

## Servicing, Grading and Drainage Plan - City of Burlington

In Compliance with Sentence B-9.14.6.1 of the Ontario Building Code, every site is to be graded so that water will not accumulate at or near the building under construction and will not adversely affect any adjacent properties. The lot grading criteria has been primarily developed to provide guidance to residential development in subdivisions. The basic principles do however apply to properties under site plan development. It should be noted that the grading design for any residential buildings containing three or more dwelling units and for any development other than residential, shall be performed by a professional engineer. Where there is a landscape plan proposed as part of the site plan application, the professional engineer designing the site grading plan shall review the landscape plan and shall provide the City of Burlington with a declaration advising that the proposed landscape works are in conformance with the site grading plan. Once construction is completed, the professional designing the site grading plan shall provide the City of Burlington with a Lot Grading Certificate and any required Retaining Wall Certificates.

A detailed site servicing, grading and drainage plan must accompany all building permit applications to the City of Burlington. Building permits will not be issued until the City of Burlington Development Services Department is satisfied with the proposed lot grading plan.

Prior to a site servicing, grading and drainage plan submission, contact the following external authorities for specific design criteria should the subject properties abut or contain:

- A watercourse/valley/creek block regulated by the Halton Region Conservation Authority
- Ontario Hydro property
- CNR or CPR
- Pipelines or pipeline easements
- If a driveway is proposed on a municipal road within 180m of an intersection with a Provincial Highway (QEW, 403, 407)
- Frontage or access to Regional Roads (Region of Halton or Peel)
- Land adjacent to Lake Ontario (Ministry of Natural Resources and Halton Region Conservation Authority)

The grading of landscaped areas and parking lots shall provide a safe path for the overland flow route to the surrounding City of Burlington right of way during storms exceeding the design storm event.

City of Burlington requires that all roof leader down spout locations are to be indicated on site servicing, grading and drainage plans.

City of Burlington also requires that Landscape Plans and Tree Preservation Plan to be reviewed and approved by the consulting Engineer to ensure conformance with approved site servicing, grading and drainage plans. Site servicing, grading and drainage plans shall be designed in accordance with City of Burlington Development Engineering standards, including City of Burlington Safe Side Slope requirements.

City of Burlington Requirements for Site Servicing, Grading and Drainage Plan:

- Information Required on Site Servicing, Grading and Drainage Plan shall be submitted as one lot per letter or ledger sized sheet at a scale of 200:1.
- A key plan with north arrow is required in the upper right hand corner of the sheet. Provide a title block with the name of builder / developer / subdivision, registered plan number, architect /designer company, scale of drawing and date of preparation.
- Provide the as-built location and elevation of storm, sanitary and water services
  - elevation of culverts, drainage ditches, sidewalks.
  - location of approved erosion and sedimentation controls.
  - location of sump pump, discharge point and any dry wells. Provide the existing elevations as per topographic survey indicating existing buildings, drainage patterns and finished first floor elevations for all buildings on adjacent lands.
- Indicate the surface run-off for all adjacent and proposed lots using arrows to show the direction of flow and swale locations, length and slope percentage.
- Indicate the house type and elevations of the finished first floor, top of foundation wall, basement floor, underside of the footings and service lateral invert at property line.

- Indicate the elevations at the lot corners, landings, garage slab and all entrances (indicating the number of risers), the existing roads and catchbasins. Refer all elevations to a geodetic City of Burlington benchmark.
- Indicate the location, length and percent slope of proposed driveways
- Provide complete details of proposed retaining walls and noise/privacy fencing.

All site servicing and grading plan drawings must include:

- Erosion and sediment controls
- City of Burlington bench mark description and elevation
- All abutting streets, right-of-ways, easements
- All utilities on existing roads including storm, sanitary, water, Bell, hydro and gas
- All proposed services to the building (note that all services including Bell and hydro must be provided underground from the existing source to the building)
- Tree Inventory/Arborist Report and Tree Removal/Tree Preservation plan
- Existing grades of abutting roads and proposed grades through new entrances, elevations on a grid throughout the site including lot corners, and a minimum 15m external to the site so that drainage patterns may be evaluated
- All surface drainage routes including swales, ditches, watercourses and their invert elevations and flow direction (flood plain limits)
- The overall surface drainage pattern on the site is to be shown by flow arrows
- Location of on-site storm sewers, manholes and catchbasins including size and class of pipe and grades
- Ground floor elevations of the building and ground elevation at all building corners, entrances, catchbasins, tops and bottoms at slopes and other locations as required to establish the surface drainage system
- Location of roof downspouts and details of roof hoppers (flow controls)
- Location and size of driveways and culverts
- A legend detailing all symbols used (i.e. catchbasins, retaining walls, road, property line, building line, existing and proposed elevations)

Information regarding the design criteria and standard for sanitary and water servicing must be obtained from the Region of Halton Public Works Department.

