

**SECTION 7.0
 ROADWAYS**

7.1 Road Right-of-Ways and Carriageway Widths

7.1.1 Right-of-way shall be of adequate width to accommodate the carriageway, ditches, boulevards, underground utilities, street lighting, etc. in a manner acceptable to the Town.

7.1.2 Carriageway widths shall be designed in conjunction with curb and gutter where required to satisfy traffic requirements. Carriageway widths in selected industrial and commercial areas may be designed based on rural cross section if requested by the Developer and approved by the Town, and will require wider right-of-ways to accommodate ditches.

7.1.3 Roadways shall be classified as follows:

Classification	No. of Housing Units	Estimated Daily Traffic
Minor local	1 to <u>50</u>	<u>0-500</u>
Local	<u>50</u> to 100	<u>500-1000</u>
Collector	100 to 300	1000-3000
Arterial	300 & up	3000 & up

7.1.4 Minimum requirements are as follow:

	<u>Type</u>	<u>Right-of-Way</u> (Urban)	<u>Carriageway</u>
.1	Lane (1) Residential (2) Commercial & Industrial	6 m 8 m	6.0m 7.4m
.2	Utility Lot (1) Drainage (2) Other	6 m 3 m	N/A N/A
.3	Minor Local (1) Residential	18 m	9 m
.4	Local Street (1) Residential (2) Commercial & Industrial	20 m 24 m	11 m 11 m
.5	Collector Street (1) Residential (2) Commercial & Industrial	20 m 30 m	13 m 13 m
.6	Arterial Streets - All	30 m	15 m
.7	Cul-de-sac - As drawings indicate - minimum radius to lip of gutter is 12.0 m for residential and 15.5 m for commercial.		

7.1.5 In industrial and commercial areas, with a rural cross section, the carriageway width is road shoulder to road shoulder measured from the outside edge of the shoulder or width of asphalt surface; otherwise carriageway width is lip of gutter to lip of gutter for all roadways.

7.2 **Rural Cross Section Design**

7.2.1 The design of the “rural” roadway cross section within the right-of-way shall be so designed to allow conversion of the roadway section to an “urban” cross section at a future date. This will take into consideration that adjacent lands are to drain to future top of curbs and that ditch sideslopes are to be maximum 3:1. Cross section design shall be subject to the approval of the Town.

7.3 **Geometric Design**

7.3.1 Roads and streets shall be designed in accordance with the geometric design standards outlined in the latest edition of the manual of “Geometric Design Standards for Canadian Roads” of the Transportation Association of Canada (TAC).

7.3.2 In addition, roads shall be designed in accordance with the following geometric standards:

		<u>Local</u>	<u>Collector</u>	<u>Arterial</u>	<u>Lanes</u>	<u>Units</u>
.1	Min. Design Speed	50	50	70	30	km/hr
.2	Min. Radius	75	150	225	--	meters
.3	Super Elevation	No	Optional	Yes	No	--
.4	Max. Gradient (a)	8%	6%	5%	8%	--
.5	Min. Gradient (a) (b)	0.5%	0.5%	0.5%	0.6%	--
.6	Min Tangent Section	30	60	150	--	meters
.7	Min. Intersection Spacing	60	60	180	--	meters
.8	Min. Curb Return Radii (Residential)	7.5	10	15	--	meters
.9	Min. Curb Return Radii (Industrial)	15	15	20	--	meters

Notes:

- a) Applies to road grades and not ditch grades.
- b) Minimum gradient on curb radii of 23 m (75 feet) or less shall be 0.8%
- c) All paved roads shall be crowned at a minimum slope of 2.0%; a maximum 4.0%. All graveled roads shall be crowned with a 3.0% cross-fall.
- d) Utility lots shall have a minimum grade of 0.6% and a maximum grade of 8.0%.

7.3.3 .1 All vertical curves shall be designed to meet or exceed the following minimum requirements:

Design Speed km/h	K Value		Minimum Length (m)
	Crest	Sag*	
50	7	6	50
60	15	10	60
70	22	15	70

$K = L/A$

L = length of vertical curve in metres

A = Algebraic difference in grades percent

* = based on comfort control and assumes street lighting

- .2 The maximum superelevation is shown in Table 7.1.
- .3 Rear lane (alleys shall have a minimum longitudinal grade of 0.6%. If gravel-surfaced, the lane shall be cross sloped from both sides from crown at 3.0%. If paved, the lane shall have a centre swale and inverted slopes of 2.5%.

