 0 to 5 | |
| 8 | 9.5 mm to 2.36 mm | | | 100 | 80 to 100 | 10 to 30 | 0 to 10 | 0 to 5 |
| 9 | 4.74 mm to 1.18 mm | | | 100 | 85 to 100 | 10 to 40 | 0 to 10 | 0 to 5 |

Numbered sieves are those of the United States Standard Sieve Series, converted to metric by Canadian Government Specification Board Standard 8 – GP – 2M.

Or shall meet the following gradation requirements for one-sized aggregate.

GRADATION REQUIREMENTS FOR ONE SIZE AGGRETATES

| Size Designation | Nominal Size Square Openings | Amounts finer than each laboratory sieve (square openings), percentage by weight. | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 23.75 mm | 19.00 mm | 13.20 mm | 9.50 mm | 4.75 mm | 2.35 mm | 75 mm |
| A | 19.0 mm to 13.2 mm | 100 | 85 to 100 | 2 to 20 | 0 to 7 | | 0 to 1 | 0 to 0.5 |
| B | 14.25 mm to 9.5 mm | | 100 | 85 to 100 | 0 to 30 | | 0 to 1 | 0 to 0.5 |
| C | 9.5 mm to 4.75 mm | | | 100 | 85 to 100 | 0 to 10 | 0 to 1 | 0 to 0.5 |

Numbered sieves are those of the United States Standard Series, converted to metric by Canadian Government Specification Board Standard 8-GP-2M.

c) For sand and seal slurry seals, the aggregate shall consist of clean, sharp sand and mineral filler, combined to meet the following gradation requirements :

| CGSB 8-GP-2M Sieve Size | Total Percent Passing |
|---|---|
| 2.36mm | 100 |
| 1.18mm | 55 – 85 |
| 600mm | 35 – 80 |
| 300mm | 20 – 45 |
| 150mm | 10 – 30 |
| 75mm | 5 – 15 |

d) Notwithstanding paragraphs b) and c), should the Contractor provide aggregates which meet the maximum size requirements, and such aggregates have a proven record of service and durability, the Consulting Engineer may approve the use of such aggregates in writing, although they do not meet the overall grading requirements specified.

## 3.0 Rates of Application

3.01 Rates of application or spread for asphaltic materials and the grade to be used shall be specified by the Consulting Engineer.

3.02 Rates of application or spread for aggregates and the gradation requirements to be used shall be specified by the Consulting Engineer.

3.03 Surface preparation of Granular Base – Prior to surface treatment of granular bases, the base shall be prepared in accordance with Appendix 3 – Surface Preparation of Asphalt Paving, paragraph 6.0.

3.04 Surface Preparation of Existing Asphalt Surfaces – Prior to surface treatment of existing asphalt surfaces, defects in the existing pavement shall be repaired in accordance with Appendix 3 – Surface Preparation for Asphalt Paving, paragraph 7.0.

## 4.0 Construction Methods

4.01 Construction of Aggregate Seals

a) Subsequent to preparation under paragraph 3.0, the surface to be treated shall be swept clean using a rotary broom, and if dusty, the surface shall be dampened with water. Particular care shall be taken to thoroughly clean the

outside edges of the area to be treated, and care taken that material removed shall not be mixed with the cover aggregate.

b) Asphaltic primer where specified shall be applied in accordance with Appendix 3 – Surface Preparation for Asphalt Paving, paragraph 5.0.

c) Following absorption and curing of the primer, application of the asphaltic binder shall be made uniformly at the specified rate using a pressure distributor. The binder shall be applied at a temperature such that the asphaltic viscosity is within the range of twenty to one hundred and twenty centistokes for asphalt cements and liquid asphalts, or fifty to one hundred centistokes for emulsified asphalts.

d) The distributor shall be cleaned thoroughly before using unless its last use was with the same type of asphaltic binder specified for the work.

e) Applications of liquid asphalts (other than emulsified asphalts) and asphaltic cement shall be made only when the surface is thoroughly dry. Application of emulsified asphalt shall be made when the surface is dry or slightly damp.

f) Asphaltic binder (other than emulsified asphalt RS-2K) shall be applied only when the pavement temperature is twenty-six (26) degrees Celsius or higher. Emulsified asphalt RS-2K shall be applied only when the pavement temperature is ten (10 degrees Celsius or higher.

g) Before beginning application, building paper shall be spread over the surface, from the joint back, for a sufficient distance for the spray bar to begin spraying and be operating at full force when the asphalt surface to be treated is reached. The paper shall be removed after application of the asphalt.

h) The spray bar shall be shut off instantaneously at each construction joint to assure full application of the asphaltic binder up to the joint. Dripping shall be prevented by the insertion of a drip pan under the nozzles.

i) Areas missed by the distributor, shall be touched up with a hand sprayer.

4.02 Application of Aggregate

a) Clean, dry aggregate shall be distributed uniformly by a mechanical or a self-propelled spreader and shall follow immediately the asphaltic application.

b) The cover coat shall be applied ahead of the truck or spreader wheels.

c) Immediately after spreading, the aggregate shall be rolled with a self-propelled pneumatic-tired roller having a total compacting width of not less than 1500 mm and minimum contact pressures of 275 kPa.

d) Rolling shall proceed in a longitudinal direction, beginning at the outer edges of the treatment and working towards the center, with each trip overlapping the previous trip by one half the width of the front wheels, or roller.

e) The first rolling of the aggregate shall be completed within one half hour after it has been spread, and rolling shall continue only until a smooth, thoroughly compacted surface is obtained.

f) In instances where the surface treatment is done one-half width at a time, 150 mm of the inside edge shall be left uncovered with aggregate to allow for an overlap of asphaltic binder when the remaining half of the surface is treated.

g) All loose aggregate shall be removed from the pavement following completion of the work.

4.03 Traffic Control

a) Traffic shall be kept off of freshly sprayed asphalt and shall be directed through the project with the least interruption of the work.

b) Should it be necessary to route traffic over the new treatment, speed shall be restricted to 8 km/h until completion of rolling and the asphalt has taken its initial set. Speed shall then be restricted to 40 km/h until the Consulting Engineer directs the end of the traffic control.

4.04 Double and Multiple Surface Treatments

Where double and multiple surface treatments are specified preparation and construction of subsequent treatments shall be done in accordance with paragraph 3.04, 4.01, 4.02 and 4.03.

4.05 Construction of Sand Seals

Preparation, application and construction of sand seal surface treatments shall follow the procedures of paragraphs 3.04, 4.01, 4.02 and 4.03, with types of materials to be used and rates of application of material specified by the Consulting Engineer.

## 5.0 Fog Seals

5.01 General

This specification covers Fog Seal Surface Treatments to existing asphalt paving.

5.02 Surface Preparation

Prior to surface treatment of existing asphalt surfaces, defects in the existing pavement shall be repaired in accordance with Appendix 3 – Surface Preparation for Asphalt Paving, paragraph 7.01.

5.03 Materials

The emulsified asphalt to be used for this application shall be SS-1 or SS-1h, which shall be diluted with water at the rate of 1:1 parts emulsified asphalt to water.

5.04 Rate of Application

The rate of application shall be specified by the Consulting Engineer.

5.05 Construction Method

a) Subsequent to Surface Preparation under paragraph 5.02, the Fog Seal shall be uniformly applied using pressure distributor at the rate specified by the Consulting Engineer.

b) The distributor shall be cleaned thoroughly before using unless its last use was with the same type of emulsified asphalt specified for the work.

c) Emulsified asphalt Fog Seal shall only be applied when the ambient temperature is not less than ten (10)º C.

5.06 Traffic Control

a) Traffic shall be kept off of freshly sprayed asphalt and shall be directed through the project with the lease interruption of the work.

b) Traffic shall be kept off of the freshly sprayed asphalt for two hours following application of the seal, or until directed otherwise by the Consulting Engineer.

**6.0 Slurry Seals**

6.01 General

This Specification covers the application of Slurry Seal Surface Treatments to existing asphalt pavements.

6.02 Surface Preparation

Prior to surface treatment of existing asphalt surfaces defects in the existing pavement shall be repaired in accordance with Appendix 3 – Surface Preparation for Asphalt Paving, paragraph 7.01.

6.03 Materials

a) Emulsified Asphalt shall be specified in the Special Provisions of the Contact.
b) Aggregate shall meet the requirements of paragraph 2.04 c).

6.04 Equipment

a) For slurry sealing of small areas the mixture may be batched in a plaster machine, dumped on the surface to be treated and then spread with long-handed squeegees.

b) For large areas, slurry seals shall be mixed in transit mix type trucks and spread with a squeegee spread box towed behind the truck, or if available the mixture may be spread using a slurry seal machine.

6.05 Slurry Mixture

Unless otherwise specified in the Special Provisions of the Contract, materials shall be combined in the following proportions:

i) Combined aggregate and mineral filler – 50 kg.
ii) Emulsified asphalt – 15 liters.
iii) Water – as required for proper consistency.

In batching the mixture, approximately two-thirds (2/3) of the estimated water requirements shall be placed in the mixer. With the mixer operating, the aggregate is added in the specified proportion followed by the emulsified asphalt. The materials shall be added at a slow and uniform rate so as not to cause any balling or lumping in the mixture. The mixture shall be blended until uniform and shall be tempered with additional water if needed to produce a free-flowing creamy textured mixture.

6.06 Construction Method

a) Immediately prior to applying the slurry, the surface to be treated shall be dampened with a light application of water, except that no pooling of free-standing water shall occur on the surface. Following dampening of the surface, a tack coat of diluted emulsified asphalt shall be applied uniformly to the surface to be treated. The tack coat shall be of emulsified asphalt, the same type and grade specified for the slurry mix, diluted in the ratio of one part emulsified asphalt and three parts of water.

b) The tack coat shall be applied at the rate of 0.5 L/m² or as directed by the Consulting Engineer, and shall be thoroughly cured prior to the application of the slurry seal.

c) The slurry seal shall be spread on the area to be treated to provide a slurry thickness of the depth (specified by the Consulting Engineer).

d) The thickness for any one single course shall not exceed 5 mm.

e) Where the slurry seal is being applied over extensively scaled areas, each application shall be thoroughly rolled with a pneumatic tired roller after the slurry has cured.

f) The pneumatic tired roller shall be a total compacting width of not less than 1500 mm and shall have contact pressures of 275 kPa. The operating contact pressure shall be specified by the Consulting Engineer.

6.07 Traffic Control

All traffic control shall be kept off the slurry seal until it has cured to a firm condition that will prevent pick-up of the mixture. Where two applications of the slurring mixture are required, the initial treatment shall be cured thoroughly prior to placing the succeeding application.

## 1.0 Scope of Specification

1.01 General

This Specification covers the duties and responsibilities of the Consulting Engineer or his authorized representatives as set in Section A1 – 3.

1.02 Testing Laboratory

The Consulting Engineer may appoint an independent testing laboratory to provide inspection services as directed, or to conduct testing of materials to ensure compliance with the Specifications.

1.03 Weather

No work shall be undertaken by the Contractor when, in the opinion of the Consulting Engineer, the weather is unsuitable or unfavorable for a particular class of work.

## 2.0 Inspection

2.01 Plant and Equipment

a) The Contractor shall at all times provide access to, and allow for inspection of the plant and all equipment during the Contract. Any materials or subsequent construction shall be reported to the Contractor immediately and corrective measures shall be taken by the Contractor.

b) Should the Contractor not take remedial action to any request arising from paragraph 2.01 a), the Consulting Engineer shall order a stoppage of the work in progress until the necessary remedial action has been done by the Contractor.

2.02 Construction

a) During construction, the Contractor shall at all times comply with the methods of construction contained in this specification. Construction methods employed by the Contractor, which are at variance with the methods of construction shall be pointed out by the Consulting Engineer and remedial action, as may be directed shall be taken by the Contractor.

b) Should the Contractor not take remedial action to any request arising from paragraph 1.02 a), the Consulting Engineer may order a stoppage of the work in progress until the necessary remedial action has been done by the contractor.

c) At any time during construction, the Consulting Engineer, if of the opinion that the Contractor's construction method is inadequate and unlikely to provide pavement of the required density or surface finish, he may direct the Contractor to change his construction method or to supply alternative equipment, as may be directed.

d) The requirements of paragraph 2.02 c) shall in no way relieve the Contractor of his responsibility for obtaining the required degree of compaction and finish without directions from the Consulting Engineer.

e) Deficiencies in the finished pavement shall be corrected by the Contractor, where such deficiencies are at variance with the Standard Specifications.

f) All such corrections shall be accomplished as directed by the Consulting Engineer at the expense of the Contractor.

## 3.0 Testing

3.01 Materials

a) As directed by the Consulting Engineer, the Contractor shall furnish samples, or provide access for sampling of materials.

b) Sampling of materials shall be in accordance with the pertinent specification as outlined in Appendix 7 – Methods of Test.

c) Testing of materials shall be accordance with the pertinant specification as outlined in Appendix 7 – Methods of Test.

d) As required for compaction testing purposes, the authorized representative shall obtain samples carefully removed from the completed pavement. Holes made by removal of such samples shall be carefully filled by the Contractor with the appropriate mixtures and thoroughly compacted to conform in every way with the adjoining undisturbed pavement.

## 4.0 Re-Testing

4.01 Failure to Meet Test Requirements

Should any tests, required by the Consulting Engineer, fail to meet the requirements of the Standard Specification, the Consulting Engineer shall direct re-testing to be done as he may deem necessary.

## 5.0 Inspection and Testing Costs

5.01 Inspection and Testing of Materials

No costs of inspection and testing of materials shall be borne by the Municipality.

## 1.0 Test Requirements

All A.S.T.M. Specifications shall be read as the latest revision thereof.

| 1.01 Asphalt Cement | A.S.T.M. Specification |
|---|---|
| Viscosity | D2170 |
| Penetration | D5 |
| Flash Point | D92 |
| Thin Film Oven Test | D1754 |
| Rolling Thin Film Oven Test | D2872 |
| Ductibility | D113 |
| Solubility | D2042 |
| Specific Gravity | D70 |
| Softening Point | D2398 |

| 1.02 Liquid Asphalt | A.S.T.M. Specification |
|---|---|
| Viscosity | D2170 |
| Flash Point | D1310 |
| Distillation | D402 |
| Water in Asphalt | D95 |
| Specific Gravity | D3142 |
| Asphalt Residue of 100 Penetration | D243 |
| Ductibility | D113 |
| Solubility | D4 |

| 1.03 Emulsified Asphalt | A.S.T.M. Specification |
|---|---|
| Viscosity | D244 |
| Residue from Distillation | D244 |
| Settlement | D244 |
| Demulsibility | D244 |
| Sieve Test | D244 |
| Cement Mixing | D244 |
| Aggregate Coating-Water Resistance Test | D244 |
| Particle Charge Test | D244 |
| Storage Stability | D244 |
| Oil Distillate | D244 |

1.04 Mineral Aggregates — A.S.T.M. Specification

| | |
|---|---|
| Sampling Aggregates for Use as HighwayMaterial | D75 |
| Sieve Analysis: | |
| Dry Sieve Analysis, Coarse and Fine Aggregate | C136 |
| Mineral Filler | D546 |
| Sand Equivalent | D2419 |
| Abrasion (Wear) | C131 |
| Soundness Test | C88 |
| Specific Gravity: | |
| Coarse Aggregate | C127 |
| Fine Aggregate | C128 |
| Filler | D854 or C188 |
| Unit Density | C29 |
| Moisture | C566 |

1.04 Asphalt Paving Mixtures

| | |
|---|---|
| Sampling Bituminous Paving Mixtures | D979 |
| Marshall Test | D1559 |
| Density | D1188 or D1726 |
| Extraction | D2172 |
| Recovery of Asphalt | D1876 |
| Moisture and/or Volatile Distillates | D255 |
| Alternate Methods | D1461 |
| Maximum Specific Gravity | D2041 |
| Sieve Analysis of Extracted Aggregate: | |
| Course and Fine Aggregates | C136 |
| Mineral Filler | D546 |

1.05 Base Materials — A.S.T.M. Specifications

| | |
|---|---|
| Sieve Analysis – Dry Sieve Analysis | |
| Coarse and Fine Aggregates | C136 |
| Sand Equivalent | D2419 |
| Abrasion (Wear) | C131 |
| Soundness Test | C88 |
| Proctor Density – Moisture Density | |
| Relations of Soils, Method A | D698 |

Density of Soil in Place:

| | |
|---|---|
| Sand-Cone Method | D1556 |
| Rubber-Balloon Method | D2167 |

| | | |
|---|---|---|
| 1.06 | Distributor Spread Rate | State of California Division of Highways |
| | Tentative Method of Field Test for Determination of Distributor Spread Rate | No. Calif. 339-A<br><br>Tentative Test Method |

## 1.0 Ready-Mix Concrete

### 1.01 Reference Standards

Latest revision of all Reference Standards shall apply.

a) C.S.A. Standard A23.1 - Concrete Materials and Methods of Concrete Construction.

b) C.S.A. Standard A23.2 - Methods of Test for Concrete.

c) A.S.T.M. Specification C494 - Chemical Admixture for Concrete.

d) A.S.T.M. Specification C618 - Fly Ash for Use in Portland Cement Concrete.

e) C.S.A. Standard A5 - Portland Cements.

f) C.S.A. Standard A266.1 - Air-Entraining Admixtures for Concrete.

g) A.S.T.M. Specification C309 - Liquid Membrane Forming Compounds for Curing Concrete.

### 1.02 Inspection and Testing.

a) All required sampling, preparation of specimens and testing shall be performed by an independent testing agency appointed by the Consulting Engineer. The testing agency shall report immediately to the Consulting Engineer when any procedure is contrary to the specifications and good practice.

b) Testing costs will be chargeable to the applicant.

c) The testing agency selected by the Consulting Engineer shall approve all mix designs.

d) The testing agency shall perform the following:

1. Supply cylinder molds, as per the concrete, make and cure test cylinders and perform compressive strength tests in accordance with C.S.A. Standards A23.2.21, A23.2.14, and A23.2.13.

2. Make slump tests and air content tests in accordance with C.S.A. Standards A23.2.20 and A23.2.19 or A23.2.18 for each concrete test.

3. Take three (3) test cylinders for each 100 cubic metres or fraction thereof for each class of concrete placed in any one day, except that in no case shall a class of concrete be represented by less than three (3) tests.

e) The Municipal Engineering Advisor may at his discretion reduce or eliminate the test cylinders to be taken for minor pours or pours not of structural significance.

f) A compression strength test of one cylinder of each set shall be performed at the test specimen age of seven (7) days and copies of these test reports shall be forwarded to the Municipal Engineering Advisor and concrete supplier within fourteen (14) days of concrete placement.

g) Compression strength tests of the remaining two cylinders of each group shall be performed at the test specimen age of twenty-eight (28) days.

h) The 28 day strength test shall be defined as the average compressive strength of two (2) companion test specimens and copies of this test report shall be forwarded to the Municipal Engineering Advisor and concrete supplier within thirty-five (35) days of concrete placement.

**1.03 Concrete Materials**

a) Cement: Portland Cement shall conform to the requirements of C.S.A. Standard A5.

b) Water: Mixing water for concrete shall be clear and free from injurious amounts of oil, acid alkali, organic matter, sediment or any other deleterious substance.

c) Aggregates: Fine and coarse aggregates shall conform to C.S.A. Standard A23.1.5.

d) Admixtures:

1. Air entraining admixtures: shall conform to the requirements of C.S.A. Standard A266.1.

2. Water reducing agents: shall conform to the requirements of A.S.T.M. Specification C494 (Type A). Accelerating or retarding admixtures of Types B, C, D, and E shall only be used with the authority of the Municipal Engineering Advisor.

3. Fly ash: shall conform to the requirements of A.S.T.M. Specification C618 – Class F. Fly Ash shall only be used with the authority of the Municipal Engineering Advisor.

**1.04 Concrete Mix Specifications:**

| | |
|---|---|
| Cement | Type 10 or 30 |
| Compressive Strength @ 28 days | 30 MPa |
| Maximum Size Aggregate | 20 mm |
| Class of Exposure | Class A |
| Slump | 80 $\pm$ 20 mm |
| Air content | 6 $\pm$ 1 percent |
| Admixtures | * |

* Air entraining agents, water reducing agents and Fly Ash shall conform to the requirements of paragraph 1.03.

**1.05 Concrete Mix Proportions**

Concrete mixes shall be proportioned in accordance with C.S.A. Standard A23.1.9.2.1, Alternative No.1, and the requirements of paragraph 1.04.

**1.06 Concrete Quality**

a) Concrete shall conform to the requirements of C.S.A. Standard A23.1.10.

b) Compressive Strength Requirements (C.S.A. Standard A23.1.10.5)
The strength of the concrete shall be considered satisfactory if the averages of all sets of three compressive strength tests equal or exceed the specified strength and no individual test is more than 3.45 MPa below the specified strength.

**1.07 Failure of Tests to Meet Requirements**

If the results of tests indicate that the concrete is not of the specified quality, the Municipal Engineering Advisor shall have the right to enforce the provisions of C.S.A. Standard A23.1.10.6. Should additional testing indicate that the concrete is not of the specified quality, the Supplier shall remove the concrete in question at the Municipal Engineering Advisor's request.

Note: C.S.A. Standard A23.1.10.6.2 If, after carrying out the appropriate requirement of Clause 10.6.1, the Municipal Engineering Advisor is not satisfied that the concrete in the structure is of the specified quality, he may require a strengthening or replacement of those portions which he deems to be unsatisfactory.

**1.08 Concrete Control**

All concrete shall be "controlled concrete: in accordance with C.S.A. Standards A23.1 and as defined by National Building Code of Canada.

**1.09 Measurement and Batching:**

a) Materials for concrete shall be measured in accordance with C.S.A. Standard A23.2.11.1 and A23.11.1.

b) Batching of materials for concrete shall be in accordance with C.S.A. Standard A23.1.11.2.

**1.10 Mixing and Delivering:**

a) The concrete shall be mixed in accordance with C.S.A. Standard A23.1.11.3.

b) Delivery of concrete shall be in accordance with C.S.A. Standard A23.1.11.4.

**1.11 Protection**

a) Cold weather requirements: Concrete shall be mixed and delivered in accordance with c.s.a. Standard A23.1.16.

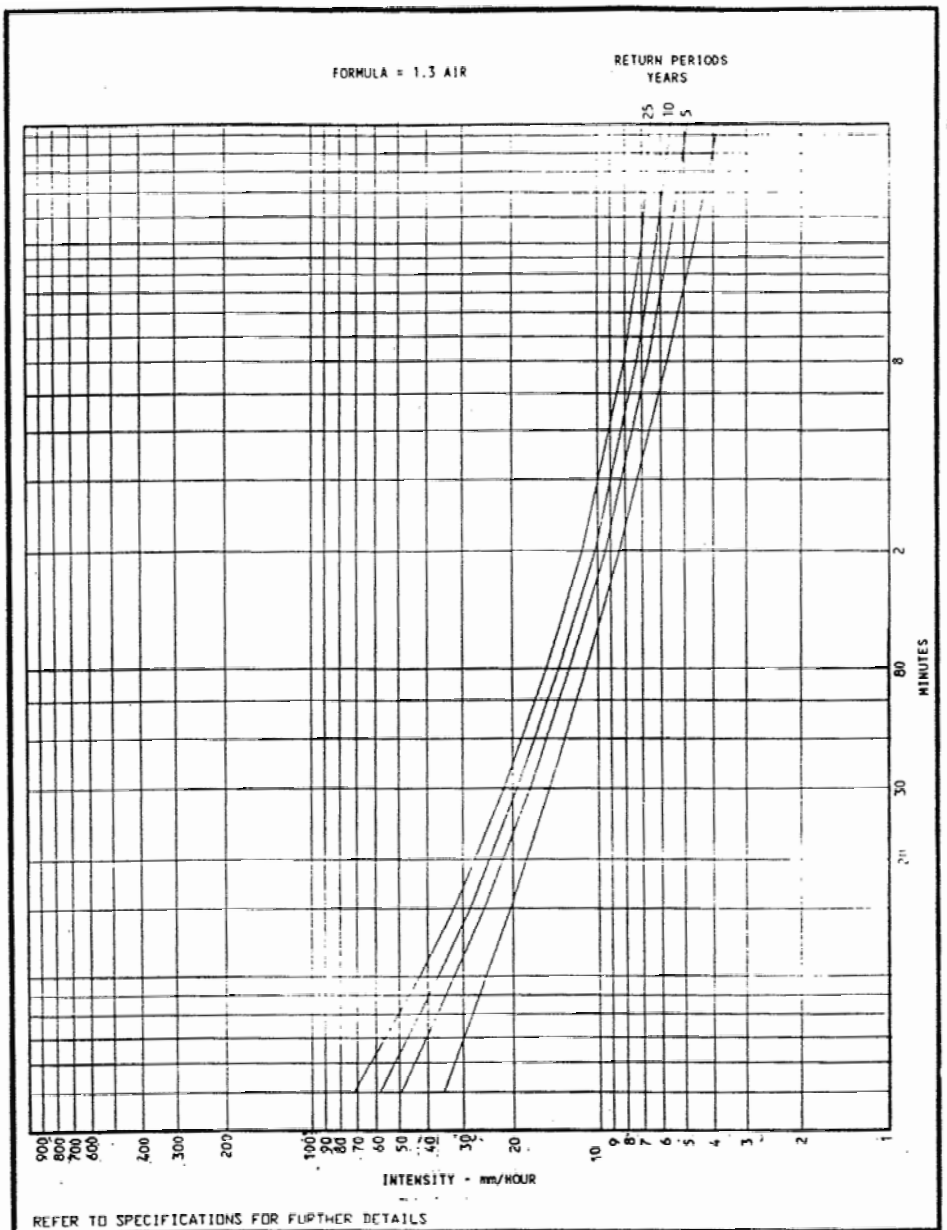
b) Hot weather requirements: Concrete shall be mixed and delivered in accordance with C.S.A. Standard A23.1.17.

