DEVELOPMENT REQUIREMENTS

SECTION 2 - DESIGN REQUIREMENTS

INDEX

2.0 INTRODUCTION

The purpose of this section is to outline the general design requirements for the construction of Municipal Services in the City of Mississauga. These requirements, however, are only general and do not relieve the Developer of the responsibility for submitting a finished product of competent Engineering design and construction.

For the approval of any deviation from minimum City Standards and requirements, such deviation(s) shall be specifically referred to by the applicant and/or his agent **with a copy of written approval of the City attached.**

2.01 ROADWAYS

2.01.01 Geometric Design

2.01.01.01 Roadways

Roadway geometric design will be in accordance with the City of Mississauga Geometric Design Standards as outlined on City Standard Drawing. Road widths and Right-of-Ways will be in accordance with the most recent City of Mississauga Standards:

2211.060 Minor Local Residential Road (8.0m pavement on 17m road allowance)
2211.070 Local Residential Road (new subdivisions) (8.0m pavement on 20m road allowance)
2211.080 Minor Residential Collector Road (10m road on 22m road allowance)
2211.090 Local Industrial Road (12.5m road on 24m road allowance)
2211.100 Industrial and Residential Collector Road (14.5m road on 26m road allowance)
2211.110 Minor Arterial Road (15.5m road on 30m road allowance)
2211.120 4 Lane Divided Arterial Road (2-8m lanes, 7.0m island on 35m road allowance)
2211.130 6 Lane Arterial Road (23m road on 35m road allowance)
2211.140 Buffer Road (8.0m road on 17m road allowance)
2211.150 5 Lane Residential Collector Road (17m road on 30m road allowance)
2211.151 Local Residential Road (Pavement offset, 8.0m road on 18m road allowance)
2211.152 Local Residential Road (Pavement offset, 8.0m road on 20m road allowance)
2211.153 City Centre Specific (14.5m road on 25m road allowance)

NOTE: Any development proposal that has non-standard widths or cross-sections should be referred to a P.U.C.C. meeting prior to a first engineering submission being made.

2.01.01.02 Driveway Entrances

Driveway entrances and curb cuts shall be in accordance with the most recent standard drawings for this purpose.

Special designs, dependent upon the expected usage, will be required for commercial and industrial driveways.

All new residential driveways must be paved with 50mm OPSS 1150 HL8 and topped with 25mm OPSS 1150 HL3F from curb to garage on a base of a minimum of 150mm Granular 'A' or 19mm crusher run limestone meeting the requirements of OPSS 1010.

Paving of the driveway is to be undertaken in two separate phases. Phase 1 being the grading of the granular, and the placing of 50mm of HL8 is to be completed at the time of sodding the lot. Phase 2, being the placing of the 25mm HL3F, which will be completed at the time of top course asphalt pavement on the roadway.

The grade of asphalt cement in residential and industrial driveways is to be PG 64-28.

Boulevard driveway slopes should not exceed 8% and should not be less than 2%. Widths of curb depressions for driveways are to be in accordance with the following.

- semi-detached and townhouses 3.8m (12.5 ft)
- detached dwellings under 12m (40 ft) frontage 5m (16.4 ft)
- detached dwellings over 12m (40 ft) frontage 6.5m (21.3 ft)

A minimum 0.6m separation at the curb shall be provided between driveways within cul-de-sacs and elbows along with corner lots and lots abutting walkways. Driveways are to be indicated on the above ground general plan.

The minimum clear distance between the edge of driveway and a utility structure or hydrant shall be 1.2m.

All new industrial driveways shall consist of a minimum of 40mm HL-3, 85mm HL-8 and 350mm of OPSS 1010 Granular 'A'.

For industrial commercial driveways, specific designs based on anticipated loads are required.

2.01.01.03 Special Designs

Special road designs, which are not covered by City of Mississauga Standards, shall be in accordance with the most recent provisions of the geometric design standards manual and urban street geometrics, as adopted by the Municipal Engineers Association.

i.e. Special Design will be required in high density residential, commercial and industrial areas.

Pavement design shall be in accordance with the most recent City of Mississauga Standards and the Ontario Provincial Standard Drawings and Specifications.

Complete mechanical analyses of the proposed sub-grade are to be taken at maximum intervals of 150m along proposed roads. On small sites, a minimum of two mechanical analyses will be required.

2.01.02 Pavement Design (Roadways)

A soil analysis must be conducted by a licensed Geo-technical Engineering firm that is acceptable to the City of Mississauga. Copies of the soil analysis, along with proposed road designs, shall be submitted to the City Transportation and Works Department.