7.3.4 **Horizontal Alignment**

- .1 The minimum radius is relative to the Road Classification, the design speed and the maximum superelevation (see 7.3.2).
- .2 All horizontal curves shall be designed to meet the minimum design requirements shown in Table 7.1.
- .3 Minimum edge of pavement radius for cul-de-sacs is 12 m in residential areas and 15.5 m in industrial areas.
- .4 Maximum cul-de-sac length shall be 100 m.(without an alternate emergency access.

7.3.5 **Curb Returns**

- .1 Curb returns at residential local street intersections shall be constructed to a radius of 7.5 m.

- .2 Curb returns at residential collector street intersections shall be constructed to a radius of 12.5 m.
- .3 In industrial/commercial areas the radius should be 15 m to accommodate truck turning movements.

7.4 **Clearing and Grubbing**

- 7.4.1 Clearing and grubbing along street and lane right-of-ways shall include at least the full width of the right-of-way.
- 7.4.2 Any clearing undertaken shall be in accordance with “approved” landscape drawings for the entire subdivision.
- 7.4.3 Burning and disposal of waste material at the Town’s discretion.

7.5 **Stripping Topsoil**

- 7.5.1 Topsoil shall be stripped off of road right-of-ways and trenching areas to its full depth and stockpiled in a location approved by the Town.

7.6 **Right-of-Way Grading**

- 7.6.1 The grading of the streets and lanes shall be compatible with the overall grading of the lots and public lands within the subdivision.
- 7.6.2 The area between the back of curb or sidewalk and the property line shall be graded to provide a uniform slope (minimum of 2%) from the top of curb or top of back of sidewalk to finished grade at the property line. Slopes greater than 4:1 will not be permitted.
- 7.6.3 The area between backslope of the ditch and property line shall be graded to provide a uniform slope from the top of the ditch backslope to finished grade at the property line as established on the lot grading plan.

7.7 **Subgrade Construction**

- 7.7.1 The subgrade shall be excavated or filled to the required grade over the full width of the carriageway. Where earth fill is required it shall be placed in lifts not exceeding 150 mm (6 inches) in depth and each lift shall be thoroughly compacted to a minimum of 98% of Standard Proctor Density to within 300 mm of finished subgrade elevation and the top 300 mm to be compacted to 100% S.P.D.; or as outlined by a geotechnical report.

7.8 **Pavement**

- 7.8.1 Pavement Structure

- .1 The Geotechnical Report for the proposed project will be submitted to the Town Engineer for review as part of the overall submission.
- .2 The Geotechnical Report must include specific recommendations for pavement structure construction on insitu conditions and projected traffic volume. The stronger of the 20 year structures recommended by the Geotechnical Consultant.
- .3 The table indicates the “normal minimum thickness” of granular and asphaltic concrete materials required for each street classification. Note that a minimum subgrade preparation of 150 mm is required in every case. The subgrade and base gravel must be compacted to 100% Standard Proctor Density. Paved roadways shall be designed in accordance with the Asphalt Institute method of pavement design using minimum design loadings of 8165 kg (18,000 pound) axle loads for local and minor streets and 10,886 kg (24,000 pound) axle loads for collector streets. All arterial roads shall be designed using a minimum design loading of 10,886 kg (24,000 pound) axle loads. The design parameters such as traffic count, percentage of trucks, California Bearing Ration (CBR), etc., are to be outlined to the Town. The Town reserves the right to request the Developer to engage a geotechnical engineering agency to carry out CBR tests on the subgrade prior to paving to confirm adequacy of design.

7.8.2 Normal Minimum Design Table:

	<u>Street Classification</u>	<u>Full Depth Asphalt</u>	<u>Granular Base</u>
.1	Minor Local	50mm Asphaltic Concrete Surface	75mm Asphaltic Concrete Surface
	100m Asphaltic Concrete Base Base	200mm of 20mm	Granular
.2	Local	75mm Asphaltic Concrete Surface	75mm Asphaltic Concrete Surface
	100m Asphaltic Concrete Base Base	225mm of 20mm	Granular
.3	Collector	100mm Asphaltic Concrete Surface	100mm Asphaltic Concrete Surface
		125m Asphaltic Concrete Base	275mm of 20mm Granular Base
.4	Arterial	150mm Asphaltic Concrete Surface	150mm Asphaltic Concrete Surface
	150m Asphaltic Concrete Base Base	330mm of 20mm	Granular

7.8.3 Asphalt Surface

- .1 Asphalt Surface shall not be placed until the base course has been inspected and approved by the Consulting Engineer. Asphalt materials, mixing, spreading and rolling shall conform to good practice using ATU's Standards as a guideline).
- a) Manholes, water valve boxes and catch basins are to be raised to finished grade prior to paving operations. The contractor is fully responsible to ensure that all manholes, water valves and catch basins are left in the same condition prior to the work in the contract.
 - b) No paving is to be done when the atmospheric temperature is lower than 2 degrees celsius or if the surface is frozen unless directed by the Town Engineer.