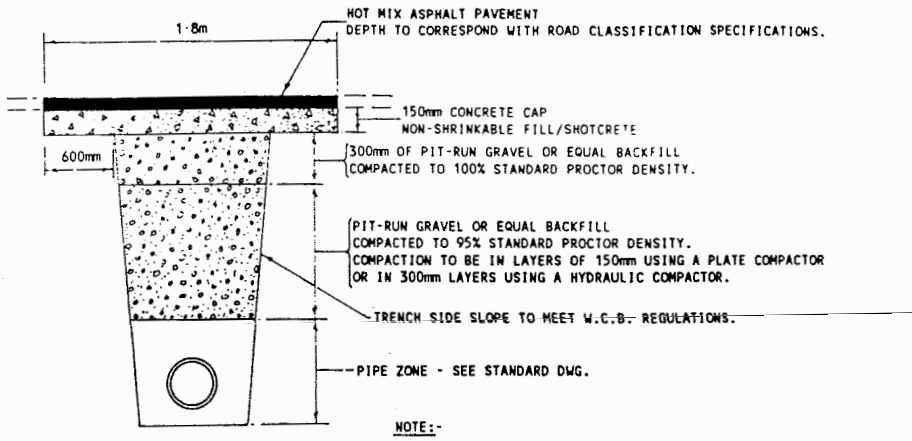
c) Concrete Curing:

1. The surface of the concrete shall be protected by an approval membrane curing material which shall be applied to the entire exposed surface of the concrete immediately after the concrete has received its finish treatment.

2. The curing compound shall meet the requirements of A.S.T.M. Designation C309.

3. The membrane material shall be applied uniformly by an approved pressure distributor at an average of 5 square metres per litre. The compound when applied to a new concrete surface at the specified rate of application shall present a uniform appearance and shall effectively obscure the original colour of the concrete.


FORMULA = 1.3 AIR
RETURN PERIODS
YEARS
25
10
5
MINUTES
INTENSITY - mm/HOUR
REFER TO SPECIFICATIONS FOR FURTHER DETAILS
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION
NO.
DATE
REVISION
RAINFALL INTENSITY
DURATION CHART
STD DWG NO
A1



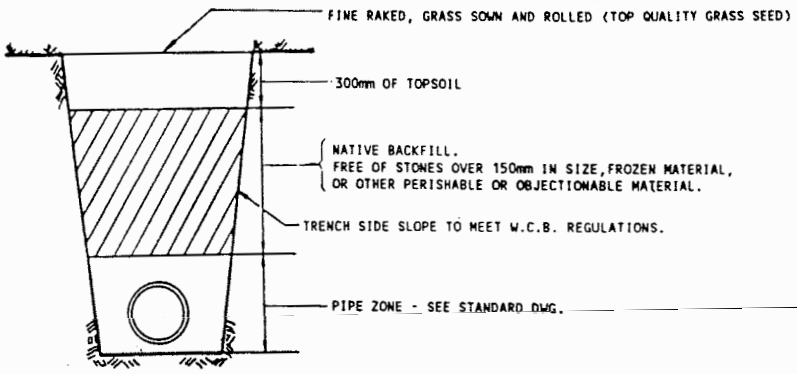

NOTE:-

1.---UNSHRINKABLE FILL MAY BE USED IN LIEU OF COMPACTED GRAVEL BACKFILL.

2.---THIS SPECIFICATION SHALL INCLUDE THE TRAVELLED PORTION OF THE ROAD AND DRIVEWAYS OR WITHIN 1.0m OF THE EDGE OF THE TRAVELLED ROAD.

3.---WITHIN NEW ROAD CONSTRUCTION, THE TRENCH IS TO BE BACKFILLED UP TO 300mm OF GROUND LEVEL AND THE REMAINING 300mm BACKFILLED WITH COMPACTED ROAD GRAVEL.

## UNDER THE TRAVELLED PORTION OF THE ROAD AND DRIVEWAY




## NON - TRAVELLED AREAS

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

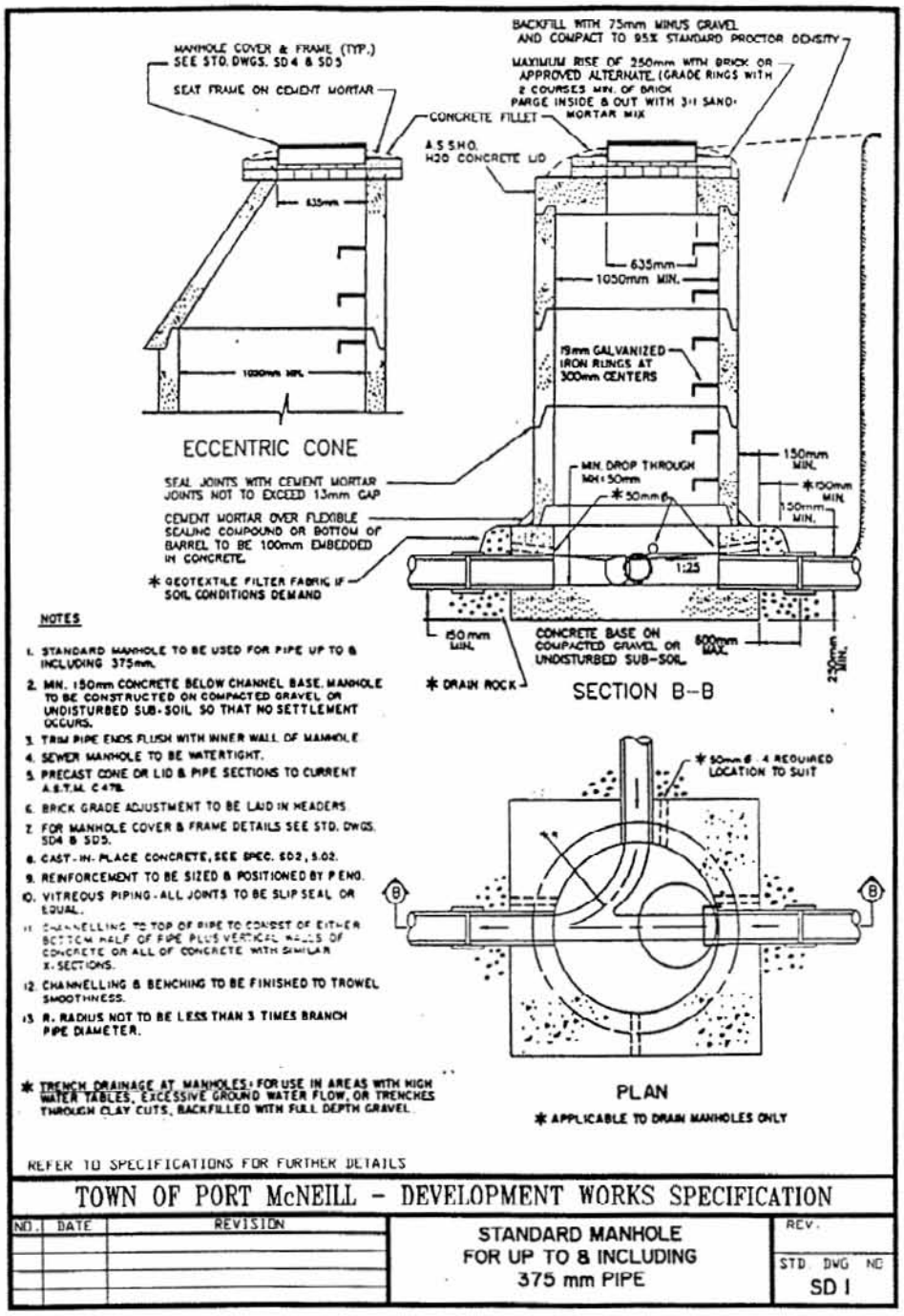
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |

TRENCH CONDITIONS ABOVE THE PIPE ZONE

REV.

STD. DWG. NO. T1




NOTES

1. STANDARD MANHOLE TO BE USED FOR PIPE UP TO & INCLUDING 375mm.
2. MIN. 150mm CONCRETE BELOW CHANNEL BASE. MANHOLE TO BE CONSTRUCTED ON COMPACTED GRAVEL OR UNDISTURBED SUB-SOIL SO THAT NO SETTLEMENT OCCURS.
3. TRIM PIPE ENDS FLUSH WITH INNER WALL OF MANHOLE
4. SEWER MANHOLE TO BE WATERTIGHT.
5. PRECAST CONE OR LID & PIPE SECTIONS TO CURRENT A.S.T.M. C478.
6. BRICK GRADE ADJUSTMENT TO BE LAID IN HEADERS
7. FOR MANHOLE COVER & FRAME DETAILS SEE STD. DWGS. SD4 & SD5.
8. CAST-IN-PLACE CONCRETE, SEE SPEC. SD2, 5.02.
9. REINFORCEMENT TO BE SIZED & POSITIONED BY P.ENG.
10. VITREOUS PIPING - ALL JOINTS TO BE SLIP SEAL OR EQUAL.
11. CHANNELLING TO TOP OF PIPE TO CONSIST OF EITHER BOTTOM HALF OF PIPE PLUS VERTICAL WALLS OF CONCRETE OR ALL OF CONCRETE WITH SIMILAR X-SECTIONS.
12. CHANNELLING & BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
13. R. RADIUS NOT TO BE LESS THAN 3 TIMES BRANCH PIPE DIAMETER.

* TRENCH DRAINAGE AT MANHOLES: FOR USE IN AREAS WITH HIGH WATER TABLES, EXCESSIVE GROUND WATER FLOW, OR TRENCHES THROUGH CLAY CUTS, BACKFILLED WITH FULL DEPTH GRAVEL.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

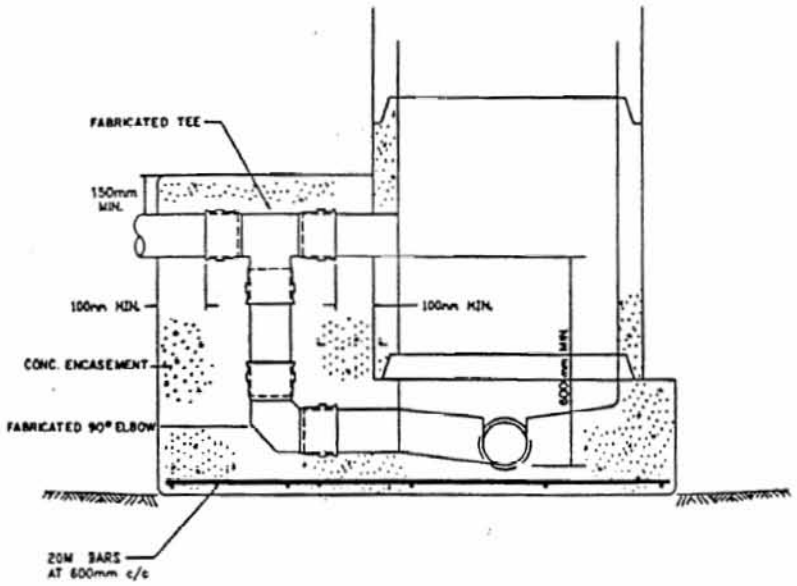
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |

STANDARD MANHOLE FOR UP TO & INCLUDING 375 mm PIPE

REV.

STD. DWG. NO. SD 1



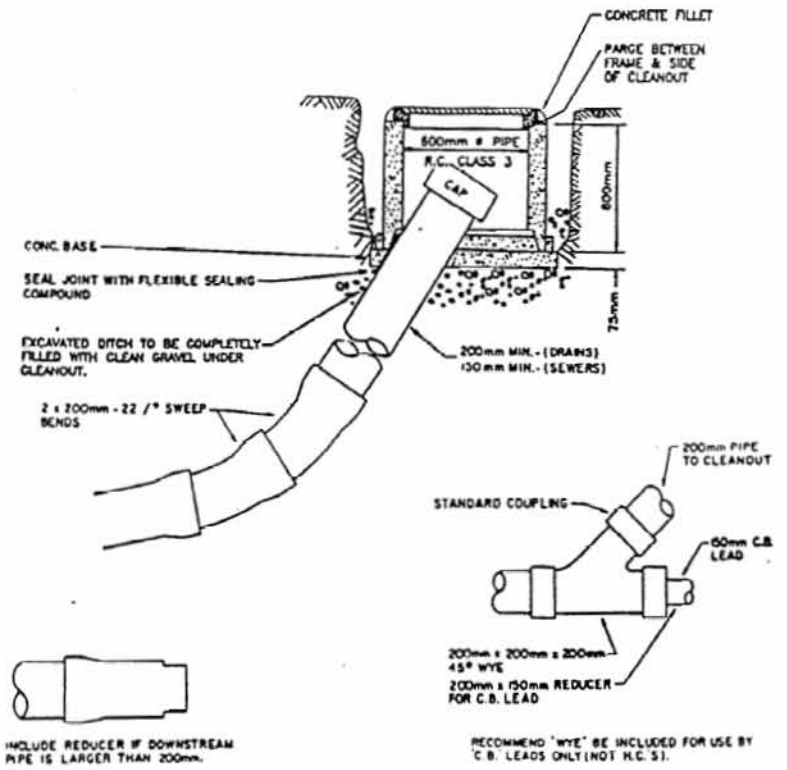

NOTES:

SEE STANDARD DRAWING NO. SD1 FOR TYPICAL MANHOLE DETAILS.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO | DATE | REVISION | DROP MANHOLE | REV. |
|---|---|---|---|---|
| | | | | STD DWG. NO SD 2 |




NOTES:

1. MANHOLE COVER AND FRAME: REFER TO STANDARD DWGS. SD 4 & SD5.
2. TOP OF COVER TO BE 75mmt ABOVE EXISTING GROUND ON EASEMENTS OR BOULEVARDS WITH SOIL PLACED SLOPING AWAY FROM THE COVER.
3. TOP OF THE COVER TO BE FLUSH WITH THE SURFACE WHEN INSTALLED WITHIN TRAVELLED PORTION OF THE ROAD.
4. BACKFILL WITH CLEAN GRAVEL AND COMPACT.
5. CAP TO BE INSTALLED WITHOUT GASKET.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

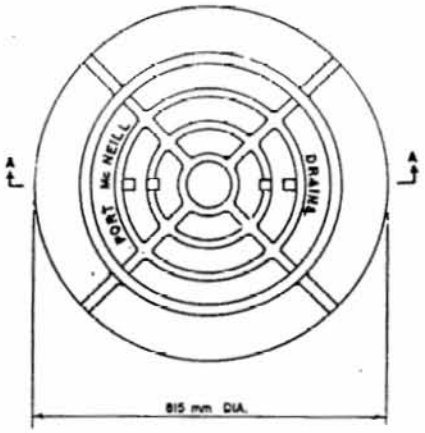
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

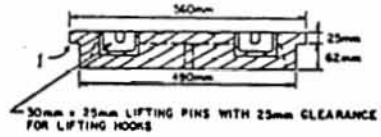
| NO. | DATE | REVISION |
|---|---|---|
| | | |

CLEANOUT

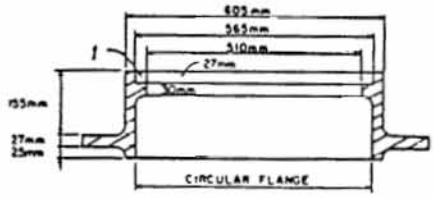
REV.

STD. DWG. NO. SD 3




SECTION OF LID THROUGH A-A




SECTION OF FRAME THROUGH A-A

HEAVY DUTY 100mm COVERS & FRAMES WILL BE ACCEPTED ON APPROVAL, WHERE 200mm SIZES DO NOT FIT.

NOTE : SEWER M.H.'S TO BE IDENTIFIED AS " PORT McNEILL SEWERS "

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

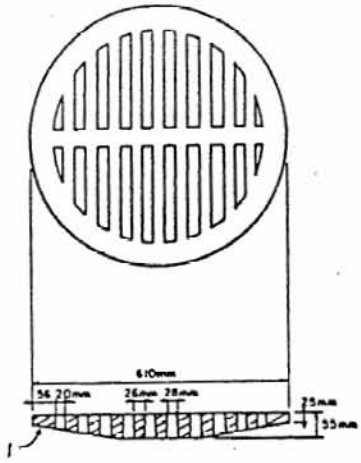
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

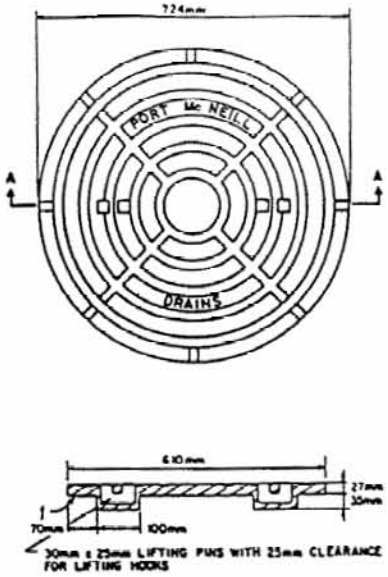
200 mm
MANHOLE COVER & FRAME

REV.

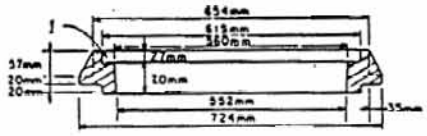
STD. DWG. NO
SD 4




GRATED STORM DRAIN LID
(FOR USE WITH SILT TRAPS)




SECTION OF LID THROUGH A-A



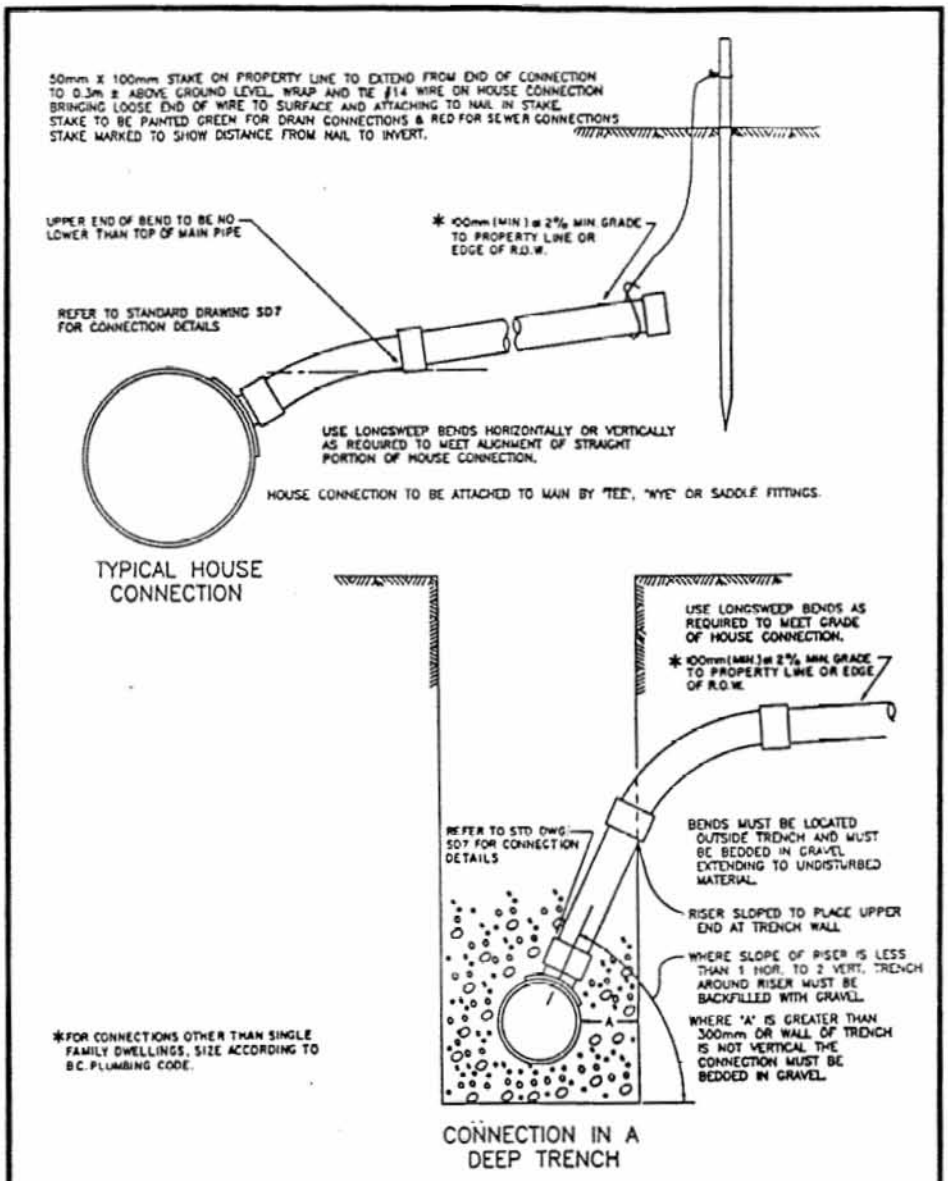

SECTION OF FRAME THROUGH A-A

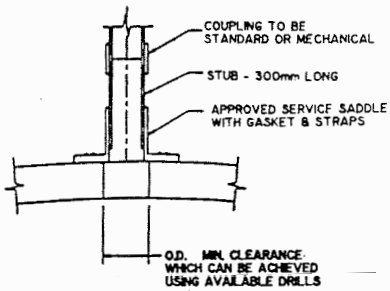
NOTE : SEWER MH'S TO BE IDENTIFIED AS " PORT McNEILL SEWERS "

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION | | REV. |
|---|---|---|---|---|
| | | | 100 mm MANHOLE COVER & FRAME | STD. DWG. NO SD 5 |

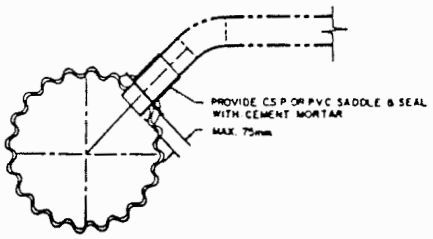

50mm x 100mm STAKE ON PROPERTY LINE TO EXTEND FROM END OF CONNECTION TO 0.3m ± ABOVE GROUND LEVEL. WRAP AND TIE #14 WIRE ON HOUSE CONNECTION BRINGING LOOSE END OF WIRE TO SURFACE AND ATTACHING TO NAIL IN STAKE. STAKE TO BE PAINTED GREEN FOR DRAIN CONNECTIONS & RED FOR SEWER CONNECTIONS STAKE MARKED TO SHOW DISTANCE FROM NAIL TO INVERT.
UPPER END OF BEND TO BE NO LOWER THAN TOP OF MAIN PIPE
* 100mm (MIN.) @ 2% MIN. GRADE TO PROPERTY LINE OR EDGE OF R.O.W.
REFER TO STANDARD DRAWING SD7 FOR CONNECTION DETAILS
USE LONGSWEEP BENDS HORIZONTALLY OR VERTICALLY AS REQUIRED TO MEET ALIGNMENT OF STRAIGHT PORTION OF HOUSE CONNECTION.
HOUSE CONNECTION TO BE ATTACHED TO MAIN BY "TEE", "WYE" OR SADDLE FITTINGS.
TYPICAL HOUSE CONNECTION
USE LONGSWEEP BENDS AS REQUIRED TO MEET GRADE OF HOUSE CONNECTION.
* 100mm (MIN.) @ 2% MIN. GRADE TO PROPERTY LINE OR EDGE OF R.O.W.
REFER TO STD DWG SD7 FOR CONNECTION DETAILS
BENDS MUST BE LOCATED OUTSIDE TRENCH AND MUST BE BEDDED IN GRAVEL EXTENDING TO UNDISTURBED MATERIAL.
RISER SLOPED TO PLACE UPPER END AT TRENCH WALL
WHERE SLOPE OF RISER IS LESS THAN 1 HOR. TO 2 VERT. TRENCH AROUND RISER MUST BE BACKFILLED WITH GRAVEL.
WHERE 'A' IS GREATER THAN 300mm OR WALL OF TRENCH IS NOT VERTICAL THE CONNECTION MUST BE BEDDED IN GRAVEL.
A
*FOR CONNECTIONS OTHER THAN SINGLE FAMILY DWELLINGS, SIZE ACCORDING TO B.C. PLUMBING CODE.
CONNECTION IN A DEEP TRENCH
REFER TO SPECIFICATIONS FOR FURTHER DETAILS
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION
NO. DATE REVISION
GENERAL
SERVICE CONNECTION DETAILS
DRAIN & SEWER
REV.
STD. DWG. NO
SD 6




DETAIL

SERVICE CONNECTION TO P.V.C. MAIN

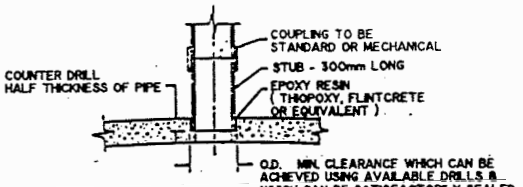
NOTE :
ALL HOLES IN MAIN TO BE CUT WITH APPROVED CUTTER. FOR SMALLER MAINS CONNECTION CAN BE MADE WITH APPROVED FABRICATED TEE OR WYE FITTING




DETAIL

SERVICE CONNECTION TO CORRUGATED STEEL OR RIBBED POLYETHYLENE PIPE

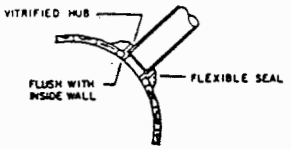
NOTE :
SERVICE PIPE TO BE TRIMMED SO AS NOT TO OBSTRUCT FLOW IN MAIN.




