HALIFAX REGIONAL MUNICIPALITY

MUNICIPAL
DESIGN GUIDELINES
2013

Part A: **Design Guidelines**

Part B: **Standard Details**

Part C: **Drawing Standards**

HALIFAX
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2013

PART A

DESIGN GUIDELINES

HALIFAX
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PART A: DESIGN GUIDELINES

1.0 DEFINITION OF TERMS

Approval
The approval of the Engineer.

Base Course
The crushed rock and aggregate which is placed immediately upon the subgrade.

Business District
Any portion of the Municipality where the majority of the land use is for business purposes.

Engineer
The Engineer of the Halifax Regional Municipality and includes a person acting under the supervision and direction of the Engineer.

Halifax Regional Municipality (HRM)
The Regional Municipality established by the Halifax Regional Municipality Act and includes the area over which that body corporate has jurisdiction.

HRWC
Halifax Regional Water Commission (Halifax Water) is the municipal water, wastewater and stormwater utility for HRM. The HRWC is authorized to own and operate the water supply, wastewater and stormwater facilities for HRM.

Municipality
The Halifax Regional Municipality.

Municipal Service Systems
Includes sanitary sewerage systems, water distribution systems, storm drainage and control systems, road/street systems, street lights, signal lights, sidewalk, curb and gutter, etc.

Professional Engineer
A registered/licensed member of Engineers Nova Scotia and is referenced in this document particularly as that person(s) under whose signature the plans are sealed.

SDI
Surface Distress Index.

Street
Any public road, street or highway owned and maintained by the Municipality or by TIR.

TIR
The Nova Scotia Department of Transportation and Infrastructure Renewal.

Unshrinkable Fill
A low strength cementitious material consisting of Portland cement, flyash, water, aggregates and admixtures suitable for backfill in underground service, utility trenches and structures.

Urban Street
An urban road is one which is characterized as having a paved surface, curbs, a piped storm sewer system, sidewalk and street lights.

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PART A: DESIGN GUIDELINES

2.0 GENERAL REQUIREMENTS

2.1 INTRODUCTION

This document was developed to provide uniform standards for the construction of infrastructure within the Halifax Regional Municipality (HRM). After amalgamation in 1996, four sets of municipal standards were combined to produce the first edition of this document in 2000. In 2007 the Halifax Regional Water Commission merged with the wastewater and stormwater operational groups of the Halifax Regional Municipality forming Halifax Water (HW).

Please send comments or proposed changes for future consideration to the Senior Design Engineer, Design and Construction Services at 490-4860 (Phone) or 490-4858 (Fax). This publication incorporates changes that emerged from the 2012 review.

This document is subject to change without notice and the onus is on users to ensure that they are in possession of all revisions. Please refer to this document and any subsequent revisions for accurate and complete information. Users can obtain an electronic copy at www.halifax.ca/designcon/design/ or purchase a hard copy at HRM Power Centres (Bayers Road, Alderney Gate and Acadia School).

2.2 GENERAL

These design guidelines have been prepared for setting minimum design and construction standards for Municipal Service Systems within the Municipality; to list and suggest limiting values for items upon which an evaluation of such designs will be reviewed and to establish uniformity of practice in the Municipality.

As of August 1, 2007, Halifax Regional Water Commission now known as Halifax Water assumed ownership and maintenance of the sanitary system within HRM and the stormwater system within the HRM core as shown in Part B: Standard Details. This design guideline was created by removing the related sections and details and inserting them into the Halifax Water design guidelines (refer to Halifax Water's Design and Construction Specifications).

The designer shall provide for Municipal Service Systems meeting these criteria but also consistent with cost-effective installation, operation and maintenance costs. The design of municipal services is to be under the seal of a Professional Engineer.

Where the designer proposes variations from this document and where the designer can show that alternate approaches will produce the desired results, such approaches may be considered for approval. The designer shall in the first instance consider such factors as safety, nuisance, system maintenance, operational costs, life cycle costs, environmental issues, natural topography, configuration of the bulk land, etc. The designer shall provide the Engineer a rationalization of these same factors in considering alternate approaches.

The Engineer's decision shall be final and binding in matters of design and construction.

Each submission shall be accompanied by a statement from a Professional Engineer that the submission is in accordance with the Design Guidelines, except, if there are variations, the designer shall indicate clearly, in all appropriate documents and plans, included with the submission, the specific variances from the Design Guidelines.

The acceptance by the Municipality of the design of proposed Municipal Services Systems does not relieve the design engineer of the responsibility for proper design nor does it imply that the Municipality has checked the design exhaustively for compliance with this document.

Where the Municipality has accepted a design which does not comply with this guideline and where the design engineer has not brought variations from this document to the attention of the Engineer, the provisions of this document still stand.

The designer shall assess the possible change in ground water movement caused by the development (in particular the use of pervious bedding material) and shall be responsible for the design of corrective measures to prevent flooding or lowering of ground water table as a result of this ground water movement. If requested by the Engineer, the designer shall provide a report prepared by a geo-technical engineer on the effectiveness of the proposed corrective measures.

In addition to these design criteria, all systems shall conform to any more stringent requirements established by other authorities having jurisdiction. No systems shall be constructed until the design has been approved by the Engineer, the approval process followed and a permit to construct obtained from Nova Scotia Environment and the necessary street opening permits.

All plans, submissions, and calculations shall be in metric units.

2.3 EROSION AND SEDIMENT CONTROL

Stormwater management systems shall be an integral part of overall site design and development.

The designer shall submit an erosion and sediment control plan in conformity with all applicable municipal and provincial regulations and guidelines. The plan shall include both short-term measures applicable during construction and long-term measures after completion of development.

Site design shall make optimum use of existing topography and vegetation and minimize cut and fill operations. During construction, site design shall prevent/minimize surface water flows across or from the construction site. Development of the site shall be based on exposing a minimum area of the site for the minimum time.

The control plan shall include the following:

- Interception and diversion ditches to direct clear water around the construction site;
- Diversion berms;
- Sediment traps;
- Covering or seeding of topsoil or other soil stockpiles;
- Isolated stripping of land being developed;
- Vegetation screens or buffers;
- Filter bags in catch basins;
- Settling ponds.

Long-term environmental protection measures shall include designs to minimize erosion and sediment flow, protect outfall areas, minimize disruption of natural watercourses, utilize wetlands for natural filtration, and provide for ground water recharge when possible.

Protection methods shall be based on but not limited to the “Province of Nova Scotia Erosion and Sediment Control Manual and Guidelines for Use on Construction Sites”.

2.4 CONSTRUCTION

All construction shall meet the requirements of HRM Specifications together with the Standard Specifications for Municipal Services, as developed by the Nova Scotia Road Builders Association and Consulting Engineers Nova Scotia Joint Committee on Contract Documents.

MUNICIPAL DESIGN GUIDELINES

PART A: DESIGN GUIDELINES

3.0 OFF-STREET DRAINAGE SYSTEMS

3.1 INTRODUCTION

3.1.1 General

A Storm Drainage System can be described as a group of interacting, interrelated, and interdependent elements carrying discharges in response to rain and snow. These discharges include overland flow, subsurface flow, groundwater flow, and snowmelt.

A complete and properly functioning Storm Drainage System includes a variety of components which may be grouped into two categories:

- "Community Systems" being those elements which serve two or more lots. For example, roadside ditches, culverts, roadways, curbs and gutters, street and backyard catch basins, pipes or conduits, retention ponds, watercourses, floodplains, and drainage swales and ground elevations along common lot lines or in easements.

- "Individual Lot Systems" being those elements which serve a single lot and are contained within its limits. For example, swales contained within lot limits, gently graded lot areas, slopes, roof downspouts, individual seepage pits, french drains, building lateral, parking lot catch basins and conduits.

  The Municipality is the administrator of subdivision and building construction for the Municipality. Within this context, and as empowered by the HRM Charter, the Building Code Act, and the Planning Act, it is an objective of the Municipality to facilitate and regulate the establishment of a complete and properly functioning Storm Drainage System to serve new building construction within the Halifax Regional Municipality.

  An important group of elements in a Storm Drainage System are the Community Systems located outside of the street limits. Poor off-street grading and drainage can lead to unsafe conditions, extensive and costly maintenance, property damage, and loss of use of lot areas.

  The primary purpose of this section of the Design Guidelines is to facilitate and regulate good design and construction with respect to the Community Systems located outside of the street limits.

3.1.2 Roles and Responsibilities

Several parties are typically involved in the design, construction, and maintenance of the Community Systems providing off-street drainage. Their roles and responsibilities within the context of this section of the Design Guidelines are described as follows:

- Designer

  The Designer is responsible for the preparation of the design of the Community Systems, such that when construction of the design takes place, the objectives of the Design Guidelines are met. In carrying out this responsibility, the Designer is to provide for adequate initial construction such that undue on-going maintenance obligations are not placed on the Homeowner or Municipality.

The Designer is fully responsible for the design regardless of the acceptance of the design by the Municipality.

- Contractor

  The Contractor is responsible for constructing the Community Systems in accordance with the design and in a good and workmanlike manner. It is required that the Contractor not deviate from the design without prior consultation with the Designer. If unusual or unanticipated site conditions are encountered during construction, the Contractor shall advise the Designer immediately.

- Subdivider

  The Subdivider is the owner of the land proposed to be subdivided, and includes anyone acting with his consent. With respect to lot grading and drainage, the Subdivider is responsible for construction of the Community Systems identified by the Engineer as being the Subdivider's responsibility. This will include construction works within easements, be they public or private, and in certain instances will involve pre-grading of entire lot areas to prevent ponding of water or other drainage problems. Construction of grades along common lot lines and grading of entire lots where community grading concerns do not exist will generally not be required.

- Municipality

  The Municipality is the administrator of the process associated with design, construction, and certification of the Community Systems. As part of this process, the Municipality may review, approve, and provide comment to the other parties. It is to be understood that as administrator of the process, the Municipality does not assume any responsibility for the actions or shortcomings of the other parties. In some instances, the Municipality is responsible for the maintenance of off-street Community Systems.

- Homeowner

  It is expected that the Homeowner will be responsible for the usual maintenance of the Individual Lot Systems, and in some instances, of the Community Systems, eg. cleaning of storm drainage inlets, maintaining drainage swales free of vegetation and debris, and maintaining suitable slope protection. It is expected that Homeowners will not block drainage routes, for example, placing excess snow at end of a driveway thereby blocking side yard drainage swales. Should the Homeowner alter any of the Community Systems, he/she is responsible for the implications of the alteration.

3.1.3 Objectives

The Community Systems designed within the context of the Design Guidelines shall achieve the following objectives:

(a) to prevent loss of life and to protect structures and property from significant damage and expense, including that which is expected to be experienced during a 1 in 100 year storm event.

(b) to provide for convenient and reasonable use of lot areas from overland flow during and following rain and snow events and from subsurface or groundwater flow, eg. continuously saturated backyard, significant continuous icing.

