



CITY OF WELLAND

MUNICIPAL STANDARDS

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FOREWARD:

The City of Welland Municipal Standards design criteria herein presented are intended as a guideline to provide a sound engineering basis for municipal servicing and subdivision design, to establish uniform criteria of minimum standards for an appropriate standard of living, and to improve processing of development applications and agreements in the City. The criteria are intended to reflect public concern over the state of the environment and provide for a greater stewardship of our remnant urban natural heritage and landscapes. Best Management Practices shall be implemented in creating ecosystems that are able to support aquatic and terrestrial life at all times. Technological or economical changes which improve or maintain the quality of the design will not be ruled out, but must be approved by the City.

This Municipal Standards document is meant to be read in conjunction with City of Welland Standard Drawings, and with the Niagara Peninsula Standard Contract Documents. Changes and revisions will be made to the Municipal Standards and Standard Drawings from time to time and it is the responsibility of the Developer or Consulting Engineer to obtain and make use of the latest versions available at the time of servicing design.

The Developer and or Consulting Engineer are also responsible to ensure that all construction work be carried out in full compliance with the current editions of the Occupational Health and Safety Act and regulations.

It is the intent of this document for each article to stand alone but also to be read in conjunction with other pertinent sections depending on the type of development and or construction being carried out. It is the responsibility of the Developer, Consulting Engineer or Contractor to familiarize themselves with all aspects of the standards.

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1 GENERAL REQUIREMENTS

1.1 Introduction

The City of Welland through Subdivision Control under Section 51 of the Planning Act, encourages well-designed and attractive subdivisions. This document together with the City's Official Plan, Comprehensive Zoning By-law and various By-laws, provides guidelines and outlines the requirements and design standards for subdivision developments in the City of Welland.

The recommended design guidelines and standards are based on considerable technical background design approaches and experience in the operation and maintenance of municipal infrastructures. Generally, any variance to the City's minimum standards would require Council approval. It is recommended that early consultation with City staff be arranged prior to adapting any non-standard approach.

1.2 Legislative Requirements for Subdivision Approval Adapted from the Planning Act

- **Subsection 51 (16):** An owner of land or the owner's agent may apply for approval of a plan of subdivision and the approval authority (City) shall permit applicants to consult, or may require pre-consultation by by-law.
- **Subsection 51 (17):** Information required to be shown on the draft plans:
 - a) the boundaries of the land to be subdivided, certified by an Ontario Land Surveyor;
 - b) the locations, widths and names of the proposed highways within the proposed subdivision and of existing highways on which the proposed subdivision abuts;
 - c) on a small key plan, on a scale of not less than one centimeter to 100 metres, all of the land adjacent to the proposed subdivision that is owned by the applicant or in which he has an interest, every subdivision adjacent to the proposed subdivision and the relationship of the boundaries of the land to be subdivided to the boundaries of the township lot or other original grant of which such land forms the whole or part;
 - d) the purpose for which the lots are to be used;
 - e) the existing uses of all adjoining lands;
 - f) the approximate dimensions and layout of the proposed lots;
 - g) natural and artificial features such as buildings or other structures or installations, railways, highways, watercourses, drainage ditches, swamps and wooded areas within or adjacent to the land proposed to be subdivided;
 - h) the available and nature of domestic water supplies;
 - i) the nature and porosity of the soil;
 - j) existing contours or elevations as may be required to determine the grade of the highways and the drainage of the land;
 - k) the municipal services available or to be available to the land proposed to be subdivided; and,
 - l) the nature and extent of any restrictive covenants or easements affecting the land proposed to be subdivided.

- **Subsection 51 (18):** The approval authority (City) may require additional information or material from the applicant if the City deems it necessary and the requirements are contained in the Official Plan.
- **Subsection 51 (19):** Timing, Refusal and Response
 - a) if the approval agency has not received information and material and the fee associated with the application, the approval authority (City) may refuse to accept or further consider the application;
 - b) within 30 days of receipt of the fees, the approval authority (City) shall notify the applicant and the Clerk as to whether the information and materials have been provided, or if they have not been provided;
 - c) within 30 days of a negative notice, the applicant or the approval authority (City) may make motion with the Municipal Board and determine if the information and material have in fact been provided, or whether the requirement is reasonable.
 - d) If no notice has been given per (b) above, after 30 days, the applicant may make notice per (c) above;
 - e) within 15 days of the approval authority (City) providing an affirmative notice per (b) above, or within 15 days of notice to the Municipal Board as per (c) above, Council shall give notice in the prescribed manner and make the information available to the public.
- **Subsection 51 (24):** In considering a draft plan, regard shall be had among other matters, to the health, safety, convenience and welfare of the future inhabitants.
- **Subsection 51 (25):** The City (as the approval authority) may impose such conditions as deemed reasonable including a condition that land be dedicated or the requirements met for park and other public recreation purposes under Section 51.1 and/or that such highways, including pedestrian pathways, bicycle pathways and public rights of way be dedicated as deemed necessary by the approval authority.
- **Subsection 51 (26):** The municipality and the Region may enter into Subdivision agreements imposed as a condition for draft approval.

1.3 Purpose of Subdivision Control

During the Subdivision Approval process, the City will review design features and co-ordinate the following:

- Overall subdivision design
- Effect on surrounding neighborhood and land uses
- Lot sizes
- Parkland requirement
- Roadway and emergency access geometry
- Sidewalk and pedestrian access requirement
- Sanitary sewer, storm sewer and water services
- Storm water management
- Utility services and street lighting
- General grading
- Streetscape

Once a completed Draft Plan of Subdivision Application is received, Integrated Services - Planning Division will circulate and process the application through various City Departments and government agencies. This way, Integrated Services - Planning Division will be the Owner's one-stop contact. Notwithstanding, the Owner is encouraged to make its own contacts with different City Departments and other government agencies during this process in order to monitor the status of its application including Engineering and Recreation and Parks, as well as agencies such as Welland Hydro and Welland Transit. Integrated Services - Planning Division will advise the Owner on the status of the proposal and any changes or conditions throughout the process. Subdivision Control ensures the implementation of City and other agency's requirements (e.g. street widening, roadway improvements, drainage, servicing, etc.). It also helps to improve the quality and appearance of the development and ensures the availability of municipal services and other amenities to prospective residents of the subdivision.

1.4 Procedure

Prior to the submission of an Application, the proponent or agent is strongly encouraged to attend a preliminary review meeting with City staff in order to identify the information and material needed to process the Application. The application must also demonstrate that a pre-consultation meeting or discussion was held with Regional Planning staff.