DETAIL

LATERAL CONNECTION TO CONCRETE TRUNK

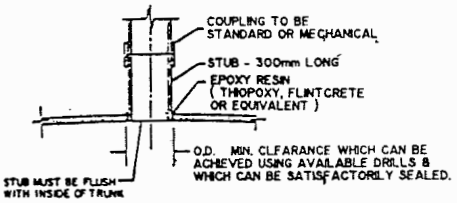
NOTE :
ALL HOLES IN CONCRETE TRUNK TO BE DIAMOND DRILLED




DETAIL

LATERAL CONNECTION TO WOODSTAVE TRUNK

NOTE :
ALL CUTS & ABRASIONS ON WOODSTAVE PIPE TO BE COATED WITH HOT CREOSOTE




DETAIL

LATERAL CONNECTION TO ASBESTOS-CEMENT TRUNK

NOTE :
ALL HOLES IN ASBESTOS-CEMENT TRUNK TO BE DRILLED WITH PILOT A.C. CUTTER OR SIMILAR DEVICE

NOTE :
FOR SMALLER MAINS CONNECTION CAN BE MADE WITH APPROVED FABRICATED TEE OR WYE FITTING

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

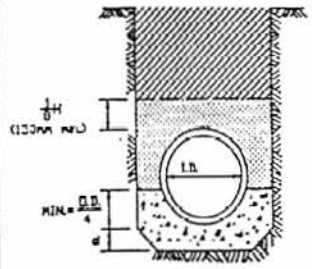
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

SERVICE CONNECTION DETAILS DRAIN & SEWER

REV.

STD. DWG. NO. SD 7




CLASS A

CONCRETE CRADLE
LOAD FACTOR 2·8

( RIGID PIPE ONLY )

O.D. - OUTSIDE DIA.
I.D. - INSIDE DIA.
H - DISTANCE FROM GROUND TO TOP OF PIPE.

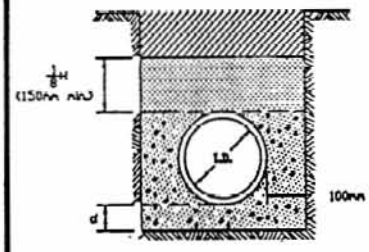
| DEPTH OF MATERIAL BELOW PIPE | |
|---|---|
| I.D. | d(MIN.) |
| < OR = 675mm | 100mm |
| 750mm - 1500mm | 100mm |
| > 1500mm | 100mm |

CONCRETE
TO BE 20 MPa MIN. @ 28 DAYS.

PIT-RUN GRAVEL (MINUS 25mm) OR SAND.
IN LAYERS NOT OVER 150mm AND COMPACTED BY SLICING WITH A SHOVEL OR TAMPING BAR.

HAND PLACED BACKFILL
FINELY DIVIDED MATERIAL FREE FROM DEBRIS, STONES AND LARGE LUMPS.

MACHINE PLACED BACKFILL
FREE FROM DEBRIS, LARGE LUMPS OR STONES OVER 150mm SIZE.




CLASS B

FIRST CLASS BEDDING
LOAD FACTOR 1·9

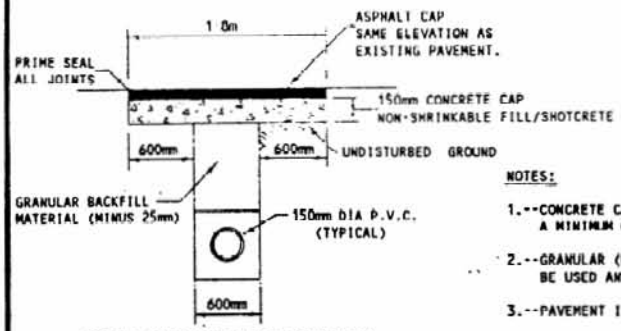
NOTES:

1.--UNDER SIDEWALKS, THE TRAVELLED PORTION OF THE ROAD & DRIVEWAYS, OR WITHIN 1·5m OF THE EDGE OF THE TRAVELLED ROAD, THE TRENCH WILL BE BACKFILLED WITH COMPACTED PIT-RUN GRAVEL OR EQUAL, TO WITHIN 300mm OF GROUND LEVEL, THE REMAINING 300mm TO BE BACKFILLED WITH ROAD GRAVEL.

2.--FOR ROCK OR OTHER INCOMPRESSIBLE MATERIALS, THE TRENCH SHOULD BE OVER-EXCAVATED A MIN. OF 150mm FROM THE OUTSIDE OF COUPLINGS OR BELLS OF THE PIPES AND REFILLED WITH GRANULAR MATERIAL. (MAX. AGGREGATE SIZE - 25mm)

3.--FOR P.V.C. PIPES, BEDDING TO BE COMPACTED TO A MINIMUM OF 95% STD. PROCTOR DENSITY WITHIN THE "HAUNCHING AREA".

4.--THIS SECTION SHOWS THE MIN. STANDARD MANUFACTURER'S RECOMMENDED BEDDING AND BACKFILLING. SPECIFICATIONS WILL GOVERN.




OPEN CUT SERVICE TRENCH

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

NOTES:

1.--CONCRETE CAP IS TO BEAR ON UNDISTURBED GROUND A MINIMUM OF 600mm ON EACH SIDE OF THE TRENCH.

2.--GRANULAR (MINUS 25mm) BACKFILL MATERIAL IS TO BE USED AND COMPACTED IN 150mm LAYERS.

3.--PAVEMENT IS TO BE SAW CUT.

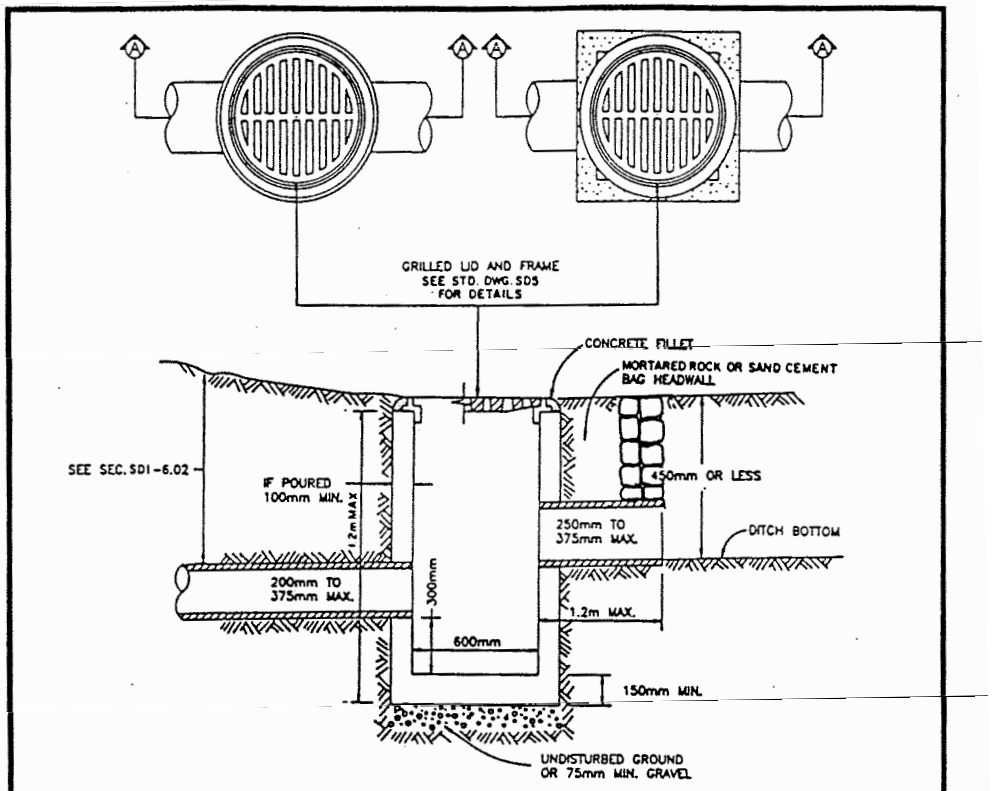
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |

CLASSES OF PIPE BEDDING FOR SEWER & WATER

REV.

STD. DWG NO. SD 8



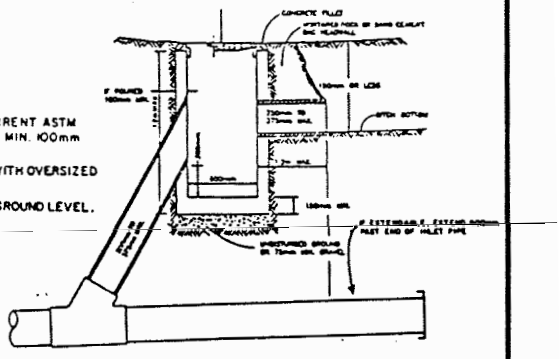

SECTION A–A

NOTES:

A 1.2m VERTICAL LENGTH OF 600mm III R.C. PIPE AS PER CURRENT ASTM C 76 SPECIFICATIONS SET ON END IS ACCEPTABLE IN LIEU OF MIN. 100mm THICKNESS OF POURED CONC. AS SHOWN.

FOR PIPES GREATER THAN 375mm, SPECIAL DESIGNED S.I.'S WITH OVERSIZED BARRELS WILL BE ACCEPTED.

TOP OF GRILL TO BE SET A MIN. OF 50mm BELOW SURRONDING GROUND LEVEL.



CONNECTION TO DEEP DRAIN

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

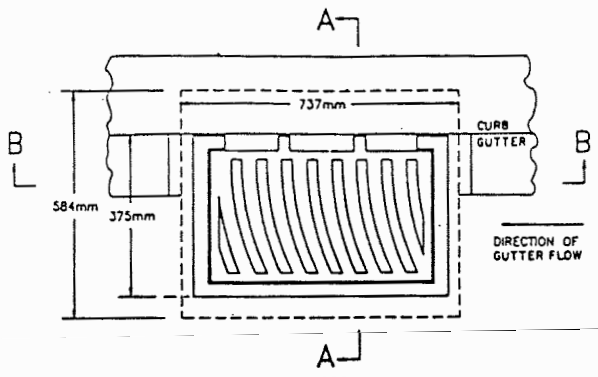
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

SILT TRAP

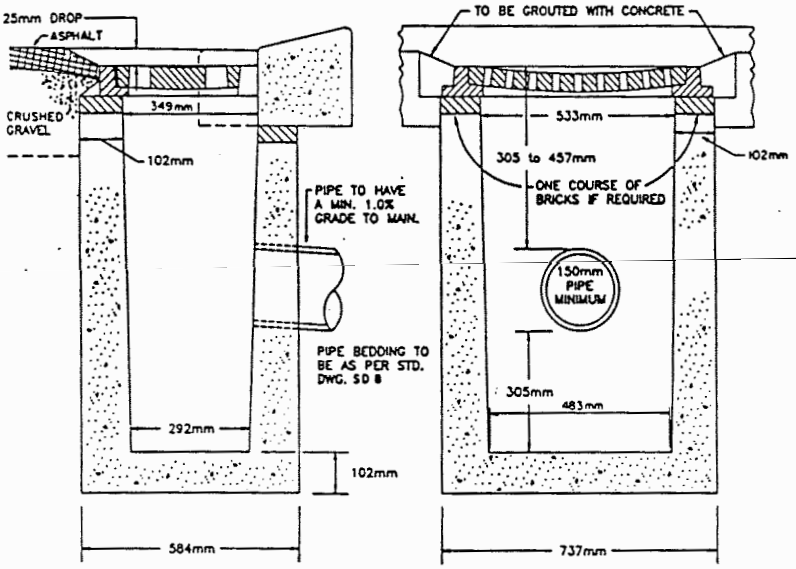
REV.

STD. DWG. NO

SD 9




PLAN




SECTION A–A

SECTION B–B

NOTES:

1. CATCH BASIN GRATE AND FRAME, SEE STD. DWG. SD13 FOR DETAILS.
2. TRENCHES AND CATCH BASINS UNDER TRAVELLED PORTION OF THE ROAD TO BE BACKFILLED WITH GRAVEL AND COMPACTED AS PER SPECIFICATIONS.
3. FOR DETAILS OF CURBS SEE STANDARD DRAWINGS R13, R13A, R14 & R15.
4. BASE TO BE COMPACTED GRANULAR MATERIAL (98% STANDARD PROCTOR) OR CONCRETE SLURRY.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

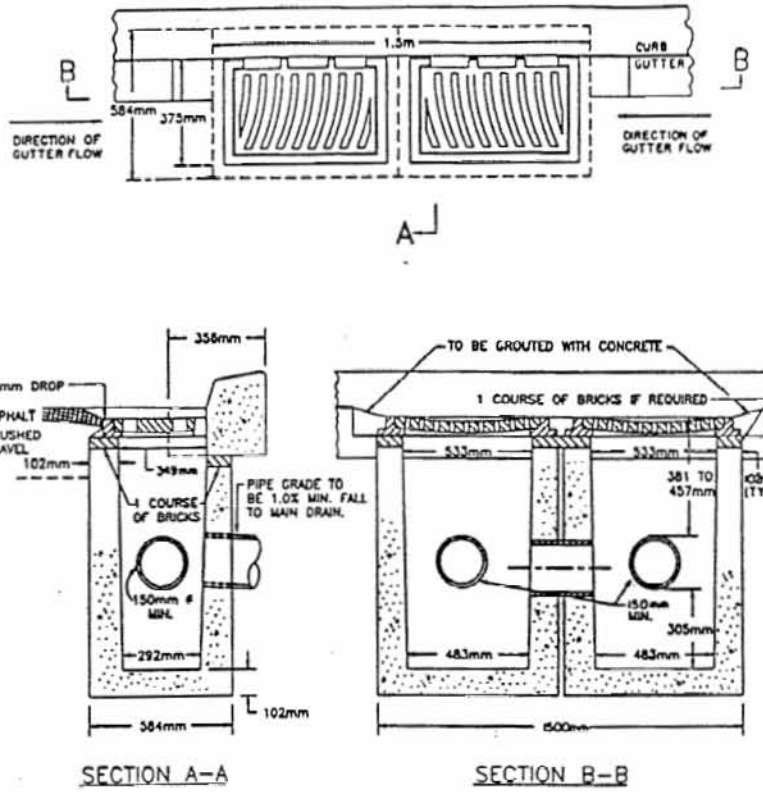
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

RECTANGULAR CATCH BASIN
(FOR USE WITH CURB & GUTTER)

REV.

STD. DWG. NO.
SD 10




SECTION A–A

SECTION B–B

NOTES:

1. CATCH BASIN GRATE AND FRAME, SEE STD. DWG. SD13 FOR DETAILS.
2. TRENCHES UNDER TRAVELLED PORTION OF THE ROAD TO BE BACKFILLED WITH COMPACTED GRAVEL AS PER SPECIFICATIONS.
3. FOR DETAILS OF CURBS SEE DWGS. R13, R13A, R14 & R15.
4. BASE TO BE COMPACTED GRANULAR MATERIAL (98% STANDARD PROCTOR) OR CONCRETE SLURRY.
5. CATCH BASINS TO HAVE SEPARATE 150mm LEADS TO MAIN PLUS 150mm CONNECTION BETWEEN BASINS.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

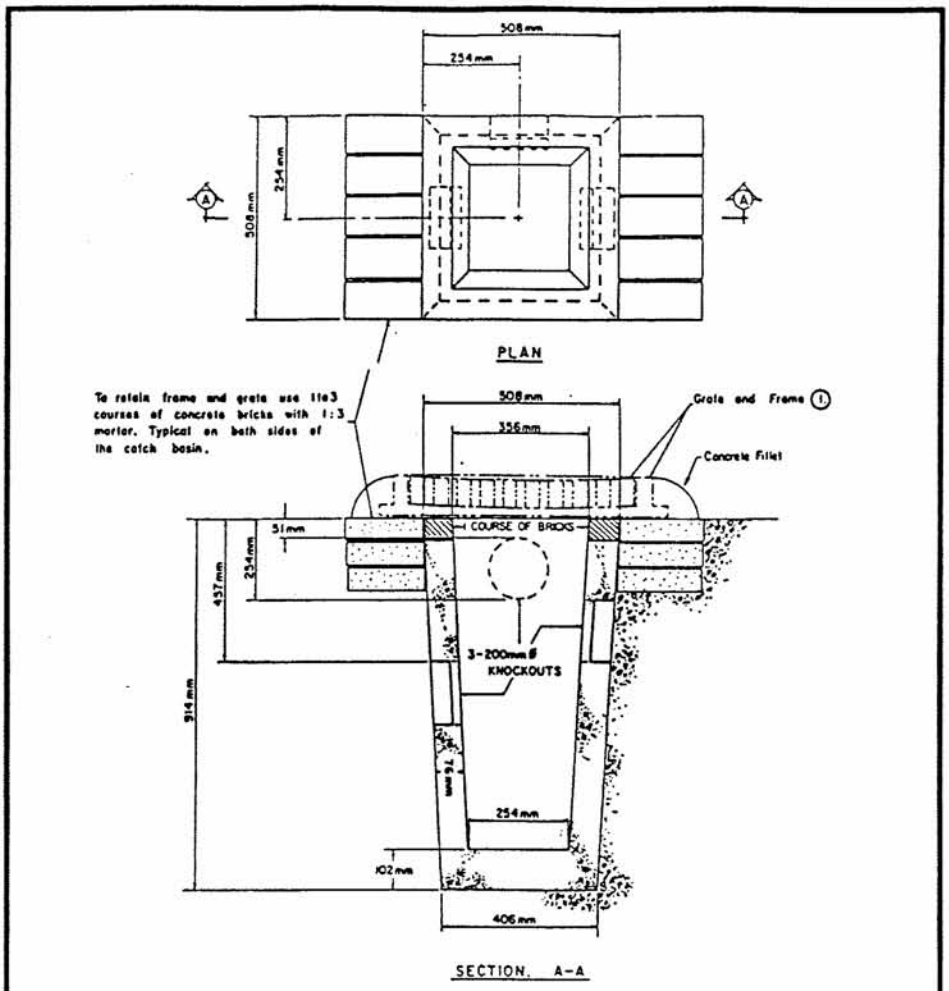
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

DOUBLE CATCH BASIN
(FOR USE WITH CURB & GUTTER)

REV.

STD. DWG. NO.
SD II




NOTES

1. FOR DETAILS OF GRATES SEE STD. DWG. SD14.
2. FOR DETAILS OF CATCH BASINS TO DRAIN CURB & GUTTERED ROADWAYS SEE STD. DWG. SD10 & SD11.
3. BACKFILL TO BE COMPACTED GRAVEL.
4. FOR USE IN AREAS WITHOUT CURB & GUTTER.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

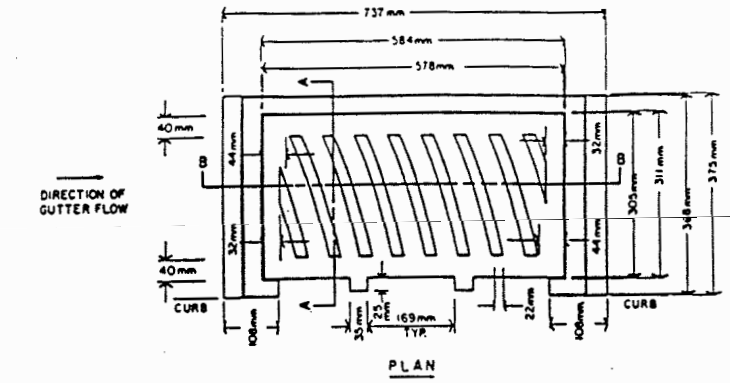
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

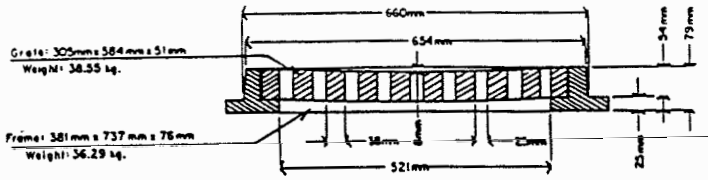
SQUARE CATCH BASIN

REV.

STD. DWG. NO. SD 12



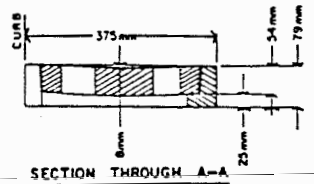

PLAN




SECTION THROUGH B–B

NOTES

1. For use with catch basins in conjunction with curbs & gutters.
2. For details of catch basin see Std. Dwg. SD 10 & SD 11.




SECTION THROUGH A–A

MATERIAL: CAST IRON

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

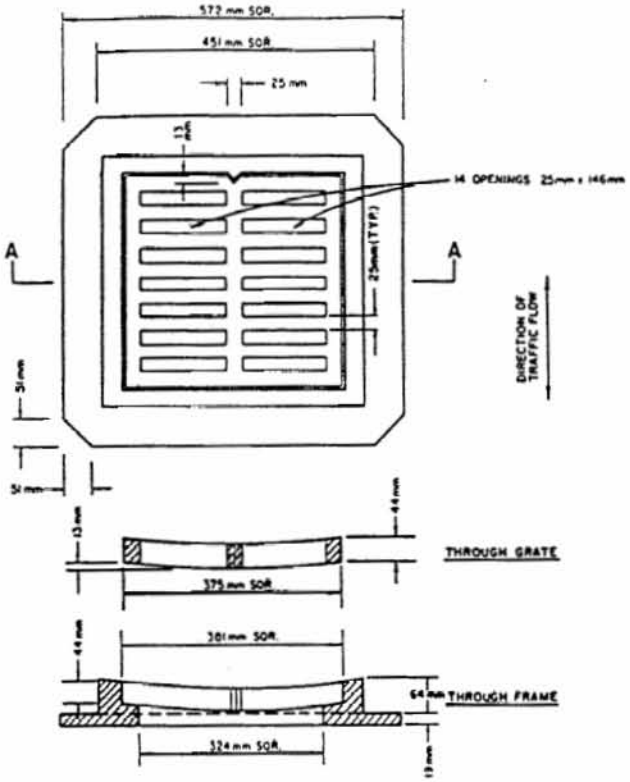
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

RECTANGULAR CATCH BASIN FRAME & GRATE

REV.

STD. DWG. NO. SD 13

PLAN




SECTION A–A

NOTES: FOR DETAILS OF CATCH BASIN, SEE STD DWG. SD 12
FOR USE IN AREAS WHERE CURB & GUTTERS NOT USED.

LONGITUDINAL AXIS OF GRATE OPENINGS TO BE PLACED PERPENDICULAR TO THE DIRECTION OF TRAFFIC FLOW.