(c) to provide for safe use of lot and street areas, eg. excessive depth of flow or water storage, significant continuous icing.

(d) to avoid drainage problems or other conditions that result in unreasonable maintenance obligations on the Homeowner or Municipality, eg. significant or regular de-icing operations.

(e) to provide protection from erosion from surface flow, subsurface flow, or groundwater, eg. slope stabilization.

(f) to direct water away from buildings in order to especially prevent basement flooding and damage to the foundation drain.

(g) to prevent standing water and soil saturation detrimental to buildings, driveways, walkways, landscaped areas and other use of the lot.

In addition to the foregoing, the Municipality requires information to demonstrate that the following overall Storm Drainage System objectives are achieved:

(h) to adequately convey stormwater flow from upstream sources.

(i) to prevent and/or mitigate the adverse effects of stormwater flow onto downstream or adjacent properties, such as erosion, or flooding due to inadequate downstream capacity or grading.

(j) to preserve natural watercourses.

(k) to minimize the long term effect of development on receiving watercourses and groundwater.

(l) to maintain pre-development drainage patterns unless some motivating factor to change the pattern exists, eg. conflict with other objectives (capacity).

In the case where Community Systems have been designed and/or constructed, it shall be an objective that the Individual Lot Systems conform to the Community Systems. Grades established at the lot limits by the Approved Subdivision Grading Plan are to be maintained, subject to variations permitted under the Lot Grading By-law.

In the preparation of a design that meets the above objectives, the Designer is encouraged to strive for an attractive living environment and give consideration to factors such as the following:

- Aesthetic conditions relating to lot grading, eg. creating space on the lot that is convenient as a play area, usually in a backyard.
- The preservation of desirable site features where practical, ie. minimizing disturbance, retaining trees.
- Providing for variance in front yard setbacks along a street and for establishing a roof line profile which is aesthetically pleasing.
- Locating slopes and boundary lines such that tops and bottoms of slopes are at property boundaries.
- Avoiding excessively deep swales.
- Where swales and french drains are contemplated at the base of a significant slope, it is recommended that the swale be located at the toe of the slope.

- Locating driveways to allow convenient and safe ingress and egress.

- Creating consistent grading lot to lot.

These above items are desirable but not addressing these factors fully will not lead to rejection or approval of a Subdivision Grading Plan.

3.2 DESIGN CRITERIA - OFF-STREET SYSTEMS AND SUBDIVISION GRADING

The Design Criteria for lot grading and drainage are to cover the more common aspects of design encountered in lot grading and drainage development. Local conditions may influence the design criteria and design requirements, for example, circumstances where soils are not free draining may require a flatter maximum permissible slope. Additional requirements affecting design are contained in other relevant documents, such as the National Building Code.

The Design Criteria reflect the experience of the Municipality as related to typical design requirements. The Criteria are provided for information and will serve as the benchmark for review of Subdivision Grading Plans in typical circumstances. However, the Design Criteria are not considered rigid. To better meet the objectives, the Designer may want to propose alternate design approaches. This will not be discouraged by the Municipality. The purpose of the Design Criteria is to provide guidance for designers in the provision of drainage systems offering acceptable service which is consistent with the lowest possible initial construction and on-going maintenance costs and effort.

3.2.1 Community Systems

In designing Community Systems, the focus is on those drainage elements which affect more than one property, eg. common backyard swales/catch basins, grading along common property boundaries. It is critical that the Designer ensure that sufficient Community Systems are in place and/or contemplated and depicted such that the Individual Lot Systems can be designed and constructed in a fashion that allows for a properly functioning overall Storm Drainage System for the Homeowner while striving for an attractive living environment. It is intended that Community Systems will not have to be altered as a consequence of design of detailed Individual Lot Systems. Therefore, it is strongly recommended that the Designer test the ability of the Community Systems to achieve the above stated objective by carrying out preliminary design of the Individual Lot Systems serving the lots in accordance with the requirements of any Lot Grading or Grade Alteration or other By-law that regulates the grading of land.

Community Systems are to be designed in accordance with the following criteria:

Ground Surface

- The area between the street right-of-way and the curb shall slope towards the curb at a minimum slope of 2% but not greater than 4%.

- The maximum slope shall be 3:1 (H:V) unless constructed on in situ rock. A steeper slope may also be permitted by the Engineer if a geotechnical report is submitted that certifies the use of a steeper slope. The top and bottom of banks shall be rounded for convenient maintenance. Notwithstanding the foregoing, the Designer is responsible to design a suitably graded slope with appropriate surface treatment to provide for long term stability.

- Where a cut intercepts the groundwater table creating potential drainage and icing problems, special measures will be required to address potential drainage problems.

- Where areas are disturbed, stabilization is to be provided to prevent erosion.

Off-Street Swales

- Except for individual single family and duplex dwelling lots, provision shall be made to collect on-site, and convey by pipe to a storm sewer, all runoff from off-street areas other than grassed or undisturbed areas.

- Swales shall be blended into the landscape to the greatest degree possible in order to provide a natural appearance.

- The minimum grade along any swale shall be 2%. Less than a 2% grade may be used where underdrains are incorporated. In cases where an underground drain is included in the swale design, the minimum grade may be reduced to 1%. Designers are encouraged to use grades, where possible, that are steeper than the minimum.

- The flow from all swales which serve multiple properties shall be intercepted by catch basins at a maximum spacing such that the maximum depth of flow in the 5 year storm event is 100 mm or as otherwise directed by the Engineer.

- Where the swale intercepts subsurface water, the swale shall incorporate underdrains, regardless of slope.

- The side slope for any swale shall be flatter than 33% (3 horizontal: 1 vertical).

- The maximum depth of flow in any swale shall be 250 mm in the 1 in 100 year storm.

- All swales shall be designed to accommodate the 1 in 100 year stormwater flow.

- An overflow route shall be provided to direct overflow to major storm drainage systems. The 1 in 100 year water level along such route shall be lower than the lowest opening to the adjacent dwellings.

- Sharp corners shall be avoided in swale design.

- Steeply sloping swales shall have appropriate surface treatment to prevent erosion.

Catch Basins

- Where a swale, which serves multiple properties, intersects a street, a catch basin, located as close as practical to the curb or to the sidewalk, shall be installed to intercept flow from the swale.

- The flow from all rear yard swales serving multiple lots shall be intercepted by a catch basin(s) installed at the rear of the property.

- The grade of lots in the immediate vicinity of a rear yard catch basin shall be graded in a manner which will direct all water to the catch basin.

- Catch basins shall be located entirely on one property and shall not be located on any property line.

- Off street catch basins may be constructed using a 750 mm diameter concrete pipe, standing vertical with bell end up. An IMP R-361 (or equivalent) grate shall then be placed in the bell end. The catch basin lead shall not protrude into the catch basin by more than 75 mm and shall be grouted with a non-shrink grout and finished on the inside and outside of the structure. Note: This type of catch basin is not permitted in paved areas or areas where vehicle traffic is present.

Underdrains

- Underdrains are to be used to remove surface and subsurface water to drain wet areas and other areas of poor drainage, or where minimum slopes with respect to lot surface or swales cannot be achieved.

- Underdrains are not permitted to discharge onto street surfaces, walkways, private properties, or any other location where there would be an impact inconsistent with the objectives of this document.

- Underdrains shall be located a sufficient distance from any part of the building foundation to avoid impacts to building foundations and/or adjacent structures when the underdrain is replaced.

- Where necessary to avoid icing problems on the street caused by water flowing over the top of the curb, the Designer shall provide an acceptable method to intercept this flow (eg. french drain installed behind the curb).

Small diameter pipe installed for "off-street" drainage such as rear yard drains, underdrains, etc., may be installed provided the following connection conditions are met:

- Off-street underdrains shall not be connected to the back or sides of an on-street catch basin.

- Off-street underdrains shall connect to the storm main via a lateral connection or to a manhole in the street ROW.

- Off-street underdrains may be considered, through the variance process, to connect to an off street catch basin.

Ownership

- Rear/side yard catch basins will be considered for ownership/acceptance by Halifax Water as an exception only (variance). If a variance is accepted, it must be constructed to Halifax Water requirements. The designer will be required to demonstrate that there are no other physical means to providing adequate and proper drainage to the property(s). The request will also be assessed to ensure the infrastructure can be accessed for cleaning and maintenance.

- Catch basins located outside of the travel way, but located within the right-of-way, will be owned and maintained by Halifax Water.

- Underdrains and swales located outside of the right-of-way will be privately owned and maintained.

Easements

- Easements shall be provided for all swales which, in the opinion of the Engineer, require such legal conveyances. Generally, easements will be required when a significant number of lots depend on the swale.

- Public easements shall be provided for all catch basins and associated stormwater pipes constructed in conformance with HRM and Halifax Water standards.

- A minimum easement width of 6 m is required for public easements as per Halifax Water requirements.

- A minimum easement width of 4.5 m is required for private easements.

MUNICIPAL DESIGN GUIDELINES

PART A: DESIGN GUIDELINES

4.0 MUNICIPAL ROADS/STREETS

4.1 INTRODUCTION

4.1.1 General

This Design Guideline provides standards for urban and rural areas and applies to new construction as well as to major reconstruction. The design of the roadway system has to respond to different constraints and possibilities depending on the situation. There are basic design concepts that apply in all situations but the expression of the objectives will necessarily vary depending on the situation.

In the 'urban' environment, there are many conflicting demands placed on the street system, including those of passenger cars, trucks, transit vehicles, cyclists and pedestrians. It is important to recognize that the street system must be effectively shared. Rights-of-way in the 'urban' environment must also serve other non-traffic needs such as utilities, lighting, environmental features, and streetscaping.

In the 'rural' areas, increased sensitivity to users other than motor vehicles is required of designers by the Municipality and by residents to meet goals of environmental quality.

When considering developments in areas now undeveloped (in either 'urban' or 'rural' contexts) the emphasis is on creation of plans that will keep traffic problems from developing while at the same time providing for convenient access and mobility. A well-conceived street system can segregate through traffic from local traffic and assure that collector and higher classed roads as well as local-serving streets are designed and constructed to standards that reinforce their intended use. Attention should be given to layouts that are suitable for bus operations (with appropriate lane widths, pavement strengths, turning radii and so forth) and to the provision of facilities that permit and encourage non-motorized travel - bikeways/walkways and sidewalks.

In general, the use of traffic laybys is not supported for various reasons. They obstruct sidewalks, they're a pedestrian crossing hazard, a maintenance problem for snow clearing and street cleaning, and a challenge for persons with disabilities. Traffic laybys should only be considered where otherwise, vehicle traffic movement will be restricted. That is, areas where high volume buildings (like hotels) can be constructed right up to the property line on high traffic volume streets.