Minimum thicknesses of asphalt and granular materials shall be as indicated on City Standard Drawing No. 2220.010.

The Granular “B” Type 1, shall have a maximum of 65% passing the 4.75mm sieve.

In all cases:

- Base course asphalt shall be O.P.S.S 1150 H.L.8 on residential roads and heavy duty binder course (HDBC) in accordance to OPSS 1150 and/or 1154 for industrial and arterial roads.

- The wearing course of asphalt shall be:

  - For Local Roads
Collector Roads
Industrial Roads O.P.S.S. 1150 H.L.3
  - For Arterial Roads O.P.S.S. 1150 H.L.I

- Asphalt job mix designs, approved by the developer’s Geo-technical consultant, shall be submitted to the City of Mississauga for review a minimum of 5 working days prior to the commencement of paving for review.

- The asphalt mix designs shall have a minimum asphalt cement content of 5.00% for H.L-8 asphalt, and 5.3% for H.L-3 asphalt

- The grade of asphalt cement for HL-8 and HL-3 asphalt on residential roads shall be PG 58-28. HL-8 asphalt may contain up to a maximum of 20% RAP. However mixes containing more than 20% RAP, will have PG 58-34 asphalt cement. No RAP is allowed in any Heavy Duty Binder Course (HDBC) or surface course asphalt mixes. The average A/C content of all tests must be no lower than the A/C content specified in the SMF.

- The grade of asphalt cement for industrial and arterial road mixes shall be PG 64-28

- O.P.S.S.1010 Granular "A" and Granular "B" materials are to be used for road construction in the City of Mississauga. The granular materials must not contain any crushed concrete or recycled asphalt pavement.

- Base asphalt thickness may be reduced by the developer if the requirements of Standard 2220.010 “Pavement and Road Base Design Requirements” are satisfied.

- The depth of Granular ‘B’ as indicated is applicable to situations where subgrade material and all trench backfill material had been placed and compacted as per OPSS and the water content is within 2% of optimum moisture content. Where the moisture content is above 2% of optimum, crusher run limestone shall be utilized in lieu of granular ‘A’ and ‘B’. However, if the water content is greater than 7.5% above optimum moisture content, road construction shall be deferred.

2.01.02.01 Placement of Top Course Asphalt within Subdivisions

Complete all sidewalk works.

Complete all curb works.

Complete all boulevard works.

Complete top course asphalt driveway paving.

Raise manhole frame and grates as well as catchbasin frame and grates and paint rims with orange flourescent paint to make them visible to drivers. Warning signs are to be placed at all access points to the subdivisions indicating that there are raised manholes and catchbasin frame covers ahead. Placement of top course asphalt shall be completed within two weeks of raising the frames and grates.

Flush and sweep surface prior to evenly applying tack coat.

2.01.03 Curbs and Gutters

All new streets shall have curb and gutter construction.

Curb and gutter is to be designed and constructed to the most recent City Standards and Ontario Provincial Standards.

Curb depressions are required at each intersection or pedestrian road crossing.

A driveway entrance is required for each lot as detailed within Section 2.02.01.02.

A minimum of 150mm of OPSS 1010 granular material compacted to 98% Standard Proctor Density will be required as a base for all types of curb installations.

Two-stage curb installation must be in accordance with City standard 2230.010

Minimum grade on curb is 0.75% on cul-de-sac bulbs and outside road elbows.

Concrete Specification

The concrete sidewalk shall be constructed according to OPSS 353, 904 & 1350. The concrete shall meet the most stringent requirements of OPSS or the contract documents. The concrete shall meet the requirements of the most current OPSS 1350, be a C-2 mix (32 MPA, 5 – 8% air content), as described in the most current CSA 23.1.

The expansion joints shall be constructed at locations described within the OPSS. Expansion joints shall be constructed where-ever the newly poured concrete meets a rigid object such as previously poured concrete, street poles, retaining walls, etc. The expansion material shall extend the full depth of the concrete.

The concrete shall be cured as per OPSS 904. The rate of application of the curing compound shall be as per the manufactures recommendation or at a minimum rate of 0.2 l/m² if not noted. All surfaces shall be covered shortly after finishing works are complete and when the surface will not be affected by the cover material (initial set). Uncured concrete will be rejected.