MATERIAL: CAST IRON

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

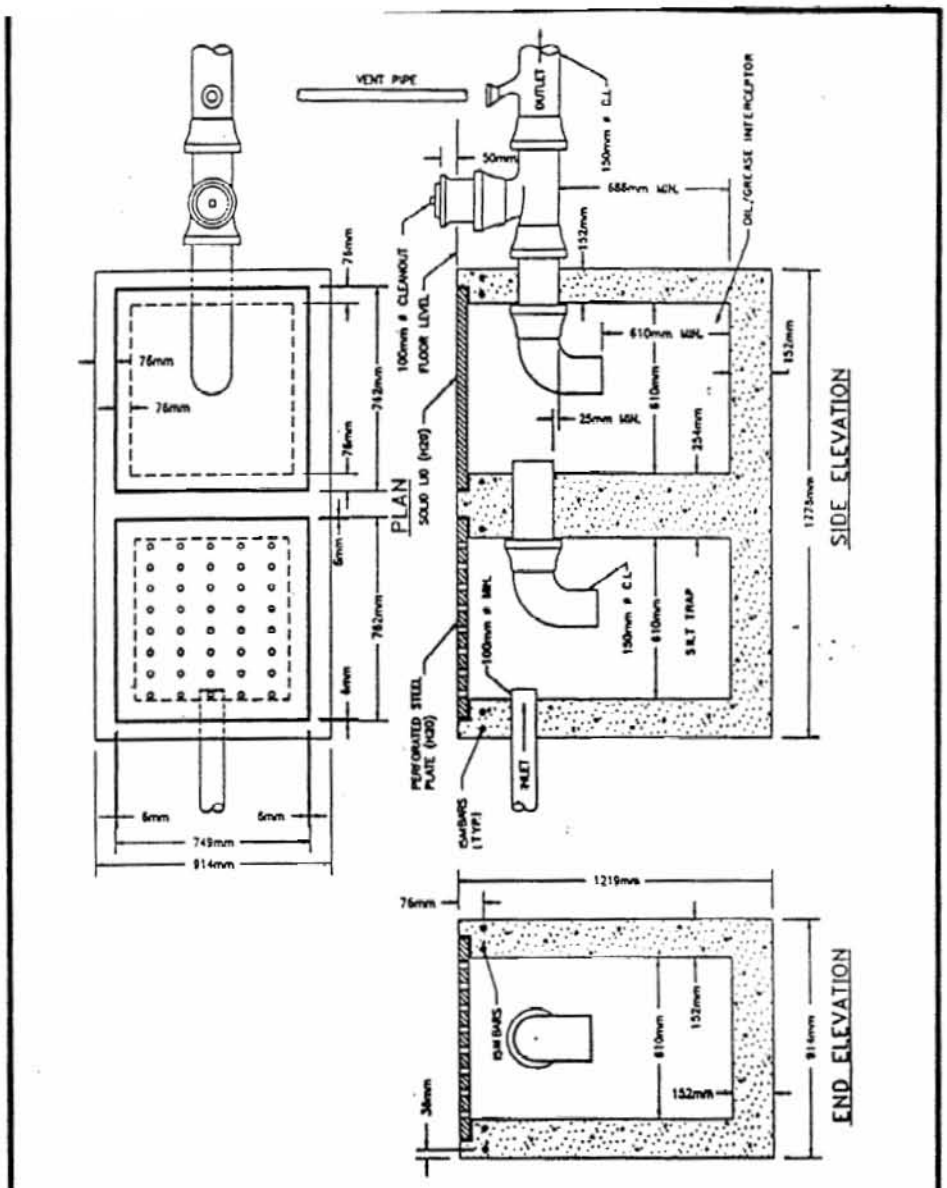
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

SQUARE CATCH BASIN
FRAME & GRATE

REV.

STD. DWG. NO.
SD 14




REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

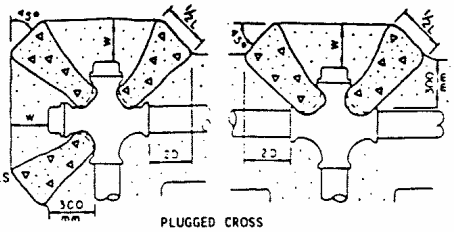
COMBINATION
SILT TRAP & GREASE INTERCEPTORS
FOR COMMERCIAL GARAGES

REV.

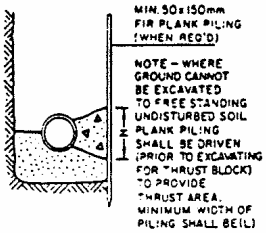
STD. DWG. NO
SD 15

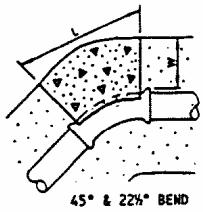
NOTES :-

1. TO FIND DIMENSIONS OF THRUST BLOCKS FOR SOFT CLAY (BEARING STRENGTH 95-190 kPa) MULTIPLY DEPTH SHOWN IN TABLE BY TWO (i.e. 100-90° BEND USE 0.85 x 0.30)
2. FOR PEAT, SILT, UNCONSOLIDATED MATERIAL (i.e. FILL) WITH BEARING STRENGTH LESS THAN 95 kPa, THRUST BLOCKS SHALL BE DESIGNED BY AN ENGINEER.
3. CONCRETE THRUST BLOCKS SHALL EXTEND INTO THE VERTICAL FACE OF UNDISTURBED SOIL. THRUST IN SOFT UNSTABLE SOILS WITH BEARING STRENGTH LESS THAN 95 kPa WILL REQUIRE REMOVAL OF SOIL AND REPLACEMENT WITH COMPACTABLE FILL OF SUFFICIENT STABILITY TO RESIST THRUST OR SPECIAL ANCHOR BLOCK AS DIRECTED BY THE ENGINEER.
4. BLOCKING WILL BE REQUIRED FOR ALL BENDS, TEES, PLUGS, CAPS, PIPE DEFLECTIONS AND OTHER FITTINGS ON LIVE MAINS WHERE ANCHOR RODS ARE NOT PRACTICAL.
5. THRUST BLOCKS SHALL BE OF AT LEAST 15 MPa 28 DAY CONCRETE OR HIGH EARLY STRENGTH CONCRETE IF REQUIRED.
6. BLOCKING SHALL BE KEPT CLEAR OF BELLS.
7. AT VERTICAL BENDS BLOCKING SHALL BE DESIGNED BY AN ENGINEER.
8. FOR LARGER DIAMETER WATERMAINS THRUST BLOCKS SHALL BE DESIGNED BY AN ENGINEER.
9. MINIMUM CURING TIME OF CONCRETE THRUST BLOCKS SHALL BE 48 HOURS BEFORE WATERMAINS ARE CHARGED.

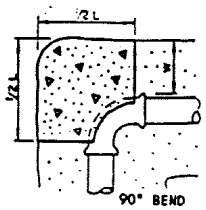



PLUGGED CROSS

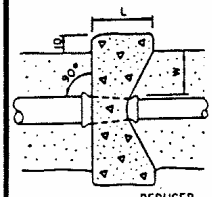


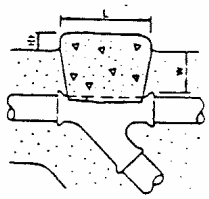
45° & 22½° BEND



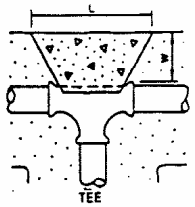
90° BEND



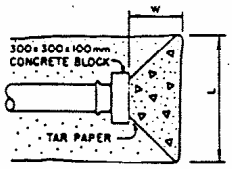
REDUCER



45° WYE



TEE




CAPPED OR PLUGGED END

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

**CONCRETE THRUST BLOCKING**

**MINIMUM THRUST AREAS BASED ON 1380 kPa WATER PRESSURE INCLUDING WATER HAMMER ALLOWANCE BEARING STRENGTH MORE THAN 190 kPa FOR HARD CLAY AND COMPACTED SAND OR GRAVEL SEE NOTES FOR OTHER MATERIALS**

| FITTING | DIA. D mm | DIST. TO BRG. FACE W m | AREA SQ.m | LENGTH & DEPTH AT FACE L m |
|---|---|---|---|---|
| 90° BEND | 100 | 0.30 | 0.13 | 0.85 x 0.15 |
| | 150 | 0.30 | 0.26 | 1.25 x 0.21 |
| | 200 | 0.30 | 0.45 | 1.25 x 0.36 |
| | 250 | 0.37 | 0.72 | 1.25 x 0.58 |
| 45° BEND 45° WYE | 100 | 0.30 | 0.07 | 0.47 x 0.15 |
| | 150 | 0.30 | 0.14 | 0.70 x 0.20 |
| | 200 | 0.30 | 0.24 | 1.25 x 0.19 |
| | 250 | 0.37 | 0.39 | 1.25 x 0.31 |
| TEES, CAPS PLUGS AND PLUGGED CROSSES | 100 | 0.30 | 0.09 | 0.63 x 0.15 |
| | 150 | 0.30 | 0.18 | 0.91 x 0.20 |
| | 200 | 0.30 | 0.31 | 1.00 x 0.32 |
| | 250 | 0.37 | 0.51 | 1.25 x 0.41 |
| 22½° BEND | 100 | 0.30 | 0.04 | 0.25 x 0.15 |
| | 150 | 0.30 | 0.07 | 0.35 x 0.20 |
| | 200 | 0.30 | 0.13 | 0.69 x 0.20 |
| | 250 | 0.35 | 0.20 | 0.80 x 0.25 |
| REDUCER LARGE DIA.* | 100* | 0.30 | 0.05 | 0.50 x 0.10 |
| | 150* | 0.30 | 0.08 | 0.53 x 0.15 |
| | 200* | 0.30 | 0.13 | 0.65 x 0.20 |
| | 250* | 0.35 | 0.20 | 0.80 x 0.25 |

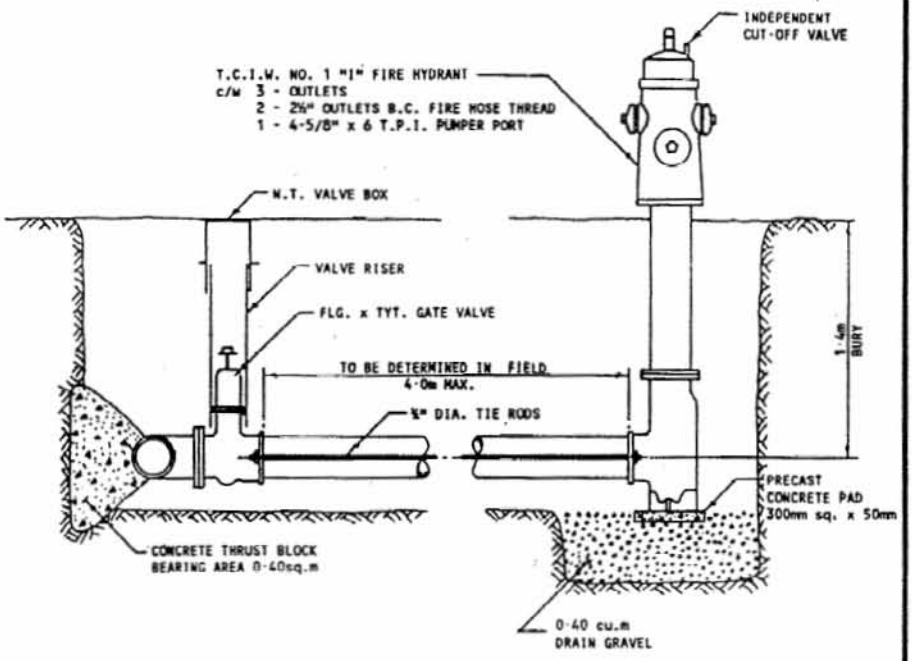
# TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**THRUST BLOCKS**

REV.

STD. DWG. NO. **W 1**




REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

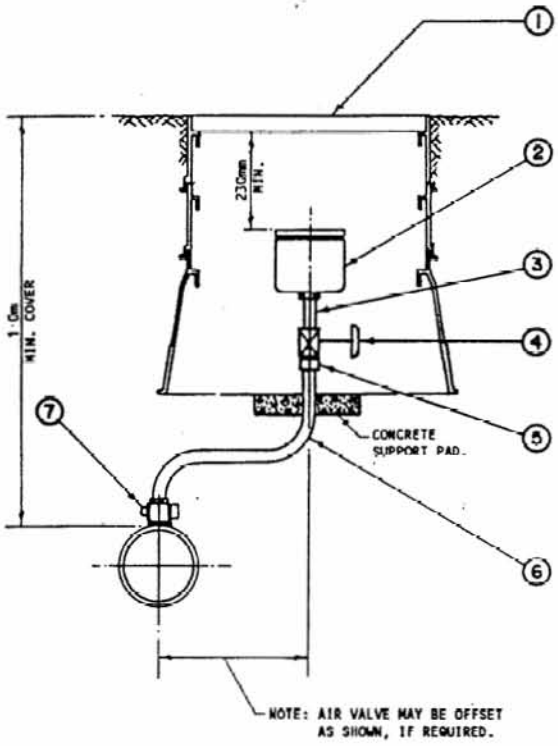
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

FIRE HYDRANT ASSEMBLY

REV.

STD. DWG. NO
W 2

| ITEM | NO. REQ'D | DESCRIPTION |
|---|---|---|
| 1 | 1 | AMETEK JUMBO METER BOX c/w EXTENSIONS & COVER. |
| 2 | 1 | 19mm D.A. AIR VALVE |
| 3 | 1 | 19mm GALV. PIPE NIPPLE x 75mm |
| 4 | 1 | 19mm I.P.T. GATE VALVE |
| 5 | 1 | 19mm COMP. x MALE I.P.T. ADAPTER (MUELLER H 15428) |
| 6 | 1 | 19mm TYPE 'K' COPPER PIPE |
| 7 | 1 | 19mm COMP. x MALE I.P.T. CORP. STOP (MUELLER H 15028) |




REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

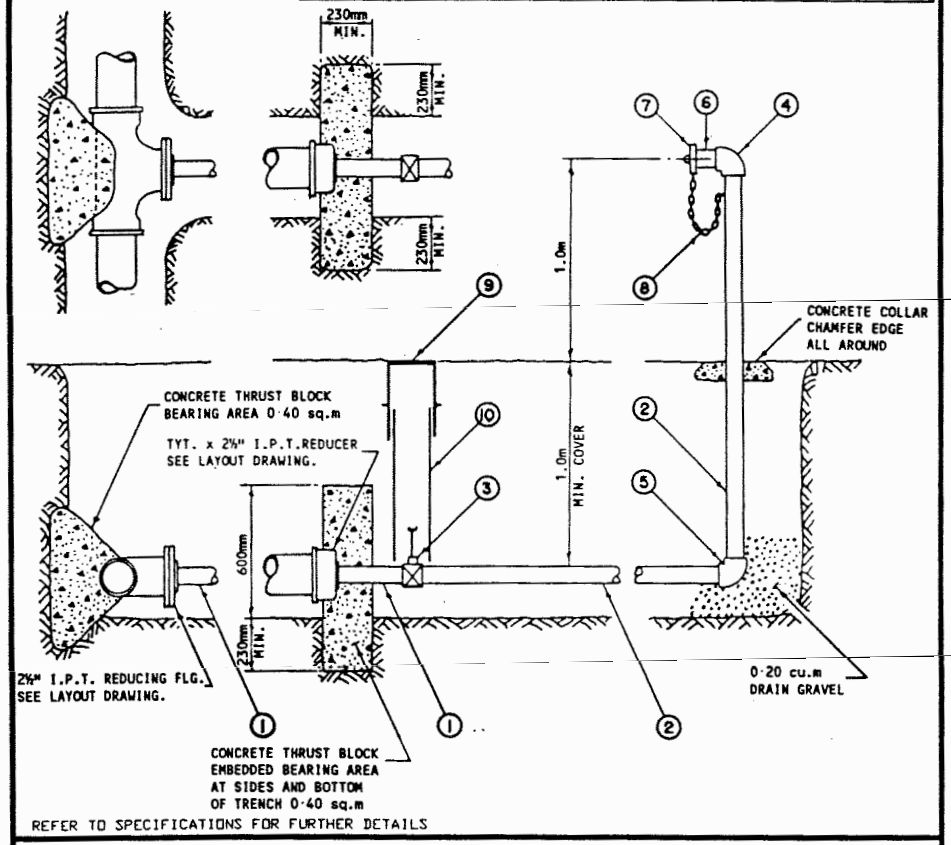
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

19mm AIR VALVE ASSEMBLY

REV.

STD. DWG NO.
W 3

| ITEM | NO. REQ'D | DESCRIPTION | REMARKS |
|---|---|---|---|
| 1 | 1 | 2½" GALV. PIPE x 300mm T.2.E. | |
| 2 | 2 | 2½" GALV. PIPE x 2.0m T.2.E. | |
| 3 | 1 | 2½" I.P.T. GATE VALVE | |
| 4 | 1 | 2½" GALV. I.P.T. 90° ELBOW | |
| 5 | 1 | 2½" GALV. I.P.T. 90° ELBOW | c/w ¼" DRILLED HOLE |
| 6 | 1 | 2½" GALV. I.P.T. x 2½" F.H. ADAPTER | |
| 7 | 1 | 2½" STD. F.H. CAP | |
| 8 | 1 | 1/8" CHAIN x 300mm LONG | |
| 9 | 1 | M.T. VALVE BOX | |
| 10 | 1 | VALVE RISER | |




TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |

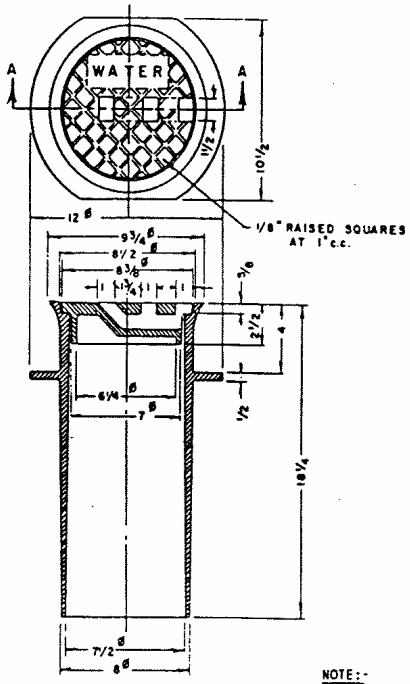
2½" STANDPIPE ASSEMBLY

REV.

STD. DWG. NO. W 4

APPLICATION:-

THE N.T.VALVE BOX IS GENERALLY USED IN ROADWAYS WHERE ACCESS TO LINE VALVES IS A MUST AND TRANSMISSION OF SHOCK FROM TRAFFIC TO THE VALVE IS TO BE ELIMINATED.
THIS BOX MAKES USE OF RECLAIMED OR CROP LENGTHS OF 6" PIPE OR FIBREGLASS RISER AS THE EXTENSION.
FOR VALVES 10" AND LARGER AN EXTENSION BASE PART IS REQUIRED.
THIS BOX ALSO FEATURES A SELF DRAIN COVER.




SECTION A-A

NOTE:-
DIMENSIONS SHOWN ARE IN INCHES. WEIGHT OF UNIT IS 80 LB.

MATERIAL: CAST IRON.

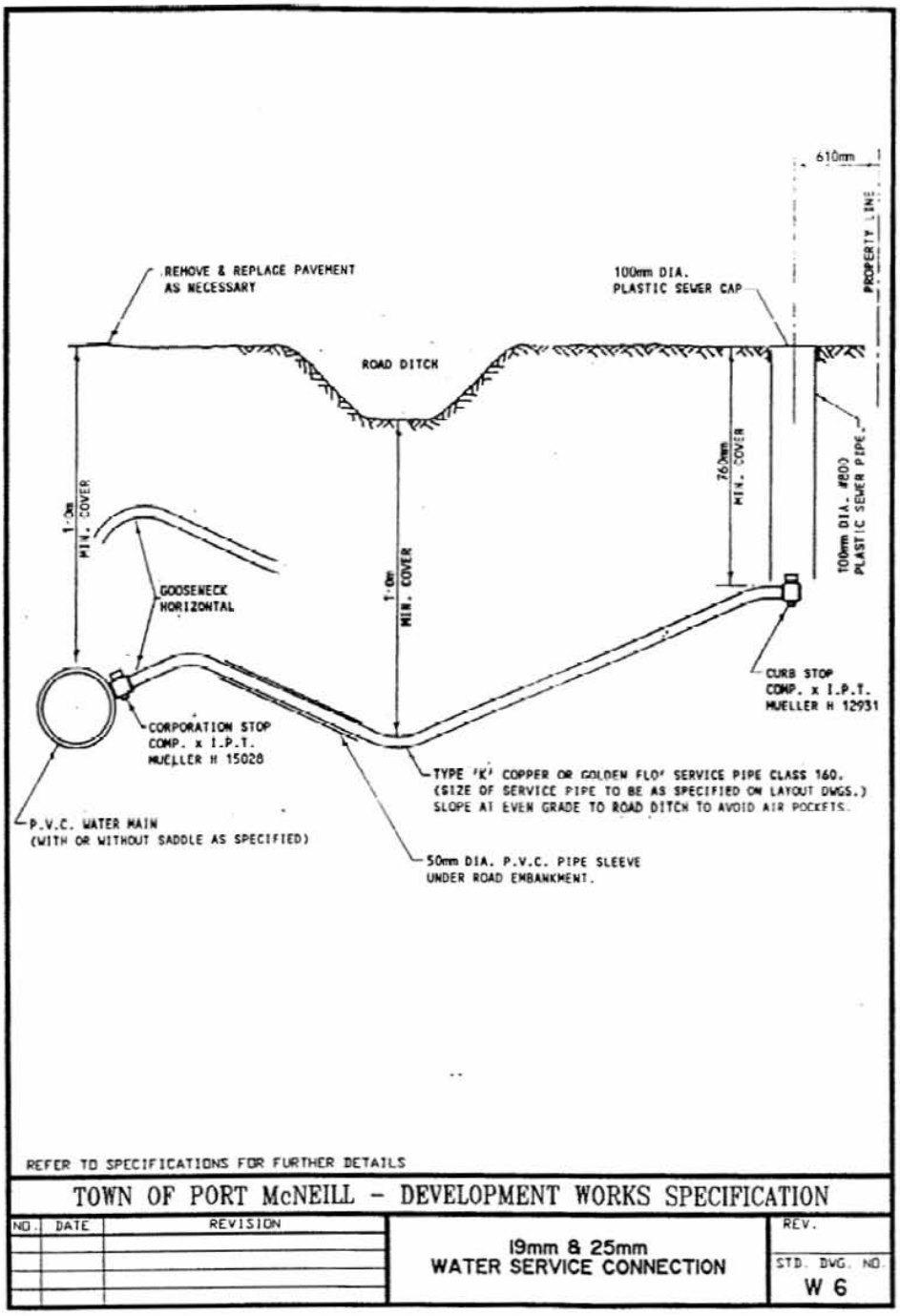
FURNISHED WHEN SPECIFIED:-

A STANDARD FIBREGLASS RISER FEATURING A FUNNEL AT ONE END THAT EXTENDS OVER VALVE. 10" OF ADJUSTMENT ARE AVAILABLE.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION | N.T. ( NELSON TYPE ) VALVE BOX | REV. |
|---|---|---|---|---|
| | | | | STD. DWG. NO. W 5 |




REFER TO SPECIFICATIONS FOR FURTHER DETAILS

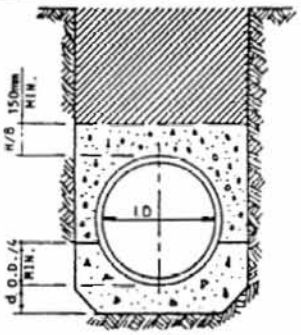
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**19mm & 25mm WATER SERVICE CONNECTION**

REV.

STD. DWG. NO. W 6




CLASS A

CONCRETE CRADLE
LOAD FACTOR 2·8

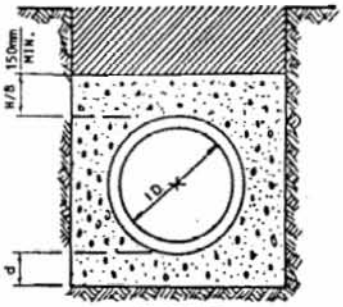
O.D. - OUTSIDE DIA.
I.D. - INSIDE DIA.
H - DISTANCE FROM GROUND TO TOP OF PIPE.

| DEPTH OF MATERIAL BELOW PIPE | |
|---|---|
| I.D. | d(MIN.) |
| < OR = 675mm | 75mm |
| 750mm - 1500mm | 100mm |
| > 1500mm | 100mm |

CONCRETE
TO BE 20 MPa MIN. @ 28 DAYS.

PIT-RUN GRAVEL (MINUS 25mm) OR SAND, IN LAYERS NOT OVER 150mm AND COMPACTED BY SLICING WITH A SHOVEL.

MACHINE PLACED BACKFILL
FREE FROM DEBRIS, LARGE LUMPS OR STONES OVER 150mm SIZE.




CLASS B

FIRST CLASS BEDDING
LOAD FACTOR 1·9

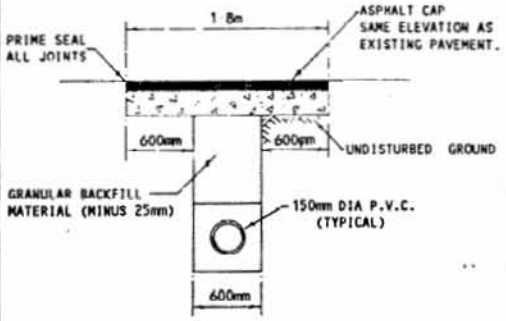
NOTES:

1.--UNDER THE TRAVELLED PORTION OF THE ROAD & DRIVEWAYS, OR WITHIN 1·0m OF THE EDGE OF THE TRAVELLED ROAD, THE TRENCH WILL BE BACKFILLED WITH COMPACTED PIT-RUN GRAVEL OR EQUAL, TO WITHIN 300mm OF GROUND LEVEL. THE REMAINING 300mm TO BE BACKFILLED WITH ROAD GRAVEL.

2.--FOR ROCK OR OTHER INCOMPRESSIBLE MATERIALS, THE TRENCH SHOULD BE OVER-EXCAVATED A MIN. OF 150mm FROM THE OUTSIDE OF COUPLINGS OR BELLS OF THE PIPES AND REFILLED WITH GRANULAR MATERIAL. (MAX. AGGREGATE SIZE - 25mm)

3.--FOR SMALL DIA. P.V.C. PIPE (< OR = 300mm DIA.) BEDDING TO BE COMPACTED TO 90% STD. PROCTOR DENSITY.

4.--FOR P.V.C. PIPE > 300mm DIA. REFER TO ASTM D2321-74.