4.1.2 Characteristics of Street Classes

Table 4.1 Characteristics of Street Classes

Characteristic	Arterial Street	Major Collector Street	Minor Collector Street	Local Industrial	Local Street
1. Traffic service function	First consideration	Traffic movement first consideration, land access second consideration	Traffic movement of equal importance with land access, parking permitted	Traffic movement second consideration with land access first consideration, parking permitted	Traffic movement second consideration with land access first consideration, parking permitted
2. Land access function	Limited access with no parking				
3. Range of design traffic average daily volume	More than 20,000	More than 12,000	Up to 12,000	Less than 3,000	Less than 3,000
4. Characteristics of traffic flow	Uninterrupted flow except at signals; with pedestrian overpasses	Uninterrupted flow except at signals and crosswalks	Interrupted flow	Interrupted flow	Interrupted flow
5. Average running speed in off-peak conditions*	50-70 km/h	40-60 km/h	30-50 km/h	15-30 km/h	15-30 km/h
6. Vehicle types	All types	All types but trucks may be limited	All types with truck limitation	All types	Passenger vehicles and service vehicles; large vehicles restricted
7. Connects to	Expressways, arterials, major collectors, minor collectors	Expressways, arterials, major collectors, minor collectors, some locals	Arterials, major collectors, minor collectors, locals	Some major collectors, minor collectors, locals	Some major collectors, minor collectors, locals

* The average running speed represents the average speed for a complete trip on the road in question, including speed variations required by other traffic and traffic control devices. It is not the maximum speed achieved on the section, nor is it the design speed. The average running speed of traffic operating under off-peak volume conditions varies on roads of the same classification depending on the type and condition of the surface, intensity of adjacent land development, access to the road, vehicle type, and traffic flow controls.

4.1.3 General Principles for Design of Streets

- Street layout, design, and control should express and reinforce street function.
- The overall street network should include streets designed to accommodate through traffic, in addition to local streets.
- Local streets should be linked to higher classification streets in a way that provides good access to other parts of the community and region, and minimizes the chances of the local streets' use by through traffic.
- Land uses along streets intended to carry through traffic should be selected and designed to minimize their sensitivity to adverse effects of traffic. When possible, uses that can benefit from the greater accessibility and public exposure that non-local streets provide should be the ones located on such streets.
- Strategies for reducing auto dependence both by residents and by others are legitimate tools of traffic management for local streets.

4.1.4 Objectives for Design of Residential Streets and Walkways

In particular, residential or local-serving streets (in both serviced and unserviced areas) should:

- Permit comfortable and safe pedestrian and bicycle movements as well as motorized vehicular movements, and protect vulnerable users such as children, persons with disabilities, and elderly persons.
- Accommodate convenient and efficient pickups and deliveries, emergency access (fire, police, ambulance), and maintenance services, and where densities justify bus or transit services.
- Enhance the overall aesthetics of the neighbourhood through well-designed street layout and street landscaping.
- Local streets should be protected from through traffic: vehicles travelling on these streets should have a trip origin or destination in the area served by them.
- Local streets should be protected from vehicles moving at excessive speeds (greater than 50 km/h).
- Residential streets should be protected from parking unrelated to residential activities.

In addition to the above guidelines, designers should be aware that Halifax Regional Municipality Council endorsed as policy the Transportation Association of Canada “A New Vision for Urban Transportation” on January 7, 1997. (It is understood by Engineering and Transportation that in this context ‘Urban Transportation’ includes residential and other similar subdivision development in areas without central services.) The New Vision includes the following principles:

- Plan for increased densities and more mixed land use.
- Promote walking as the preferred mode for person trips.
- Increase opportunities for cycling as an optional mode of travel.
- Provide higher quality transit service to increase its attractiveness relative to the private auto.
- Create an environment in which automobiles can play a more balanced role.
- Plan parking supply and price to be in balance with walking, cycling, transit and auto priorities.
- Improve the efficiency of the urban goods distribution system.
- Promote inter-modal and inter-line connections.
- Promote new technologies which improve urban mobility and help protect the environment.
- Optimize the use of existing transportation systems to move people and goods.
- Design and operate transportation systems which can be used by persons with disabilities.

- Ensure that urban transportation decisions protect and enhance the environment.
- Create better ways to pay for future urban transportation systems.

In Urban areas where an active transportation plan is required, refer to the active transportation cross sections as shown in Part B: Standard Details.

4.2 GENERAL DESIGN SPECIFICATIONS

4.2.1 General

These specifications cover the more common aspects of design encountered with roadway design. In cases where this specification needs to be expanded or additional specifications are required, the "Geometric Design Guide for Canadian Roads", the “Manual of Uniform Traffic Control Devices for Canada”, prepared by the Transportation Association of Canada (TAC), and the Nova Scotia Motor Vehicle Act and Regulations shall be used.

4.2.2 Asphaltic Concrete

Asphaltic concrete is to be designed and placed in accordance with HRM’s Specification for Hot mix asphaltic concrete and HRM’s specification for performance graded asphalt binder.

www.halifax.ca/procurement/UnitPriceContractsDesignConstructionServices.html

4.2.3 Layout

4.2.3.1 Streets must be laid out wherever possible in prolongation of existing streets, either in the same subdivision or in adjacent subdivisions. In a phased development, the minimum length of street which will be considered for approval by the Municipality is 150 m, with the exception of cul-de-sacs.

4.2.3.2 An acceptable right-of-way access to adjacent properties must be provided and deeded to HRM. This right-of-way may have to be wider than normal to allow for future construction of road without disturbing adjacent land. These access roads must be located along the boundary in such a manner as to not prejudice development of adjacent land. The road must be graded to include Type 2 gravels, and services (water, sanitary, and storm), if required, must be provided to the property line. A guiderail shall then be installed at the entrance of the road.

The subsequent developer of the adjacent property is then responsible for completing the construction of the entire road, including the portion on adjacent property. This includes removal of the guiderail, removal of the temporary cul-de-sac (if one exists), installation of the remaining services (sewers, water main, curbs, etc.), grading the existing surface, and the installation of gravels and asphalt to finish the road.

4.2.3.3 In general, the use of continuous streets is encouraged and the number of cul-de-sacs shall be limited where the land can be effectively serviced by the continued extension of the road system. Where cul-de-sacs are to be provided they shall end in a cul-de-sac, have a right-of-way deeded to the Municipality, and not normally have islands. Where islands are necessary, the minimum radius of the island shall be 6 m and the minimum width shall be 9 m between curbs for urban roads and 6.4 m pavement width for rural roads. Islands shall be designed for low maintenance.

4.2.3.4 The maximum permanent cul-de-sac length where a walkway is located at the end of the cul-de-sac and connects to another street shall be 230 m for urban areas and 400 m for rural roads.

Otherwise the maximum length shall be 100 m and 200 m respectively, measured from the intersection of the cul-de-sac's centerline and the street-line of the intersecting street to the centre of the cul-de-sac.

4.2.3.5 On cul-de-sacs with townhouse lots, a sidewalk may not be required unless there is a pedestrian destination on the route such as park or walkway; at the discretion of the Engineer.

4.2.4 Access

4.2.4.1 Other than cul-de-sacs meeting the requirements of section 4.2.3, any lot in a subdivision shall have at least two independent street accesses to the existing street system, and these accesses shall, where possible, be located at opposite ends of the subdivision.

4.2.4.2 Notwithstanding section 4.2.4.1 and other than cul-de-sacs meeting the requirements of section 4.2.3:

- Where there is an approved phasing plan and subdivision agreement in place confirming that a second street access will be provided within a specified time approved by the Engineer, up to 300 lots containing a maximum of 300 dwelling units may be approved prior to the second access being provided;

- Where, in the opinion of the Engineer, it is impractical to provide a second access, up to 100 lots containing a maximum of 100 dwelling units may be approved with a single access.

4.2.5 Right-of-Way

Minimum street rights-of-way for various roadway classifications are presented in Table 4.2. The Municipality may require a greater width of right-of-way to facilitate traffic, active transportation, construction and/or maintenance requirements.

Table 4.2 Minimum Street Rights-of-Way

Street Classification	Minimum Right-of-Way
Urban - Local	16 m
Urban - Local Industrial	20 m
Urban - Minor Collector	16 m
Urban - Major Collector	25 m
Urban - Arterial	32 m
Rural - Local	20 m
Rural - Local Industrial	23 m
Rural - Minor Collector	25 m
Rural - Major Collector	30 m
Rural - Arterials	40 m

4.2.6 Intersections

4.2.6.1 The maximum number of street approaches to any intersection shall be four.

4.2.6.2 The minimum centerline distance between intersections on the same side of the street shall be 75 m for local and minor collector streets (see Table 4.3).

4.2.6.3 The minimum centerline distance between adjacent opposite intersections shall be 45 m for local and minor collector streets (see Table 4.3).

4.2.6.4 The minimum centerline distance between intersections on major collector and arterial streets shall be 150 and 500 m respectively (see Table 4.3).

4.2.6.5 The maximum centerline distance between intersections for local and collector streets shall not be more than 500 m and shall be laid out in such a manner as to not prejudice development of adjacent land (see Table 4.3).

4.2.6.6 Intersection of local & arterial roads is not permitted.

4.2.6.7 The minimum curb and edge of pavement radius for roads shall be in accordance with Table 4.4.

4.2.6.8 The angle subtended by the centre-line of intersecting streets shall be between 70 and 110 degrees.

The centre-line shall be a straight line for a minimum of 10 m measured from and along the intersection of the centre-line of the approach street and the edge of the shoulder/curb of the street to which it is connecting.

4.2.6.9 At intersections the Street Line shall be cut back from the extended street line intersection point in accordance with Table 4.4 (see “Pedestrian Ramp Alignment” Standard Detail in Part B).

Table 4.3 Minimum & Maximum Centerline Distance Between Intersections

Intersections on this Road Class:	Minimum distance between intersections (m)	Maximum distance between intersections (m)
Arterial Same or opposite side of road	500	
Major Collector Same or opposite side of road	150	500
Minor Collector Same side of road Opposite side of road	75 45	500 500
Local Same side of road Opposite side of road	75 45	500 500

Table 4.4 Design Parameters at Intersection		
Intersection Type	Curb and Edge of Pavement Radii	Street Line Cut-Back
Residential Local at Residential Local	7.5 simple radius in new areas, 5.0 minimum in older areas; fire truck and moving van turns shall be possible between curb lines	4.5 m
Residential Local or Residential Minor Collector at Residential Minor Collector	7.5 simple radius in new areas, 5.0 minimum in older areas; fire truck and moving van turns shall be possible between curb lines	4.5 m
Commercial Local / Commercial Local or Commercial Minor Collector / Commercial Minor Collector	10.0 simple radius; fire truck and moving van turns shall be possible between curb lines	7.0 m
Industrial Local / Industrial Local or Industrial Collector / Industrial Collector	15.0 simple radius, but must accommodate truck turning functions well, 3-centred curve permitted, pedestrian crossing time and distance to be considered	11.0 m
Major Collector / Major Collector or Arterial / Arterial	15.0 simple radius, but must accommodate truck turning functions well, 3-centred curve permitted, pedestrian crossing time and distance to be considered	11.0 m

4.2.7 Driveways

4.2.7.1 Driveway access shall be in accordance with By-law Number S-300, By-Law Respecting Streets.

4.2.7.2 Driveway ramps for residential driveways shall be dropped curb. Curb radius returns may be permitted on commercial, institutional and industrial properties at the discretion of the Engineer.