2.01.04 Sidewalks

2.01.04.01 Location

Sidewalks shall be constructed on City of Mississauga streets as shown on the City's Road Cross-Section Standards and should be located on the same side as the streetlight poles:

2211.060 Minor Local Residential Road
2211.070 Local Residential Road (new subdivisions)
2211.080 Minor Residential Collector Road
2211.090 Local Industrial Road
2211.100 Industrial and Residential Collector Road
2211.110 Minor Arterial Road
2211.120 4 Lane Divided Arterial Road
2211.130 6 Lane Arterial Road
2211.140 Buffer Road
2211.150 5 Lane Residential Collector Road
2211.151 Local Residential Road (Pavement offset, 18m road allowance)
2211.152 Local Residential Road (Pavement offset, 20m road allowance)

2.01.04.02 Specification

Sidewalks shall be designed and built according to the most recent City of Mississauga Standards and specifications, which include:

Concrete sidewalks shall normally be a minimum of 130mm thick and 180mm thick across commercial or industrial driveways respectively.

No special bedding requirements are normally necessary where sidewalks are constructed upon earth which has been properly consolidated to 98% Standard Proctor and has a bearing capacity of at least 75 kPa.

Sidewalks shall not be constructed on organic soils.

Where fill is required to bring the sidewalk to approved grade, the fill shall be OPSS- Granular 'A' material compacted to a minimum of 95% Standard Proctor Density.

The concrete sidewalk shall be constructed according to OPSS 351, 904 & 1150. The concrete shall meet the most stringent requirements of OPSS or the contract documents. The concrete shall meet the requirements of OPSS 1350, be a C-2 mix (32 MPA, 5 – 8% air content), as described in the most current CSA 23.1.

Expansion joints shall be installed every 6 metres and the expansion joint material shall extend to the full depth of the sidewalk with no concrete extending to the other each side of the joint. The expansion joints shall be constructed at locations described within the OPSS. Expansion joints shall be constructed where-ever the newly poured concrete meets a rigid object such as previously poured concrete, street poles, retaining walls, etc.

All utility structures are required to be isolated from the main concrete by "boxing out" the structure with forms. The formwork shall form a square box, and be no closer than 150mm from any point of the utility structure. Origination of the box shall be determined in the field by the city representative. The area inside the box, surrounding the structure shall be filled with C-2 concrete, or concrete that matches the concrete mix of the main concrete pour.

Expansion joint material shall be placed between the main concrete and the concrete surrounding the pole, as well as around the utility structure itself, or be constructed as per the detail shown in City Standard 2240.010.

The concrete shall be cured as per OPSS 904. The rate of application of the curing compound shall be as per the manufactures recommendation or at a minimum rate of 0.2 l/m² if not noted. All surfaces shall be covered shortly after finishing works are complete and when the surface will not be affected by the cover material (initial set). Uncured concrete will be rejected.

2.01.05 Transit Concrete Pads & Platforms

- Concrete is to conform to OPSS 351
- Concrete pads and platforms shall have a thickness of 180mm
- 100mm of OPSS Granular ‘A’ or 19mm crushed concrete meeting gradation requirements of OPSS Granular ‘A’ shall be placed and compacted to a minimum of 95% Standard Proctor Density.
- Final platform location to be approved by the City of Mississauga.
- For use with City of Mississauga Standards 2250.010, 2250.020 and 2250.030

2.02 REGIONAL SERVICES

2.02.01 Sanitary Sewers

Information regarding the design criteria and standards for sanitary sewers must be obtained from the Region of Peel, Public Works Department.

2.02.02 Watermains

Information regarding the design criteria and standards for watermains must be obtained from the Region of Peel, Public Works Department.

2.03 STREET NAME AND TRAFFIC SIGNS

2.03.01 Plan

A separate plan shall be submitted showing the proposed location of signs to be installed in the subdivision. The plan shall be part of the engineering drawings which must be approved by the Commissioner of Transportation and Works. The above ground plan may be used for this purpose provided the signs can be clearly shown without cluttering other details.

2.03.02 Street Name Signs

Street name signs shall be placed at every intersection and shall be double sided. These signs shall be placed in the locations and shall be of the type shown on City Standard Drawing No. 2420.010.

Temporary street name signs, approved by the Commissioner of Transportation and Works, must be erected at intersections upon completion of rough grading of the roadways. These signs must be maintained in legible condition until such time as the permanent street name signs are in place.

2.03.03 Traffic Control Signs

Traffic control signs shall be located as shown on City Standard Drawing No. 2420.010. Where the positioning is not covered by the standard drawing, the location must conform to the most recent versions of the Uniform Traffic Control Devices for Ontario or the Highway Traffic Act Regulations for Ontario.

