S E C T I O N 7B

STREETS - CONSTRUCTION

STANDARD DRAWINGS

R1	Downtown Road 24.0m ROW
R2	Urban Collector 20.0m ROW
R3	Rural / Industrial Collector 21.0m ROW
R4	Urban Local 15.5m ROW
R5	Rural / Industrial Local 18.0m ROW
R6	Lane 6.0m ROW
R7	Standard Urban Cul-de-sac 30.0m ROW
R8	Standard Rural / Industrial Cul-de-sac 36.0m ROW
R9	Statutory ROW For Municipal Mains
R10	Typical Driveway Grades
R11	Typical Sign Installations

S E C T I O N 7B

STREETS - CONSTRUCTION

7B.l SCOPE

This section shall govern the construction of roads, lanes, boulevards, curbs and gutters, sidewalks and driveways within the Municipality.

7B.2 GENERAL

Construction shall be in accordance with the design drawings approved by the Engineer and with these specifications.

7B.3 MATERIALS

7B.3.l Sub-base (Pit-run Gravel)

Sub-base shall be a pit run gravel, screened if necessary, composed of inert, durable aggregate, uniform in quality and free from soft or disintegrated particles, clay and silt balls and other deleterious material.

It shall be capable of being compacted by rolling into a dense firm course which will, at an average moisture condition, hold the weight of construction equipment and loaded trucks without leaving pronounced indentations.

Sub-base material shall conform to the following gradation limits when tested in accordance with ASTM Cl36:

US Standard Sieve Size	% Passing (by Weight)
75 mm	l00%
25 mm	50-85%
0.l5 mm	0-l6%
0.075 mm	0-5%

7B.3.2 Base (Crush Gravel)

The base course shall be composed of inert, durable, crushed aggregate, uniform in quality and free from soft or disintegrated pieces. They shall be capable of being compacted by rolling into a dense, firm course that will at any moisture condition hold the weight of loaded trucks without leaving pronounced indentations.

Base material shall conform to the following gradation limits when tested in accordance with ASTM Cl36:

US Standard Sieve Size	% Passing (by Weight)
l9 mm	l00%
9.5 mm	60-l00%
4.75 mm	40-80%
2.36 mm	30-60%
l.l8 mm	20-45%
0.3 mm	8-20%
0.075 mm	2-6%

A minimum of 50% of all material retained on the 4.75 mm Sieve shall have at least one crushed face.

7B.4 CONSTRUCTION CONDITIONS

Construction shall not be undertaken during snow, heavy rain, freezing, or other unsuitable conditions. Aggregate shall not be placed upon a frozen, wet, muddy or rutted subgrade or subbase surface.

7B.5 CLEARING AND STRIPPING

7B.5.l Site Clearing

The full width of the road allowance shall be cleared of all standing and fallen trees, stumps, logs, roots, brush, all vegetation and accumulated rubbish which, in the opinion of the Engineer, is detrimental to construction of roads and services. During the Landscaping review (see Landscaping Guidelines), certain trees or shrubs may be required to remain within the road allowance and the Contractor will take all precautions to ensure that they remain undamaged during the construction period. All material resulting from site clearing shall be disposed of by the Contractor in compliance with all current Municipal and Provincial regulations.

7B.5.2 Stripping and Overburden

All overburden and topsoil shall be stripped from the road allowance to such widths as will be affected by the road grading and the construction of sidewalks curbs and gutters or ditches. All topsoil shall be stored onsite during construction and upon completion shall be spread between the back of the curb and the property line to form a boulevard. Surplus overburden shall be disposed of by the Contractor.

7B.6 ROAD BASE CONSTRUCTION

7B.6.l Design Cross-section

The design cross-section shall comply with the Standard Drawings as applicable, unless otherwise approved by the Engineer.

7B.6.2 Sub-grade Preparation

(a) Cuts

(i) In cut areas, the subgrade shall be excavated, graded and compacted to the design subgrade cross-section. Any soft spots that develop during the process of compaction shall be excavated and filled with pit-run gravel.

(ii) Where cuts are in rock, no points or pinnacles shall be left protruding above the subgrade cross-section; subgrade rock shall be shattered at least 300 mm below the subgrade to permit uniform grading and compaction. Where rock excavation results in an uneven subgrade that does not permit uniform grading and compaction, the subgrade shall be left l00 mm low to permit installation of additional sub-base material.

(iii) Rock cuts shall be scaled to remove any loose or unstable material.

(iv) Material excavated from cut areas shall be disposed of unless approved for fill materials as specified below.

(b) Fills

(i) Fills constructed with pit-run gravel shall be placed in maximum l50 mm lifts and compacted to 95% Modified Proctor Density.

(ii) Any fills constructed with material other than pit-run gravel must have the prior approval of the Engineer and be installed under the direction of a geotechnical engineer.

(iii) When considering approval of fill other than pit-run gravel, the Engineer will require that an assessment of the fill material, prepared by a geotechnical engineer, be submitted for review. This assessment should include recommendations related to placement and compaction, and indicate the level of onsite monitoring required.