OPEN CUT SERVICE TRENCH
REFER TO SPECIFICATIONS FOR FURTHER DETAILS

NOTES:

1.--CONCRETE CAP IS TO BEAR ON UNDISTURBED GROUND A MINIMUM OF 600mm ON EACH SIDE OF THE TRENCH.

2.--GRANULAR (MINUS 25mm) BACKFILL MATERIAL IS TO BE USED AND COMPACTED IN 150mm LAYERS.

3.--PAVEMENT IS TO BE SAW CUT.

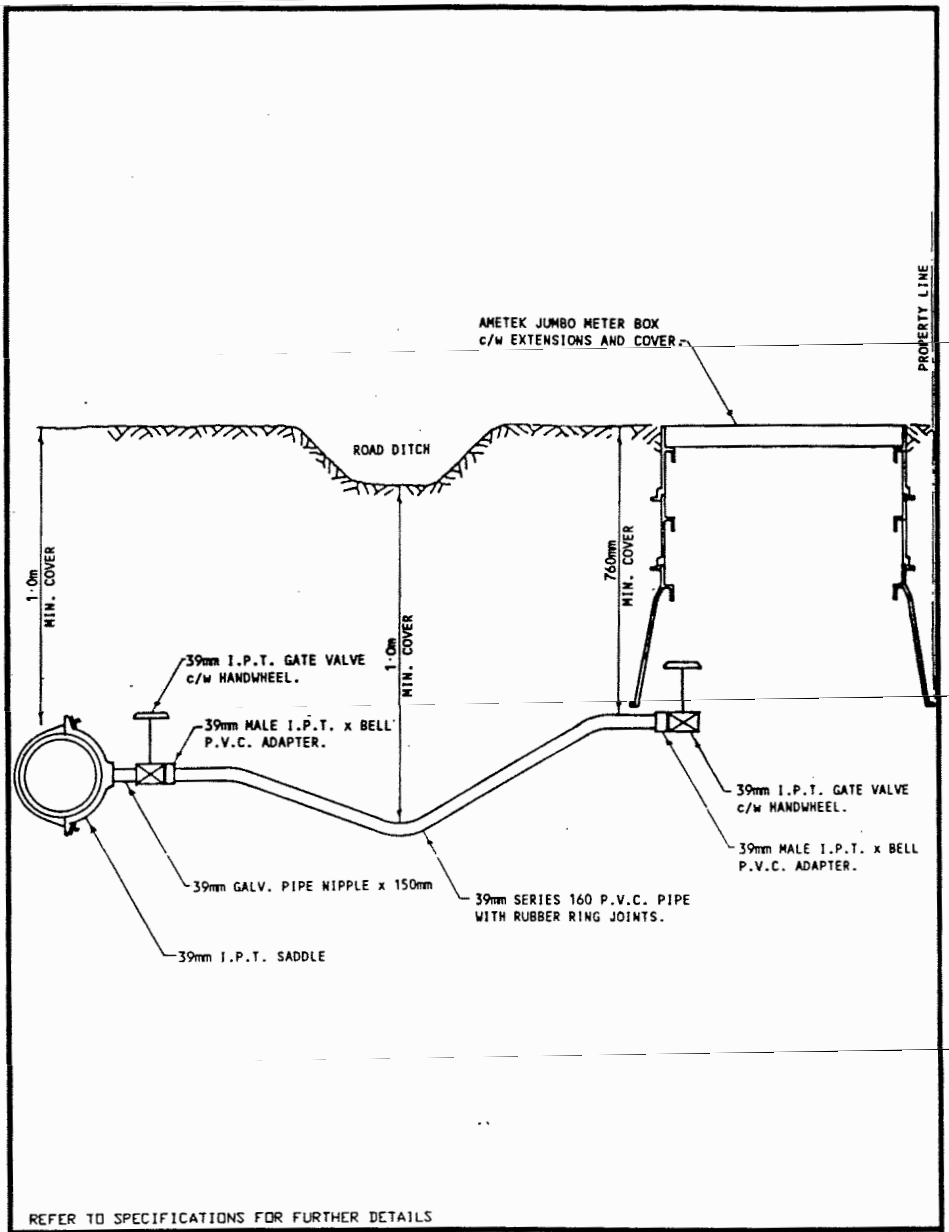
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

CLASSES OF PIPE BEDDING

REV.

STD. DWG. NO.
W 7




REFER TO SPECIFICATIONS FOR FURTHER DETAILS

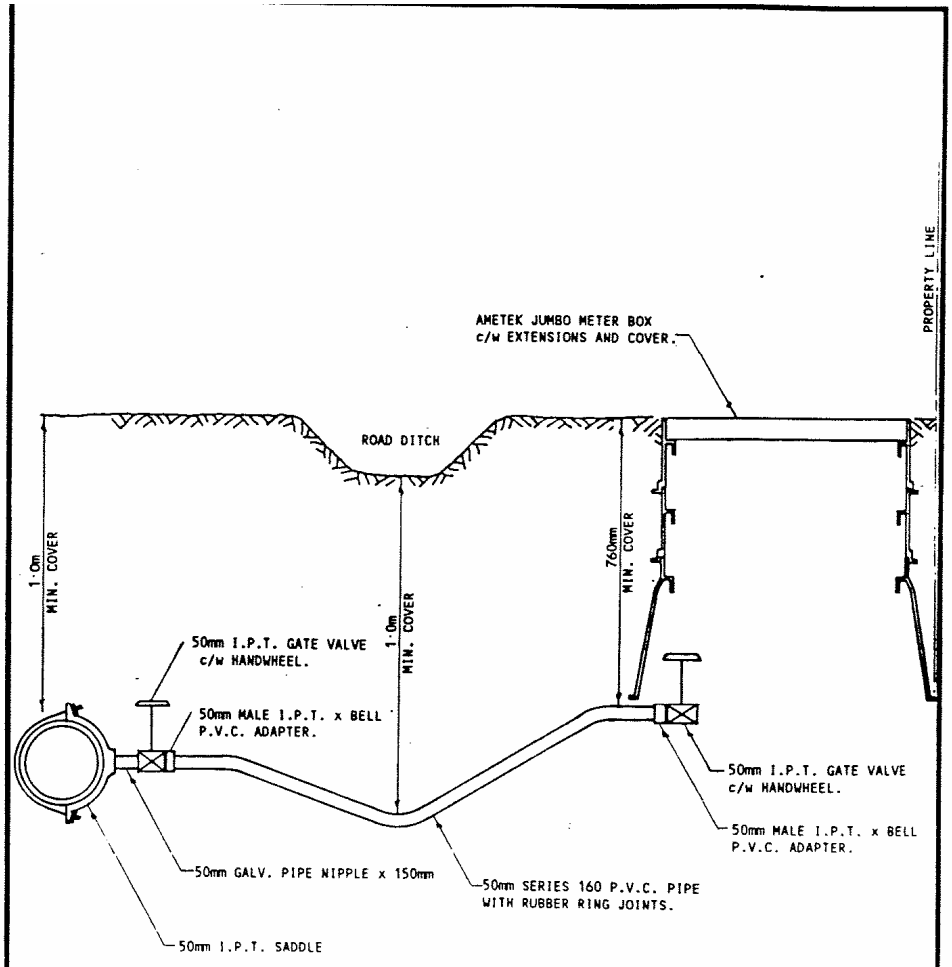
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**39mm**
**WATER SERVICE CONNECTION**

REV.

STD. DWG. NO.
W 8




REFER TO SPECIFICATIONS FOR FURTHER DETAILS

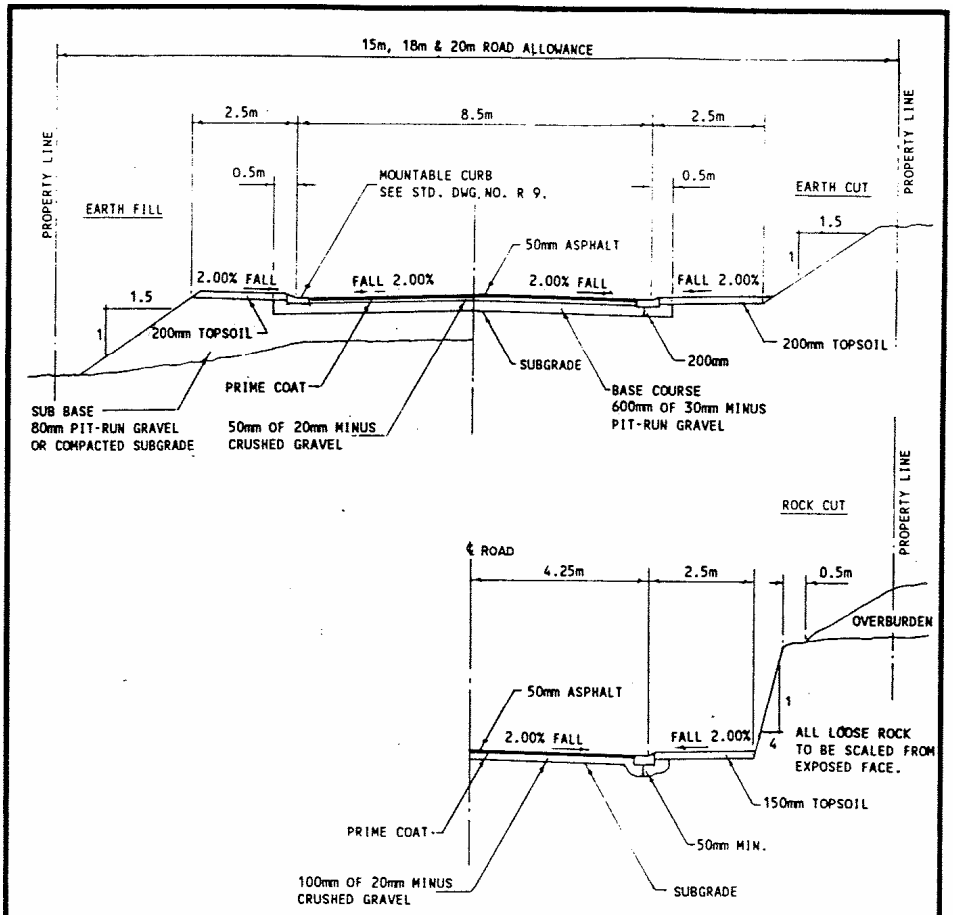
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**50mm**
**WATER SERVICE CONNECTION**

REV.

STD. DWG NO
W 9




NOTE:- DEPTHS OF SURFACING AND BASE GRAVELS ARE MINIMUM AND IN SOME CASES WILL HAVE TO BE INCREASED TO PROVIDE A STABLE ROAD BED.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

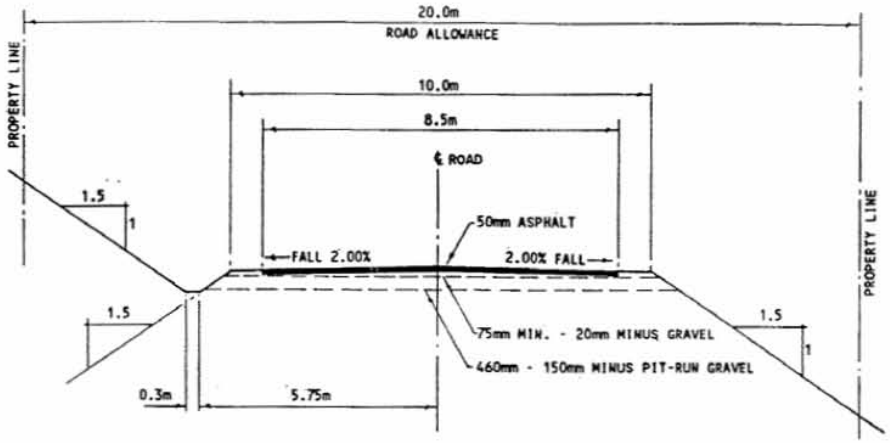
## TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**TYPICAL CROSS SECTION**
**8.5m RESIDENTIAL ROAD**

REV.

STD. DWG. NO.
R i




REFER TO SPECIFICATIONS FOR FURTHER DETAILS

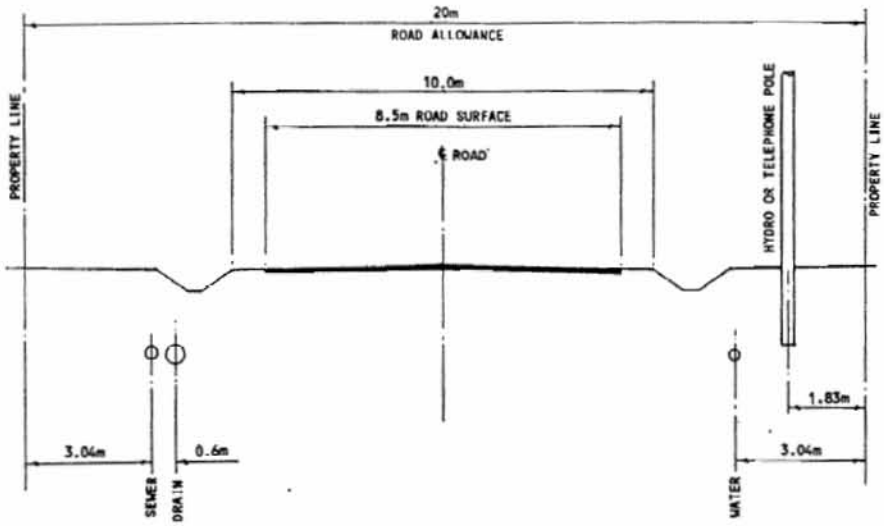
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**TYPICAL ROAD CROSS SECTION**

REV.

STD. DWG. NO.
R 2




REFER TO SPECIFICATIONS FOR FURTHER DETAILS

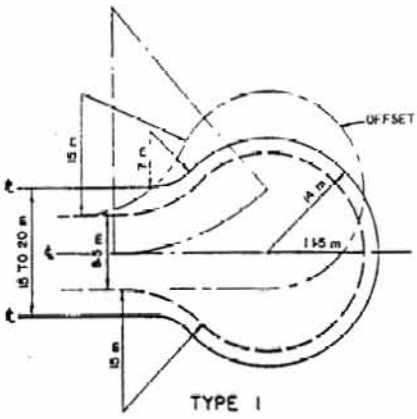
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

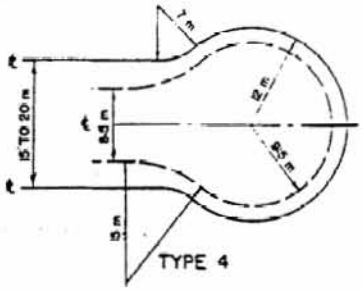
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

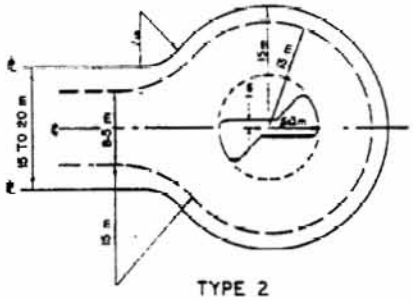
**TYPICAL LOCATION OF WORKS 20m R/W**

REV.

STD. DWG. NO. R 3



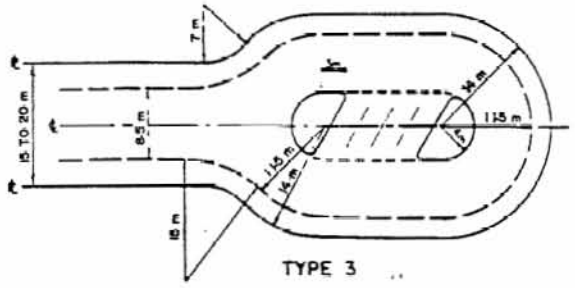




NOTES:

THESE STANDARDS APPLY TO TURN - AROUNDS ON RESIDENTIAL ROADS FOR SINGLE FAMILY DWELLINGS.

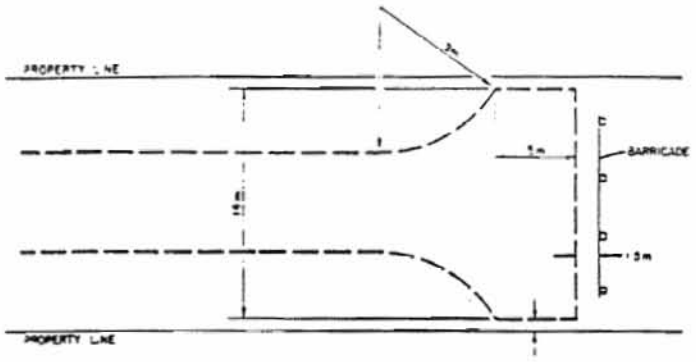
CHAINAGE FOR PROFILE TO BE ALONG CENTRE-LINE. SHOW SPOT ELEVATIONS FOR TOP OF CURB AS WELL AS CENTRE-LINE PROFILE.



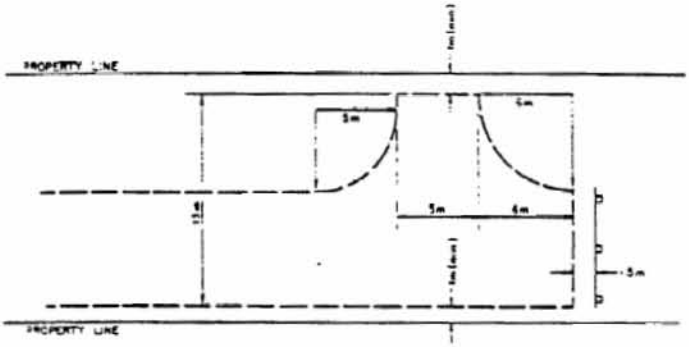

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION | | REV. |
|---|---|---|---|---|
| | | | TYPICAL CUL-DE-SACS | STD. DWG. NO. R 4 |




HAMMERHEAD TYPE




TEE TYPE ( FOR NARROW ROAD ALLOWANCE WITH OFFSET PAVEMENTS )

NOTES:

ALL TURN-AROUNDS TO BE FULLY WATER CONTROLLED.

FOR BARRICADE DETAIL REFER TO STD. DWG. NO. R 16.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

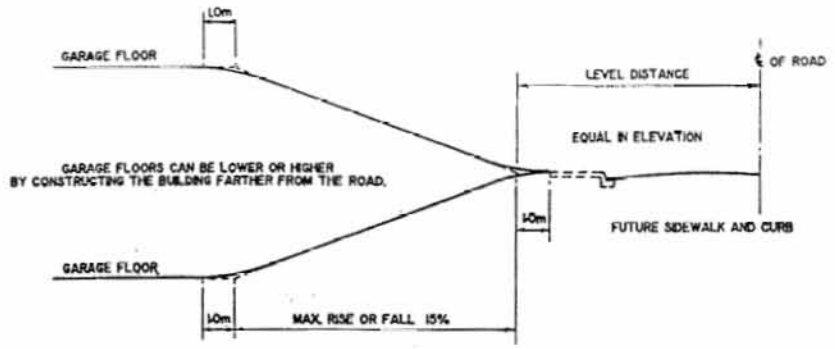
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |

TEMPORARY TURN-AROUND DETAILS

REV.

STD. DWG. NO. R 5




NOTES:

1. TO ALLOW FOR FUTURE ROAD WIDENING AND SIDEWALK CONSTRUCTION, THE DRIVEWAY AND FINISHED BOULEVARD GRADE MUST BE AT THE SAME ELEVATION AS THE CENTRE OF THE EXISTING ROAD SURFACE AT THE FOLLOWING LEVEL DISTANCE FROM THE PAVEMENT CENTRELINE:

| | MINIMUM LEVEL DISTANCE |
|---|---|
| RESIDENTIAL ROADS | 7.5m |
| COLLECTOR ROADS | 8.5m |
| MAJOR ROADS | TO BE DETERMINED BY THE MUNICIPAL ENGINEERING ADVISER. |

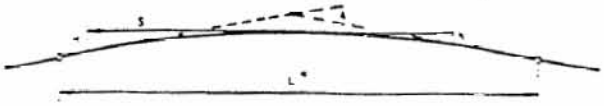
2. THE MAXIMUM GRADE OF DRIVEWAY IS 15% ( 1.125m RISE OR FALL IN 7.5m )
3. WHERE THE CENTRE OF THE EXISTING ROAD SURFACE IS MORE THAN 1.5m OFF THE CENTRE OF THE ROAD ALLOWANCE, MEASURE THE LEVEL DISTANCE FROM THE CENTRE OF THE ROAD ALLOWANCE.
4. EXCEPTIONS TO THESE STANDARDS WILL BE ALLOWED ONLY AT THE DISCRETION OF THE MUNICIPAL ENGINEERING ADVISER.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION | DRIVEWAY GRADES | REV. |
|---|---|---|---|---|
| | | | | STD DWG. NO. R 6 |

## CREST CURVES




| DESIGN SPEED (km/h) | STOPPING SIGHT DISTANCE (m) | | CREST, K (m) | |
|---|---|---|---|---|
| | (a) MINIMUM | (b) DESIRABLE | (c) COLLECTOR AND MAJOR ROADS | (d) RESIDENTIAL ROADS |
| 50 | 65 | 65 | 7 | 0 |
| 60 | 85 | 90 | 15 | 20 |
| 70 | 110 | 120 | 22 | 35 |

* L IN METRES SHOULD BE NOT LESS THAN DESIGN SPEED IN KILOMETRES PER HOUR

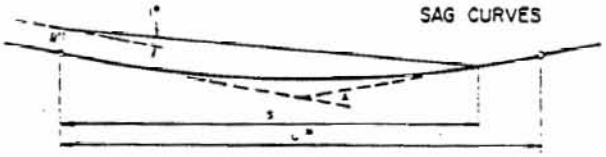
(a) BASED ON FIXED PERCEPTION REACTION TIME OF 2.5 s
(b) BASED ON VARIABLE PERCEPTION REACTION TIME OF 2.5 s AT 40 km/h TO 3.5 s AT 140 km/h
(c) BASED ON FIXED PERCEPTION REACTION TIME AND TAIL LIGHT HEIGHT OF 380 mm
(d) BASED ON VARIABLE PERCEPTION REACTION TIME AND OBJECT HEIGHT OF 150 mm

LEGEND

L = LENGTH OF VERTICAL CURVE IN METRES
A = ALGEBRAIC DIFFERENCE IN GRADE PERCENT
S = MINIMUM STOPPING SIGHT DISTANCE IN METRES
h = HEIGHT OF DRIVERS EYE 1.05m
h' = HEIGHT OF HEAD LAMPS 0.6 m
h = HEIGHT OF OBJECT
1° = ANGLE OF LIGHT BEAM UPWARD FROM PLANE OF VEHICLE

$$L = KA$$

## SAG CURVES




| DESIGN SPEED (km/h) | STOPPING SIGHT DISTANCE (m) | SAG, K (m) MINIMUM | |
|---|---|---|---|
| | | WITHOUT STREET LIGHTING | WITH STREET LIGHTING |
| 50 | 65 | 11 | 6 |
| 60 | 85 | 20 | 10 |
| 70 | 110 | 25 | 15 |

* L IN METRES SHOULD BE NOT LESS THAN DESIGN SPEED IN KILOMETRES PER HOUR
CENTRIPETAL ACCELERATION 0.3 m/s²

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

VERTICAL CURVES FOR MINIMUM STOPPING SIGHT DISTANCE

REV.