Signs are to be located on the right-hand side of the roadway. Signs in any other position will be considered only as supplementary to the signs in the normal position.

Signs shall be mounted at right angles to the direction of and facing the traffic they are intended to serve.

Signs are to be aluminium, anodized both sides, according to the following requirements:

Sizes

600mm	-	1.6mm utility series
600mm - 900mm	-	2.0mm No. 65ST6
over 900mm	-	3.2mm No. 65ST6

All traffic control signs are to be made with high intensity type reflective sheeting approved by the Ministry of Transportation Ontario, the current standards of the Manual of Uniform Traffic Control Devices for Ontario, the Highway Traffic Act Regulation for Ontario and the Commissioner of Transportation and Works, including colours.

2.04 ROADWAY MARKINGS

The Developer will design pavement markings for all roadways over two lanes in width or as required by the Commissioner of Transportation and Works. The design shall be in accordance with the Manual of Uniform Traffic Control of Ontario and as approved by the Commissioner of Transportation and Works.

2.05 TRAFFIC SIGNALS

Traffic signal handwells, power service pedestals and conduit are to be designed in accordance with City Standard Drawing No.'s 2060.010 and 2060.110 and OPSD 2112.010 and 2122.020. Ministry of Transportation Ontario PHM-125 base plans are to be supplied to the City showing intersection geometrics, conduits and power service pedestals. Traffic signal power service pedestals are also to be indicated on the subdivision electrical drawing.

2.06 STREETLIGHTING

2.06.01 Lighting Levels and Uniformity Ratio

Streetlighting shall be supplied and installed on all streets and pedestrian walkways in the subdivision. Detailed design criteria and standards are contained within the City's most recent Street Lighting Design Manual and are based on ANSI|IES RP-8.

2.06.02 Light Source

The light source shall be High Pressure Sodium.

2.06.03 Light Fixtures

The light luminaire and pole shall be as approved the Commissioner of Transportation and Works and Enersource Hydro Mississauga.

2.06.04 Approval and Construction

Approval of plans for streetlighting must be obtained from Enersource Hydro Mississauga. The Developer must guarantee and maintain the lighting for one year after the electrical system assumption in accordance with the electrical subdivision agreement with Enersource Mississauga Hydro. Energy charges will be paid by the City upon energization of the streetlighting.

2.07 RESIDENTIAL LOT DRAINAGE AND SODDING

2.07.01 General

- Lots (including drainage ditches or swales) are to be completely topsoiled and sodded with a minimum depth of 100mm of topsoil and No. 1 Nursery Sod.

- Grade areas to:

  - Provide proper surface drainage and maximize usable land area.
  - Preserve existing trees where possible.
  - Direct drainage away from houses

- Minimum yard slope - 2%

- Minimum driveway slope 2% and all driveways must slope away from the dwelling.

- Maximum driveway slope -8% (from standard sidewalk location)

- Maximum grade between houses in any direction:

  -3 horizontal : l vertical, use steps and/or retaining walls if this requirement cannot be met.

- Provide a 0.60 m wide flat access strip (at 2%) along at least one side of the building where side yard setback permits. (Usually along the garage side or side door entrance).

- Clear stone rather than topsoil and sod are required for combined side yards between two buildings which are 1.20m or less. For side yards greater than 1.2m clear stone may be required at the discretion of the Commissioner of Transportation and Works.

- Overland Flow Route:

- Maximum ponding depth is 0.35m

- Where overland flow is directed between two dwellings, the depth and width of the swale must be such that the 100 year flow does not come in contact with the dwelling. Basement windows will not be permitted on the side of the dwelling abutting the overland flow route swale.

2.07.02 Type of Drainage Pattern

- Back to front drainage may be considered if the side yard building setback is a minimum of 1.2m for each lot totalling 2.4m of open space between the dwellings.

- Rear yards which drain through abutting lower back-to-front type lots are permitted where:

    - Sufficient fall is available between the adjacent streets to achieve desired grades for swales and yards.

    - Cut-off swales along the rear lot lines are to direct run-off from the upper lots into the lower lot side yard swales.

    - Down spouts on the upper lot do not direct flow to the lower lots.

    - No more than one upper lot shall drain into the lower lot side yard swales.

2.07.03 Rear Yard

- A minimum of 75% of the rear yard area is to be usable (2% to 4% slope).

- Retaining walls are to be employed where necessary to achieve the required rear yard areas.