If determined appropriate, the Subdivision proposal will be the subject of a limited circulation by way of a preliminary Plan of Subdivision in order to scope issues, determine compliance (or non compliance) with local, regional and provincial planning policies and identify the prescribed information and material.

Upon receipt of an Application for Draft Plan Approval, the Application will be reviewed and determined by Planning staff as to whether the Application is complete. As per Section 51(18) of the Planning Act, Planning staff may require other information and material that is considered needed.

The information, as per Section 51(18) of the Planning Act, may include but not be limited to: Planning & Land Use Justification (Background) Report, Preliminary Engineering Report, Environmental Assessment/Impact Statement, Archaeological Assessments, Traffic Impact Report, Financial Impact Analysis, Urban Design Analysis, Gas Well Analysis, Acoustic Analysis etc. More information can be obtained from Planning staff.

Until the City has received the information, materials and fees required, the City may refuse further consideration of the Application as per Section 51(19) of the Planning Act. The submission of an incomplete Application, together with reasons why the Application was considered incomplete will be reported to the Applicant as per Section 51(19.1) of the Planning Act.

Upon receipt of all prescribed information, materials and fees, the Application may proceed.

1.5 Planning and Land Use Justification (Background Report)

Together with the complete Subdivision Application, prescribed information, materials and fees, the Applicant is required to submit a Planning & Land Use

Justification (Background) Report. Said Report should address and/or identify the following:

- Proposed integration of roadways within the subdivision and vehicular and pedestrian circulation pattern in surrounding area.
- Inventory of physical features (wetlands, watercourses, tree stands, etc.) on the site and adjacent lands.
- Inventory of existing and proposed utilities and water, sanitary and storm facilities serving uses proposed in the subdivision.
- Location of parklands and other public lands (other than traveled roadways) in the vicinity of the site.
- Likely uses of all lots and blocks within the subdivision and the number of people to be accommodated.
- Existing public transportation serving the site.
- Whether the Official Plan and/or Zoning By-law need to be amended.
- All information provided by Agencies and Departments pre-consulted by the Applicant.
- If a residential development is proposed, location of schools serving the subdivision and access routes to those schools.
- Opportunities for affordable housing provided in the proposed subdivision.
- Archaeological and cultural heritage features (check with City staff).
- All information required to satisfy the needs of Provincial Policy (check with Regional Planning staff) (i.e., Provincial Policy Statement, Places to Grow).

1.6 Preliminary Development Report

A Preliminary Development Report prepared by a qualified Engineer may be required outlining the servicing viability of the proposed Subdivision at the discretion of City Staff. This Report shall identify different options of servicing the development and recommends the best alternative consistent with the City's Master Servicing Plans including the estimated costs of servicing works.

- a) Roadway Network
 - Impact of the development on any roads within 2 km of the site.
- b) Sanitary Sewer System
 - Drainage areas and proposed flows;
 - Main Sizing, location and outlets;
 - Treatment facilities and pumping stations (if required).
- c) Storm Sewers and Stormwater Management
 - Drainage areas and proposed flows;
 - Designation of major and minor drainage systems – direction of flow and outlet;
 - Stormwater management facilities;
 - Main sizing, location and outlets.
- d) Water System
 - Main sizing, location and looping;
 - Pressure boundaries, booster stations and treatment facilities (if required).

- e) Cost Sharing
- Any proposed cost sharing schemes.

1.7 Environmental Impact Study (EIS)

An Environmental Impact Study MAY be required from a qualified environmental consultant to identify potential impact of the Subdivision to existing topography, tree coverage and environmental conditions of the property. Preservation of natural features such as wetlands, tree stands, historical sites and natural watercourses may significantly affect the proposed development.

Consistent with provincial policy natural wetlands are to be preserved wherever feasible. If the watercourse is required to be engineered, the facility should be designed to have natural restoration including tree planting and landscaping.

A Tree Preservation Plan may be required to protect or retain existing tree stands as much as possible. Grade alteration should be minimized within the development in order to attain the desired result of tree preservation.

1.8 Archaeological Assessment Report

An Archaeological Assessment of the proposed development MAY be required from a licensed archaeologist to conduct an assessment of the site, to ensure preservation or resource removal and documentation of any significant archaeological resources found on site.

1.9 Geotechnical Investigation

A geotechnical investigation shall be required to be carried out by a competent consulting engineer in order to assess soils condition with respect to the proposed infrastructures and building construction.

1.10 Parkland Dedication

All residential subdivision developments require that a minimum of five percent (5%) of park spaces be conveyed to the City free and clear of any encumbrance. Undevelopable land, stormwater management facilities or hazard lands will not be accepted as parkland dedication as such lands cannot be developed for active park purposes and may be unsafe for recreational uses.

Parkland development including grading, sodding or seeding, fencing, landscaping and tree plantings or tree preservation shall be covered within the applicable Subdivision Agreement. Parking will be at the sole discretion of the City of Welland.

In cases where parkland dedication is impractical, cash in lieu of parkland dedication may be acceptable. Cash in lieu of parkland dedication is based upon City Policy. The Owner is responsible to provide the City with a valuation report from a competent and qualified appraiser approved by the City.

1.11 Phasing, Building Types and Zoning

Plans should indicate the expected phases of a development. Phasing should be pre-approved by the City of Welland and should be sized to provide a reasonable number of lots. It is desirable that phasing ensure that there are a very limited number of dead end

streets and ensures that a secondary access will be available for emergency purposes in and out of the subdivision.

The subdivision should provide a range of dwelling types consistent with existing zoning in place/proposed for the property. Appropriate clustering of uses is encouraged and the more dense the development, the closer it should be to the perimeter of a neighbourhood. Consideration should be given to medium or high-density developments to locate on collector or arterial roads.

The Owner may consider or be required to site various facilities located in a Plan of Subdivision. These may include neighbourhood commercial facilities or, at the request of the appropriate agency, an institution. Such facilities should be appropriately located and properly zoned. In addition, the location of these facilities should consider the effect of traffic generation, proximity to parks, parking requirements, etc. In general, such facilities should be located with access to a collector or arterial road.

1.12 External Services

All services that are required to be extended to service the subdivision will be the responsibility of the Owner to include not only the actual construction, but payment of all costs. Sidewalks may also be required to be constructed outside the limits of the proposed subdivision at the expense of the Owner in order to provide continuity of pedestrian access from the new subdivision to the existing sidewalk systems. Design and construction of certain facilities or services to accommodate future developments may be required and will be the responsibility of the Owner provided such facilities or services are not included in the City's current Development Charges.