STD. DWG. NO. R 7

## SUPERELEVATION AND MINIMUM SPIRAL PARAMETER, e MAX.=0.06

| DESIGN SPEED km/h | 50 | | | 60 | | | 70 | | |
|---|---|---|---|---|---|---|---|---|---|
| RADIUS m | e | A 2 LANE | A 3 & 4 LANE | e | A 2 LANE | A 3 & 4 LANE | e | A 2 LANE | A 3 & 4 LANE |
| 7000 | NC | | | NC | | | NC | | |
| 5000 | NC | | | NC | | | NC | | |
| 4000 | NC | | | NC | | | NC | | |
| 3000 | NC | | | NC | | | NC | | |
| 2000 | NC | | | NC | | | RC | 275 | 275 |
| 1500 | NC | | | RC | 225 | 225 | RC | 250 | 250 |
| 1200 | NC | | | RC | 200 | 200 | 0.023 | 225 | 225 |
| 1000 | RC | 170 | 170 | 0.021 | 175 | 175 | 0.027 | 200 | 200 |
| 900 | RC | 150 | 150 | 0.023 | 175 | 175 | 0.029 | 180 | 180 |
| 800 | RC | 150 | 150 | 0.025 | 160 | 160 | 0.031 | 175 | 175 |
| 700 | 0.021 | 140 | 140 | 0.027 | 150 | 150 | 0.034 | 175 | 175 |
| 600 | 0.024 | 125 | 125 | 0.030 | 140 | 140 | 0.037 | 150 | 150 |
| 500 | 0.027 | 120 | 120 | 0.034 | 125 | 125 | 0.041 | 140 | 150 |
| 400 | 0.031 | 100 | 100 | 0.038 | 115 | 120 | 0.045 | 125 | 135 |
| 350 | 0.034 | 100 | 100 | 0.041 | 110 | 115 | 0.048 | 120 | 125 |
| 300 | 0.037 | 90 | 100 | 0.044 | 100 | 110 | 0.051 | 120 | 125 |
| 250 | 0.040 | 85 | 90 | 0.048 | 90 | 100 | 0.055 | 110 | 120 |
| 220 | 0.043 | 80 | 90 | 0.050 | 90 | 100 | 0.057 | 110 | 110 |
| 200 | 0.045 | 75 | 90 | 0.052 | 85 | 100 | 0.059 | 110 | 110 |
| 180 | 0.047 | 70 | 90 | 0.054 | 85 | 95 | 0.060 | 110 | 110 |
| 160 | 0.049 | 70 | 85 | 0.056 | 85 | 90 | MINIMUM R = 90 | | |
| 140 | 0.052 | 65 | 80 | 0.059 | 85 | 90 | | | |
| 120 | 0.055 | 65 | 75 | 0.060 | 85 | 90 | | | |
| 100 | 0.058 | 65 | 70 | MINIMUM R = 130 | | | | | |
| 90 | 0.060 | 65 | 70 | | | | | | |
| | MINIMUM R = 90 | | | | | | | | |

NOTES

e – SUPER ELEVATION
A – SPIRAL PARAMETER IN METRES
NC – NORMAL CROSS SECTION
RC – REMOVE ADVERSE CROWN AND SUPERELEVATE AT NORMAL RATE
SPIRAL LENGTH $L = \frac{A^2}{R}$ – RADIUS
SPIRAL PARAMETERS ARE MINIMUM AND HIGHER VALUES SHOULD BE USED WHERE POSSIBLE
SPIRALS ARE DESIRABLE BUT NOT ESSENTIAL ABOVE THE HEAVY LINE FOR 6-LANE PAVEMENT. ABOVE THE DASHED LINE USE 4-LANE VALUES. BELOW THE DASHED LINE USE 4-LANE VALUES x 1.15
A DIVIDED ROAD HAVING A MEDIAN LESS THAN 7 m MAY BE TREATED AS A SINGLE PAVEMENT

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

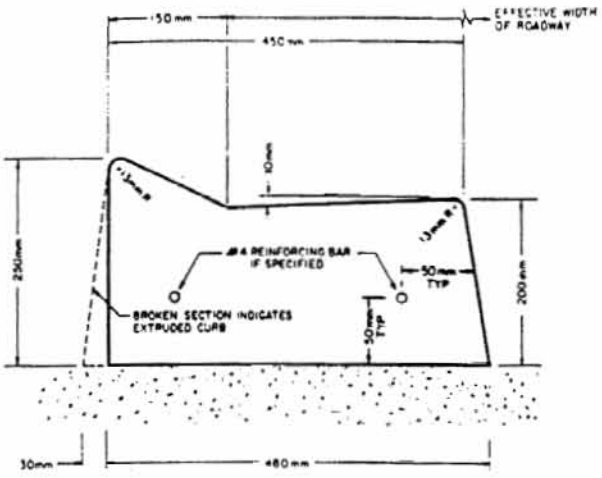
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

SUPERELEVATION

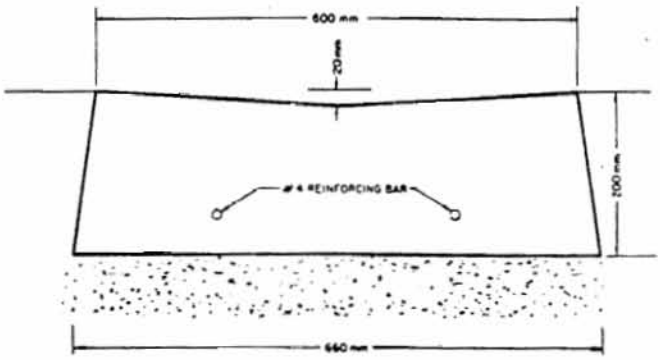
REV.

STD. DWG. NO. R 8




MOUNTABLE CURB (WIDE SECTION)

REFER TO STD. DWG. NO. R 10 FOR REINFORCING AT CATCH BASINS




INVERT GUTTER

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

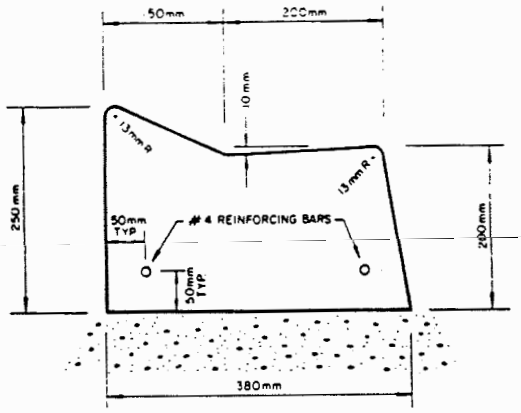
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

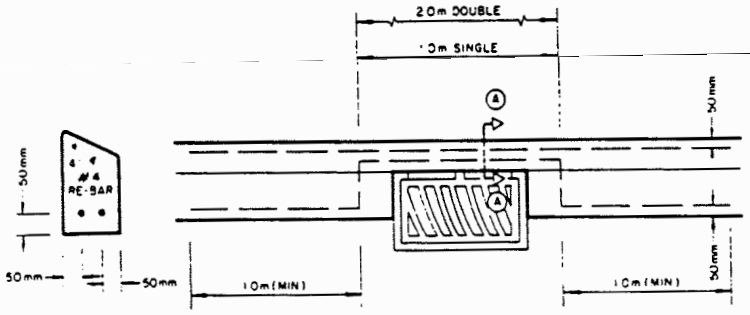
MOUNTABLE CURB ( WIDE SECTION ) AND INVERT GUTTER

REV.

STD. DWG. NO. R 9




MOUNTABLE CURB (NARROW SECTION)




SECTION A-A

CURB REINFORCING AT CATCH BASINS

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

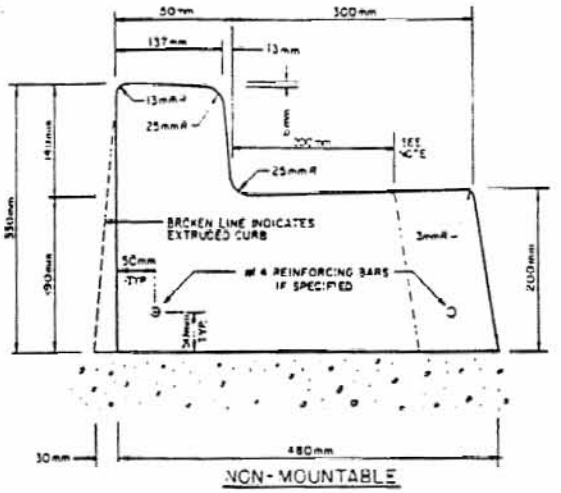
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |

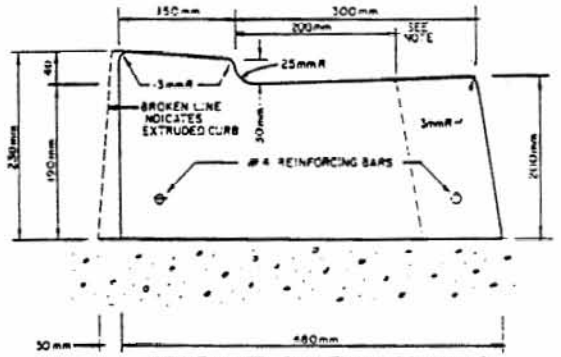
MOUNTABLE CURB ( NARROW SECTION )
& CURB REINFORCING AT CATCH BASINS

REV.

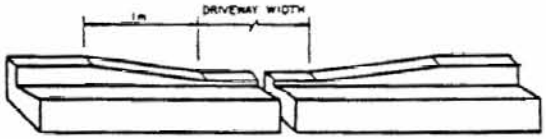
STD. DWG. NO.
R 10




NON-MOUNTABLE




REINFORCED DRIVEWAY CROSSING

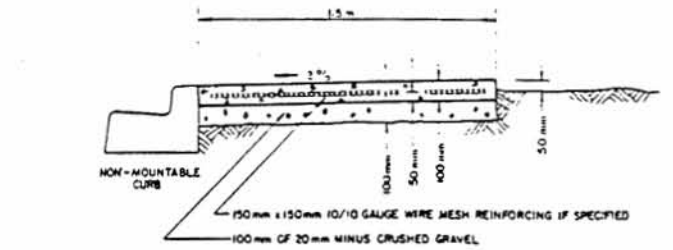


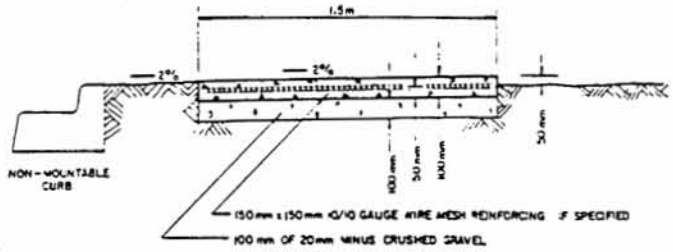

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

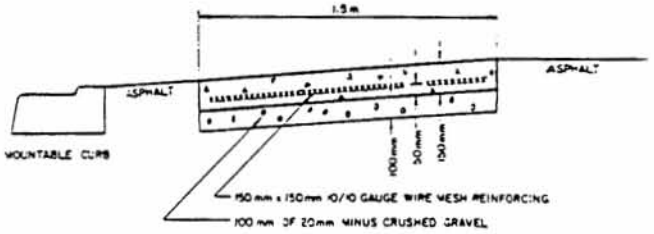
| NO. | DATE | REVISION | NON-MOUNTABLE CURB | REV. |
|---|---|---|---|---|
| | | | | STD. DWG. NO. R11 |

## SIDEWALK ABUTTING CURB




## SEPARATED SIDEWALK




## REINFORCED DRIVEWAY CROSSING

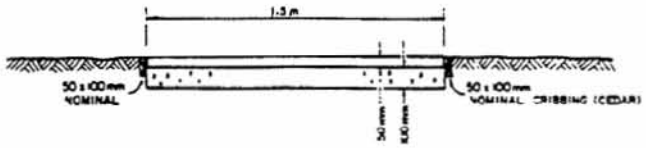
NOTES

1. REMOVE ALL SOD & ORGANIC MATERIALS FROM PROPOSED SIDEWALK LOCATION. APPLY APPROVED WEED KILLER LIBERALLY PRIOR TO INSTALLATION OF GRAVEL IN EXCAVATION. BACKFILL ANY LOW AREAS WITH PITRUN SAND OR GRAVEL.
2. WHERE PRACTICAL KEEP SIDEWALK APPROXIMATELY 50mm ABOVE NATURAL GROUNDS.
3. GRADING & SEEDING IS REQUIRED FOR REMAINING LANE WIDTH

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION | | REV. |
|---|---|---|---|---|
| | | | CONCRETE SIDEWALK | STD. DWG. NO. R 12 |




CROSS SECTION DETAIL

NOTES:

1. SIDEWALK SHALL BE INSTALLED TO GRADES AND ALIGNMENT AS LAID OUT BY DESIGN DRAWING. MINIMUM GRADE 0.50%, SIDEFALL 2.00% UNLESS OTHERWISE SPECIFIED.
2. REMOVE ALL SOD AND ORGANIC MATERIALS FROM PROPOSED SIDEWALK LOCATION. APPLY APPROVED WEED KILLER LIBERALLY PRIOR TO INSTALLATION OF GRAVEL IN EXCAVATION. BACKFILL ANY LOW AREAS WITH PITRUN SAND OR GRAVEL.
3. INSTALL HOTMIX ASPHALT SIDEWALK 50 mm THICK BY DIMENSION SHOWN ON PLAN.
4. WHERE PRACTICAL KEEP SIDEWALK SLIGHTLY ABOVE NATURAL GROUND.
5. BASE TO BE A MINIMUM OF 100 mm DEPTH COMPOSED OF 20 mm MINUS CRUSHED GRAVEL.
6. USE 50 x 100 mm (NOMINAL) CEDAR CRIBBING ALONG EDGES OF SIDEWALK.
7. GRADING AND SEEDING IS REQUIRED FOR REMAINING LANE WIDTH.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

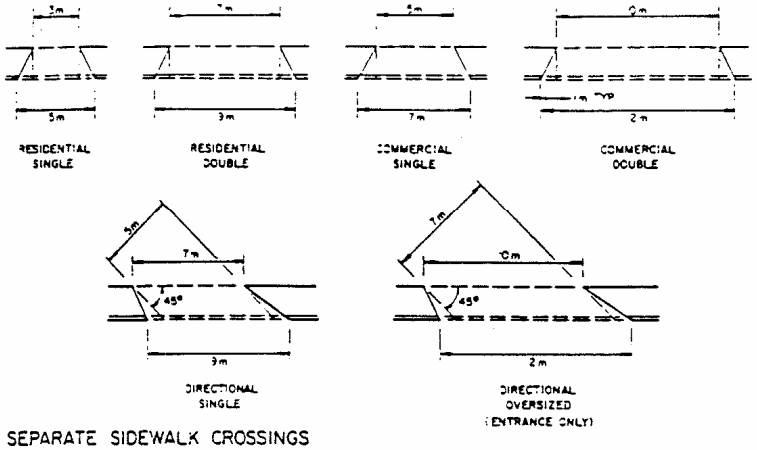
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

ASPHALT SIDEWALK

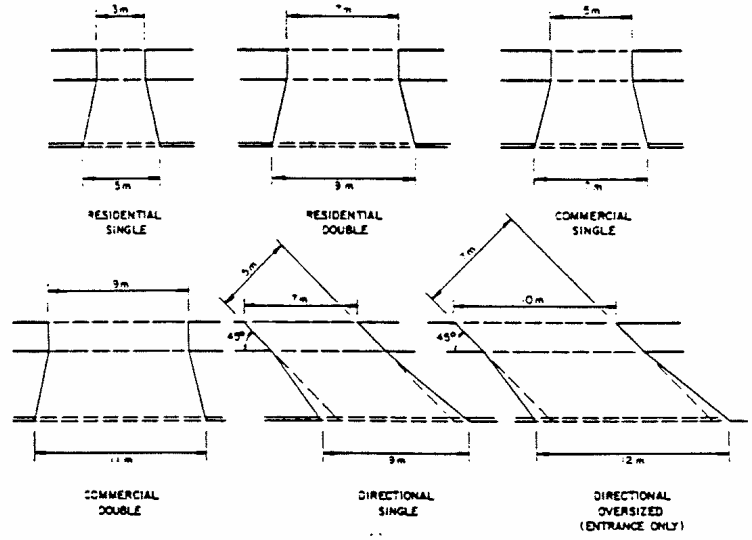
REV.

STD. DWG. NO.
R 13

MONOLITHIC SIDEWALK CROSSINGS




SEPARATE SIDEWALK CROSSINGS




REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

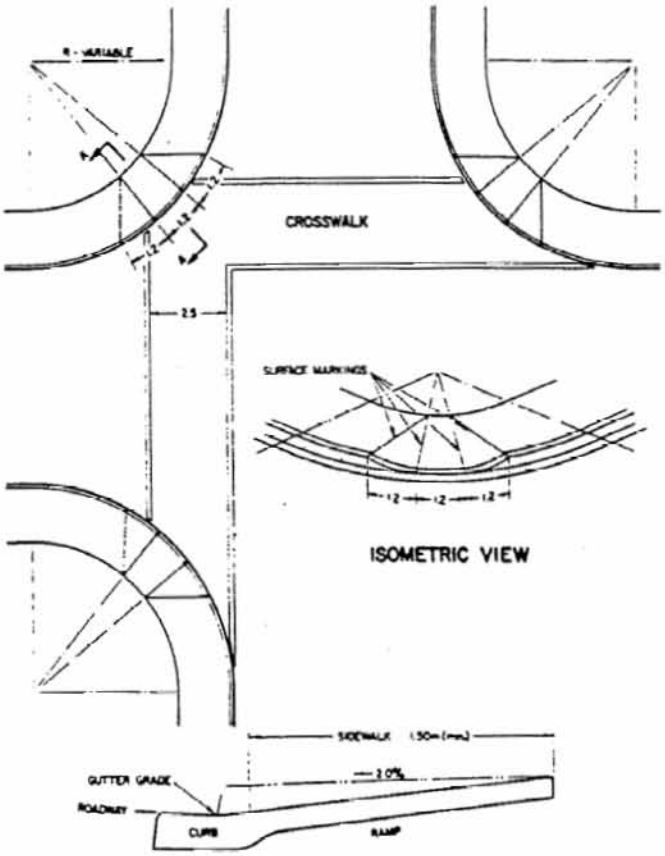
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

SIDEWALK DRIVEWAY CROSSING

REV.

STD. DWG. NO.
R 14

PLAN




ISOMETRIC VIEW

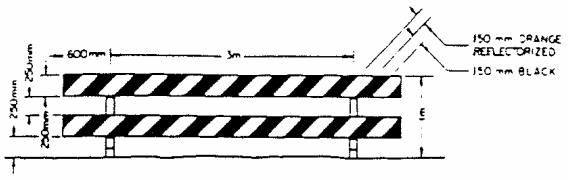



SECTION A-A

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

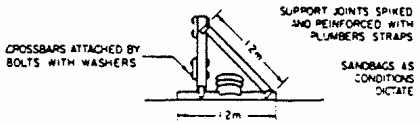
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION | | REV. |
|---|---|---|---|---|
| | | | SIDEWALK CORNER RAMP | STD. DWG. NO. R 15 |



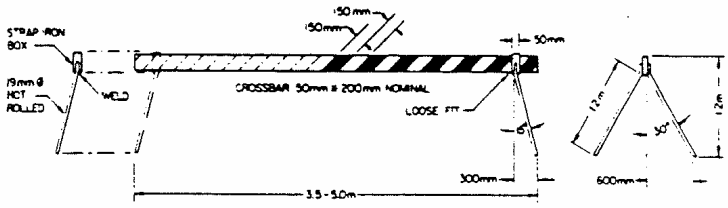

CROSSBAR 50mm x 250mm NOMINAL
SUPPORT 90mm x 90mm NOMINAL

END VIEW




CLASS I BARRICADES

STRIPES, 45° DIAGONAL, BLACK AND REFLECTORIZED ORANGE, SLOPED BOTH SIDES AS SHOWN




CLASS II BARRICADES

NOTE BARRICADE LENGTH SHOULD BE EQUAL TO OR GREATER THAN PAVEMENT WIDTH IF FEASIBLE.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

BARRICADES

REV.

STD. DWG. NO.
R 16

ASSEMBLY DETAILS NOT SPECIFIED IN THESE STANDARDS ARE TO BE IN ACCORDANCE WITH THE FENCING MANUFACTURER'S RECOMMENDATIONS

TENSION BAR 5mm x 19mm GALVANIZED WITH 4 TIES

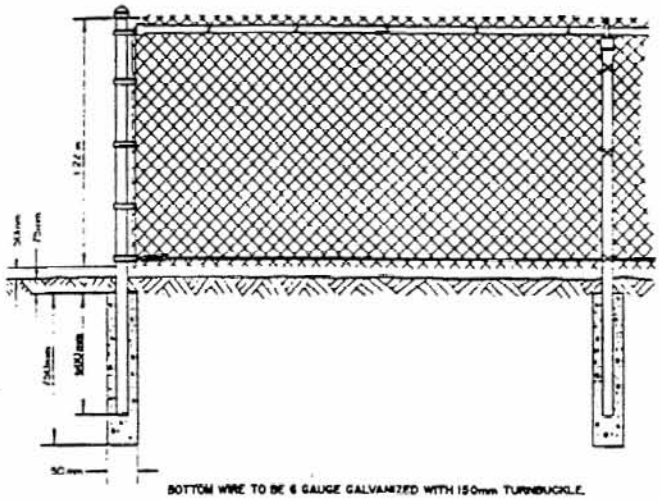
TIES TOP AND BOTTOM ON 450mm SPACING

LINE POST 48mm O.D. GALVANIZED.

TERMINAL POST 60mm O.D. GALVANIZED.

TOP OF CHAIN LINK FABRIC TO BE A FINISHED EDGE AND TO BE 15 TO 25mm ABOVE TOP RAIL.

TOP RAIL 35mm O.D. GALVANIZED



BOTTOM WIRE TO BE 6 GAUGE GALVANIZED WITH 150mm TURNBUCKLE.

BOTTOM OF CHAINLINK FABRIC FINISHED OR UNFINISHED AND TO BE 50 TO 100mm ABOVE GROUND.

TERMINAL AND LINE POSTS TO BE SET ON 2.5mm MAXIMUM CENTRES. CONCRETE FOOTINGS TO BE MINIMUM 150mm x 750mm WITH A MINIMUM 75mm TOPSOIL COVER. ALL POSTS TO BE SET 600mm INTO CONCRETE FOOTINGS.

PIPE SIZES AS NOTED AND GALVANIZED ONLY. ALL PIPE TO BSS 1387 SPECIFICATIONS OR ASTM SCHEDULE 40-A-120.

CHAINLINK MESH : 5mm x 3.55mm WIRE TO ASTM A392 CLASS 1 w/T COATING.

FITTINGS : DOME TOPS, EYE TOPS, RAIL ENDS, RAIL SLEEVES AND SIMILAR FITTINGS TO BE GALVANIZED AND IN ALL RESPECTS AS SUPPLIED BY THE FENCING MANUFACTURER.

CHAINLINK FABRIC TO BE INSTALLED ON TRAFFIC SIDE OF FENCE.

IF POST BEING INSTALLED IN ROCK, DRILL HOLES TO SUIT POST AND GROUT IN.

NOTE :

ALL FENCING MATERIAL SIZES SHOWN ARE NOMINAL.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

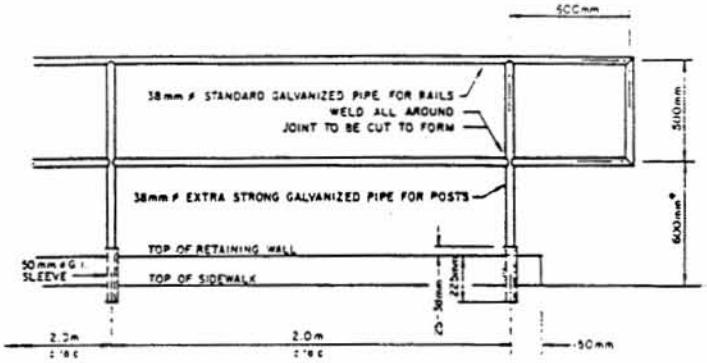
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

CHAIN LINK FENCE

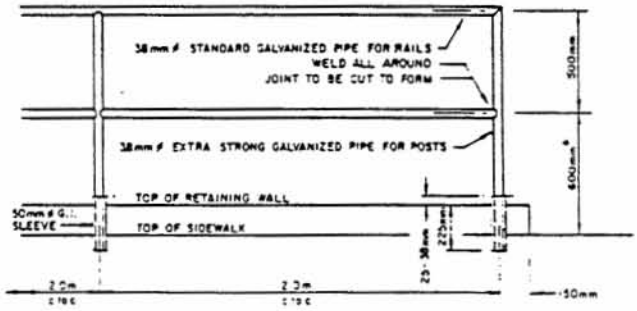
REV.

STD. DWG. NO.
R 17




NOTES:

PIPE SIZES ARE NOMINAL
* MEASUREMENT FROM TOP OF SIDEWALK OR TOP OF RETAINING WALL WHERE NO SIDEWALK EXISTS
ALL WELDED JOINTS TO BE COATED WITH GALVACON OR EQUIVALENT.




REFER TO SPECIFICATIONS FOR FURTHER DETAILS

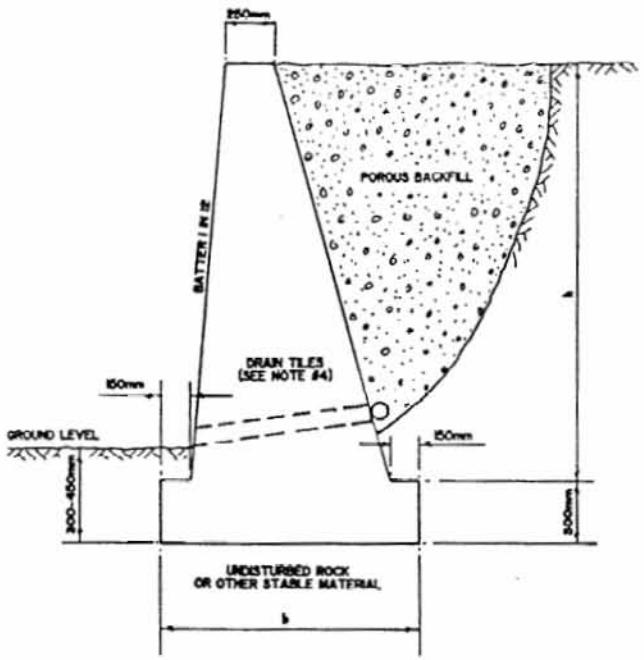
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

SIDEWALK HANDRAILS

REV.