2.07.04 Swales

- Longitudinal slope - minimum 2%

- Side slopes - maximum 3 horizontal to l vertical

- Rear Yard Swale To Rear Lot Catch Basin:
    - Maximum length of rear yard swale
        - On lots less than 12 m in frontage - three lots
        - On lots 12m and greater in frontage - two lots
    - Location of Centreline of swale - 1.0m maximum offset from rear lot line

- Maximum swale depth - 450mm

- Side Yard Swale~~:~~ Depth:

    - Maximum 250mm (450mm allowable if combined side yard is more than 3.6m)
    - Minimum 150mm

2.07.05 Retaining Walls

- Retaining walls are generally required where the difference in elevation exceeds 0.60m.

- Details of retaining walls over 0.60m are to be submitted with grading plans and stamped by a Professional Engineer. It is preferable that the Engineer who stamped the plan certifies the wall construction.

- Construct retaining walls entirely on the upper lot so that tie backs do not cross property boundaries.

- Certification by the consultant stating that the retaining wall is designed and constructed to meet the most recent design standards as to granular backfill, structural integrity, materials, tie backs, line and grade is required.

- For retaining walls 0.6m to 1.0m in height light weight pre-fabricated concrete retaining wall products may be utilized. For retaining walls greater than 1.0m in height, heavy block or wet walls are to be utilized.

- Fencing is required where retaining wall height exceeds 0.6m.

2.08 EROSION AND SEDIMENT CONTROL

2.08.01 General

In accordance with the City of Mississauga Erosion and Sediment Control By-law No. 512-91, as amended, an Erosion and Sediment Control Permit must be obtained prior to undertaking any land disturbing activities on development sites greater than one (1) hectare in size or on development sites of any size that are adjacent to a body of water. Copies of the By-law and the permit application package are available through the Infrastructure and Environmental Planning Section of the Transportation and Works Department.

All erosion and sediment controls are temporary applications constructed prior to any land disturbing activities on the site and shall be maintained throughout the duration of the construction period. *Permits can be issued based on Stage 1 - Earthmoving Operations and Stage 2 - Servicing Works.*

All activities on the site shall be conducted in a logical sequence to minimize the area of bare soil exposed at any one time.

All disturbed ground left inactive shall be stabilized by seeding, sodding, mulching or covering, or other equivalent control measure. The period of time of inactivity shall not exceed 30 days, unless otherwise authorized by the Commissioner of Transportation and Works.

All erosion and sediment controls should comply with the requirement of “The Erosion and Sediment Control Guidelines from Urban Construction,” issued by the Greater Golden Horseshoe Area Conservation Authorities.

2.08.02 Sediment Basins

Temporary sediment basins shall be constructed on sites having a disturbed drainage area of greater than 2 hectares or having an average slope greater than 12%.

The basin shall be designed to settle out soil particles that are 0.04mm in diameter or larger from surface water runoff and/or storm sewer flows, and shall meet the following requirements:

- The minimum basin volume shall be 125 m^3 per hectare of contributing drainage area.

  NOTE: The total basin volume consists of storage zone volume and the settling zone volume.

- The surface area of the basin shall be designed using the following equation:

$$A = \frac{1.2\,Q}{V_s}$$

,where V_s = Settling velocity (0.0021 m/s for 0.04mm diameter soil particle)
A = Surface area of basin (m^2)
Q = Peak inflow rate (m^3/s)

  NOTE: The peak inflow rate shall be calculated using a 1:10 year return period based on the City of Mississauga Standard Intensity Duration Frequency Rainfall Curves (City Standard Drawing No. 2111.010) *(Q=C x i x A)*

  The basin length to width ratio shall be greater than 2 and, if less than 10, a baffling system is required to be used to prevent "short circuiting" and to minimize "dead zones".

- The storage zone depth shall allow for one year of estimated sediment yield based on the Universal Soil Equation.

  The Universal Soil Equation is:

$$E = 2.24\,R\,K\,Ls\,Vm$$

where E = Amount of soil loss per unit area for the time interval represented by the factor R (tonnes/ha)
R = Rainfall factor (Joule/ha)
K = Soil Erodibility Factor (tonnes/Joule)
Ls = Topographic factor (dimensionless)
Vm = Erosion control factor (dimensionless)

NOTE: Factors used in the Universal Soil Loss Equation shall be in accordance with the most recent Ontario Ministry of Transportation published data.

To determine the volume of soil loss per unit area assume a soil density of 1 tonne/m^3.