Unless the City has a funding mechanism (Special Area Development Charge, Development Charges, Cost Sharing Agreement, Front-End Financing Agreement, etc.) in place, the Owner shall, at its own costs, be responsible for all required external services including the upgrade of existing roads abutting the subdivision to urban cross section or to an acceptable standard required by the City.

Any off-site servicing required to allow the subdivision to proceed shall be the Owner's responsibility at their own costs. The City may entertain an Agreement with the Owner under Section 10 of the Municipal Act or alternatively, a front-ending Agreement.

1.13 Subdivisions

The subdivision cost estimate shall be an Attachment of the Subdivision Agreement, and shall be used as the calculation basis for securities posted by the Owner.

The Owner shall provide the City with Financial Securities to cover 50 percent of the total cost of construction (including the cost of all public services, landscape, engineering and contingency fees, off-site services and H.S.T. were applicable). If there is no Pre-Servicing Agreement, no work may commence on the site until the Subdivider's Agreement is executed by all parties, all legal documentation is received by the City and Financial Securities are in place with the City.

Periodic reductions in the Financial Securities may be authorized upon the completion of various stages of the subdivision.

1.14 Security Requirements

- (1) The Owner shall deposit with the City Treasurer security in the amount of 50% of the estimated total cost of all the works, including engineering design and supervision costs plus H.S.T. in the form of:
 - a) an irrevocable letter of credit satisfactory to the City Treasurer from any financial institution approved by the City Treasurer in accordance with City Policy upon which the City may draw funds without the consent of the Owner; or
 - b) currency in Canadian funds.
- (2) The said security deposit may be reduced from time to time as the works progress by amounts which will leave the amount of the security deposit equal to 10% of the original estimated total cost of the works, plus the sum of the estimated amounts of the works yet to be completed; plus works completed and not paid for;
- (3) Save as otherwise provided herein, the said security will be utilized by the City for the purpose of applying it to pay for the cost of any works that are deemed to be in default.
- (4) When a cash deposit is given, the City Treasurer shall deposit same in a Chartered Bank or subject to Section 286(1) (b) of The Municipal Act, 2001, as amended, in any similar financial institution, and the Owner shall be entitled to any interest or dividends earned thereupon as and when they become payable but only on the amounts taken as security of the works.
- (5) The City shall, from time to time, review the sums deposited by the Owner and the City may, from time to time, demand an increase in the sums deposited in accordance with increases in the actual cost of performing the works required. The Owner shall deposit such further and other sums as the City deems reasonably necessary to ensure the completion of the outstanding works and protection of the City from default of the terms of the subdivision agreement.
- (6) Upon the assumption of a subdivision and return of the normal securities of a development and in the case where there is a storm water management facility (SWMF) that accepts the effluent from a development, the developer shall submit a \$25,000 security, as a letter of credit or cash, for the maintenance of the SWMF until such time as the City assumes the SWMF infrastructure and all maintenance periods have expired. If there is an existing SWMF that accepts run off from a proposed development and such development is constructed after the assumption of the SWMF, the developer shall deposit the sum of \$10,000 security (as above) as guarantee for the maintenance of the SWMF during construction.

1.15 Cash Payments

1.15.1 Perpetual Maintenance Fees

The City of Welland has developed a policy to deal with maintenance of landscape elements installed by owners and placed within public lands.

A Maintenance Fee Policy enables the City to collect 'Perpetual Maintenance Fees' from owners when a Subdivision Agreement is entered into for landscape

design elements placed on City property. These 'Fees' are required to offset costs for long-term maintenance, potential removal, and/or replacement. Maintenance Fees will be applied to design elements in the landscape, including but not limited to, subdivision entry features/walls, decorative perimeter fencing, and planted traffic islands.

The 'Fee' will be held specifically to pay for maintenance, removal and/or replacement of those elements ultimately assumed by the City. The 'Fee' amount is based upon the type of materials utilized in the construction of the element. The 'Fee' will be collected as cash or certified cheque, and will be non-refundable. The City will have the ability to remove the design element in the event that, after assumption of the Subdivision, the design element maintenance costs are exceeded. Warning clauses in purchase and sale agreements are necessary to ensure the future homeowner is made aware of this.

Any element subject to the Perpetual Maintenance policy must be itemized separately within the landscape cost estimates.

1.16 Security Reductions

Security Reductions may be requested throughout the construction of the subdivision. Each reduction request must be made by the Engineer of record in writing to the City and include the Owner's Statutory Declaration of payment of accounts and the Consultant's statement of work that remains outstanding and work that has been completed. A statutory declaration from the contractor that performed the work shall also be submitted stating that all payments have been received. Application does not automatically mean a guaranteed reduction will take place.

Security reduction will not be utilized until inspections of the public services have been completed and any deficiencies repaired to the satisfaction of the City.

Security reductions will be based on the cost estimate included in the Subdivision Agreement.

1.17 Maintenance Period(s)

In subdivision Agreements, maintenance periods shall be in accordance with the agreement. The two maintenance periods are the Primary and Secondary maintenance periods. Primary servicing, as a rule of thumb, shall be items such as water mains, sewer mains (including services) and base roadways and hydro servicing including appurtenances. Basically anything underground will be considered Primary services. Secondary services are considered to be everything above ground or curbing, top asphalt, sidewalks, trees, boulevards etc.

1.17.1 Process to Start Maintenance Period

Prior to the commencement of the Maintenance Period for primary services, the Owner shall:

Arrange for an inspection by the City of all primary services. Prior to the inspection, all services shall be cleaned and all sewers flushed. The sewers shall be examined by closed circuit television inspection. The Engineer of Record shall submit the video inspection to the City for review and acceptance. Any repairs shall be carried out immediately and the affected sewers video inspected again.

The Engineer of Record shall ensure that all noted deficiencies be rectified to the satisfaction of the City. When all of the deficiencies are rectified, the City will establish a date for the commencement of the Maintenance Period.

1.17.2 Owner's Responsibilities During the Maintenance Period(s)

During the maintenance period(s), the Owner shall be responsible for the maintenance of all public services and new parks, if applicable. As the end of the maintenance period(s) approach, the Consultant shall arrange for an inspection of the works where necessary. Any deficiencies noted are to be rectified to the satisfaction of the City. When the Consultant is satisfied that the work is complete and acceptable, the City shall be notified, and a final inspection with the City shall be arranged.