STD. DWG. NO.
R 18




| h | b |
|---|---|
| 1.0m | 0.75m |
| 1.5m | 0.90m |
| 2.0m | 1.10m |
| 2.5m | 1.35m |

NOTES :

1. WALL HEIGHT NOT TO EXCEED 2.5m.
2. CONSTRUCTION JOINTS AT 9.0 CENTRES, JOINT TO HAVE TONGUE AND GROOVE KEY AND TO BE COVERED WITH A STRIP OF WATERPROOF MEMBRANE AT BACK OF WALL.
3. FOR VEHICULAR LOADS NEAR TOP OF WALL, USE THE "b" DIMENSION OF WALL 0.5m HIGHER.
4. 100mm DRAIN TILES TO BE INSTALLED AT 3.0m CENTRES OR ALONG BACK OF WALL.
5. STANDARD SIDEWALK HANDRAIL TO BE INSTALLED WHERE REQUIRED. ( REFER TO STD. DWG. NO. R 16. )

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

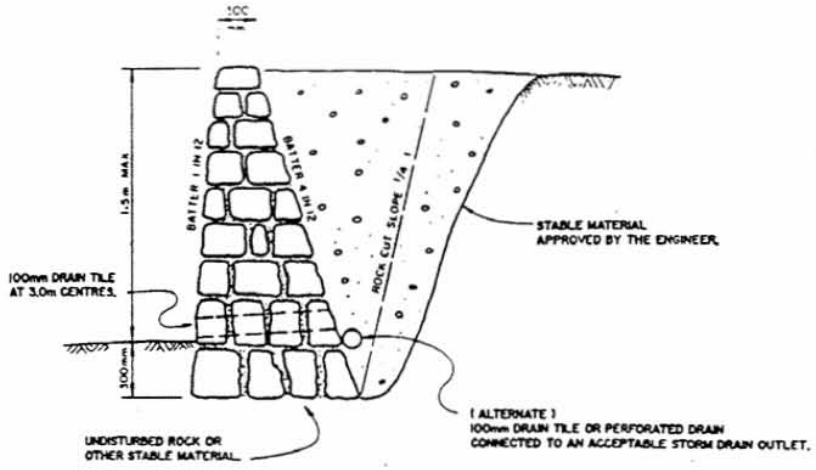
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

CONCRETE
GRAVITY RETAINING WALL

REV.

STD. DWG. NO.
R 19



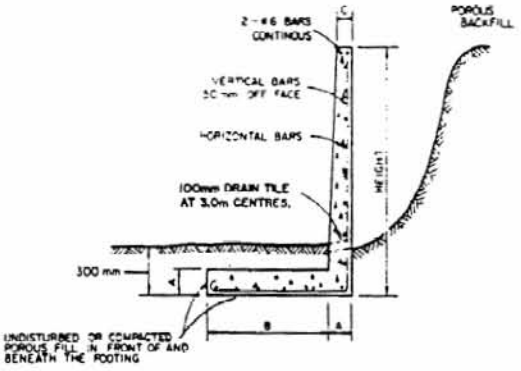

NOTES :

1. WALL HEIGHT OVER 1.5m TO BE DESIGNED BY A PROFESSIONAL ENGINEER.
2. MORTAR TO BE COMPOSED OF ONE PART PORTLAND CEMENT AND TWO PARTS SAND.
3. INDIVIDUAL STONES TO HAVE A THICKNESS OF NOT LESS THAN 100mm AND A WIDTH OF NOT LESS THAN 1.5 TIMES THE THICKNESS. STONES TO INCREASE IN THICKNESS FROM THE TOP TO THE BOTTOM OF THE WALL.
4. BACKFILL TO BE CLEAN, FREE DRAINING , GRANULAR MATERIAL APPROVED BY THE ENGINEER.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION | ROCK MASONRY RETAINING WALL | REV. |
|---|---|---|---|---|
| | | | | STD. DWG. NO. R 20 |




NOTES :

1. WALL HEIGHT OVER 1.75m TO BE DESIGNED BY A PROFESSIONAL ENGINEER.
2. ALTERNATE VERTICAL BARS MAY BE CUT AT HALF WALL HEIGHT.
3. CONSTRUCTION JOINTS AT 9.0m CENTRES, 13mm EXPANSION JOINTS AT 18m CENTRES.
4. FOR VEHICULAR LOADS NEAR TOP OF WALL, USE DIMENSIONS FOR A WALL 0.75m HIGHER ( EXCEPT THE HEIGHT )
5. STANDARD SIDEWALK HANDRAIL TO BE INSTALLED ON TOP OF WALL WHERE REQUIRED. ( REFER TO STD. DWG. NO. R 18.
6. TYPICAL FOR GOOD SOIL CONDITIONS, FOR POOR SOIL CONDITIONS SPECIAL DESIGNS ARE REQUIRED.

| DIMENSIONS | | | | REINFORCEMENT | |
|---|---|---|---|---|---|
| HEIGHT | A | B | C | VERT. STEEL | HOR. STEEL |
| 1.00m | 180mm | 0.360m | 150mm | #3 @ 375mm | 4 - #4 |
| 1.25m | 150mm | 0.500m | 150mm | #3 @ 350mm | 6 - #4 |
| 1.50m | 200mm | 0.500m | 200mm | #3 @ 300mm | 8 - #4 |
| 1.75m | 200mm | 0.760m | 200mm | #3 @ 300mm | 10 - #4 OR 7 - #5 |

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

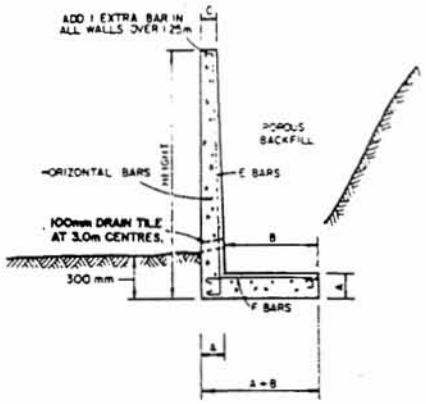
TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

CONCRETE CATILEVER RETAINING WALL TYPE A

REV.

STD. DWG. NO. R 21




NOTES :

1. WALL HEIGHT OVER 1.75m TO BE DESIGNED BY A PROFESSIONAL ENGINEER.
2. ALTERNATE VERTICAL BARS MAY BE CUT AT HALF WALL HEIGHT.
3. CONSTRUCTION JOINTS AT 9.0m CENTRES, 13mm EXPANSION JOINTS AT 18m CENTRES.
4. FOR VEHICULAR LOADS NEAR TOP OF WALL, USE DIMENSIONS FOR A WALL 0.75m HIGHER ( EXCEPT THE HEIGHT )
5. STANDARD SIDEWALK HANDRAIL TO BE INSTALLED ON TOP OF WALL WHERE REQUIRED. ( REFER TO STD. DWG. NO. R 18.
6. TYPICAL FOR GOOD SOIL CONDITIONS, FOR POOR SOIL CONDITIONS SPECIAL DESIGNS ARE REQUIRED.

| DIMENSIONS | | | | REINFORCEMENT | | |
|---|---|---|---|---|---|---|
| HEIGHT | A | B | C | E BARS | F BARS | HOR. STEEL |
| 1.00m | 150mm | 0.406m | 150mm | * | * | 4 - #4 |
| 1.25m | 200mm | 0.508m | 150mm | * | * | 6 - #4 |
| 1.50m | 200mm | 0.635m | 200mm | #3 @ 300mm | #3 @ 300mm | 8 - #4 |
| 1.75m | 200mm | 0.790m | 200mm | #3 @ 300mm | #3 @ 300mm | 10 - #4 |

* REPLACE E AND F BARS WITH A SINGLE #6 BAR USING A SIMPLE BEND AND 300mm CENTRES.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

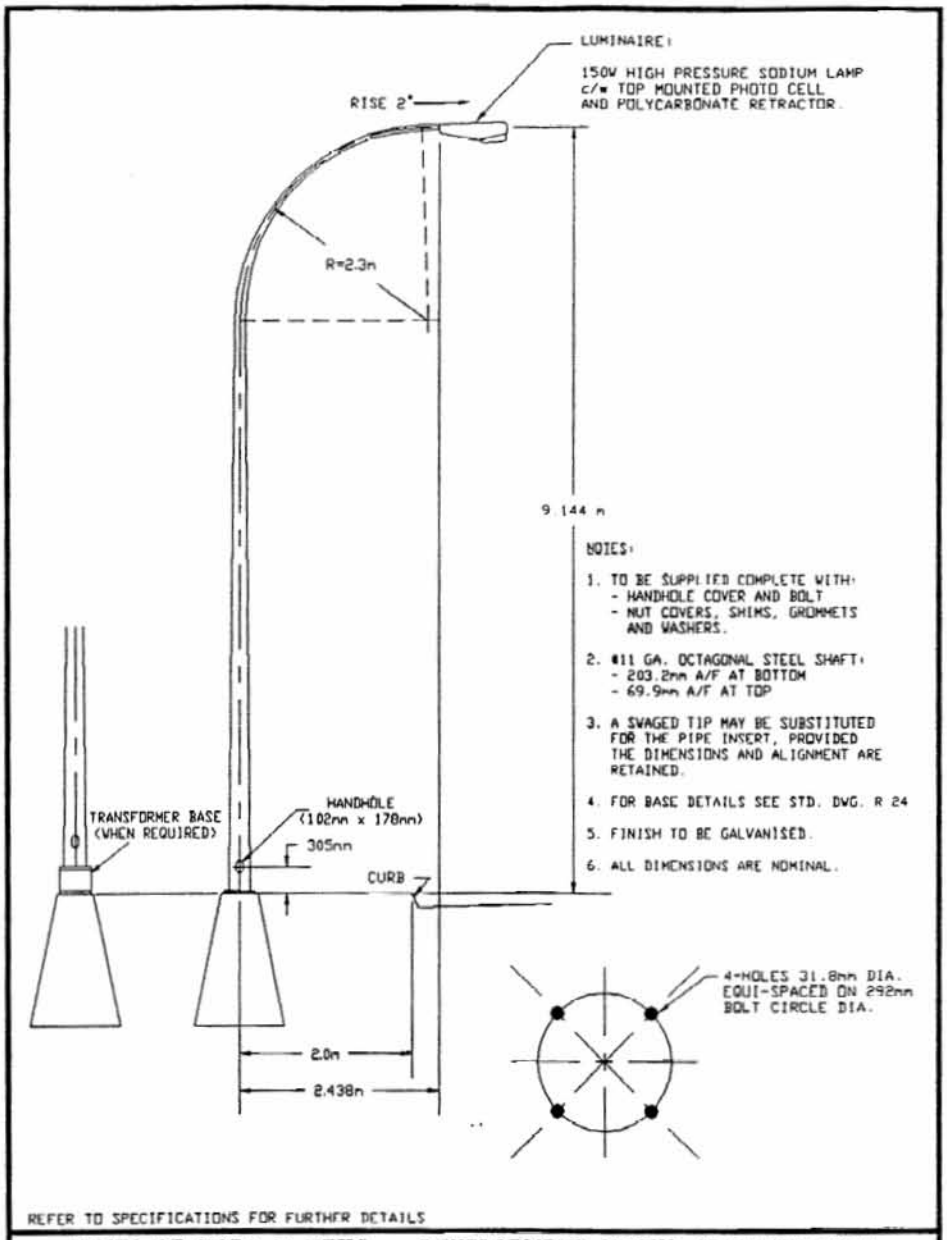
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

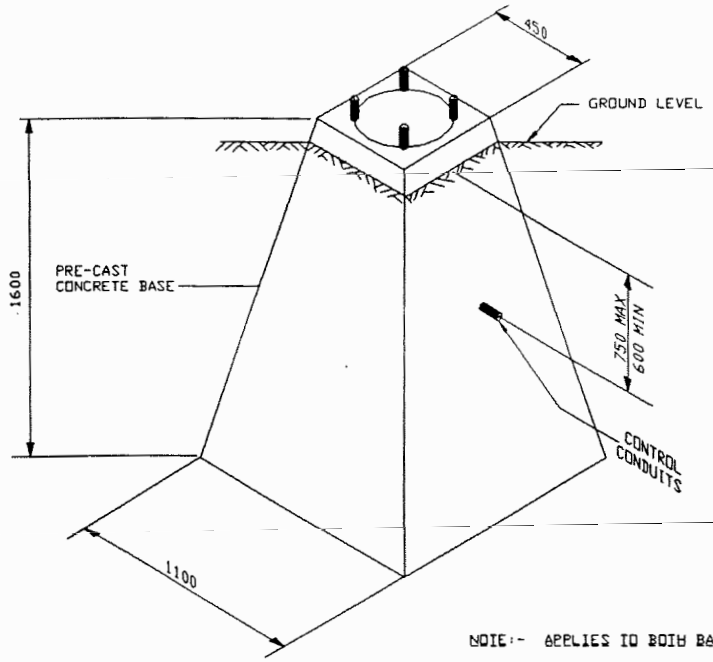
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

CONCRETE
CATILEVER RETAINING WALL
TYPE B

REV.

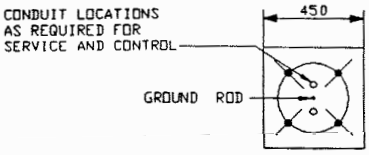
STD. DWG. NO.
R 22


LUMINAIRE:
150W HIGH PRESSURE SODIUM LAMP
c/w TOP MOUNTED PHOTO CELL
AND POLYCARBONATE RETRACTOR.
RISE 2"
R=2.3m
9.144 m
NOTES:
1. TO BE SUPPLIED COMPLETE WITH:
- HANDHOLE COVER AND BOLT
- NUT COVERS, SHIMS, GROMMETS
AND WASHERS.
2. #11 GA. OCTAGONAL STEEL SHAFT:
- 203.2mm A/F AT BOTTOM
- 69.9mm A/F AT TOP
3. A SWAGED TIP MAY BE SUBSTITUTED
FOR THE PIPE INSERT, PROVIDED
THE DIMENSIONS AND ALIGNMENT ARE
RETAINED.
4. FOR BASE DETAILS SEE STD. DWG. R 24
5. FINISH TO BE GALVANISED.
6. ALL DIMENSIONS ARE NOMINAL.
TRANSFORMER BASE
(WHEN REQUIRED)
HANDHOLE
(102mm x 178mm)
305mm
CURB
4-HOLES 31.8mm DIA.
EQUI-SPACED ON 292mm
BOLT CIRCLE DIA.
2.0m
2.438m
REFER TO SPECIFICATIONS FOR FURTHER DETAILS
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION
NO.
DATE
REVISION
REV.
STREET LIGHT STANDARD
STD. DWG. NO.
R 23




NOTE:- APPLIES TO BOTH BASES

IN SOFT GROUND FLARE THE BASE TO SUIT THE CONDITIONS.
ON ROCK MIN. BASE DEPTH 1000 WITH 25mm DIA. DEFORMED IRON RODS SUITABLY SET 600mm INTO ROCK AND A MINIMUM OF 600mm INTO BASE.
CONCRETE:-
25 MPa
80mm MAX. SLUMP
25mm MAX. AGGREGATE




NOTE
TOPS OF BASES TO BE LEVELLED ACCURATELY.
4-ANCHOR BOLTS 25.4 x 914 EQUI-SPACED ON BOLT CIRCLE DIAMETER. 50.0 PROJECTION.
BOLT CIRCLE DIAMETER MAY VARY WITH MAKE AND TYPE OF STANDARD.

BASE DESIGNED FOR SOILS WITH A MINIMUM BEARING PRESSURE OF 100 KPa

ALL DISTANCES ARE IN MILLIMETRES

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

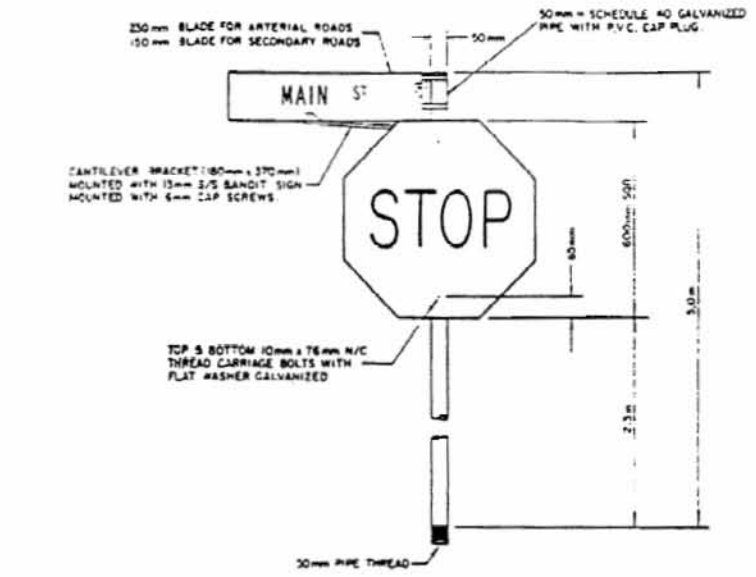
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

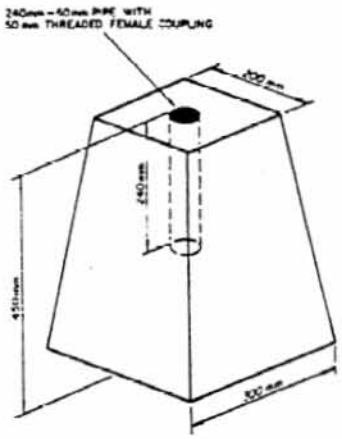
STREET LIGHT & TRAFFIC SIGNAL STANDARD BASE

REV.

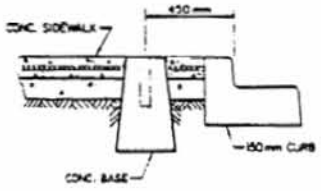
STD. DWG. NO. R 24




SIGN DETAIL




CONCRETE BASE




LOCATION DETAIL

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

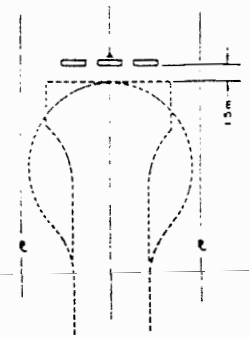
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

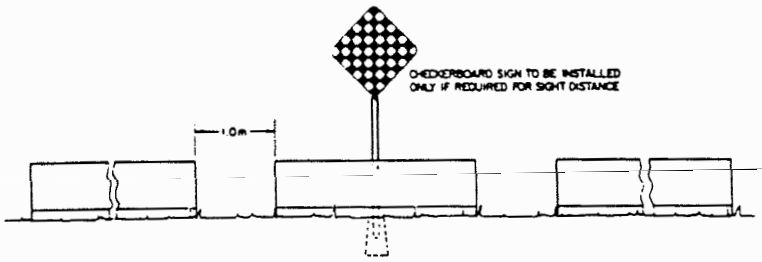
STREET NAME STANDARD

REV.

STD. DWG. NO. R 25

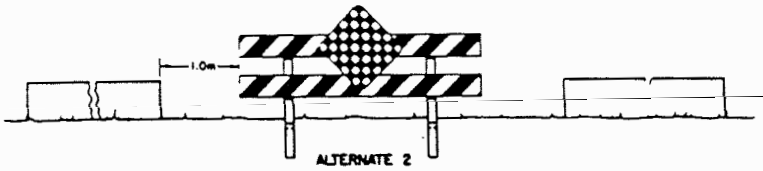


TYPICAL BARRICADE LOCATION N.T.S.




ALTERNATE 1
( MUST BE APPROVED BY FIRE CHIEF )

NOTE :
THE ROAD FACE OF ALL PRECAST CONCRETE BARRIERS TO BE PAINTED WITH REFLECTIVE YELLOW PAINT.

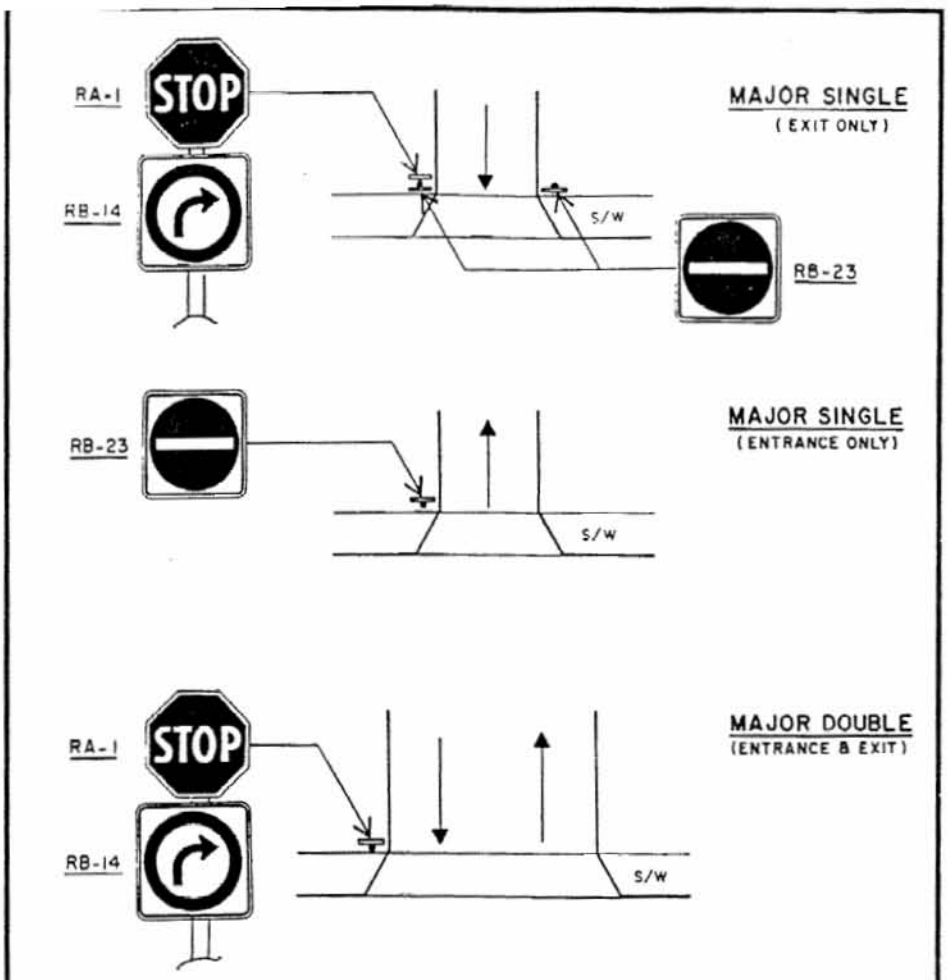



ALTERNATE 2

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION | STANDARD ROAD CLOSURE | REV. |
|---|---|---|---|---|
| | | | | STD. DWG. NO. R 26 |




GENERAL REQUIREMENTS

1. ALL SIGNS TO CONFORM TO "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR CANADA." (IN SIZE, SHAPE, COLOUR AND REFLECTORIZATION)
2. ALL SIGNS TO BE FABRICATED ON SHEET ALUMINUM. MOUNTED ON GALVANIZED STEEL POSTS (50mm. Inside Diameter) AND ANCHORED IN CONCRETE BASE AS PER SAANICH SIGNING PRACTICES.
3. SIGN CORNERS, TO BE ROUNDED. HEIGHT FROM GROUND TO BOTTOM OF SIGN – 2.2m.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

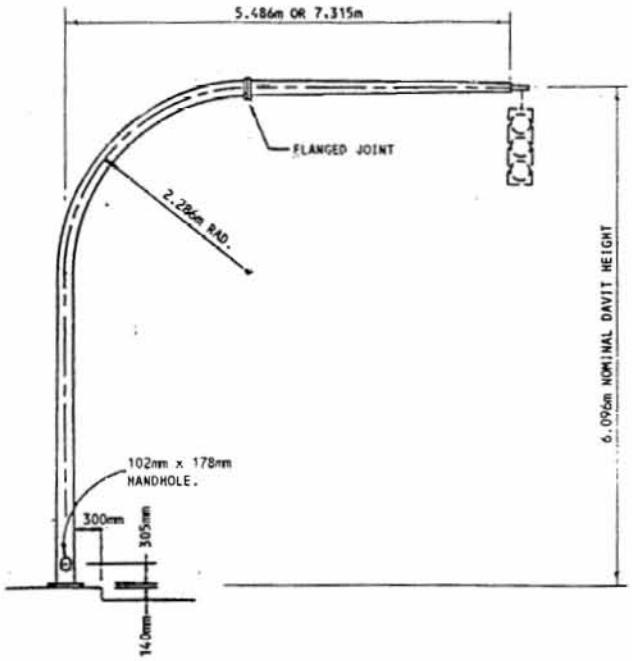
TOWN OF PORT McNEILL – DEVELOPMENT WORKS SPECIFICATION

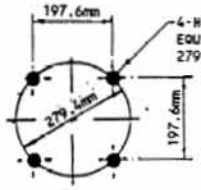
| NO. | DATE | REVISION |
|---|---|---|
| | | |

MAJOR STREET
DRIVEWAY SIGNING

REV.

STD. DWG. NO.
R 27




ANCHOR BOLT SPACING

NOTES:-

1.--- TO BE SUPPLIED WITH:
HANDHOLE COVER AND BOLT, NUT COVERS, SHIMS, GROMMETS AND WASHERS.

2.--- #7 GA. (MIN.) OCTAGONAL STEEL UPRIGHT.

3.--- A SWAGED TIP MAY BE MAY BE SUBSTITUTED FOR THE PIPE INSERT PROVIDED DIMENSIONS AND ALIGNMENT ARE RETAINED.