.2 The asphalt hot mix concrete pavement shall meet the following test requirements based on the 75 Blow Marshall Method for heavy traffic areas and 50 Blow Marshall method for light/medium traffic areas:

Property	Sand Base <u>Course</u>	25 mm Base <u>Course</u>	Surface <u>Course</u>
Compaction blows on each face of test specimens	50	75	75
Minimum Marshall stability at 60°C Kn	3.5	4.0	5.4
Flow value mm	5.0 max.	2 - 4	2 - 4
Air voids in total mix	3% - 12%	3% - 8%	3% - 5%
Voids in mineral aggregate	16% min.	13% min.	15% min.

.3 All asphaltic concrete to be compacted to 98% density and densities are subject to normal reduction clauses for deficient areas.

.4 Asphalt Concrete Thickness - For areas deficient in thickness, monies shall be accrued to the Town as follows:

- Areas deficient in thickness by more than 15 mm will not be accepted.
- For areas deficient in thickness by more than 5% of the total design thickness and less than 15 mm, the Town shall receive an amount calculated by the following formula:

$$\text{Amount to Town} = \left[1 - \frac{(\text{actual thickness})^2}{(\text{specified thickness})^2} \right] \times \text{Current ACP Price}$$

The Current ACP Price shall be determined based on recent similar work performed in the Town.

- .5 (a) Asphalt Density - All asphaltic concrete to be compacted to 98% of density obtained with field Marshall specimens prepared from the samples of mixture being used.
- (b) For areas deficient in density, monies will be accrued to the Town as follows:

<u>Density</u>	<u>Fraction of Current ACP Price</u>
97.50 to 97.99%	0
97.00 to 97.49%	1%
96.50 to 96.99%	4%
96.00 to 96.49%	9%
95.50 to 95.99%	16%
95.00 to 95.49%	25%
94.00 to 94.99%	100%
Less than 94.0%	Asphaltic concrete to be removed

- (c) The current ACP price shall be determined based on recent similar work performed in the Town.
- (d) Forwarding monies to the Town for deficient asphalt does not relieve the Contractor of the Contract Maintenance requirements.

7.9 **Graveled Road Surface**

7.9.1 Design

- .1 A specified rate of gravelling shall be required for each road in the subdivision. Soil conditions may vary, resulting in a gravelling rate adjustment. A minimum of 150 mm (6 inch) thickness of traffic gravel is to be used or as specified by a Geotechnical Report in order to meet the required road cross section depths for the traffic loadings.

7.9.2 Material

- .1 Material to be used as road gravel will be subject to the approval of the Town. The bottom lifts shall be 50 mm (2 inch) minus gravel with the top lift being 25mm (1 inch) minus gravel. The gravel shall be well graded, crushed gravel, free from roots, sods and other deleterious material and shall contain sufficient binder material. Material shall be spread over the prepared subgrade to the width of the proposed carriageway.

7.10 **Lanes**

- 7.10.1 Paved lanes shall be constructed to the same standard as paved streets.
- 7.10.2 Gravelled lanes shall have a minimum 150 mm subgrade preparation compacted to 100% S.P.D. and surfaced with a minimum of 150 mm of 25 mm crushed gravel to 100% S.P.D., spread over the entire width.
- 7.10.3 Graveled lanes to be paved for 6.0 m from the back of the sidewalk.
- 7.10.4 Lane cross sections to be built to the same equivalent standards as the roadways within that area.

7.11 **Driveways**

- 7.11.1 The Developer shall coordinate the location of all hydrants, light standards, service pedestals, transformers, etc. so as to eliminate any conflicts with existing or proposed driveway locations. All such structures to be 1.8 m clear of all driveways.

7.12 **Geotextiles**

- 7.12.1 The use of engineering fabrics or geotextiles may be considered where certain ground conditions warrant for subgrade and base construction preparation techniques.
- 7.12.2 The Developer's Engineer is to submit the proper engineering designs to the Town for approvals prior to their use in the field, with reasons outlining the necessity of using such materials.