The following City of Burlington design criteria applies to overall residential subdivision drainage control and lot/site specific drainage design.

- Lot specific elevations shall conform with the City of Burlington approved subdivision control plan.
- All swales shall have a minimum depth of 150mm and a minimum slope of 2% for a maximum length of 60m before outfall to sewer, creek or City of Burlington/Region of Halton road/block.
- In general, where an upper lot drains onto a lower lot, an interceptor swale shall be located on the lower lot, adjacent to the rear property line in such a manner as to divert the drainage to the side yard swales of the lower lot.
- Window wells, where required, shall be indirectly connected to the weeping tile system using 100mm drainpipe filled with 19mm clear stone.
- All downspouts shall discharge onto approved sodded areas using splash pads for erosion control. Direct connection of the downspouts to the storm system must have prior approval from the City of Burlington (high density). The location of the discharge is not to interfere with access or pose a safety hazard.
- Where Sump pumps are required, pumps must discharge directly to a storm sewer or a City of Burlington/ Region of Halton drainage ditch. Discharge of a pump to a sideyard is not acceptable.

## **City of Burlington Lot Grading Criteria**

- Minimum ground slope to be 1%, asphalt surfaces 0.5%
- Maximum desirable driveway slope is 6%; maximum permitted driveway slope is 8%
- Maximum of 4 townhouse units to be serviced by one sump pump
- Locating catch basin leads and storm sewers under buildings is discouraged
- Driveway entrances to be set back at least 3 m from a side lot line unless otherwise approved
- Reverse crown roadways will be discouraged on private development unless the owner/developer can demonstrate that the center line gradient exceeds 1%
- Minimum swale slope for all types of residential properties to be 2%
- Minimum swale slope for commercial and industrial properties to be 1.5%

On-site storm water quantity controls are required where drainage restrictions are established or post-to-pre runoff control is warranted. The modified Rational Method or equivalent may be used for the analysis of simple sites. OTTHYMO/INTERHYMO modeling may be required where warranted or another Model may be dictated by the Watershed Study.

Control devices shall be installed on the upstream side of control manholes located on the street line; preferred method is a two-piece adjustable diamond orifice. Orifice openings must have a diameter of no less than 75 mm in order to prevent clogging of the opening. Storm connections from the building roof and foundation drains must be made downstream of the manhole and/or catchbasin inlet controls. Roof drains should be selected to provide the required flows to obtain the designed detention storage.

Pond limits and available storage are to be depicted on the site servicing/grading drawings. Maximum ponding depth in parking areas is not to exceed 250mm, and no ponding shall be located in a fire route. No five-year ponding (nuisance) on pavement: use landscaped areas, roofs or underground structures. Sites are to be designed to contain all runoff with major overland spills diverted to approved channels or municipal right-of-ways. External flows shall be accepted without upstream impacts. An overland flow route shall be clearly marked on drawings. The grading of landscaped areas and parking lots shall provide a safe path for the overland flow route to the surrounding municipal right of way during storms exceeding the design storm event.

If the existing topography requires an infiltration gallery (drywell) to manage the stormwater for a proposed development, the City of Burlington requires a geotechnical report to support a drywell design brief.

All existing services, utilities and abutting properties are to be shown in dotted lines. All proposed services shall be shown with the solid line. The locations of all service connections shall be shown on the servicing and grading plan. The City of Burlington requires stamped engineering on-site storm water management report and stamped engineering site servicing drawings for site plan approval and to issue building permit.

All retaining walls are to be constructed of a minimum material being pressure treated wood conforming to CAN/CSA-080.1-M89. Retaining walls may also be constructed of poured in place concrete, pre-cast concrete or stone. Retaining walls exceeding 1m in height are required to have plans submitted to the City of Burlington Development Services Section stamped by a professional engineer and showing the proposed retaining wall construction.

Fences or rails will be required on all retaining walls that exceed 0.6m in height. The fence must be a minimum height of 1.2m. All retaining walls are to have the face of the wall placed on the property line in such a manner that any tiebacks etc. are located entirely within the upper lot.

Final lot grading certificates signed by a registered professional engineer must be submitted to the City of Burlington upon completion of the grading.

Site grading plan incorporating appropriate stormwater management shall safely convey the site drainage from the Regulatory Storm (defined as the larger of the 100-year storm or the Regional Storm), without causing flood damage and with minimum inconvenience. The minimum on-site runoff retention requires to retain all runoff from a small design rainfall event - typically 5 mm through infiltration, evapotranspiration & rainwater reuse.

Peak regulated post-development flow must not exceed pre-development conditions. The site grading and drainage should be designed such that the post-development site stormwater run-off is equal to or less than the pre-development site stormwater run-off. If the project will increase the impervious area of a lot, then more stormwater is likely to runoff from the site than before. To prevent this extra stormwater runoff, a filtration-retention device large enough to retain/detain the added stormwater runoff shall be designed and installed.