The minimum storage zone volume of the basin shall be $50m^3$ per hectare of contributing drainage area.

- The ratio of the basin length to the settling zone depth is to be less than 40 to prevent scouring of the storage zone. The minimum settling zone depth shall be 0.6m.

- The outlet of the basin shall be designed to provide a minimum of 24 hours of detention time and to prevent turbulence and re-suspension of settled particles.

- The basin shall have a maximum side slope of 3:1.

- The basin shall have a minimum freeboard of 0.3m.

- The basin shall be provided with an emergency spillway

- 1.8m high chain link fence shall be erected along the perimeter of any sediment basin. A warning sign shall be attached to the security fencing stating that the area is off limits to the general public and advising that the basin is used for sediment control purposes and that the enclosed area is subject to flash flooding.

- For Subdivision the temporary sediment basins are not to be removed until 80% of the development has been developed and sodded.

2.08.03 Catchbasin Sediment Control

During construction, all catch basins shall be provided with sediment control, in accordance with the following requirements.

Catchbasin Sediment Trap

Catch basin sediment traps shall be provided for unpaved areas draining 2 hectares or greater and less than 4 hectares and shall be constructed in accordance with City Standard Drawing No. 2930.010.

Sediment removal is required when the depth from the underside of frame to top of the accumulated sediment is reduced to 300mm.

Catch basin Sediment Barrier

All rear lot catch basins or catch basins within unpaved areas draining less than 2 hectares shall be provided with a sediment control barrier in accordance with City Standard Drawing No.'s 2930.020 or 2930.030.

Roadway Catch Basin Sediment Control Device

Under appropriate drainage circumstances, all roadside catch basins shall be provided with sediment protection in accordance with City Standard Drawing No. 2930.040 or *2930.050*

2.08.04 Sediment Control Fence

Sediment control fences shall be placed along all downslope sides of a site along the edges of a drainage channel passing through the site, and along the perimeter of all other areas sensitive to sediment accumulation. The sediment control fence shall be constructed in accordance with City Standard Drawing No. 2940.010.

2.08.05 Vegetative Buffer Strips

A minimum 3m wide *undisturbed* buffer strip shall be *maintained* along the limits of the development adjacent to existing road boulevards. Where a sediment control fence is required, it shall be constructed in front of the buffer strip.

2.08.06 Topsoil Stockpile Protection

All topsoil stockpiles containing more than 100m^3 of material shall be located a minimum of 10m away from a roadway, drainage channel or an occupied residential lot. The maximum sideslopes for topsoil stockpiles shall be 1.5 horizontal to 1.0 vertical.

Runoff from all topsoil stockpiles shall be controlled by a sediment control fence or other approved devices. If remaining for more than 30 days, topsoil stockpiles shall be stabilized by vegetative cover, or other means.

2.08.07 Stone Pad Construction Entrance - Construction Access

In order to reduce the tracking of mud onto a paved street, a pad of crushed stone shall be constructed at the site entrance and exit leading onto any existing road. The stone pad shall be a minimum of 300mm thick, 15m long and 10m wide. The first 10m from the entrance/exit shall be constructed with 50mm clear stone. The remaining 5m shall be constructed with 150mm rip rap. This stone pad must be maintained as required given the site conditions to ensure mud tracking is kept to a minimum. *The Stone Pad Construction Entrance shall be constructed in accordance with City Standard Drawing No. 2970.010*

2.08.08 Rock Check Dam

Rock check dams are to be installed in ditches and swales in accordance with City Standard Drawing No. 2980.010.

2.08.09 Site Conditions/Inspection

All disturbed ground left inactive shall be stabilized by seeding, sodding, mulching or covering, or other equivalent control measure. The period of time of inactivity shall not exceed 30 days, unless otherwise authorized by the Commissioner of Transportation and Works.

All erosion and sediment control devices are to be inspected by the Consulting Engineer once per week and after each rainfall of 1 cm or greater to ensure that they are in proper working condition.

2.09 DRAWINGS

2.09.01 Specifications for Engineering Drawings

Size:	-	Drawings to be A1 Metric (594mm x 84lmm)
	-	Plans to have a minimum of 50mm waste material on right hand side of plan (next to title block)
Format:	-	Same as City of Mississauga Transportation and Works Department standard sheets unless otherwise approved.
Materials for Final Submission and "as-constructed" drawings	-	Translucent Mylar (.04mm matte)
	-	Black Ink (permanent), original 1st generation plots only
Materials for Preliminary Submissions	-	Mylar (0.4mm matte)
	-	Black Ink (permanent), original 1st generation plots only

2.09.02 General Drawing Requirements

Work on the drawings is to be done neatly and legibly.