4.--- FOR BASE DETAILS SEE STD. DWG. NO. R 24.

5.--- FINISH TO BE GALVANISED.

6.--- ALL DIMENSIONS ARE NOMINAL.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TOWN OF PORT McNEILL - DEVELOPMENT WORKS SPECIFICATION

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

TRAFFIC SIGNAL STANDARD

REV.

STD. DWG. NO.
R 28

**SECTION 991 DEVELOPMENT SERVICING AGREEMENT**

(SUBDIVISION OR DEVELOPMENT)

**THIS AGREEMENT** dated the _____day of _____, 19__

**BETWEEN:**

**TOWN OF PORT MCNEILL**
1775 Grenville Place,
Box 728
Port McNeill, British Columbia
V0N 2R0

(hereinafter referred to as the "Town")
OF THE FIRST PART

**AND:**

_____
_____
_____

(hereinafter referred to as the "Developer")
OF THE SECOND PART

Whereas the Developer is the owner or has agreed to purchase and proposes to develop a portion of the lands within the Town of Port McNeill in the Province of British Columbia, and more particularly known and described as:

_____
_____
_____

(hereinafter referred to as the "Lands"); and

**WHEREAS** the Developer, by the **"Town of Port McNeill Subdivision and Development Bylaw No. 414"**, is required as a condition of _____(Insert "approval of a subdivision" or "issuance of a Building Permit") to construct and install a complete system of works and services required in connection with the said _____(Insert "subdivision" or "Building Permit") to the standards set forth in the Subdivision and Development Bylaw No. 414 to the Lands, on highways immediately adjacent to the Lands and on the Lands; and

**WHEREAS** the Developer desires _____ (Insert "approval of a subdivision" or "issuance of a building permit") in respect of the lands, before completing the construction and installation of all works and services required by the above bylaws; and

**WHEREAS** the Developer has agreed to assign and transfer unto the Town all of its right, title, and interest in the works and services, as they are constructed, free and clear of any encumbrances for the Town's own and unfettered use absolutely.

**NOW THEREFORE** this agreement witnesses that in consideration of the premises, the sum of ONE DOLLAR ($1.00), the receipt and sufficiency of which the Developer hereby acknowledges, and of other good and valuable consideration, the Developer and the Town Covenant and Agree, each with the other, as follows:

**Definitions**

1. In this Agreement:

**"Approval"** means, in the case of a subdivision, the Approving Officer affixing his signature to the subdivision plan pursuant to Section 88 of the Land Title Act or, in the case of a building permit, issuance of the building permit by the town.

**"Bond"** means the security required to be deposited with the Town pursuant to Section 10;

**"Clerk"** means the Clerk of the Town Of Port McNeill.

**"Completion"** means the completion of the Works by the Developer to the satisfaction of the Municipal Engineering Advisor when so certified initially by him in writing in Schedule "C".

**"Consulting Engineer"** means a Professional Engineer, registered in the Province of British Columbia, who is retained by the Developer.

**"Municipal Engineering Advisory"** means a Professional Engineer registered in the Province of British Columbia who is retained by the Town.

**"Warranty Period"** means that period specified in Section 12; and

**"Works"** means the works and services required to be constructed and installed pursuant to Section 3 and includes all things required to be done under this Agreement or otherwise in relation to the construction and installation of these works and services.

**Payments**

2. The Developer shall, prior to the approval of the proposed development, pay the Town:

(a) the security outlined pursuant to Section 10; and

(b) all taxes outstanding against the Lands.

**Construction**

3. (1) The Developer, at his own expense, shall:

(a) Retain a consulting engineer who will comply with Section 4 of Schedule "H" to the Town's Subdivision and Development Bylaw.

(b) construct and install on the Lands all works and services as shown on the drawing s marked as Schedule "A" of this Agreement, all of which are incorporated into and form a part of this Agreement, to compliance with the Town's Subdivision and Development Bylaw No. 414, and to the satisfaction of the Consulting Engineer, to be proved only by the delivery of his Certificate of Completion, as shown on Schedule "B", to the Town.

(c) not construct any buildings upon the Lands without the prior written approval of the Clerk.

(d) complete the Works to the satisfaction of the Municipal Engineering Advisor within 365 days of the date of this Agreement, such satisfaction to be proved only by the delivery of his Initial Certificate of Satisfaction in Schedule "B" to the Developer.

(d) Further, perform all work that, in the opinion of the Municipal Engineering Advisor, is necessarily incidental to the provision of the works and services required pursuant to this Agreement,

including, notwithstanding the generality of the foregoing, any work or extra work that arises out of soil conditions or the existence of utilities not shown or incorrectly shown on design or other drawings, including those prepared or provided by the Town.

(2) The Consulting Engineer shall certify that all materials supplied and all work performed generally conforms to Schedule "H" the Development Works Specifications of the Town's Subdivision and Development Bylaw No.414 or such other standards approved by the Municipal Engineering Advisor.

(3) Where permitted by the Municipal Engineering Advisor, the Developer may construct and install the works and services shown in the Engineering drawings in Schedule "A" which are to be located on an existing highway or other public right of way in the Town. Where this is permitted, these off-site works and services shall be deemed to be a part of the Works for all purposes in this Agreement.

**Site Personnel**

4. The Developer shall:

(a) not employ any person who, in the opinion of the Municipal Engineering Advisor, is unfit or not skilled in the work assigned to him; and

(b) at all times in connection with the construction and installation of the Works, keep and employ a competent general superintendent capable of speaking, reading and writing the English language.

**Bylaws**

5. The Developer shall:

(a) Comply with all Town bylaws throughout the term of this Agreement; and
(b) Notwithstanding provisions of the Municipal Act, comply with any changes in subdivision requirements or standards established by bylaw prior to the commencement of construction of the Works on the Lands.

**Debris**

6. If any material or debris is left within any highway allowance during or after the construction of the Works, the Town may forthwith remove the material or debris at the expense of the

Developer, the cost of the removal to be the actual cost to the Town plus an amount equal to 10% of that cost, and the Developer shall pay this cost to the Town forthwith on demand.

**Survey**

7. The Developer shall protect all survey markers, pins, posts and similar things during the construction, installation, maintenance and repair of the Works and shall employ, at the Developer's expense, a British Columbia Land Surveyor to replace any such markers, pins, posts or similar things which may be moved, damaged or destroyed during the construction, installation, maintenance or repair of the Works.

8. (1) The Town shall:

(a) Permit the Developer to install and construct the Works on the terms and conditions contained in this Agreement;

(b) Issue the Developer an Initial Certificate of Satisfaction for the Works, in Schedule "C", signed by the Municipal Engineering Advisor, when the Works have been constructed and installed to the satisfaction of the Municipal Engineering Advisor

(2) The Town may, in its discretion, cause the Municipal Engineering Advisor to issue separate initial certificates of completion for highways, water, sewer, drainage and underground civil duct work, or other work.

**Property**

9. The Works,

(a) Become the property of the Town when the Municipal Engineering Advisor issues his Initial Certificate of Satisfaction, the Approving Officer has given final approval, and registration of the approved plans and statutory Right-of-way plans and agreements in the Land Title Office has taken place.

(b) Remain at the full risk of the developer until the events of (a) above have occurred.

**Security**

10. (1) As security for the due and proper performance of all obligations of the Developer in this Agreement, the Developer shall deposit a Bond with the Town which is to be valid until the Certificate of Completion is delivered to the Developer, consisting of:

(a) cash, or

(b) a certified cheque payable to the Town, or

(c) an Irrevocable Letter of Credit, listing the Town as beneficiary, or

(d) a Guaranteed Investment Certificate, made out to the Town of Port McNeill,

in the amount of _____. ____

(2) The amount of the Bond may be reduced at any time with the written approval of the Clerk.

(3) The Irrevocable Standby Letter of Credit shall have the following statement incorporated as an automatic renewal clause:

"It is a condition of this Irrevocable Standby Letter of Credit that it shall be deemed to be automatically extended without amendment for a further one (1) year period from the present or any future expiration date hereof, unless at least 30 days prior to the present or any future expiration date, the issuer notifies the Town in writing by registered mail, that it does not elect to consider this Irrevocable Standby Letter of Credit to be renewable for any additional period."

11. (1) If, in the sole discretion of the Town, the Town determines that the Developer has defaulted on any of its obligations in this Agreement, the Bond is forfeited and the Town may:

(a) perform the obligations of the Developer at the cost of the Developer;

(b) from time to time draw upon any or all of the Bond:

(i) to compensate the Town for the costs it incurs or expects to incur in performing the obligations of the Developer; and

(ii) to satisfy any amount the Developer is required to pay to the Town.

(2) The cost to the Town of performing the obligations of the Developer includes the actual costs of construction plus engineering, supervision, testing, legal survey, and other costs incurred by the Town in connection with performing the obligations together with an administration fee equal to 10% of the total of these costs.

(3) If the Bond is insufficient to compensate the Town for the costs of performing the Developer's obligations or satisfying an amount required to be paid to the Town the Developer shall pay the insufficiency to the Town forthwith on demand.

(4) The Town may deliver the remaining balance of the Bond, if any, to the Developer on delivery of the Certificate of Completion.

**Warranty Period**

For a period of twelve months following the issuance of the initial Certificate of Satisfaction by the Municipal Engineering Advisor in Schedule "C", or where more than one Certificate of Completion has been issued by the Municipal Engineering Advisor, then the last such certificate, the Developer, at his own expense shall maintain and repair all works installed or constructed by him if, in the opinion of the Municipal Engineering Advisor, the works are in any way defective as to either materials or workmanship, so that the works are fully operative and function in accordance with the intent of the Port McNeill Subdivision and Development Bylaw No.414 and to the satisfaction of the Municipal Engineering Advisor or forfeit the bond. The satisfaction of the Municipal Engineering Advisor is proved only by the delivery of his final Certificate of Satisfaction in Schedule "C" to the Developer.

**Indemnity**

13. The Developer indemnifies and saves the Town harmless from:

(a) any liability, cost, or expense of any kind arising from or in any way connected with the construction, installation, repair, or maintenance of any work or service done or provided under this Agreement;

(b) without limiting section 13(a), any liability, costs or expense of any kind which the Town may incur by reason of damage arising out of or in any way connected with the construction, installation, repair or maintain; and

(c) without limiting the foregoing, any liability, costs or expense of any kind incurred by reason of liens for nonpayment of labour or materials, workers' compensation assessments, unemployment insurance, federal or provincial tax, check-off or encroachments owing to mistakes in surveying.

**Insurance**

14. (1) The Developer shall take out and maintain, with a company licensed to carry on the business of insurance in the Province of British Columbia, on terms that are acceptable to the Town, and at the Developer's expense:

(a) until the Certificate of Completion is issued, comprehensive general liability insurance covering without limitation premises and operations liability, non-owned automobile liability and contractual liability;

(b) without limiting section 14(1)(a), at least until the Certificate of Completion has been delivered to the Developer, insurance covering contractor's contingency liability with respect to the operations of sub-contractors; and

(c) without limiting section 14(1)(a), during the Warranty Period, insurance covering completed operations liability.

(2) The limits of liability for personal injury and property damage combined shall be not less than two million dollars ($2,000,000.00) for every occurrence.

(3) The Town shall be added as an additional named insured under, and a cross liability clause shall be included within, the policies of comprehensive general liability insurance.

(4) All policies shall provide that they shall not expire, be cancelled or be materially changed without at least 30 days prior written notice to the Town.

(5) If any of the policies are cancelled or materially changed, the Town may require the Developer to cease the construction and installation of the Works.

(6) The Developer shall, prior to commencing the construction and installation of the Works and subsequently upon the request of the Town, file with the Town certified copies of each insurance policy required by this Agreement, or such other proof, satisfactory to the Town, that all required policies are in force.

(7) If the Developer does not obtain and maintain the required insurance or when required does not deliver the policy or policies to the Town, the Town shall have the right, but not the obligation, to obtain and maintain the required insurance. The Developer hereby appoints the Town its lawful attorney to do all things necessary for this purpose. All amounts expended by the Town for insurance premiums under the provisions of this section shall be charged to the Developer and are payable by the Developer to the Town forthwith on demand.

**Further Agreements**

15. (1) The Developer shall provide all statutory rights of way required by the Town in terms acceptable to the Town.

(2) The Developer shall execute and deliver or use his best efforts to cause to be executed and delivered, all such further transfers, agreements, documents, instruments, easements, statutory rights of way, acts, deeds,and assurances and do and perform or cause or procure to be done, performed, executed and delivered all such acts and things as may in the opinion of the Town be reasonably necessary to give full effect to the intent or meaning of this Agreement.

**Delay**

16. If in the opinion of the Municipal Engineering Advisor, a delay in performance of the Works is caused by reason of labour disputes, fire, Act of God, unusual delay by common carriers or any other act which is effectively beyond the Developer's control, the Municipal Engineering Advisor may extend the time for completion of the Works by the Developer for whatever time the Municipal Engineering Advisor deems to be reasonable in the circumstances.

**Interpretation**

17. (1) All references to each party herein are deemed to be references to the heirs, executors, administrators, successors, assigns, servants, agents and officials of the respective parties hereto whenever the context so allows.

(2) This Agreement shall enure to the benefit of and be binding on the parties hereto.

(3) Whenever the singular or masculine is used in this Agreement, the same shall be deemed to include the plural, the feminine, or the body politic or corporate as the context so requires.

(4) Waiver of any default by either party shall not be deemed to be a waiver of any subsequent default by that party.

(5) The rights, powers and remedies of the Town provided in this Agreement are cumulative and not exclusive of any right, power or remedy that may be available to the Town at law or in equity.

(6) Time is of the essence of this Agreement.

(7) Section headings are included for convenience only and do not form part of this Agreement and shall not be used in the construction or interpretation of this Agreement.

**Entire Agreement**

18. The whole Agreement between parties hereto is set forth in this Agreement and no representations, warranties, or conditions, express or implied, have been made other than expressed herein.

**Notice**

19. (1) Whenever it is required or desired that either party deliver or serve a notice on the other, delivery or service shall be deemed to be satisfactory and deemed to have occurred when:

(a) served personally, on the date of service; or

(b) mailed by prepaid registered mail to the address listed for that party on the first page of this Agreement or other address of which that party has in writing notified the other, on the earlier of the date received or on the fifth business day following date of mailing at any Canada Post Office, but in the event of interruption of mail service, notice shall be deemed to be delivered only when actually received by the party to whom it is addressed.

(2) The general superintendent or person in control or apparently in control of the Developer's activities on the Lands is an agent of the Developer for the purpose of service of notices.

**Town's Right Reserved**

20. Nothing contained in or implied by this Agreement shall in any way prejudice or effect the rights and powers of the Town in the exercise of its function under any public and private statutes, bylaws, orders and regulations.

**Severance**

21. Should any clause or portion of this Agreement be declared or held invalid for any reason, the invalid portion shall be severed and the severance shall not affect the validity of the remainder.

**IN WITNESS WHEREOF** of the parties hereto have executed this Agreement as of the date first written above.

**SIGNED, SEALED AND DELIVERED BY** )
The owner in the presence of: )
_____)
_____)
_____)
Occupation
(For use where the owner is an individual or
Partnership)

**THE COMMON SEAL OF THE DEVELOPER)**
was affixed in the presence of: )
)
Title_____)

_____)

Title_____)
(for use where the owner is an incorporated company
society)

**THE CORPORATE SEAL OF THE )**
**TOWN OF PORT MCNEILL was )**
hereunto affixed in the presence of: )
)
_____)
Mayor )
)
_____)
Clerk )

**IRREVOCABLE LETTER OF CREDIT**

(Bank Letterhead)

Letter of Credit No.: _____ Amount: $_____

Initial Expiry Date: _____

TO: Town of Port McNeill

ADDRESS 1775 Grenville Place, P.O. Box 728, Port McNeill, B.C. V0N 2R0

**WE HEREBY AUTHORIZE YOU TO DRAW ON THE** (name and address of bank) for the account of (name of Developer) UP TO AN AGGREGATE AMOUNT OF (dollars in writing and in numbers) available on demand.

**PURSUANT TO THE REQUEST** OF our customer: (name of Developer) we the (name of bank) hereby establish and give you an Irrevocable Letter of Credit in your favour in the above amount which may be drawn on by you at any time and from time to time, upon written demand for payment made upon us by you, which demand we shall honour without enquiring whether you have the right as between yourself and the said customer to make such demand and without recognizing any claim of our said customer, or objection by it to payment by us.

**THE LETTER OF CREDIT** we understand relates to those services and financial obligations set out in an Agreement between the customer and the (name of Municipality) and referred to as (name and number of Contact).

**THE AMOUNT** of this Letter of Credit will continue in force for a period of one year, but shall be subject to the condition hereinafter set forth.

**IT IS A CONDITION** of this Letter of Credit that it shall be deemed to be automatically extended without amendment from year to year from the present or any future expiration date hereof, unless at least 30 days prior to the present or any future expiration date, we notify you in writing by registered mail that we elect not to consider this Letter of Credit to be renewable for any additional period.

Dated at , British Columbia, this____day of _____, 19_____.

COUNTERSIGNED BY:_____
(name of Bank)

_____ per:

_____

_____

# WARRANTY AGREEMENT

**THIS AGREEMENT** dated the ____ day of _____, 19_____

**BETWEEN:** TOWN OF PORT MCNEILL
1775 Grenville Place
P.O. Box 728
Port McNeill, B.C.
V0N 2R0

(hereinafter referred to as the "Town")
OF THE FIRST PART.

**AND**: _____
_____
_____
_____

(hereinafter referred to as the "Owner")
OF THE SECOND PART.

**WHEREAS.**

a. The Owner has entered into an agreement with the Town to provide works and services for a subdivision or development of the lands described for the purpose of this agreement as:
_____
_____

B. Before a plan of subdivision of the said lands will be approved by the Approving Officer of the Town, or a building permit issued, the Owner must enter into an agreement with the Town to warranty the works and services constructed and installed or forfeit the amount secured by a bond to be deposited by the Owner with the Town.

**NOW THEREFORE THIS AGREEMENT WITNESSETH** that in consideration of the premises and the terms and conditions hereinafter contained, the parties hereto covenant and agree a follows:

1. In this agreement the term “the works and services” means those works and services shown on design Drawings Nos._____(name them), as approved by the Approving Officer of the Town, for the works and services shown on said drawing to be constructed and installed at the expense of the Owner.

2. The Town shall not assume responsibility for works and services installed under this agreement until satisfactory “as-constructed” drawings are delivered to the Clerk by the Owner and a bond in the form of cash, certified cheque or letter of credit is deposited with the Clerk in the amount of five percent with a minimum of Five Hundred Dollars, whichever is the greater, of the estimated construction cost of the services as certified by the Owner, as a guarantee of faithful and diligent performance in rectifying any deficiencies in design, materials and workmanship that may arise in connection with the services during the twelve months next following the issuance of the Certificate of Completion in Schedule “B”.

3. Any deficiencies in design, materials or workmanship that may arise in connection with the services during the twelve months next following the assumption of ownership of the works and services by the Town shall be rectified by the Owner at his own expense and to the satisfaction of the Clerk. If the Owner fails, after notice from the Town to rectify any such deficiencies to the satisfaction of the Clerk, the Town may rectify such deficiencies and pay the cost thereof out of the bond referred to in the preceding paragraph. If the cost of rectifying such deficiencies is greater than the amount of the bond, the Owner shall pay such excess amount to the Town. Where a deficiency arises in a functioning sanitary sewer, storm drain or water pipe or where a deficiency in a service creates a danger to the public, the Town may rectify the deficiency without giving prior notice to the Owner and pay the cost thereof out of the bond and charge the Owner for any excess cost.

4. Where a Letter of Credit, including an extension of a Letter of Credit, has an expiry date, the Owner shall, by no later than one week prior to the expiry date, deliver to the Clerk a one-year extension of the Letter of Credit, in default of which the Clerk may, at his option draw the outstanding balance of funds secured by the Letter of Credit.

5. Where cash or a certified cheque is given, the Town shall deposit the cash or certified cheque in an interest bearing account and will return seventy-five percent of any interest earned. Twenty five percent of any interest shall be retained by the Town for administrative costs.

6. Upon approval of the works and services at the end of the twelve month period, any unused portion of the Letter of Credit will be released and/or any balance of cash deposits will be returned and this agreement will terminate.

7. This agreement shall be binding upon and shall enure to the benefit of the parties hereto and their respective executors, administrators, successors and assigns.

8. The Owner agrees to indemnify and save harmless the Town from any claims, suits, demands, actions, damages, costs, or expenses, arising out of any deficiencies in the design, materials, or workmanship of services installed by the Owner during the warranty period provided by this agreement.

**IN WITNESS WHEREOF** the parties hereto have executed this Agreement as of the date first written above.

**SIGNED, SEALED AND DELIVERED BY** )
the Owner in the presence of: )
_____ )
_____ )
_____ )
_____ )
Occupation
(For use where the Owner is an individual or partnership)

THE COMMON SEAL OF THE OWNER )
was affixed in the presence of: )
)
_____ )
Title_____ ) (SEAL)
_____ )
Title_____ )
(for use where the Owner is an incorporated company or society)

THE CORPORATE SEAL OF THE TOWN OF )
PORT MCNEILL was hereunto affixed in the presence of)
)
_____ )
Mayor )
)
_____ ) (SEAL)
Clerk )

THIS AGREEMENT made the _____ day of _____, 19____.

BETWEEN:

(hereinafter called the “Grantor”)

OF THE FIRST PART

AND:

TOWN OF PORT MCNEILL
P.O. Box 728
Port McNeill, B.C. V0N 2R0

(hereinafter called the “Grantee”)

OF THE SECOND PART

WHEREAS:

A. The Statutory Right-of-Way hereinafter created is necessary for the operation and maintenance of the Grantee’s undertaking.

B. The Grantor is the registered owner in fee simple of the Land described in Schedule “A”, (hereinafter referred to as “The Grantor’s Lands”).

C. Plan , the Plan of Statutory Right-of-Way over Parts of the Grantor’s Lands, has been deposited in the Land Title Office at Victoria, British Columbia on the day of , 1995. The Plan was tendered under s. 113(2) of the Land Title Act and was authorized under s.214 of the Land Title Act, (hereinafter referred to as the “Plan”).

NOW THIS AGREEMENT WITNESSETH:

1. In consideration of the sum of ONE ($1.00) DOLLAR of lawful money of Canada (receipt and sufficiency of which is hereby acknowledged), the Grantor hereby grants in perpetuity to the Grantee the right and easement for the Grantee, its servants, agents and all others the licensees of the Grantee:

(a) to construct, excavate, trench, operate, maintain, remove, and replace _____(Insert “sewer”, “water”, or “drain”) pipes together with all necessary appurtenances thereto (herein called the “works”) in, under and upon that part of the Grantor’s Land shown outlined in heavy black on the Plan, and which part is herein call the “Statutory Right-of-Way”.

(b) To pass and repass over the Statutory Right-of-Way to clear, dig, remove and backfill soil, and make trenches and excavations on the Statutory Right-of-Way for any of the purposes aforesaid.

2. The Grantor further grants to the Grantee, its servants, agents and all others the licencees of the Grantee, a licence:

(a) to pass and repass over and across the Grantor’s Lands with necessary tools and equipment for the purpose of ingress and egress to and from the Statutory Right-of-Way.

(b) During the initial period of construction only, to use such portion of the Grantor’s Land alongside the Statutory Right-of-Way as may be reasonably necessary as an additional working area to facilitate the Grantee carrying out its work under the rights granted herein.

3. The Grantee covenants with the Grantor that it will, as soon as weather and soil conditions permit, and as often as it may exercise its right of entry hereunder to any of the Grantor’s Lands, restore the same as near as may be reasonably possible to the same condition as it was prior to such entry, provided however that nothing herein contained shall require the Grantee to restore any trees.

4. The Grantor hereby covenants with the Grantee:

(a) Not to make, place, erect or maintain, subsequent to the date hereof, any building, structure, excavation, pile of material or obstruction in, under or upon the Statutory Right-of-Way without the written consent of the Grantee first had and obtained.

(b) Not to do or knowingly permit to be done any act or thing which will interfere with or injure the said works and in particular will not carry on any blasting on or adjacent to the Statutory Right-of-Way without the consent of the Grantee, provided that such consent shall not be unreasonably withheld.

(c) Not to substantially diminish the soil cover over any of the works in the Statutory Right-of-Way, and in particular without in any way limiting the generality of the foregoing, not to construct open drains or ditches along or across any of the works installed in the Statutory Right-of-Way without the consent of the Grantee, provided that such consent shall not be unreasonably withheld.

5. It is mutually agreed between the Grantor and the Grantee:

(a) That the Statutory Right-of-Way shall be construed as running with the land, that no part of the fee of the soil shall pass to or be vested in the Grantee under or by these presents and that the Grantor may use and enjoy the said land, subject only to the rights and restrictions herein provided.

(b) That the expressions “Grantor” and “Grantee” herein contained shall be deemed to include the executors, administrators, successors and assigns of such parties wherever the context so admits.

(c) Wherever the singular or masculine are used in this Agreement they shall be construed as meaning the plural or the feminine or the body corporate where the context or the parties hereto so require.

IN WITNESS WHERE OF the parties hereto have caused these presents to be executed as of the day and year first above written.

**THE END**