Building permit applications for lots that are intended for any single detached dwelling, duplex dwelling or semi-detached dwelling used solely for residential use now require a [Grading and Drainage Clearance Certificate](#), in accordance with [City of Burlington By-law 52-2018](#).

A [Grading and Drainage Clearance Certificates](#) must be approved before applying for a building permit.

After Capital Works has completed their review of the application and deemed it acceptable, install erosion and sediment control measures for staff inspection, if required. Obtain your Grading and Drainage Clearance Certificate from Capital Works and provide it to the Building Department with your building permit application.

Complete all construction in accordance with the approved Grading and Drainage Plan, including any restoration and stabilization, if required. Execute and register the Drainage System Appurtenances Agreement (PDF), if required. Contact Capital Works to carry out a final inspection and obtain final approval.

A drainage system appurtenance includes any additions to the normal operation of surface related grading that is necessary for the effective operation of the drainage system. These items can include such additions as catchbasins, area drains, manholes, infiltrations galleries as well as low impact development (LID) related measures.

If the proposed Grading and Drainage Plan requires a drainage system appurtenance, then a Drainage System Appurtenances Agreement will be required.

All erosion and sediment control plans shall be designed in accordance with the City of Burlington, Region of Halton and Halton Region conservation authority guidelines for Erosion & Sediment Control.

We prepare engineered Site Servicing, Grading, Drainage & Erosion/Sediment Control Plans that would fulfill all engineering requirements of the City of Burlington, Region of Halton and/or Halton Region Conservation Authority.

Having vast experience in municipal engineering design, we offer effective, innovative and cost-efficient Engineered Site Grading Plans, Drainage Plans, Erosion & Sediment Control Plan, Stormwater Management Plan, and Site Servicing Plans to our clients. Our team's proficiency in conceptualizing designs and plan in accordance with our clients' requirements has made us very successful.

Our licensed professional engineers prepare thorough, detailed, and clear "Engineered Site Grading Plans, Drainage Plans, Erosion & Sediment Control Plan, Stormwater Management Plan, and Site Servicing Plans" to suit our client's needs while also adhering to engineering design requirements of the City of Burlington, Halton Region, and/or Halton Region Conservation Authority and submit to the City of Burlington for review and approval to obtain site plan approvals and building permits.

Site Grading Plan incorporating applicable Site Servicing Plan, Erosion & Sediment Control Plan, Drainage Plan as per applicable City of Burlington and Region of Halton Engineering Guidelines/requirements prepared and stamped by our Licensed Professional Engineers would be ready in 10 business days upon receipt of all the required information and documents. It is important to note that many assumptions, methodologies require varying degrees of engineering judgement that may, or may not, be easily adopted by the reviewing public agencies through their critical review of our reports, plans and drawings. No additional charges for required revisions & changes to our drawings and plans due to the comments from the authorities upon reviewing the drawings prepared by us.

Following supporting documents may be required to prepare the required site grading and drainage plan:

- CAD drawing of the site plan showing the following details:
  - Proposed building location, including porches and steps/stairs
  - Proposed/existing road layout including curbs, sidewalks
  - Proposed /existing fencing including acoustical, privacy and flankage fencing
- CAD drawing of the topographic survey showing the elevations of the following:
  - Spot elevations within the project site, minimum 5 m outside the property boundaries including curbs, sidewalks and centre line of the road and at reasonable intervals within the property and along the boundaries including driveway, lot corners, intermediate points of grade change, the door step elevation and finished floor elevations of adjacent properties
  - Lateral invert elevations of water, sanitary, storm service connections at the street line.
  - Grate and invert elevations of all catchbasins
  - Elevations of any existing swales, ditches, culverts, creeks, watercourses, ravines, and drainage easements/routes complete with inverts.
- Architectural & Structural Drawings showing



Proposed elevations including finished first floor, basement floor, top of foundation wall, underside of footing and garage entrance.

Engineered fill and extended footing information, where required

Sill elevations at side entrances where elevation differs from the finished first floor

The number of risers at each entrance

Proposed roof downspout locations

Proposed Retaining Walls

• Arborist Report & Landscape Architect Drawings Showing

Existing trees to be preserved

Proposed locations for all tree protection zones

• Plan-profile drawings of municipal Sanitary Sewers, Storm Sewers and Watermains

• Record of locates from Ontario One Call (On1Call) for existing utilities.

• Location of well(s) and septic system(s) with offsets from the proposed development.

• If applicable, locations of any regulatory flood lines or development limit lines (i.e. setback and slope stability limits from the Halton Region Conservation Authority).