Permanent black ink is to be used with the exception of the following:
- proposed utilities invert elevations, lot elevations, and profiles which may be done in pencil.
- existing conditions and profile grid which may be done in red ink (permanent)

Drawings are to include the signature and seal of the Professional Engineer responsible for the design.

The applicant is to relate all wording to a current and existing City of Mississauga benchmark value without applying any shift. Any submissions that show elevation values related to a datum other than the 1928 Canadian Geodetic Datum (i.e.the Mississauga Datum) will not be accepted.

Rubber stamps shall not be used except for the Engineer' seal.

Nothing shall be affixed to the drawing with tape or adhesive.

The drawings must contain a note indicating the submission phase to which they apply, and a space must be provided for the initials of the city staff who reviewed the submission. The caption for this space should read "reviewed by".

2.09.03 General Plans

2.09.03.01 Above Ground Plans

General plans showing aboveground services and appurtenances are to be drawn to a scale of 1 to 1000 or larger and shall indicate but not be limited to the following:

- School signs
- Street signs
- Future land use signs
- Barricades
- Fencing
- Retaining walls
- Rear lot/block catchbasins
- Screen planting
- Any required easements including dimensions and descriptions
- Driveway location for corner lots
- Driveway locations and building envelopes for detached dwellings less than 12 metres, Semi-detached dwellings and townhouse dwellings
- A typical detail showing building envelopes, driveway location and widths, driveway curb cut and dimension for detached dwellings less than 12 metres, semi-detached dwellings and townhouse dwellings
- Bus stop platforms
- Community mail box

2.09.03.02 Below Ground Plans

General plans showing all below ground services and appurtenances are to be drawn to a scale of 1 to 1000 or larger and are to include any required easements.

2.09.04 Storm Drainage Plans

Storm drainage plans are to be drawn to a scale of 1 to 1000 or larger (a scale not exceeding 1 to 5000 will be accepted for large external drainage areas) and are to indicate the total area to be drained by the proposed storm sewers. The storm drainage plan is to be compatible with the grading plan and the City's latest contour mapping. The storm drainage plan shall indicate but not be limited to the following:

- Existing contours
- Drainage patterns of adjacent lands
- Runoff coefficients and areas (ha) of tributary areas outside the development and for each section of the storm sewers within the development
- Direction of runoff
- Street names
- Manhole numbers
- Sewer sizes and slope
- Directions of flow in the sewers
- Any catchbasins or swales, on the lots or blocks, required to pick-up the runoff
- Temporary or permanent quantity and quality storm water management facilities
- Overland flow route
- Culverts and other drainage appurtenances

2.09.05 Grading Plans

Grading plans for lots and blocks are to be drawn to a scale of 1 to 500 or larger showing existing contours established from field elevations.

The grading plans shall indicate but not be limited to the following:

- Existing contours
- Proposed elevations at the following locations:
  - Along the centre line of any existing or proposed roads (maximum 30m apart)
  - Centre line of each lot at the front and rear building line
  - At the corners of each lot and block
  - At frequent intervals along block property lines
  - Proposed contours for grading within large blocks and parks
  - Any other points necessary to give proper picture of the proposed drainage scheme including tops of catchbasins, bottoms of swales and top and bottom of retaining walls
- Existing contours and elevations within the plan and at least 30 metres externally. The external contours are to be extended far enough to determine the existing drainage pattern. In addition to the above, grading plans for parks are to indicate existing contours at 0.5m intervals along with all existing trees, structures, watercourses, etc.
- Percent street grades for all roads within the development. The distance of the particular grade shall also be included.
- Overland flow route.
- Easements including dimensions and descriptions
- Fencing
- Retaining walls
- Drainage types in accordance with typical details
- Cut off swales and catchbasins to intercept interim block drainage and external drainage

2.09.06 Plan-Profile Drawings

Plan-profile drawings are to be drawn to a horizontal scale of 1 to 500 and a vertical scale of 1 to 50 and are to conform to the following:

- Where two or more sheets are required for one street, match lines must be used and there is to be no overlap or duplication of information

- Where intersecting streets are shown on a plan-profile, only the diameter of the pipe and direction of flow of the intersecting sewers are to be shown. This also applies to easements for which a separate plan-profile has been drawn.