4.2.7.3 Driveways in rural areas shall incorporate concrete headwalls (see standard detail in Part B).

4.2.8 Community Mailboxes

4.2.8.1 Shall be located within the right-of-way.

4.2.8.2 Community Mailboxes shall be located on local streets wherever possible. If located on urban collector streets, laybys may be required. Laybys are required on all rural local road applications (see standard detail in Part B).

4.2.8.3 Community Mailbox locations shall not be located within 30 m of a street intersection controlled by traffic signals, within 30 m of the intersection of a major street and within 8 m of the intersection of a local street.

4.3 GEOMETRIC DESIGN

4.3.1 Design Speed

The applicable design speed shall be in accordance with Table 4.5.

4.3.2 Vertical Alignment

4.3.2.1 The minimum grade shall be in accordance with Table 4 5.

4.3.2.2 The minimum centre line grade of any street shall not be less than 0.5 percent. The minimum centre line grade on a cul-de-sac shall be such as to provide a minimum curb or ditch grade of 0.5 percent.

4.3.2.3 The maximum grade allowed on any local road shall not exceed 10 percent. Under exceptional circumstances, HRM may allow a grade of 12% for local roads only.

4.3.2.4 The grade of a minor road at an intersection shall match the cross section of the major street at that point. The grade shall continue for a minimum of 20 m from the intersection and shall not exceed 4 percent.

This will be measured along the centerline of the intersecting street, from where the centerline intersects with edge of the travelled way of the major street.

4.3.2.5 The maximum centerline grade of cul-de-sac bulbs shall not exceed 6 percent.

4.3.2.6 Cul-de-sac shall be graded to drain from the centre to the curb or ditch.

4.3.2.7 Curb elevations at intersections, critical grade locations, and bulbs of cul-de-sac shall be shown on drawings at a minimum 3 m spacing.

4.3.2.8 Driveway grades shall match the typical street cross section within the street right-of-way.

4.3.2.9 The maximum grade for a residential driveway shall be limited to 15 percent. The maximum grade for commercial and industrial driveways shall be limited to 8 percent.

4.3.2.10 Minimum K values for vertical curves shall be in accordance with Table 4.6.

4.3.2.11 For non-illuminated roadway conditions, headlight control values must be used for sag vertical curves.

4.3.2.12 For illuminated conditions, comfort control values may be used where there is adequate street lighting to better match design grades with existing grades.

Table 4.5 Geometric Design Parameters for Urban and Rural Roads							
Ref.	Parameter	Local *	Local 50	Local Industrial	Minor Collector	Major Collector	Arterial
4.3.1	Posted Speed (km/h)	50	50	50	60	70	80
4.3.1	Design Speed (km/h)	40	60	60	70	80	90
4.3.2	Min. Grade	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
4.3.2	Max Grade	10%**	10%**	8%	8%	6%	6%
4.3.3	Superelevation	no	no	no	Optional	yes	yes
4.3.4	Min. ℄ Curve Radius	20 m	100 m	100 m	see TAC	see TAC	see TAC
4.3.5	Sight Distance Requirements	45 m	65 m	65 m	85 m	TSD	TSD

TAC Transportation Association of Canada Geometric Design Guide for Canadian Roads

TSD Turning Sight Distance

(*) Local cul-de-sacs, p-loops or crescents which are less than 400 m in length.

(**) A 12 percent grade may be allowed under exceptional circumstances.

4.3.3 Super Elevation

4.3.3.1 Collectors and arterials shall be superelevated in accordance with the TAC Geometric Design Guide. The maximum superelevation rate used (eg. 0.04 m/m) shall be approved by the Municipality.

4.3.3.2 Local streets generally shall not be superelevated unless there are safety or drainage concerns. Where superelevation is used on a local street it shall be carried out in accordance with the TAC Geometric Design Guide.

4.3.4 Horizontal Alignment

4.3.4.1 The minimum curve radius to be used for collectors and arterials will be directly related to the design speed and the maximum superelevation rate used, and shall be in accordance with the TAC Geometric Design Guide.

4.3.4.2 The minimum centerline curve radius shall be in accordance with Table 4.5.

4.3.4.3 Tangent distances between horizontal reverse curves shall not be less than 20 m.

4.3.4.4 Tangent distances between horizontal curves turning the same way should not be less than 40 m.

4.3.5 Stopping and Intersection Sight Distance

4.3.5.1 Minimum stopping sight distance as defined by the TAC Geometric Design Guide shall be provided for all driveways on all streets in accordance with Table 4.5.

4.3.5.2 Minimum stopping sight distance shall also be provided at intersections in accordance with TAC Geometric Design Guide.

4.3.5.3 Minimum turning sight distance, shall be as defined by the TAC Geometric Design Guide.

Table 4.6 Minimum K Factors to Provide Stopping Sight Distances on Vertical Curves

Design Speed (km/h)	Crest Vertical Curves	Sag Vertical Curves	
	Rate of Vertical Curvature (K)	Rate of Vertical Curvature (K)	
		Headlight	Comfort
30	2	4	2
40	4	7	4
50	7	12	6
60	13	18	9
70	23	25	12
80	36	32	16
90	see TAC	see TAC	see TAC
100	see TAC	see TAC	see TAC
110	see TAC	see TAC	see TAC
120	see TAC	see TAC	see TAC
130	see TAC	see TAC	see TAC

TAC Transportation Association of Canada Geometric Design Guide for Canadian Roads

4.4 CROSS SECTION ELEMENTS

4.4.1 Roadbed

4.4.1.1 Roads shall be centred within the right-of-way and shall have a cross-slope as indicated on the standard details.

4.4.1.2 The travel way and road surface widths for public roads shall be in accordance with the standard details.

4.4.1.3 On sections where a guide rail is required, the roadbed width shall be increased by one metre on the side where the guide rail is to be installed.

4.4.1.4 A geotechnical report prepared by a professional engineer is to be submitted to the Engineer for review with the design drawings or after grubbing operations but prior to subgrade construction. The geotechnical report shall address the geological and hydrological aspects of the development and shall determine soil types.

The geological section of the report shall include but not be limited to:

- slope stability;
- buried landfill;
- sieve analysis representative of road subgrade;
- identification of poor subgrade materials such as quick soils, swelling soils, deep fills and highly organic deposits;
- highly erodible soils;
- identifying frost susceptible soils;
- proposing solutions to mitigate their effect.

The hydrological section of the report shall include but not be limited to the identification of groundwater level and underground streams, notwithstanding that allowances have to be made for groundwater levels determined during dry weather conditions. If it is probable that the existing subgrade to a depth of 1.5 m below finished grade may be subject to frost heave, the engineer shall identify solutions to prevent frost damage.

4.4.1.5 The street roadbed shall include as a minimum, the asphalt and gravel base structure shown on the standard detail for the classification of road required. Additional granular materials may be required depending upon the subgrade type, which are defined as follows:

Silt/Clay Option 1:	refers to materials with more than 25 percent silt/clay size particles
Silt/Clay Option 2:	refers to materials with more than 25 percent silt/clay size particles and are above optimum moisture content
Granular Till:	refers to materials with less than 25 percent silt/clay size.
Rock Fill:	refers to blasted rock fill.
Rock Fill, 100mm	refers to blasted rock fill meeting the following gradation:

Sieve Size (mm)	Percent Passing
100	100
5	25 - 80
0.08	0 - 10

4.4.2 Lane Width

4.4.2.1 The lane widths for locals, collectors and arterials shall be in accordance with the standard details. Lane widths adjacent to concrete curb and gutter shall be measured from the face of curb.

4.4.2.2 The minimum parking lane width shall be 2.4 m. On-street parking is permitted on at least one side of local streets. The decision on the street category and the parking allowances rests with the Engineer.

4.4.3 Shoulders (Roads with Rural Cross Sections)

4.4.3.1 The minimum shoulder width (inclusive of shoulder rounding) for all rural roads shall be 2.0 m.

4.4.3.2 On sections where a sidewalk may be required in the future, the shoulder width shall be increased by a minimum of 1 m, or as otherwise required by the Engineer.

4.4.3.3 Where the grade of the road exceeds 7%, an asphalt swale is to be installed along each side of the road (abutting the asphalt travelled way) with a runoff to the ditch every 30 m. At the discretion of the Engineer, and considering certain circumstances (ie. superelevation), the swale may be omitted from one side of the road (see standard detail in Part B).

4.4.4 Ditches

4.4.4.1 Roadside ditches shall be constructed as per the rural road standard details and Halifax Water requirements.

4.4.4.2 When a false roadside ditch is required, construct as per Halifax Water guidelines and provide any required false ditch easements in favour of Halifax Water.

4.4.5 Medians and Boulevards

4.4.5.1 The standard width for a raised concrete median shall be 4.5 m. Under special circumstances, this may be reduced to 1.2 m. Median width shall be measured from face of curb to face of curb.

4.4.5.2 The minimum boulevard width for an urban local and minor collector road shall be 1.5 m and shall be measured from face of curb to edge of sidewalk. The minimum boulevard width for major collectors and arterials shall be 2.0 and 2.85 m respectively.

4.4.6 Cut and Fill Slopes

4.4.6.1 For common excavation, side slopes in cuts shall be no steeper than 3:1 (horizontal to vertical) with the following exceptions: If the cut slope is 1.5 m or less in height (measured from top of ditch or top of curb), a 2:1 slope may be permitted. If the cut slope is greater than 1.5 m in height, a 2:1 slope may be permitted if a geotechnical report is provided.

4.4.6.2 For rock excavation, side slopes in cuts shall be no steeper than 1:2 (horizontal to vertical). On rock cuts over 1.2 m high (measured from top of ditch or top of curb), a safety fence, as per the standard details, shall be provided on private property. On cuts greater than 1.2 m in height, a 1:1 slope may be permitted to waive the requirement for a safety fence.

4.4.6.3 Embankment slopes shall be a maximum of 2:1. More gentle slopes shall be required for less stable material.

4.4.6.4 Cut slopes for rural roads that do not intercept existing grade within the street right-of-way shall be benched beginning at street line for a distance of 3 m before the cut slope continues.

4.4.6.5 All overhanging and loose rocks shall be removed from the slope. The Engineer may require slope stabilization of rock faces (e.g. wire mesh, shotcrete, etc) if unsafe conditions exist or the rock is susceptible to weathering.

4.4.6.6 The Engineer may require certification from a Geotechnical Engineer that areas adjacent to streets or easements are and will remain stable.