If, in the opinion of the City, it is necessary to make emergency repairs immediately to remediate damage or hardship to persons or property, the City may enter the development site, without notice, and make any repairs deemed necessary. The cost of any emergency repairs shall be borne by the Owner as invoiced by the City. Unpaid invoices will be deducted from the Owner's Letter of Credit if payment has not been made within 30 days.

1.18 Assumption

1.18.1 Process for Assumption

Following completion of all construction and expiration of the Maintenance Period, the Owner may request Assumption of the subdivision through his engineer of record. A circulation for clearance is distributed to Departments within the City as well as the following agencies, as required:

- Niagara Peninsula Conservation Authority
- Welland Hydro
- Regional Municipality of Niagara

All deficiencies noted by the various Agencies must be rectified prior to Assumption.

Prior to Assumption, the Consultant shall request a final inspection of all public services by the City, and shall correct all deficiencies to the satisfaction of the City.

Note: Inspection for landscape works will not be conducted after October 31 or before May 1.

1.18.2 Requirements for Assumption

A Statutory Declaration is to be supplied by the Owner, verifying the payment of all accounts pertaining to the construction of the subdivision.

The Consultant is to certify that all subdivision works have been constructed according to the approved plans and specifications including a final storm water management analysis and submission of the computer files. (All SWM facilities are subject to approval by the City.)

All SWM facilities are to be cleaned, brought back to their original state and certified as to their design depths and volumes prior to assumption.

The City is provided with a maintenance manual detailing recommended maintenance procedures and frequency.

All lot grading must be submitted and certified by the Engineer of Record.

Video and visual inspections of the storm sewers must be carried out to the satisfaction of the City. As a minimum, video inspections must be conducted at time of Building Permit application and prior to Assumption. A visual inspection is required at start of the Maintenance Period, prior to top asphalt. If the development video inspections are more than 5 years old the sewers shall be video inspected again and inspections submitted for review and approval. Any deficiencies shall be immediately remedied.

Certification by a registered Ontario Land Surveyor that all control S.I.B.'s, all easement I.B.'s and all City dedicated land I.B.'s have been confirmed or re-established.

Certification by the Acoustical Engineer that all noise attenuation features have been constructed or installed as per the approved Acoustical Report, if required.

Confirmation shall be given from the City Solicitor that the Owner's Solicitor has submitted all records of the transference of easements, reserves and municipal lands.

Acceptance of all works under the jurisdiction of other agencies such as Welland Hydro, Region of Niagara, Niagara Peninsula Conservation Authority and Ministry of Transportation Ontario.

Parkland, walkway, open space conveyance, woodlot and/or cash-out shall be resolved and/or cash-in-lieu of parkland to the satisfaction of the City.

Parkland Construction by Owner to City satisfaction including all certifications, product warranties, manuals and inspections as required.

All landscaping within the R.O.W. shall be to the satisfaction of the City including the provision of securities or cash-out, where applicable.

As-built mylar and digital files shall be submitted as required.

When all work has been completed to the satisfaction of the City, a report will be forwarded to Council recommending Assumption of the works.

1.19 Acceptance for Risk Assessed Lands for Conveyance to the City

The acceptance of the Risk Assessed (RA) lands shall be based on the following:

1.19.1 General

- The City may, under the conditions noted below, accept contaminated lands that have been risk assessed, and where a Record of Site Condition which includes the risk assessment and the risk management plan, have been approved by the MOE;
- The City's decision is final regarding whether the lands are acceptable from an environmental perspective for conveyance to the City;
- The decision to accept risk assessed land shall be determined by Council;

- The site condition standards must meet the standards of the intended land use or the most sensitive adjacent land uses, whichever are more stringent;
- Any deviation from the above policies and/or the following conditions will require approval by Council.

1.19.2 Conditions

- Only in-situ contaminated materials are to remain in the lands to be conveyed (i.e. new contaminated soil cannot be imported and buried in the lands to be conveyed);
- All Phase I and Phase II Environmental Site Assessment reports, the Pre-Submission Form (PSF), risk management plan, CPU, if any, and Record of Site Conditions (RSC) will be submitted to the City for peer review and concurrence;
- The owner will be responsible for all costs associated with the peer review;
- The PSF must consider the future use of the conveyed lands including construction workers in trenches as potential receptors, and the presence of underground municipal services and private utilities;
- There is to be no risk management measures or Certificate of Property Use (CPU) associated with the conveyed lands that will impact or restrict the intended use of the lands or will result in any significant future cost implication to the City;
- MOE approval of the RA and acknowledgement of the RSC for the conveyed lands are required; and
- Affidavit of Consultant RSC.

1.19.3 Gas Wells

The development of lands may encroach upon the existing gas wells located within the City. The geotechnical investigation shall include the evaluation of in-situ gases and a mitigation plan developed, should encroachment be determined.

2 SUBMISSIONS - SUBDIVISIONS

2.1 General

Prior to the preparation and execution of a Subdivider's Agreement, the City of Welland requires a complete submission of Engineering Drawings and Specifications to be provided by the Owner's Consulting Engineer to the City's Infrastructure Services - Engineering Division for their technical review and comment.

A complete submission constitutes the following items:

- a) A Letter of Retention;
- b) Engineering Design Brief;
- c) Engineering Drawings (digital format);
- d) Contract Documents;
- e) Construction Cost Estimate;
- f) Proposed Construction Schedule.

2.1.1 Niagara Peninsula Conservation Authority Pre-screening Criteria

The Niagara Peninsula Conservation Authority (NPCA) works in partnership with municipalities to ensure that new development create no flood or erosion problems associated with lakes, rivers and streams.

To ensure timely processing of subdivisions, it is recommended that consultation be undertaken with the NPCA prior to the submission of the subdivision requirements referenced in Section 4.1 General.

2.2 Letter of Retention

The Owner is required to retain the services of a qualified Consulting Engineer to lead the team of professionals for the design and provide contract administration and construction supervision of all municipal services and projects.

A Letter of Retention can be a standardized form or a formal letter, from the Owner to the City, indicating the name of the company retained the services to be provided and the appropriate contact personnel.

A sample Letter of Retention is presented in Appendix B, 'Schedules'.

2.3 Engineering Design Brief

The engineering design brief is a technical report summarizing the intent of the project, and outlines the design assumptions, calculations, supporting documentation and references to previous studies, for each component of the development.

The design brief shall also address all conditions of Draft Plan Approval including the co-ordination of all approvals from various agencies.