(c) Compaction and Grading

(i) The subgrade shall be compacted and graded to conform to the design grades and cross-section. In particular, the subgrade must be shaped to permit proper drainage and ensure that water is not trapped on or in the subgrade.

(ii) Compaction of the subgrade shall be to 95% Modified Proctor Density.

7B.6.3 Sub-base Course

(a) The subgrade shall be approved by the Engineer prior to placement of the subbase course.

(b) The subbase shall be the required width and shall form an integral part of the base of the

curb and gutter, and shall be laid to the consolidated thickness required by the design cross-section. Each layer or lift (maximum l50 mm) of gravel shall be adequately consolidated with the use of vibratory type compactors. Where deemed necessary, water shall be used to aid compaction. A grader shall be used in conjunction with the compaction roller to maintain an even and uniform compaction surface. The finished subgrade surface shall conform to grades with a tolerance of 25 mm.

(c) The surface shall be graded to provide a finished surface in accordance with the design cross-section. All underground services shall be installed and the trenches backfilled and consolidated prior to the application of the subbase course.

(d) A minimum compaction of 95% Modified Proctor Density for the subbase material shall be attained.

7B.6.4 Base Course

(a) Base course materials shall be placed over the subbase in accordance with the design cross-section.

(b) No base course gravel shall be placed on the subbase surface until the latter has been approved by the Engineer.

(c) Base course shall be placed in maximum l50 mm lifts. The base course shall be spread in uniform layers over a previously shaped, compacted and approved subbase. Each layer shall be watered and mixed or aerated as directed by the Consulting Engineer to bring all the material to its optimum moisture content. Each layer shall be compacted by the use of a roller. A grader shall be used in conjunction with the compaction rollers to obtain an even and properly shaped surface, conforming to the lines and grades as required.

(d) Compaction of the granular base course is required to attain 95% modified Proctor Density in each layer.

(e) The finished grade surface of the compacted base course shall be within l5 mm of the design grade and cross-section and shall be free from ridges, humps or depressions exceeding l0 mm when measured with a 3 m long straight-edge placed parallel to or perpendicular to the road centre line. Care shall be taken along the gutters if such gutters are existing, to leave exactly the specified depth for the subsequent placing of the final asphalt layer(s).

7B.7 WATERING FOR COMPACTION AND DUST CONTROL

7B.7.l If weather conditions and construction materials are such that watering may be required, upon direction from the Consulting Engineer, the Contractor shall maintain suitable watering equipment on the site. Watering shall be performed as directed by the Consulting Engineer to control dust and to ensure optimum moisture conditions for earth fill compaction, subgrade preparation and placing subbase and base course materials.

7B.7.2 Water in excess of that required for optimum moisture conditions may be used only with the Consulting Engineer's approval, to obtain the specified density.

7B.7.3 Water shall be supplied uniformly from a pressure type distributor equipped with suitable control apparatus and a spray bar and nozzles similar to those used on asphalt distributors. Splash plate type distributors or distributors with spray bars, which discharge jets of water, require approval by the Consulting Engineer.

7B.8 BOULEVARD GRADING

Boulevard areas and other areas within the road allowance or right-of-way shall be sloped, graded with 75 mm of topsoil and seeded with grass, unless otherwise approved by the Engineer.

7B.9. CLEANUP

7B.9.l During construction, any material (rock, sand, mud, etc.) that is carried onto outlying Municipal streets, shall be removed at the end of each working day to the satisfaction of the Engineer.

If the Contractor does not adequately clean the effected streets, it will be done by Municipal personnel at the Contractor's expense.

7B.9.2 Prior to completion of construction, all existing and newly constructed drainage ditches, waterways, and culverts shall be cleaned to restore their full effectiveness. Boulevards and all other areas affected by the construction operation shall be cleaned of all loose rock, boulders and other debris and in all respects prepared suitable for placement of topsoil or as otherwise directed by the Engineer.

7B.l0 TESTING

7B.l0.l The Consulting Engineer will arrange for a testing firm to carry out tests to determine whether the applicable standards and specifications have been met. Where initial testing indicates non-compliance with the specifications, additional testing shall be required at the Contractor's expense.

7B.l0.2 The Contractor, as directed by the Consulting Engineer, shall supply specimens or samples for testing.

7B.l0.3 Required Tests

Determination of moisture content and Modified Proctor Density (ASTM Dl557) on the remolded subgrade, subbase and base course materials in place during construction. A minimum of one field density test per l000 square metres of subgrade or granular base will be performed.

7B.l0.4 The types of tests listed below may also be required:

(a) Regular sieve analysis of aggregate gradation during the crushing operation and during the delivery of aggregate to the project site in accordance with ASTM Cl36.

(b) Benkelman beam tests on the prepared subgrade, subbase, base and pavement. Seasonally Corrected Benkelman Beam rebound values at final asphalt shall not exceed :

0.75 mm for Arterial Roads
1.0 mm for Collector Roads
1.2 mm for Local Streets or use designations

(c) Other testing as required by the Engineer.

7B.ll PROOF ROLLING

The Engineer shall be given 48 hrs written notice in advance of proof rolling. Proof rolling shall be conducted in the presence of the Consulting Engineer and the Town of Ladysmith Works Inspector.