4.4.7 Guide Rails

4.4.7.1 In general, guide rails are to be provided on all local, collector and arterial roads where fill heights exceed 3 m unless a slope of 6:1 can be provided.

4.4.7.2 Guide rails may also be required to provide protection from other hazardous areas such as bridge piers, overhead signs, bodies of water, rock cuts, transformers, etc.

4.4.8 Utilities

4.4.8.1 All sewers, watermains, natural gas pipelines, electrical, communication and other such utilities located within the right-of-way must have Municipality approval with respect to location, prior to their installation.

4.4.8.2 The minimum pole setback shall be 450 mm from face of curb to near side face of pole for local urban roads and 600 mm for urban collectors and arterials. On rural roads, the pole shall be set at least 1 m beyond the outside edge of the ditch where a ditch exists, otherwise set poles 600 mm inside street line.

4.4.9 Sodded Areas

4.4.9.1 Sodded areas shall consist of a minimum of 150 mm of topsoil and sod. Hydroseed will be permitted on slopes beyond the right-of-way.

4.5 RETAINING WALLS

Retaining walls are not normally accepted as a means of handling grade differentials associated with streets or services in the Municipality.

Retaining walls can create a hazardous situation and an on-going maintenance cost as well as a future capital cost when the wall needs to be replaced. The street and service systems are to be designed such that retaining walls are avoided if possible.

In the extreme circumstances that a retaining wall is acceptable to the Municipality, the wall shall be designed by a Professional Engineer with due consideration given to soundness of material, stabilization, safety, maintenance and other relevant features. As a minimum, retaining walls over 1 m in height must have a handrail or safety fence incorporated into the design. The handrail or safety fence must be a minimum of 1.05 m in height (see standard detail in Part B).

Where retaining walls support any portion of the right-of-way, wall type and material to be to the satisfaction of the Engineer. Retaining walls, including footings, shall be located on private property unless approved by the Engineer.

4.6 SIGNS

The developer is responsible to supply and install sign bases and posts, the Municipality will then supply and install the sign. At the discretion of the Engineer, utility poles may be used for signs if they are in the appropriate location.

Street name signs shall be erected at each intersection with one sign for each leg of the intersection and one post for each approach street. Street name signs shall be to the Municipality's Standard.

Regulatory signs shall be included in the Engineering Design.

4.7 CONSTRUCTION

All clearing, grubbing, pipe work, roadwork, etc. is to be carried out in carefully planned phases in conjunction with the erosion and sediment control measure to minimize the environmental impact of construction.

All construction shall meet the requirements of HRM Specifications together with the Standard Specifications for Municipal Services, as developed by the Nova Scotia Road Builders Association and Consulting Engineers Nova Scotia Joint Committee on Contract Documents.

Echelon paving shall be used for all lifts of asphaltic concrete on new street construction which exceed 300 metres in length.

MUNICIPAL DESIGN GUIDELINES

PART A: DESIGN GUIDELINES

5.0 WALKWAYS, SIDEWALKS AND CURB AND GUTTER

5.1 WALKWAYS

5.1.1 The design criteria presented herein applies, for the most part, to walkways located on urban roads. Other facilities such as walkways located in developments outside of the urban areas and nature trails located in conservation zones or park areas shall be designed to suit the natural condition of the area and shall be in consultation with the Engineer and other appropriate Departments of the Municipality.

5.1.2 Selection of locations for walkways shall take into account the requirements for pedestrian circulation for the neighbourhood. For example, if a walkway ends on a street with a single sidewalk, the sidewalk should be located on the side of the road to meet the walkway. If the layout of the development would require a walkway to terminate opposite a single sidewalk then a second sidewalk from the walkway to the nearest appropriate roadway intersection shall be required.

5.1.3 The walkway shall have a minimum right-of-way width of 4.5 m. At the discretion of the Engineer, additional easement or right-of-way width may be required to facilitate construction and maintenance of Municipal infrastructure. Where the wastewater and stormwater easement is within a walkway, the easement shall be a minimum width of 6.0 m as per Halifax Water guidelines, and the easement shall be granted to Halifax Water prior to the transfer of ownership of the walkway to HRM.

5.1.4 The travelled portion of a walkway shall be centered within the right-of-way unless approved otherwise and shall have a minimum width of 1.8 m.

5.1.5 A minimum of 150 mm of topsoil and sod shall be placed on each side of the travelled portion and shall extend for the full width and length of the walkway right-of-way. In locations where maintenance of the sod may be difficult, mulch or other ground cover may be accepted or required.

5.1.6 Walkways shall be located and designed whenever possible so that the grade of the walkway shall not exceed 8%. Steeper grades may be permitted only where the topography makes it impractical for grades to be less than 8%, or to avoid the installation of stairs. On streets where the maximum grade is 10%, the maximum walkway grade is 10%

5.1.7 A pedestrian ramp shall be constructed at the ends of walkways where curb and gutter is present. Pedestrian ramps shall be placed at all cross walk locations.

5.1.8 Each side of a walkway right-of-way shall be fenced. The fence shall be commercial grade galvanized chain link material, 50 mm wire mesh, No. 9 Gauge, shall be 1.2 m high and shall be as specified by the National Standards of Canada CAN2-138.1-M80, CAN2-138.2-M80, CAN2-138.3-M80.

5.1.9 The right-of-way shall be graded to control surface water and major drainage within the right-of-way. Landscaped and sodded swales, catch basins, pipe and drains shall be provided to control erosion and maintain a safe surface. Swales, where required, shall not be located closer than 600 mm from the edge of the travelled portion.

5.1.10 Walkways shall be lighted and shall be oriented as to benefit from street lighting where possible. The maximum distance between lights on a walkway shall be 75 m.

5.2 SIDEWALKS

5.2.1 The minimum width of sidewalks shall be in accordance with the standard details. Sidewalks shall be provided on both sides of collectors and arterial roads. Sidewalks shall have a 1.5 m clear zone around all utility poles, sign posts, etc., to accommodate winter maintenance vehicles.

5.2.2 See the Municipal Roads/Streets section for landscaped median widths between curb and sidewalk.

5.2.3 In locations with curbs, pedestrian ramps shall be installed on both sides of each road at all roadway intersections, and at Canada Post Community Mail Box locations. A pedestrian ramp is not to be installed at the end of a sidewalk unless the sidewalk ends at a roadway intersection.

5.2.4 No concrete sidewalk shall be placed between October 15 and May 1 unless approved by the Engineer and under an approved Quality Management Plan.

5.3 CONCRETE CURB AND GUTTER

No concrete curb and gutter shall be placed between October 31 and May 1 unless approved by the Engineer and under an approved Quality Management Plan.

5.4 CONSTRUCTION

All construction shall meet the requirements of HRM Specifications together with the Standard Specifications for Municipal Services, as developed by the Nova Scotia Road Builders Association and Consulting Engineers Nova Scotia Joint Committee on Contract Documents.

MUNICIPAL DESIGN GUIDELINES

PART A: DESIGN GUIDELINES

6.0 TRENCH REINSTATEMENT

6.1 INTRODUCTION

This section documents the requirements for reinstatement of trenches within the HRM Rights-of-Way. This document does not address trench excavation procedures, trench design, or associated safety related issues.

6.2 BACKFILL MATERIALS

The backfilling of trenches within roadways requires placement of the following material types;

6.2.1 Embedment Materials

Embedment material is designed to provide a protective layer surrounding the utility and is comprised of the bedding layer, the haunch layer, and the cover layer. Bedding material shall be Type 1 gravel, or under limited conditions sand or clear stone (for example, around natural gas pipelines). Type 1 gravel shall meet all specification requirements of the Standard Specifications for Municipal Services.

Bedding material separating the trench base and service utility shall have a minimum compacted thickness of 100 mm. Haunch and cover layers shall be placed at a maximum thickness of 200 mm prior to compaction. All embedment material shall be compacted to a minimum density equal to 95% of Standard Proctor density. Sand used as embedment around natural gas pipelines does not require the same level of compaction; however, the compaction requirements must be achieved for all other layers and the expectation is that the sand layer does not negatively impact on the street and sidewalk related infrastructure. The use of clear stone shall be restricted to those conditions where the trench base holds excessive free water or conditions that prohibit the use of specified materials. The clear stone shall be surrounded with geotextile fabric to prevent migration of fines into voids in the clear stone.

6.2.2 Structural Fill

Structural fill shall be placed immediately over the embedment material and extend to the subgrade for street gravels. Structural fill shall be placed in uniform layers not to exceed 300 mm before compaction. The top 300 mm of structural fill shall be compacted to a minimum density equal to 98% of Standard Proctor density with the underlying structural fill compacted to a minimum of 95% Standard Proctor density.

Structural fill may be suitable naturally occurring material or imported fill similar in composition to naturally occurring material. In either case the material shall be free of excessive organics or deleterious materials and be moisture conditioned to within ± 3% of the optimal moisture content as determined by the Standard Proctor test. Where natural occurring clayey soils are utilized as structural fill moisture conditioning in the form of drying may be required. The determination of “suitable natural occurring material” will be at the discretion of HRM. Controlled density fill or unshrinkable fill may be approved by HRM for use in small quantities in tight or restricted-access areas where placing and compacting of fill or gravel is difficult. Controlled density fill shall not interfere with natural subsurface drainage patterns and be located a minimum of 600 mm below ground level to prevent differential frost movement. Controlled density fill shall meet the requirements of the Standard Specifications for Municipal Services.

6.2.3 Type 1 and Type 2 Gravel

Type 1 and Type 2 gravels shall be placed between the structural fill and the asphaltic concrete at the thickness specified in the street classification standard details. Type 2 gravel may be replaced with Type 1 gravel on shallow trenches. Gravels shall be compacted to a minimum density equal to 100% of Standard Proctor density.

6.3 ASPHALTIC CONCRETE

Asphaltic concrete shall meet HRM's specification. The asphaltic concrete shall be placed over a Type 1 gravel base. The thickness, number of lifts and type of asphaltic concrete placed in any trench excavation shall be in accordance with the standard detail for the street classification. Asphaltic concrete shall be compacted to a minimum of 92% of the theoretical density based on comparative loose mix samples recovered from the project.

Specific requirements pertaining to the remediation of pavements are provided below;

6.3.1 The pavement thickness shall not exceed that specified for the street classification in the standard detail for the street classification irrespective of pavement types (rigid, flexible, cobble stone).

6.3.2 Asphaltic concrete shall be placed with an asphalt spreader on streets where the SDI is greater than 6.0; the trenches are longitudinal and wider than 1.5 meters

6.3.3 Where a concrete layer directly underlies the asphaltic concrete the concrete shall be replaced with asphalt, and the replacement thickness of asphalt shall be the lesser of 250 mm or the combined thickness of the existing concrete and asphalt structure.

6.3.4 Shallow Trenches are those with a maximum depth of 1.2 m, and are typically for gas lines, telecommunication or electrical conduits and other utilities.