2.4 **Procedure**

2.4.1 **First Submission of Engineering and Landscape Design**

The following shall be submitted as one package:

- a) Two (2) complete sets of drawings including: Refer to Section 3.4.
- b) A Letter of Retention to the City from the Owner indicating the name of the qualified Consulting Engineer has been retained for the design and complete general construction supervision of all municipal services.
- c) A Letter of Retention from the Owner indicating which Geotechnical Consultant has been retained to supervise all filling operations and the installation of bedding and backfill in all trenches within road allowances and easements, furthermore the Geotechnical Consultant will perform sufficient tests to certify to the Owner and the City that the installation and compaction of bedding, backfill and all engineered fills is in compliance with the City's specifications.
- d) A Letter of Retention from the Owner indicating which Landscape Architect has been retained for the design and complete general construction supervision of all landscape works.
- e) Two (2) complete sets of detailed cost estimates for all grading and construction of municipal services.
- f) Two (2) sets of the Ministry of Environment application forms for approval of storm sewers (internal and external) and storm water management pond works. These shall be completed **by the Engineer** and signed by the Owner. The City will complete the storm sewer approval section and forward the forms to the **consultant**. The Region of Niagara shall also be supplied with the Storm Sewer Design Sheets and all applicable plans.

NOTE: The MOE applications will not be forwarded to the Region or MOE until the City has conceptually approved the storm sewer design for the development.

NOTE: This subdivision will not be reviewed until a complete package is received. The City will return a marked-up set of drawings with the City's comments to the consultant. The City will provide a letter summarizing their comments and if clarification is required a meeting with the City can be arranged.

2.4.2 **Final Submission of Engineering and Landscape Design**

The following shall be submitted as one package:

- a) The marked-up 1st submission drawings.
- b) Four (4) complete sets of drawings as outlined in Section 4.4, revised as required following the first submission.
- c) Four (4) complete sets of revised cost estimates.
- d) Copies of applications for approval to all ministries, authorities and agencies, as they pertain to the particular development.
- e) Certification of compliance with EA Schedule "A" for private projects.

- f) The original mylar sheets for signature. After signature, the mylar will be returned to the Consulting Engineer. Prints of these City approved drawings will be the only ones used for construction.
- g) One (1) complete set of contract documents including tender forms and specifications.
- h) A complete set of design drawings in AutoCad format.

2.5 Engineering Drawings

2.5.1 General

Engineering Drawings shall be prepared in accordance with Section 4 – Drafting Requirements.

2.5.2 Procedure for M.O.E Approval

1. Owner or Consultant submits four (4) copies of completed application forms for storm, sanitary or water works. Submission must include:
 - a) Letter or Form of Transmittal;
 - b) Engineer's Report;
 - c) Supporting documentation - servicing study, charts, graphs, etc.;
 - d) Plan and profile drawings (including key plan);
 - e) Contract Specifications - detail drawings and standards;
 - f) General and Drainage Area Plans;
 - g) Design sheet and computations;
 - h) Environmental Assessment Exemption Affidavit (when appropriate);
 - i) Corporate Business Return (for private developments).
2. Upon City approval **of sewer and water mains**, the Consultant submits two (2) applications including a certified cheque **for associated** fees, to Regional Niagara for review under the transfer program and one (1) application to the local M.O.E. office.
3. Region makes necessary policy checks and submits application and data to the M.O.E. with a recommendation.
4. M.O.E. reviews submission and issues Certificate of Approval if requirements are met.
5. Owner or Design Consultant submits four (4) copies of completed application forms for stormwater management. Upon City approval, the Design Consultant submits one (1) application including all fees directly to the M.O.E. Approvals and one (1) duplicate application and attachments to the local M.O.E. District office for issuance of the Certificate of Approval.

2.6 Contract Documents

Upon final Engineering submission for approval of the Engineering Drawings and prior to tendering, two (2) copies of the Contract Documents for the project are required to be provided to the City of Welland Infrastructure Services - Engineering Division for its review.

Prior to commencement of construction of services, three (3) copies of the Contract Documents, two (2) with signatures and prices and one (1) without signatures and prices, plus six (6) sets of complete contract drawings are required to be provided to the City's Infrastructure Services - Engineering Division.

The Contract Documents shall include all addenda and the Form of Tender, five (5) million dollars liability insurance with the City and Design Engineer as additional insured, performance bond, labour and material payment bond and Worker's Compensation Board clearance.

2.6.1 Additional Documents Required

Upon execution of Subdivider's Agreement by Owner and Chargee(s), Agreement to be returned to Integrated Services - Planning Division with the following:

- All securities;
- Cash payments;
- All legal documents;
- Letter from Welland Hydro-Electric System Corp. stating Agreement entered into and security in place;
- One (1) signed contract;
- One (1) set final Contract drawings;
- Certificate of Insurance from the Owner naming the City and Region of Niagara as additional insured (\$5 Million);
- Certificate of Insurance from the Contractor naming the City and Region of Niagara as additional insured (\$5 Million);
- W.S.I.B. Clearance Certificate;
- Notice of Project;
- Notification from Welland Hydro-Electric System Corp. re: Agreement;
- Written clearance from all agencies

2.6.2 Preparation of Subdivider's Agreement

(Contact Integrated Services - Planning Division)

The draft of the Subdivider's Agreement will be prepared by City of Welland Integrated Services - Planning Division and forwarded to the Owner for execution.

Prior to the preparation of the draft Agreement, Intergrated Services - Planning and Department Division must be in receipt of the following information:

- a) A letter indicating the name of the person and/or company with whom the Subdivider's Agreement will be executed the signing authority and respective position;
- b) Letter indicating name of any new chargee, etc. The name, address and telephone number of the Owner's Lawyer;
- c) Current PIN Sheet;

Two (2) copies of the Draft 'M' Plan and Draft 'R' Plans as well as in digital format.

In addition to the above, the submission of the following documents must accompany the contract documents prior to the preparation of the Subdivider's Agreement:

- Four (4) copies of reference plans for any easements to be granted to the City and two (2) copies of same in digital format;
- Four (4) copies of final (M-Plan) for registration and two (2) copies of same in digital format;

2.6.3 Niagara Peninsula Standard Specifications (All City Projects)

The Niagara Peninsula Standard Specifications (NPSS) was developed in order to standardize construction practices relating to road and municipal services contracts. The NPSS has taken into account existing specifications at the provincial level (OPS) and at the Municipal level.

The NPSS is intended for use in conjunction with the Ontario Provincial Specifications (OPS). It is also intended that the special needs of projects can be accommodated through the use of supplementary special provisions.

The City of Welland requires the use of NPSS for all Capital projects and construction contracts within the City.

2.7 Cost Estimate

An itemized cost estimate for the construction of all works in the form acceptable to the City of Welland (refer to Appendix B) is required along with a breakdown of any items designated to be cost-shared.