Before proceeding further with the work each finished layer of subgrade, subbase and base course shall be proof rolled by receiving one complete coverage using a single rear axle truck having an 9,000 kg (20.000 lbs) rear axle load. Should any areas of rutting or displacement result, they shall be excavated, refilled and compacted. Excavated and refilled areas shall be proof rolled to confirm rutting and/or displacement has been eliminated.

7B.l2 STREET TRAFFIC AND NAME SIGNS

7B.l2.l Street traffic and name signs shall be located as shown on the drawings and as directed by the Engineer. All signs shall be mounted approximately at right angles to the direction of and facing the traffic they are intended to serve except in the case of No parking and No Stopping signs.

7B.l2.2 Reflectorized signs shall be placed at a slight angle away from approaching traffic.

7B.l2.3 Signpost bases shall be installed in accordance with the manufacturer's recommendations for installation.

7B.l2.4 Anchor posts shall be provided for sign base installations where native soils are unable to hold the sign rigidly in its proper and permanent position and to prevent it from swaying in the wind, from being turned or otherwise displaced.

7B.l3 STREET NAME SIGNS

7B.l3.l Street name signs shall be double sided and constructed of l50 mm wide extruded aluminum blade.

7B.l3.2 The sign shall consist of silver engineering grade reflective sheeting reverse screened green background. Letters shall be l00 mm universe 67 upper and lower case.

7B.l3.3 The abbreviations St., Dr., Pl., Rd., etc., are to be the same height as the street name.

7B.l4 STREET TRAFFIC SIGNS

7B.l4.l Street traffic sign shapes, colours, dimensions, symbols and wording shall be in accordance with the standards detailed in the Motor Vehicle Act Regulations.

7B.l4.2 Illumination or reflectorization of signs shall also be in accordance with the standards detailed in the Motor Vehicle Act.

(a) Signs shall be made on l2 gauge (3 mm) sign grade aluminum.

(b) Reflective sheeting shall be engineering grade.

7B.l5 STREET TRAFFIC AND NAME SIGN FASTENERS

7B.l5.l Street name signs shall be mounted suing non-corrosive metal fasteners.

7B.l5.2 Street traffic signs are to be mounted using Unistrut rivets or equivalent.

7B.l6 STREET TRAFFIC AND NAME SIGN POSTS

7B.l6.l Sign posts to be min. 60 mm O.D. galvanized steel or "Gatorshield' type pipe.

7B.l6.2 Base shall be a minimum of 450 x 450 x 600 mm deep concrete, set a minimum 50 mm below finished grade level.

7B.l7 STREET MARKINGS

7B.l7.l The "Manual of Uniform Traffic Control Devices for Canada" shall apply for all standards pertaining to markings including colours, materials and patterns, unless otherwise noted on the drawings or approved by the Engineer.

7B.l7.2 Paint for curb markings delineating "Bus Stops" shall be red, "No Parking" yellow, and "Loading Zones" white.

7B.l7.3 All marking paint shall be pre-qualified according to the Province of British Columbia Ministry of Transportation and Highways (MOTH) qualification procedures and test methods. Marking paint shall be suitable for spray application at a temperature of 50 deg. C " 5 deg. C to asphalt or concrete pavements and shall meet the MOTH General Specifications for Highway Construction - Traffic Paint.

7B.l7.4 The paint shall be used with overlay glass reflectorizing beads. Paint shall not have any "Premix" beads.

7B.l7.5 Reflectorizing glass beads shall conform to the MOTH Specifications for Glass Beads.

7B.l7.6 All crosswalks stop bars and traffic arrows shall be thermoplastic with a minimum thickness of 3 mm.

7B.l7.7 Pavement surface shall be free from surface water, frost, ice, dust, oil, grease and other foreign

materials. In areas designated by the Consulting Engineer, clean pavement surface by method approved by the Engineer.

7B.l7.8 Apply paint only when air temperature is above l0 deg C and no rain is forecast.

7B.l7.9 Apply paint evenly at 3 square meters/litre.

7B.l7.l0 Do not thin paint unless approved by the Engineer.

7B.l7.ll Paint lines to be of uniform colour and density. No overspray will be allowed.
7B.l7.l2 Thoroughly clean distributor tank before refilling with different colour paint.

7B.l7.l3 Apply glass beads at a specified rate.

7B.l7.l4 Paint markings shall be with " l0 mm of specified dimensions.

7B.l7.l5 Protect pavement markings until they are dry.

7B.l7.l6 Thermoplastic shall be applied in accordance with the Manufacturer's recommendations.

7B.18 COMMUNITY MAIL CENTRES

7B.18.1 Community and centralized mail centres (CMC) installation shall meet or exceed Canada Post specifications. The Town of Ladysmith may require alternate surface material (i.e.: brick pavers) as part of the overall landscaping scheme.

7B.18.2 The developer is required to provide and erect signage at each community mail centre location. The sign is to read "FUTURE LOCATION OF COMMUNITY MAIL CENTRE" and be approved by the Engineer.