6.3.5 Deep Trenches are those deeper than 1.2 m, and are typically for sewer and water pipes, but may include other utility pipes or conduits.

6.3.6 Except for local streets, the asphaltic concrete joint shall be located outside the wheel path of vehicles.

6.3.7 On streets that have an SDI greater than 4.0 the existing asphaltic concrete shall be cut back far enough that the edge is above gravel and soil that has not been disturbed by the excavation. The minimum cut back shall be 200 mm for shallow trenches and 300 mm for deep trenches.

6.3.8 Prior to placement of asphaltic concrete, the edges of the existing asphalt shall display smooth vertical cuts (full depth asphalt cut is required; however, if asphalt is greater than 250 mm a variance may be approved) which are in a straight line along the outside of the trench and parallel to the pavement cut on the opposite side of the trench. For longitudinal trenches the minimum distance between jogs (approximate 90 degrees to the edge of the pavement) shall be 5 meters, with no more than 4 jogs along any 50 meter section of trench. Jogs are normally not permitted for transverse cuts. Asphalt cuts are not to end at manholes or valves, and shall be a minimum of 1 meter from these structures.

6.3.9 The asphalt edges shall be clean and dry prior to applying a uniform application of tack coat which should be allowed sufficient time to cure prior to the placement of joint sealant and asphaltic concrete.

6.3.10 Adhesive joint sealants such as Denso Reinstatement Tape or equivalent shall be used on construction joints on roadways which have an SDI greater than 4.0. This requirement may be waived in isolated areas where the existing asphalt is in such poor condition that placement of joint sealant is not practical.

6.3.11 At the discretion of the HRM representative Type C-HF asphalt may be utilized for the full depth of reinstatement, and for Local roads Type C-HF may be replaced with Special Type C. Individual lift thicknesses shall not exceed 75 mm for Type B-HF and 50 mm for Type C-HF asphaltic concrete. The Engineer may consider one lift up to 125 mm for narrow and shallow utility trenches with the expectation that the compaction requirements are met. In addition, the surface course shall not exceed the design thickness as specified in the standard detail for the street classification.

6.3.12 The proposed trench asphalt cut on a street with an SDI greater than 4.0 shall be moved to the following locations if within one meter of the:

- edge of existing pavement.
- edge of concrete curb or curb and gutter.
- existing asphalt joint (provide a new clean cut).

6.3.13 Where more than 75% of the street asphaltic concrete pavement width is removed for a trench and the SDI of the street pavement is greater than 6.0 the existing asphaltic concrete on each side of the trench (to the full width of the street pavement) shall be milled and paved to a thickness of 50 mm. Where the street asphaltic concrete pavement width removed is between 50% and 75% and the SDI of the street pavement is greater than 6.0, the existing asphaltic concrete on each side of the trench shall be milled and paved to a thickness of 50 mm to the nearest existing longitudinal asphalt joint. If the existing asphaltic concrete in the above two cases is less than 75 mm, the full depth of the asphalt shall be removed and replaced.

6.3.14 The surface of the asphalt patch shall conform to the cross-section of the street surface to within 6 mm when checked with a 3 meter straightedge placed in any direction. There shall be no noticeable pavement marks or “ripples” caused by rolling and compaction of the asphalt.

6.3.15 Trench reinstatement between October 31 and May 1 shall be considered temporary (unless under an approved Quality Management Plan), and shall be replaced to these specifications the following construction season (between May 1 and June 15). Temporary reinstatement shall include a minimum thickness of 300 mm for gravel and 50 mm for asphaltic concrete.

6.3.16 Trenches that are open to vehicle or pedestrian traffic shall be reinstated with permanent or temporary asphalt (minimum of 50 mm thick) within 5 business days for Local Streets and 3 business days for Collector and Arterial Streets. Temporary asphalt placed between May 1 and October 31 shall be replaced with permanent asphalt within 45 days or by October 31, whichever comes first. Temporary asphalt placed between October 31 and May 1 shall be replaced with permanent asphalt by June 15.

6.3.17 Refer to Part B: Standard Details; Shallow Trench Reinstatement, Deep Trench Reinstatement and Trench Backfill and Reinstatement – Testing.

6.4 CONCRETE CURB, SIDEWALK, AND DRIVEWAYS

Concrete curb, sidewalk, and driveways shall meet the requirements of the HRM specifications.

Concrete curb shall be placed such that the minimum distance between any joints in the existing or proposed curb is 1.2 m.

6.5 TESTING AND ENGINEER'S REPORT

An Engineer's Report is required to certify that the requirements of the Trench Reinstatement specification have been met.

The requirements for bedding, haunch, cover, and structural backfill are included in the standard detail for Trench Backfill and Reinstatement – Testing; however, the Engineer's Report for these materials will only be required when the total length of trench for the project exceeds 100 meters, or when the HRM inspector has reason to believe that the specifications for those materials is not being met by the contractor. Compaction tests may not be required on the Type 2 gravel in emergency situations.

The Engineer shall be a registered professional engineer licensed to practice in the Province of Nova Scotia who is in good standing with Engineers Nova Scotia and experienced in the testing requirements of this specification. The Engineers report shall be submitted to HRM within 2 weeks of completion. Maintain copies of all test results for a period of 2 years after the test date and if requested, make them available to HRM.

6.6 WARRANTY PERIOD

Any Contractor carrying out work under an HRM Streets and Services Permit is deemed to have become familiar with this specification and hereby agrees to carry out the trench reinstatement in accordance with this document. The utility cut shall have a warranty for a period of 2 years as stipulated in By-law Number S-300. Any deficiencies identified by HRM shall be rectified within the time requested by HRM.

MUNICIPAL DESIGN GUIDELINES

PART A: DESIGN GUIDELINES

7.0 CAPITAL DISTRICT

7.1 INTRODUCTION

The Capital District is comprised of Downtown Dartmouth, Downtown Halifax, Gottingen Street, Quinpool Road and Spring Garden Road (refer to Part B: Standard Details). Each of these areas possess their own specific sidewalk, planter, site furnishing, lighting and intersection details as stipulated within the Council-adopted Capital District Urban Design Project - Streetscape Guidelines: (2004). There are some basic design concepts that apply to all situations, however the expression of the designs themselves will vary upon the individual site.

In the Capital District streetscaping is a balancing act of redesigning roads and implementing improvements to commercial street corridors for the purposes of creating destinations that enhance the social experience of these “Places”, their functionality and the aesthetic quality of the public realm and of connecting both the existing and the possible future activities that may occur along them.

7.1.1 General Capital District Streetscape Guidelines

7.1.1.1 Bike Racks:
Manufacturer: Landscape Forms (Or Equivalent)
Single Rack Style: ”Bola”
Double Rack Style: “ Flo”
Finish: Stainless Steel
Colour: Natural

7.1.1.2 Concrete Paver Pattern for Sidewalks:
See Standard Detail in Part B: Standard Details
Outside Edge Soldier Course:
Paver Manufacturer: Terrastone
Paver Colour: Pewter
Interior Field:
Paver Manufacturer: Oldstone
Paver Color: Grand Parade Blend

7.1.1.3 Concrete Tree Grate / Floating Sidewalk:
See Standard Detail in Part B: Standard Details

7.1.1.4 Pedestrian Ramp
See Standard Detail in Part B: Standard Details

7.1.1.5 Waste Receptacles:
Type #1
Manufacturer: Maglin (Or Equivalent)
Model: MLWR200-20
Finish: Powdercoat
Colour: Black Semi-gloss
Mounting: On ground
Type #2
Manufacturer: Belaire Recreation / Paris Manufacturing
Model: HRM Custom #7191180 (Liner Model #719670)

7.2 DOWNTOWN DARTMOUTH STREETSCAPE GUIDELINES

7.2.1 Benches:

Manufacturer: Maglin (Or Equivalent)
Model: MLB300M (with back) or MLB300B (backless)
Finish: Powdercoat
Colour: Black Semi-Gloss

7.2.2 Streetlights

.1 General:
Manufacturer: Holophane (or equivalent)
Model: Lantern Series RSL-350 Series
Size: Dependent on spacing (Manufacturer's recommendation)
Finish: Powdercoat
Colour: Black Semi-Gloss

.2 Alderney Drive, Ochterloney Street and Hawthorne Street
Manufacturer: Lumec (or equivalent)
Model: S26A (with ladder rests / banner arms)
Height/Size: Dependent on spacing (Manufacture's recommendation)
Finish: Powdercoat
Colour: Black Semi-Gloss

7.3 DOWNTOWN HALIFAX STREETSCAPE GUIDELINES

7.3.1 GENERAL

.1 Benches:
Manufacturer: Maglin (or equivalent)
Model: MLB300M (with back) or MLB300B (backless)
Finish: Powdercoat
Colour: Black Semi-Gloss

7.3.2 STREET LIGHTS

.1 General
Manufacturer: Lumec (or equivalent)
Model: S26N (without ladder rests/banner arms)
Height/Size: Dependent on spacing (Manufacturer's recommendation)
Finish: Powdercoat
Colour: Black Semi-Gloss

.2 Halifax Common:

.1 Streetlight Poles:
Manufacturer: Holophane (or equivalent)
Model: Fluted Sitelink
Height/Size: Dependent on spacing (Manufacturer's recommendation)
Base: CH12 "Charleston"
Finish: Powdercoat
Colour: Black Semi-Gloss

.2 Streetlight Luminaires:
Manufacturer: Holophane (or equivalent)
Model: "GranVille Premier" Pole Top
Size: Dependent on spacing (Manufacturer's recommendation)
Housing: M" - Modern Fluted Swing Open Design
Finish: Powdercoat
Colour: Black Semi-Gloss
Trim: None
Finial: None

7.4 HALIFAX AND DARTMOUTH WATERFRONT GUIDELINES

7.4.1 Benches:

Manufacturer: Maglin (Or Equivalent)
Model: MLB300M (With Back) Or MLB300B (Backless)
Finish: Powdercoat
Colour: Black Semi-Gloss

7.4.2 Street Lighting:

Manufacturer: Lumec (Or Equivalent)
Model: CAND1-CN1
Height/Size: Dependent on Spacing (Manufacturer's Recommendation)
Finish: Powdercoat
Colour: Black Semi-Gloss (Halifax Waterfront, Sullivan's Pond and Lake Banook)
Burgundy (Alderney Landing)

7.5 GOTTINGEN STREET STREETSCAPE GUIDELINES

7.5.1 Benches:

Manufacturer: Maglin (Or Equivalent)
Model: MLB 300 m (with back) or MLB 300B (backless)
Finish: Powdercoat
Colour: Black Semi-Gloss

7.5.2 Streetlighting:

Luminarie:
Manufacturer: Holophane (or equivalent) Teardrop
Pole:
Model: Fluted Sitelink
Height / Size: Dependent on spacing (Manufacturer's recommendation)
Base: CH12 "Charleston"
Finish: Powdercoat
Colour: Black Semi-Gloss