The transparency and integration of the Site Plan review process allows the City of Burlington to provide greater assurances to communities that development in residential areas will occur sensibly and be respectful of the built character of Burlington's older established neighbourhoods and that it will not compromise existing servicing needs such as grading and drainage patterns.

City of Burlington requires finished grades associated with any development must be compatible with the finished grades of the neighbouring properties and existing grades and drainage patterns should be maintained. Also the City of Burlington requires existing grades within the site should be maintained adjacent to boundary trees.

City of Burlington - Site Engineering is responsible for reviewing the site grading, drainage and servicing of the proposed development; driveways; site inspections after completion; and collection and release of securities.

## **SERVICING AND GRADING PLAN**

Required Details for a typical grading and servicing plan

- existing & proposed catch basins, servicing pipe sizes, invert elevations and slopes, top & invert elevations for catch basins & manholes, lateral invert elevations at storm main; existing & proposed underground storm, water & sanitary lines connection from the building to street
- closest municipal hydrant and any private fire hydrants and underground fire mains, standpipe/sprinkler siamese connections location
- existing and proposed grades; sufficient ground elevations on adjacent lands to identify drainage patterns • location of adjacent creeks (top-of-bank); proposed retaining wall location and details
- location and type of easements and rights-of-way (existing and proposed)
- location of existing driveways on abutting properties that are within 6 m of the mutual lot line(s), location of existing driveway(s) located opposite the subject property
- road widening, sight triangles (consult with Engineering as to deemed width)
- identify all existing vegetation on the property and within 3m of the lot lines, and on City property; individually locate all trees with caliper measuring 100 mm or greater, all other vegetation to be identified in masses showing outline of canopy created by massing
- Curb returns shall maintain a minimum clearance of 1.2m from above ground utilities (eg. hydro poles, hydrants),
- No planting or berming allowed on road allowance; boulevards to be sodded by property owner

### **Fire Access Routes**

- For buildings being designed in conformance with Part 3 of the 1990 Ontario Building Code, as amended, Fire Access Routes to be designed & constructed as per Articles 3.2.5.5. thru 3.2.5.7
- Clearly delineate the location of the Fire Access Routes on the site plan
- For attached multiple residential units (condo townhouses etc), being designed in compliance with Part 9 of the 1990 Ontario Building Code, as amended, Fire Access Routes shall be in compliance with Sentence 3.2.5.6.(2) of the Ontario Building Code 6.4 Design Specifications - Fire Access Routes
- Provide Fire Access Route(s) to the building face with the principle entrance and any additional building face required to face a street, under Subsection 3.2.2. of the Ontario Building Code

- Have a clear width of not less than 6 m and be connected with a public thoroughfare
- Be located not less than 3 m and not more than 15 metres measured horizontally from each face of the building required to face a street under Subsection 3.2.2. of the Ontario Building Code
- Have a centre line turning radius of not less than 12 m (minimum inside radius of 9 m)
- Provide an overhead clearance of not less than 5 m
- Have a change of gradient of not more than 1 in 12.5 over a min. distance of 15 m (8% slope)
- Be designed to support the expected loads imposed by fire fighting equipment and be surfaced with concrete, asphalt or other material designed to permit accessibility under all climatic conditions
- Have a turn around facility for any dead-end portion of the F.A.R. that is over 90m in length
- Post designated Fire Access Routes on both sides if possible.

### **Fire Hydrants**

- Where buildings are being designed in conformance with Part III of the 1990 Ontario Building Code, as amended, fire hydrant protection is required in compliance with Sentence 3.2.5.8(2). Site plan proposals shall show the location of municipal and/or proposed private fire hydrants
- Hydrant shall be located within 90 m horizontally of any portion of the building perimeter which is required to face a street under Subsection 3.2.2. of the Ontario Building Code
- If possible, hydrants shall be placed at least 12m from building face and not obscured by planting
- Hydrants to be within 6 m of a F.A.R. and installed with the 100 m steamer port facing the F.A.R.
- Hydrants shall be installed in compliance with the requirements of the Region of Halton, i.e. a minimum underground supply main of 200 mm serving a hydrant on a dead end service, etc.
- Upon completion of the project, the installing contractor is to certify in writing to the Fire Department that the hydrant(s) have been tested and left fully operational

### **Standpipe and Sprinkler Siamese Connections**

- Standpipe and Sprinkler Siamese Connections shall be located in compliance with Articles 3.2.5.16. of the 1990 Ontario Building Code, as amended, and be indicated on submitted drawings

- Locate siamese connection within 45 m of a fire hydrant (allowing for Hose Runs)
- Locate siamese connection adjacent to a street or fire access route

**For Additional Information Contact:**

**Edgar Labuac, P.Eng**

**Principal Municipal Engineer**

**Joomin Park, M.Eng**

**Senior Municipal Engineer**

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