If actual tendered prices are being submitted (excluding H.S.T.), a factor of 1.10 is to be applied and the new total factored by 1.03 to obtain the cost estimate for purposes of the Subdivider's Agreement.

A proposed construction schedule for all construction activities is to be provided to the City's Infrastructure Services - Engineering Division. During the progress of the work, any revisions to the original schedule shall be forwarded to the City.

2.8 Construction Requirements

An itemized cost estimate for the construction of all works in a form acceptable to the City of Welland is required along with a breakdown of any items designated to be cost-shared. The format of the cost estimate is provided in Appendix B, 'Schedules' - Cost Estimate.

If actual tendered prices are being submitted (excluding H.S.T.), a factor of 1.10 is to be applied and the new total factored by 1.03 to obtain the cost estimate for purposes of the Subdivider's Agreement.

2.9 As-Constructed' Records and Drawings

2.9.1 General

- a) Construction Records Service Location Plans

Upon preliminary acceptance of services, the required location plans for as constructed measurements are to be completed on the City of Welland Standard Service Location Records and submitted to the City's Infrastructure Services - Engineering Division showing all necessary details for underground service installations.

One reproducible copy of each location plan is to be submitted to the City.

Construction Records location plans are required for the following:

i. Sanitary Sewers

- Location of service tie connections at the main line sewer are to be dimensioned along the mainline sewer from each maintenance hole;
- Location of service cleanouts (City projects) at street line are to be dimensioned from the lot corners and the elevation of the service invert at street line is to be recorded.

ii. Storm Service and Catchbasin

- Location of service and catch basin lead tie connections at the mainline sewer are to be dimensioned along the mainline sewer from each maintenance hole;
- Location of services at street line are to be dimensioned from the lot corners and the elevation of the service invert at street line is to be recorded;
- Catch basin locations are to be dimensioned as a distance along the storm sewer from the nearest maintenance hole and the elevation of the catch basin rim and lead invert recorded.

iii. Watermain Valves, Tees and Appurtenances and Water Services

- The location of watermain valve box and valve chambers are to be dimensioned up or down the road from the nearest maintenance hole and an offset distance from the centreline of the road or back of the curb;
- Water service main stops are to be dimensioned along the alignment of the water main from the nearest valve and curb stops and boxes are to be dimensioned from lot corners.

Where watermains are not within road allowances or near sewers, ties to property corner shall be used.

b) Construction Records Drawings

"Construction Records" drawings constitute the original Engineering Drawings which have been plotted again to show "Construction Records" conditions. The "Construction Records" drawing, mylar and a copy of the AutoCAD drawing files (or DWGS Format if AutoCAD file unavailable) on a CD shall be submitted to the City for their permanent records

c) As stated, final measurement location plans are to be completed and submitted at time of preliminary acceptance of services. "Construction Records" drawings are to be submitted to the City Infrastructure Services -

Engineering Division for checking, no later than six (6) months after preliminary acceptance of top asphalt

2.9.2 Construction Records Field Survey

The "Construction Records" revisions shall be based upon a "Construction Records" survey of all the development services and shall include a field check of the following items:

- a) Location of maintenance holes for utilities;
- b) Location of catch basins;
- c) Location of hydrants;
- d) Location and ties to valve chambers and valve boxes;
- e) Location of streetlights;
- f) Maintenance hole inverts;
- g) Pipe Inverts;
- h) Distance between maintenance holes;
- i) Special maintenance hole details;
- j) Catch basin inverts.

2.9.3 Construction Records

Drawings

The "Construction Records" drawings for all the Municipal Services shall incorporate all revisions found in completing the "Construction Records" field survey and include a check of the following items and incorporation of the necessary revisions.

- a) Percent grade - sewers;
- b) Invert elevations - sewer at maintenance holes, at plugs for future extensions;
- c) Top of pipe and/or invert elevations - watermains, where necessary (ie. where water main has been varied from normal depth requirements) in field, to avoid conflict with other buried services;
- d) Top of watermain and sanitary sewer at centreline of creek crossing;

Note: Original design information (inverts, grades, etc.) are to be removed from the drawing and replaced by the Construction Records information.

- e) Pipe type, class and bedding;
- f) Service connections **at street line**- sanitary, storm and water;
- g) Label "Construction Records Drawings" (shown in revision column with date), and on cover sheet;
- h) Registered Plan Number is to be shown on plan view of each drawing including general plans;
- i) Lot and block numbers shall be in conformity with the registered plan.
- j) Street names shall be in conformity with the registered plan or as approved by the City.

3 PRE-SERVICING

3.1 General

Under circumstances where this type of agreement is authorized, the Owner is required to deposit Financial Securities to cover the following costs, at the discretion of the City:

50% of the value of all on-site works plus 100% of the value of all off-site works,

Securities may be required for the preservation of existing vegetation.

No work may commence on the site until the Agreement is executed by all parties and Financial Securities are in place with the City.

No periodic reductions will be authorized for Pre-Servicing Agreements until the value of the site works is less than 50%. When the Owner enters into a Subdivision Agreement with the City, adjustments to the Financial Securities required shall be made at that time.

Notes

4 DRAFTING REQUIREMENTS (all developments)

4.1 General

- a) Drawing size shall be A1 (596mm x 841mm) (digital format);
- b) Plan and Profile
 - horizontal metric scale shall be 1:500
 - vertical metric scale shall be 1:50;Plan and Profile drawings will not be required for Site Plan submissions. Topographic plans or Site Plans are only required. Profile drawings are not warranted for Site Plan applications.
- c) Metric scale for general plans shall be a minimum of 1:1000;
- d) Original material used for all drawings shall be mylar matte surface on working side or equivalent (submission of mylar drawings only required upon submission of construction records);
- e) All drawings shall be neat, legible and completed in ink;
- f) All engineering drawings **must contain** the City standard title block, a key plan, north arrow, current revision status, and be stamped by a Professional Engineer licensed to practice in the Province of Ontario;
- g) All sewers, watermains, maintenance holes, maintenance hole numbers, pipe diameter, direction of flow, pipe class and bedding, and service connection shall be shown on all drawings;
- h) Where plans require more than one drawing, match lines shall be provided, showing both reference drawing numbers, preceding and following, plus station;
- i) Servicing drawings must clearly label existing services distinctly from proposed services by label and by line type.
- j) In Site Plan submissions all existing infrastructure and existing structures shall be shown in greyscale and opaque. All proposed works and construction shall be solid and shown darker than existing to proposed works to stand out from existing.
- k) Upon submission of the subdivision design drawings the Consultant shall provide and submit a set of either CAD drawings or a set of drawings in PDF format.