7.6 QUINPOOL ROAD STREETSCAPE GUIDELINES

7.6.1 Benches

Manufacturer: Landscapeforms (Or Equivalent)
Model: Parc Vuc
Finish: Stainless Steel
Colour: Natural

7.6.2 Streetlighting

Luminaire:
Manufacturer: to Be Determined
Pole:
Model: Sitelink
Height/Size: Dependent on Spacing (Manufacturer's Recommendation)
Base: to Be Determined
Finish: Brushed Aluminium
Colour: Natural

7.7 SPRING GARDEN ROAD STREETSCAPE GUIDELINES

7.7.1 Benches:

Manufacturer: Maglin (Or Equivalent)
Model: MLB300M (With Back) Or MLB300B (Backless)
Finish: Powdercoat
Colour: Black Semi-Gloss

7.7.2 Streetlight Poles

Manufacturer: Holphane (Or Equivalent)
Model: Fluted Sitelink
Height/Size: Dependent on Spacing (Manufacturer's Recommendation)
Base: Ch12 "Charleston"
Finish: Powdercoat
Colour: Black Semi-Gloss

7.7.3 Streetlight Luminaires

Manufacturer: Holophane (or equivalent)
Model: "Gran Ville Premier" Pole Top LED
Size: Dependent on spacing (Manufacturer's recommendation)
Housing: "M" - Modern Fluted Swing Open Design
Finish: Powdercoat
Colour: Black Semi-Gloss
Trim: None
Finial: None

MUNICIPAL DESIGN GUIDELINES

PART A: DESIGN GUIDELINES

8.0 TREES

8.1 GENERAL REQUIREMENTS

8.1.1 Trees shall be provided wherever concrete curb and gutter is required.

8.1.2 Tree planting shall be undertaken in accordance with Landscape Nova Scotia Specifications, unless stipulated otherwise in this standard.

8.1.3 Trees shall be No. 1 grade in accordance with The Canadian Standards for Nursery Stock. Proof of Horticultural Standards must be produced on the request of the Engineer. Trees shall be warrantied for one full growing season from the time of planting.

8.1.4 Trees shall be a caliper not less than 60 mm, measured at 300 mm above the ground.

8.1.5 Trees shall be soil ball/wire basket with ⅓ of basket cut and peeled back during planting. The tree species selected shall be diversified as much as possible so as not to promote monoculture; with planting of less than 25 trees, no one genus shall make up more than 25%; for planting of between 25-50 trees no genus shall make up more than 15% and plantings of more than 50 trees no genus shall make up more than 10%. Trees selected shall be winter hardy to zone 5. Tree species selected shall be suitable to specific site conditions e.g. overhead wires, etc.

8.1.6 Acceptable tree species include:

<u>Medium Growing Deciduous:</u>

- Ivory Silk Lilac (Syringa)
- Cork (Phellodendron amur)
- Ornamental Pear (Pyns calleryana)
- Ginkgo (Ginkgo Biloba)
- Amur Chokeeherry (Prunus maakii)
- Black Birch (Betula nigra)

<u>Large Growing Deciduous:</u>

- Zelova Maple (Acer saccharum “Green Mountain”)
- Red, Oak (Quercus rubra)
- Hackberry (Celtis occidentalis)
- Linden (Tilia spp.) * only to be planted if residential set back is over 7 meters from the curb. No Tillia cordata “Greensprie” will be permitted.
- Red Maple (Acer rubrum “Morgan”)
- Freeman Maple (Acer freemaini)
- Pin Oak (Quercus palustris)
- European Beech (Fagus spp.)
- White Ash (Fraxinus Americana)
- Green Ash (Fraxinus pennsylvanica)
- London Plane (Platanus acerifolia)
- Elm (Vluvs spp.) * DED hardy species
- Columnar English Oak (Quercus robur “Fastigiata”)* in areas of limit space for canopy width. Areas where visual or sound barrier is required the following evergreens are permitted provided adequate soil area is available.

Evergreens:

- Silver Fir (Abies concolor)
- Balsa Fir (Abies balsamea)
- White Pine (Pinus strobus)
- Red Pine (Pinus strobus)
- Canadian Hemlock (Tsuga Canadensis)

8.1.7 The types of trees and planting locations shall be shown on servicing plans and shall meet the following requirements:

Type of Tree	Minimum Horizontal Distance to Service Lateral	Minimum Vertical Distance to Service Lateral	Planted under Utility Lines
Medium Growing Deciduous	1.5 m*	1m	Yes
Large Growing Deciduous	1.5 m *	1m	Single Phase Primary only
Evergreen	1.5 m*	1m	Depends on Height

*Where this distance cannot be accommodated an approved lateral sleeve may be used at the discretion of the Engineer.

8.1.8 Generally trees shall be planted along both sides of the street and centered between the curb and gutter and the sidewalk (as long as the proper offset is provided between the curb and tree). One tree shall be planted per lot and no further than 25 m apart, exceptions can be made in cases where this distance cannot be accommodated.

MUNICIPAL DESIGN GUIDELINES

PART A: DESIGN GUIDELINES

9.0 STREET LIGHTING

9.1 GENERAL

These standards and design criteria have been developed to permit a level of illumination which will meet or exceed the minimum requirements as recommended by the Illumination Engineering Society of North American (IESNA) Handbook.

The luminaire shall be Light Emitting Diode (LED) technology, only. It shall be designed to properly light the roadway and sidewalk and shall provide maximum spill light cut-off beyond the sidewalk to reduce spill light and glare impacts on local residents as per IES RP-8-0 standards. The Luminaire must be International Dark Sky Association (IDA) compliant.

Refer to section 7.0 Capital District for standards within the Capital District.

9.2 DESIGN CRITERIA

The following table is based on IES RP-8, Table 2 Illuminance Method – Recommended Values and must be used to determine the minimum light levels required for the lighting design in question. Use the table provided below and the explanations of each category to determine what minimum standard to follow.

Illuminance Method						
Road and Pedestrian Conflict Area		Pavement Classification (Minimum Maintained Average Values)			Uniformity Ratio	Veiling Luminance Ratio
Road	Pedestrian Conflict Area	R1 Lux/fc	R2 &R3 Lux/fc	R4 Lux/fc	E avg / E min	L vmax / L avg
Freeway Class A		6.0/0.6	9.0/0.9	8.0/0.8	3.0	0.3
Freeway Class B		4.0/0.4	6.0/0.6	5.0/0.5	3.0	0.3
Expressway	High	10.0/1.0	14.0/1.4	13.0/1.3	3.0	0.3
Expressway	Medium	8.0/0.8	12.0/1.2	10.0/1.0	3.0	0.3
Expressway	Low	6.0/0.6	9.0/0.9	8.0/0.8	3.0	0.3
Major	High	12.0/1.2	17.0/1.8	15.0/1.5	3.0	0.3
Major	Medium	9.0/0.9	13.0/1.3	11.0/1.1	3.0	0.3
Major	Low	6.0/0.6	9.0/0.9	8.0/0.8	3.0	0.3
Collector	High	8.0/0.8	12.0/1.2	10.0/1.0	4.0	0.4
Collector	Medium	6.0/0.6	9.0/0.9	8.0/0.8	4.0	0.4
Collector	Low	4.0/0.4	6.0/0.6	5.0/0.5	4.0	0.4
Local	High	6.0/0.6	9.0/0.9	8.0/0.8	6.0	0.4
Local	Medium	5.0/0.5	7.0/0.7	6.0/0.6	6.0	0.4
Local	Low	3.0/0.3	4.0/0.4	4.0/0.4	6.0	0.4

Road classification definitions for street lighting design criteria follow (note: these definitions do not coincide with the definitions as shown in Table 4.1 Characteristics of Street Classes);

- Expressway: A divided major road for through traffic, with partial control of access and generally with interchanges at major crossroads. Expressways for non-commercial traffic within parks and park-like areas are generally known as parkways.

- Major: The part of the roadway system that serves as the principal network for through traffic flow. The routes connect areas of principal traffic generation and important rural roadways leaving the municipality. These routes are often known as “Arterials”, “thoroughfares” or “preferentials”. They are sometimes subdivided into primary and secondary; however such distinctions are not necessary in roadway lighting. (2.4 cars per minute)

- Collector: Roadways servicing traffic between major and local streets. These are streets used mainly for traffic movements within residential, commercial, and industrial areas. They do not handle long, through trips. Collector streets may be used for truck or bus movements and give direct service to abutting properties. (1-2.4 cars per minute)

- Local: Local streets are used primarily for direct access to residential, commercial, industrial, or other abutting property. They make up a large percentage of the total street system, but carry a small portion of vehicular traffic. (0.07-1 cars per minute)

Pedestrian Conflict;

- High: Over 100 people within the first hour of darkness.

- Medium: 11 to 100 people within the first hour of darkness.

- Low: 10 or fewer people within the first hour of darkness.

Pavement Classification;

Class	Qo	Description	Mode of Reflectance
R1	0.10	Portland cement concrete road surface. Asphalt road surface with a minimum of 12% of the aggregates composed of artificial brightener (eg; Synopal) aggregates (eg; labradorite, quartzite).	Mostly Diffuse
R2	0.07	Asphalt road surface with an aggregate composed of a minimum 60% gravel (size greater than 1cm. Asphalt road surface with 10-15% artificial brightener in aggregate mix. (Not normally used in North America)	Mixed (Diffuse and specular)
R3	0.07	Asphalt road surface (regular and carpet seal) with dark aggregate (eg; trap roack, blast furnace slag); rough texture after some months of use (Typical highways).	Slightly specular
R4	0.08	Asphalt road surface with very smooth texture	Mostly specular

Using all of the information above a minimum light level can be taken from the “Illuminance Method Table”. This is the minimum average maintained light level as per ANSI RP-8-00.
Developers shall be required to tabulate light loss factor total unit input wattages and photometric calculation of proposed LED Fixtures. The photometric calculations shall be completed with software such as “Visual Roadway Tool”. The terms below are defined in ANSI/IES RP-8-00 – “American National Standard Practice for Roadway Lighting”. Provide data for both methods of measurement ie; Illuminance and Luminance shall be provided.

Photometric data must be based on minimum L70 life of 88,000 hour life cycle operating at 25 deg.C for calculation purposes, the (LLD) Lamp Lumen Depreciation and the (LDD) Luminaire Dirt Depreciation will be determined at 88,000 hours (20 years). The (LATF) Luminaire Ambient Temperature Factor is to be taken at 1.04 at 10 deg C. The light loss calculations must be in accordance with IES Lm80 and TM-21, all calculations are to be proven and submitted with the photometric package. If the luminaire light loss depreciation is submitted without LM80 TM-21 test results it shall be taken as 0.7. Light Loss Factor Formula LLF=LLD x LDD x LATF

9.3 LUMINAIRE MOUNTING HEIGHT

Luminaires mounted on wooden poles must comply with the installation drawing “Cobra Head on a Davit Arm” (see standard detail in Part B). Mounting heights will be determined by the position of the secondary conductors existing on the wooden pole. Developers must comply with all regulations provided by Nova Scotia Power and Communication Utilities for spacing between high voltage and communication conductors.