- On plan-profile drawings the type of sewer (sanitary or storm), the diameter, length, grade and class of pipe are to be shown on the profile portion of the drawings only. Only the type and diameter are to be shown in the plan portion

- Where possibility of conflict with other services exists, connections are to be plotted on the profile

- Pavement/road base designs for the particular roadway are to be indicated on all plan-profile drawings

- The detail information from all borehole logs is to be plotted on the profile drawings and located on the plan. If this interferes with some other detail such as a manhole, the exact location may be altered sufficiently for clarity. Borehole information should contain a borehole plot plus a brief description of soils and the water level. The borehole log must extend a minimum of (1) metre below the lowest manhole in the vicinity.

- Gutter drainage details for temporary turning radii and cul-de-sacs

2.09.07 As-Constructed Drawings

2.09.07.01 General

Prior to final acceptance of a subdivision by the City of Mississauga, the Developer's Engineer shall produce a complete set of ”as-construct” drawings for the development and supply same to the Transportation and Works Department of the City of Mississauga. In addition, a complete set of Mylar reproductions (minimum 0.003 thickness, reverse reading, matte both sides, blackline) shall be prepared from the "as-constructed" originals and supplied to the Public Works Department of the Regional Municipality of Peel.

In addition to the above, the Region of Peel has additional requirements that consist of, “as-constructed” digital files in Microstation (DGN) format Version 5 or higher, after the following have been completed,

- One set of folded prints submitted for review prior to sending the originals
- CAD files on CD 1 each of the plan & profiles - including Regional drawing number to be submitted to the Public Works Department of the Regional Municipality of Peel

These drawings shall show the location both horizontally and vertically of everything which is on or under the lands to be accepted by the City.

These drawings shall be sealed and signed by a Registered Professional Engineer and stamped "As-Constructed" and dated.

2.09.07.02 Drafting Requirements for "As-Constructed" Drawings

Storm Sewers, Sanitary Sewers and Watermains shall be "as-constructed" in all cases. Other specialized "as-constructed" information may be required in certain instances. Direction will be given by the Transportation and Works Department on an individual project basis, as required.

2.09.07.03 Storm Sewers

All sewer invert elevations, if different than proposed, are to be indicated on the as constructed drawings. If the difference is greater than 150mm affected portions of sewer (in profile) to be redrawn. Hydraulic calculations are to be provided, reflecting these changes, for review and approval.

Any manhole locations which differ by more than 1.50m from proposed are to be redrawn in both plan and profile.

The following shall be indicated on the "as-constructed" drawings, if different than proposed:

Type of manhole

Pipe size

Grade of sewer

Type of sewer material

Class of pipe

Type of bedding

Stormwater Management

A topography survey is to be provided for the swim pond prior to servicing approval and/or prior to assumption of the swim pond.

2.09.07.04 Sanitary Sewers

All sewer invert elevations, if different than proposed. If difference is greater than 150mm affected portions of sewer (in profile) to be redrawn.

Any manhole location which differs by more than 1.50m from proposed to be redrawn both in plan and profile.

The following shall be indicated on the "as-constructed" drawings, if different than proposed:

Type of manhole

Pipe size

Grade of sewer

Tee chainage from downstream manhole

Type of sewer pipe material

Class of pipe

Type of pipe bedding

Original ground at centre profile to remain on all plans

Lateral ties and elevations

This section is duplicated in 4.02.09 Drafting Requirements for As Constructed Drawings

2.09.07.05 Watermains

All watermain elevations, if different than proposed. If difference is greater than 150mm, affected portions of watermain (in profile) to be redrawn.

All alignment changes greater than 150mm to have offsets revised in plan. If alignment changes exceed 1.5 metres, watermain to be redrawn in plan as well as indicating revised offsets.

All main valves are to be tied to permanent features, such as buildings, manholes, catchbasins, etc...

Ties and elevations to all stubs.

The following shall be indicated on the "as-constructed" drawings, if different than proposed:

Pipe size

Type and class of pipe

Type of bedding

All fitting changes (bends, reducers, blocking, etc...)

Type of valves and hydrants

Original ground profile over watermain (if applicable) to remain

This section is duplicated in 4.02.09 Drafting Requirements for As Constructed Drawings

2.09.08 Erosion and Sediment Control Plans

The erosion and sediment control plans are to be prepared in accordance with the requirements of Erosion and Sediment Control By-law No. 512-91, as amended. Copies of the By-law *and permit application package* can be obtained from the *Infrastructure and Environmental Planning Section* of the Transportation and Works Department.