4.2 CAD and GIS'

Computer-Aided Design (CAD) shall be used to generate all engineering drawings. Vector format "DWGS" files with no X-Refs shall be supplied to the City. This data shall be supplied when "as-builts" are submitted for assumption. Storm sewer, sanitary sewer and watermain information must be on a separate layer.

4.3 Geodetic Control

Where required, a digital drawing file with the following spatial characteristics shall accompany development applications:

Map Projection: *Universal Transverse Mercator*
Horizontal Datum: *NAD83 Zone 17 North*
Horizontal Units: *Metres*

The graphics in the drawing must be geographically positioned to third order accuracy. The City's horizontal control network (UTM NAD83) may be used as a control reference and can be accessed on the City of Welland Internet Map Server at the following web address:

<http://gis.welland.ca/wims/login.asp>

user name: survey

password: control45

These online survey control maps contain the following information for each control point:

UTM Northing (eg. 4759528.62 metres)

UTM Easting (eg. 643968.44 metres)

Marker Type (eg. GPM, SCP, BM)

Marker ID (eg. SCP-517)

Elevation (eg. 179.812)

Description (eg. "Has old curb stop type cover with steel T bar.")

The City will no longer disseminate digital copies of the parcel boundary graphics.

4.4 List of Drawings

A complete set of engineering and landscape drawings shall include:

- a) Title Sheet
- b) General Plan of Services
- c) General Notes
- d) Composite Utility Plan
- e) Streetscape Plan
- f) Signal Wiring Plan and Signalized Intersection Plan
- g) Sanitary Drainage Plans
- h) Storm Drainage Plans
- i) Park/Open Space Concept/Grading Plan (as required)
- j) Subdivision Grading Plans
- k) Plan and Profile Drawings
- l) Street Lighting and Electrical Distribution
- m) Detail Sheets

4.4.1 Title Sheets

The Title Sheet shall include the following:

- a) Name of the Development
- b) Name of the Owner
- c) City of Welland
- d) Name of the Consulting Engineer
- e) Key Plan at scale of 1:10,000 indicating the location of the proposed development and the proposed new street alignment
- f) Index to each drawing constituting the complete set indicating drawing number and title
- g) Approvals.

4.4.2 General Plan of Services

To a scale of 1:1000, showing the following:

- a) Roads, lots and their numbers
- b) Sanitary and storm sewers including pipe diameter and direction of flow and SWM facilities (where applicable)
- c) Watermains, hydrants and valves
- d) Maintenance holes and catchbasins
- e) Culverts and easements
- f) Existing streets and services surrounding the development and their relation to the proposed work
- g) Location and description of all available benchmarks.

4.4.3 General Notes Sheet

This sheet shall list the following notes:

- a) General City of Welland design criteria that apply to all sheets. The pertinent notes for the project can be extracted from the design criteria chapter (i.e. lot service, pipe sizes, curb type, CB grate type, etc.)
- b) Special warnings from utility companies and government agencies, i.e. existing structures and buried services.
- c) General City policies and by-laws which apply to the construction activity (i.e. hours of work, mud tracking, fire permits, construction access, etc.).

4.4.4 Composite Utility Plan

In lieu of Municipal Consents and/or PUC applications for individual utilities, the applicant is required to submit Composite Utility Plans which are plan drawings at a scale of 1:500 showing; road layout, all underground services/utilities, all above ground appurtenances to the services, all street furniture including sidewalk, all street trees, and driveways. The plan must include all utility structures/buildings.

The plans must be stamped/signed and dated by all utilities and the consulting engineer prior to submission to the City for review and approval.

Note: The City will not issue Building permits until these plans have been submitted and approved.

4.4.5 Streetscape Plan

Traffic Control Plan(s) to be drawn to a scale of 1:1000 or larger and shall show land uses, road layout, sidewalk, bicycle paths, bicycle lanes, multi use trails, entrances to parks and open space areas, signage for bicycle circulation, pedestrian routing, storage and tapers for turn lanes, street name signs, traffic control signs including no parking signs, stop bars and other painted lines, on-street parking (0.5 parking spaces per lot) and any traffic calming measures (if proposed/required).

4.4.6 Signal Wiring Plan and Signalized Intersection Plan

Should traffic signals be required, a separate Signal Wiring Plan; and Signalized Intersection Plan showing location of all poles and mounted hardware, handwells, ducts/cables, the controller, and full turn lanes (storage and taper). The plans shall be submitted at a scale of 1:500.

4.4.7 Phasing Plan

If a plan of subdivision is to be developed in stages, a Phasing Plan showing current and future phases is to be prepared at a scale of 1:1000 or larger. The City may request various scales in order to create composite plans with other developments.

If this information can be clearly shown on the General Plan/Underground Services Plan, the two drawings can be combined.

The Phasing Plan's function must be substantiated with an interim Stormwater Management and Traffic Report (and other reports as required by the City).

4.4.8 Sanitary Drainage Area Plan

To a scale of 1:1000, unless otherwise approved by the City, showing the following:

- a) Proposed sanitary sewers, maintenance holes and appurtenances, indicating grade, pipe size, length of each section of pipe and direction of flow;
- b) Drainage areas within the development and the limits of outside areas within the development and the limits of outside areas draining into the proposed system;
- c) Area in hectares, direction of flow and section population or population density shall be indicated on all drainage areas.

4.4.9 Storm Drainage Plans

Storm drainage plans are to be drawn to a scale of 1:1000 or larger. If large external drainage areas are to be detailed, a separate External Drainage Area Plan is to be produced. A scale of 1:5000 is acceptable for an External Drainage Plan and is 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 must indicate the following:

- a) Existing contours (0.5 m intervals)
- b) Drainage patterns of adjacent lands and a breakdown of contributing external areas,
- c) The run-off co-efficients and area of tributary areas internal and external to the development for each section of the storm sewers within the development,
- d) Direction of run-off (overland flow)
- e) Street Names
- f) Maintenance hole and Catch basin Numbers
- g) Sewer Sizes
- h) Directions of flow in the sewers
- i) Any catch basins or swales, on lots, parks or blocks, required to accept storm runoff
- j) Complete major and minor storm systems.