Where the utility poles are not utilized for a street lighting system, the luminaires shall be mounted on an aluminum standard with a break away transformer base and set on a concrete base, as shown in Part B: Standard Details.

9.4 ELECTRICAL DISTRIBUTION SERVICE

Street lighting systems shall be single/three phase 120/208 volt or single/three phase 347/600 volt. The electrical distribution system shall be an un-metered service mounted on a wooden pole, or fed from an Underground Street Light Power Enclosure as shown in Part B: Standard Details.

All work completed must be in compliance with the latest edition of the Canadian Electrical Code (CEC) as well as the Province’s Labour and Advanced Education Department’s procedures, guidelines and bulletins, and must be permitted and inspected by Nova Scotia Power. The Halifax Regional Municipalities Street Lighting Department must be notified of any addition or modification to Halifax Regional Municipality owed street lighting equipment.

9.5 LUMINAIRE, STREET LIGHT BRACKET, AND PHOTO CELL SELECTION

The luminaire, street light bracket, and photo cell will be selected by the Halifax Regional Municipalities Street Lighting Department.

9.6 CONSTRUCTION REQUIREMENTS – UNDERGROUND STREET LIGHT CIRCUITS

9.6.1 All electrical circuits shall be identified using numbered wire tags.

9.6.2 Minimum conduit size shall be 38 mm.

9.6.3 All underground electrical joints shall run to the nearest pole to avoid the usage of underground junction boxes.

9.6.4 All wire runs shall contain an extra conductor as a spare.

9.6.5 Grease all screws and bolts using neverseize.

9.6.6 Minimum wire size #8AWG R90 XLPE.

9.6.7 Tape marretts with super 88 electrical tape.

9.6.8 No split bolts. Use ISCO PBTD3-4 connector.

9.6.9 Transformer base shall be grounded with ground lug. Bundy K2A26U and bonded to ground plate.

9.6.10 Overhead connections shall use KZEP 410 Tyco piecing connector.

9.6.11 Every pole shall have a separate ground plate installed and bonded to pole through ground lug.

9.6.12 Every pole shall have a fuse kit installed for every individual head using fuse kit (Amerace #65U and/or D65U).

9.6.13 Any modifications to any existing street lighting power enclosure shall be approved by the Engineer.

MUNICIPAL DESIGN GUIDELINES

PART A: DESIGN GUIDELINES

10.0 NATURAL GAS PIPELINES

10.1 GENERAL

10.1.1 Natural gas pipelines proposed to be installed within municipal streets shall be located so as to not interfere with, damage or impede maintenance access to any existing municipal infrastructure.

10.1.2 The gas distribution system shall be designed, installed and maintained to meet or exceed the standard set out in all applicable Federal, Provincial and Municipal enactments, codes and specifications, and the Canadian Standards Association (CSA) Oil and Gas Pipeline Systems Standard.

10.1.3 Warning marker tape shall be installed with all natural gas pipelines installed using open trench techniques.

10.2 ENGINEERING PLAN

Prior to any work within the street right of way, a detailed engineering plan must be submitted.

10.2.1 For elevated pressure pipelines, a plan and profile are required which accurately depict the location, depth and dimensions of proposed pipelines and existing sewer pipes, watermains, service connections and other underground utilities within 3.0 meters of the proposed gas pipelines and also including pavement surface, curbs, drainage ditches, sidewalks, trees, street lights, fire hydrants, curb stops, valve boxes, property lines and other relevant features, with respect to the construction to be undertaken.

10.2.2 For plastic (PE) distribution pipeline, and engineering plan is required which accurately depicts all the information noted in 10.2.1 with the exception of depth information, unless otherwise required by the Engineer.

10.3 INSTALLATION WITHIN EXISTING STREETS

10.3.1 Trenchless technology methods shall be used, whenever possible, with particular consideration for crossing of sidewalks, curbs, driveways and in the vicinity of trees.

. 10.3.2 Unless otherwise authorized by the Engineer, horizontal separation of gas pipelines from water and sewer mains shall be approved by Halifax Water and horizontal separation from conduits and duct banks shall be as approved by Nova Scotia Power, Aliant and other telecommunications utilities as applicable.

10.3.3 Gas pipelines shall not be located within the bounds (tops of slope) of a drainage ditch.

10.3.4 Where there are existing structures (buildings, retaining walls, etc.) located at or near street lines, gas pipelines shall be located to accommodate the future reconstruction of such structures.

10.3.5 Gas pipelines shall be located such that the primary root systems of trees are not damaged.

10.4 INSTALLATION WITHIN NEW STREETS

10.4.1 All service connections which cross under the vehicular traveled way must be installed before completion of street construction or by using trenchless technology methods.

10.4.2 Required service laterals shall extend from the main to 1.5 m outside the road right-of-way.

10.5 DEPTH OF COVER

10.5.1 The depth of cover of gas pipelines and service connections shall be a minimum of 750 mm below grade for pavement areas and otherwise a minimum of 600 mm below the surface grade of the street and shall comply with the CSA Oil and Gas Pipeline Systems Standard. The Engineer may require a greater depth to allow for future road reconstruction.

10.6 RECORD DRAWINGS

10.6.1 When not part of new construction and/or the Streets and Services Acceptance Requirements, the utility shall provide record drawings to the Engineer in hard copy and electronic format compatible with the HRM GIS system, within 60 days of the end of the annual construction season.

10.7 STREET RESTORATION

This section applies to the restoration of existing streets after the installation of natural gas pipelines.

10.7.1 All construction shall meet the requirements of the Trench Reinstatement section, HRM Specifications together with the Standard Specifications for Municipal Services, as developed by the Nova Scotia Road Builders Association and Consulting Engineers Nova Scotia Joint Committee on Contract Documents.

10.7.2 All surfaces shall be restored to the same or better condition as previous to the pipeline installation to the satisfaction of the Engineer.

10.7.3 Within Vehicular Travelled Way

Upon approval by the Engineer, pipelines installed by trenching within the vehicular travelled way shall comply with the following:

10.7.3.1 Pavement cuts shall not be permitted for two years on streets which have been resurfaced, reconstructed or received a pavement treatment, unless authorized by the Engineer.

10.7.3.2 Unless otherwise authorized by the Engineer, where it has been longer than 2 years since a street was last resurfaced, reconstructed or received a pavement treatment, the asphalt or concrete pavement shall be cut and reinstated as indicated on the standard details as found in Part B.

10.7.3.3 Unless otherwise approved by the Engineer, pipe trenches shall be backfilled with type 1 gravel compacted to 100 % standard proctor and the minimum width of trench shall be 600 mm plus the pipe diameter.

10.7.4 Outside Vehicular Travelled Way

10.7.4.1 Pipelines installed outside of the vehicular travelled way must be installed without damage to any sidewalks, trees, street lights, fire hydrants, curb stops, valve boxes or any other municipal infrastructure.

10.7.4.2 If any sidewalk or concrete curb and gutter is undermined or otherwise damaged in the opinion of the Engineer, then it shall be reconstructed to meet the requirements of this Guideline.

MUNICIPAL DESIGN GUIDELINES

PART A: DESIGN GUIDELINES

11.0 STREETS AND SERVICES ACCEPTANCE REQUIREMENTS

11.1 GENERAL REQUIREMENTS

Prior to the Halifax Regional Municipality accepting streets and services, the applicant must submit the following:

11.1.1 Record drawings, certified by a Professional Engineer, in 3 mil Mylar and electronic AutoCAD format prepared in accordance with the record drawing procedures contained in this document and a digital ASCII file containing three dimensional coordinates for all critical points, ie. manholes, inverts, valves, water mains, sewers, underground utilities, sign posts, curbs, sidewalk, trees, etc.;

11.1.2 Detailed records of all actual construction costs and quantities breakdown for each street;

11.1.3 All warranty deeds for streets, walkways, easements, parkland, and any other property being conveyed to the Municipality to be conveyed to the Municipality, in the specified form, at no cost to the Municipality;

11.1.4 Three copies of the final plan of subdivision showing the entire constructed Municipal street and all drainage easements or rights-of-way outlined in red; road reserves, walkways and parks outlined in yellow and easements outlined in green.

11.1.5 A certificate of title prepared by a solicitor, in the specified form, certifying that the conveyed lands are free from encumbrances;

11.1.6 Certification by a Nova Scotia Land Surveyor stating that all services have been installed within the boundaries of the streets, easements, walkways and any other land(s) reserved for public purposes; and that the as-constructed centre line of the public street coincides with the final legal subdivision plans of the public street;

11.1.7 Certificate of Compliance from a Professional Engineer certifying that all works have been inspected and are completed according to the approved engineering drawings and specifications;

11.1.8 Copy of the Certificate to Construct from NSE and Professional Engineer's Certification of Compliance with NSE requirements for site stabilization and erosion control.

11.1.9 A final copy of the Geotechnical Materials Testing Report prepared by a certified Professional Engineer including confirmation of materials, the thickness, and compaction of subgrade, and in accordance with section 4.4.1.4.

11.1.10 Warranty Security for one year in the amount of 10% of the actual costs of the streets and services.

11.1.11 Where services such as power-lines, communications, gas mains, etc., are placed within HRM right-of-way, HRM requires certification from the service provider that infrastructure has been designed and installed to their requirements.

11.2 STORM DRAINAGE SYSTEM REQUIREMENTS

11.2.1 Submission and acceptance requirements to Halifax Water Design and Construction Specifications.

11.2.2 Video inspection (CCTV) and report, including catch basin leads (required again immediately prior to end of the warranty security period.) CCTV reports shall require; at a minimum, the date, weather, material, pipe size, length of pipe, location, direction of flow and include an overall plan illustrating the location. Pan and tilt cameras shall be used for all connections.

11.2.3 Pipe test report, including laterals to the property lines.

11.2.4 Manhole and catch basin report.

11.2.5 Sewer lateral cards in Halifax Water format. Non erasable pen shall be used in all fields.

11.2.6 Pipe lateral bedding, materials testing, and compaction results.

11.3 STREET REQUIREMENTS

11.3.1 Professional Engineer's Certification of Inspection and Completion at the following stages of street construction:

- after clearing (pre-construction).
- after grubbing (before culvert and drain installation).
- at subgrade prior to application of any gravels.
- prior to surfacing gravel being applied.
- prior to paving.
- Final (prior to acceptance of services by the Municipality).

11.3.2 Copies of laboratory and field tests of materials (sieve analysis, density tests, concrete compressive strength tests, etc.), confirming that the specified standards for the materials were achieved;

11.3.3 Professional Engineer's Certification of asphalt mix, materials and plant placement are in compliance with HRM asphaltic concrete specification requirements.

11.3.4 Testing and Engineer’s Report as per the Trench Reinstatement section.