4.4.10 Park/Open Space Concept Plans and Grading Plans

Park/Open Space Concept Plans are to demonstrate that the proposed park facility program, including buffers, can be satisfactorily achieved. Park facility program will be provided by Parks and Recreation staff. Also, space should be provided for grading and drainage requirements and trails (ie. benched areas

with tributary buffers and/or SWM ponds for future trail installation). A Park Grading Plan will ensure that the drainage can work with proposed facilities as shown on the Park Concept Plan. Both Park Concept Plan and Park Grading Plan are to be to a scale of 1:500.

4.4.11 Subdivision Grading Plans

Grading plans for all lots and blocks are to be drawn to a scale of 1:500 showing existing contours (0.5 m intervals), established from elevations taken in the field and/or from the City's base mapping.

4.4.11.1 Existing Elevations At:

- a) the corners of each lot and block
- b) external elevations extending to a minimum 30 m perimeter external to the Plan
- c) flow direction for external drainage
- d) the base of all large trees 10 cm or more in diameter plus their drip line, and the composite drip line of all contiguous vegetated areas such as woodlots, hedgerows, etc.
- e) regular intervals within any woodlot or other natural blocks where deemed necessary to determine the effect of grade change on tree preservation.

4.4.11.2 Proposed Elevations At:

- a) intervals along the centreline of all proposed roads (maximum 20 m spacing); the slope of each road section is to be noted
- b) all high points (split drainage, rear and side yards, top and bottom of slopes)
- c) the corners of each lot and block
- d) 15 m intervals along cut-off swales and ditches
- e) the exterior grade at the front and rear of each structure
- f) any other points necessary to present a proper picture of the proposed drainage scheme including tops of catch basins and bottoms of swales and associated easements
- g) critical transition points adjacent to walkways or existing lots or (provide section details where useful)
- h) top of grate and invert elevations for rear yard catch basins.

4.4.11.3 Other Required Information:

- a) street furniture including road structures (catch basins and maintenance holes, fire hydrants, hydro transformers and street lights)
- b) direction of gutter flow at catch basins
- c) direction of overland flow routes including points of outlet and ponding limits for the 100 year event
- d) label all lots with a drainage type and refer to a detail on the detail drawings
- e) indicate existing trees and proposed tree saving limits; indicate provisions for the preservation of any existing trees where identified for retention

- f) detail retaining walls and structures were required, including top of wall and bottom of wall elevations
- g) show all fencing, easements and noise attenuation structures
- h) indicate the regulatory flood limits of watercourses
- i) provide percent grade where swales are at a minimum slope or are otherwise critical
- j) specify run vs. rise ratio where slopes are created with a slope greater than 10% (Note: maximum slope = 3:1)
- k) a minimum basement elevations to be 0.3 m above the 100 year hydraulic grade line, or, as an alternative, specify the use of sump pumps with backflow preventors.

4.4.12 “Plan and Profile” Drawings

4.4.12.1 General Requirements

- a) All plan and profile drawings are to be drawn to a horizontal scale of 1:500 and a vertical scale of 1:50.
- b) Where two or more sheets are required for one street, match lines must be used and there are to be no overlaps or duplication of information.
- c) Where intersecting streets are shown on a plan and profile drawing, 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 and profile drawing has been drawn.
- d) Pavement designs for the particular roadway are to be indicated on the plan and profile drawing **or on the General Notes Plan.**
- e) The detail information from all the borehole logs is to be plotted on the profile and located on the plan. Borehole information should contain a borehole plot plus a brief description of soils and the water level.
- f) Where roundabouts are provided, a plan and profile drawing shall indicate detailed design dimensions including radius, lane width, etc. The roundabout design shall be in accordance with the TAC Design Manual.

4.4.12.2 Plan View

The following information and details are to be included:

- a) Key plan, legend, street names, block/lot number and frontage dimension, block/lot type (single, semi, multiple), servicing locations for storm, wastewater and water, all existing and proposed sewers and watermains, maintenance holes, catch basins, valve chambers, hydrants, sidewalk, centreline chainage (every 20 m), north arrow (true and construction), road allowance and pavement dimensions, curb radii, easements, reserves, road sections where clarification is required, detail gutter grades on large radius bends and cul-de-sacs (minimum 0.75%), light standard and transformer locations.
- b) Only the type and diameter of the sewers are to be indicated on the Plan view.

- c) Provide a phasing and construction schedule that shows the works required to mitigate sediment contamination of affected creeks, adjacent lands, and storm sewer systems and how they are to be staged. (Erosion and sedimentation control)

4.4.12.3 Profile View

- a) The type of public service (existing and proposed wastewater or stormwater), the diameter, length, grade and class of pipe are to be shown on the profile portion of the drawings only.
- b) Where possibility of a conflict with other services exists, connections are to be plotted on the profile (i.e. watermain).
- c) Indicate the road profile, existing and proposed. Any structural fill areas are to be hatched in.
- d) Provide centreline chainage and elevations. Indicate the elevation at grade changes and provide the slope and length of each section.
- e) Provide all vertical curve data on the top of the profile view.
- f) Provide existing and proposed maintenance hole details, including size, OPS Standard, pipe inverts at entry and exit, drop structure details. Indicate safety platforms and elevations where required.
- g) Plot the 100 year hydraulic grade line.
- h) Provide detailed information for all outfalls external to development.

4.4.13 Streetlighting and Electrical Distribution Drawings

(For additional details, refer to Section 13.)

To a scale of 1:1000, showing the following:

- a) Roads, lots and their numbers;
- b) The position of all new light standards within the development;
- c) The position of existing light standards surrounding the development and their relation to the proposed work;
- d) A detail of and tabulated specifications for the type of luminaires proposed.

All designs shall be in accordance with the "Guide for Design of Roadway Lighting" as developed by the Transportation Association of Canada (TAC).

4.4.14 Construction Details

Any particular detail drawing referenced on any of the preceding drawings or any additional particular drawing required by the Engineer.

4.4.15 Individual Lot Grading Plans (Sitings)

Detailed Lot Grading Plans (2 copies) must accompany all building permit applications. Building permits will not be issued until the Consultant has approved the subdivision Grading Plan.

4.4.15.1 Information Required on Individual Lot Grading Plan(s)

The individual grading plans must be in conformance with the overall Subdivision Grading Plan, as approved.

Sitings for single homes and semis shall be prepared as one lot per sheet at a scale of 250:1. Sheet size of 8.5" by 14".

Sitings for townhouse blocks shall be prepared as one block per sheet at a scale of 250: 1. Sheet size of 11" by 17".

Provide a title block with the name of building/Owner/subdivision/registered plan number, lot number and municipal address (if available), architect/designer company, scale of drawing and date of preparation.

The plan is to show the following:

- elevation of culverts, drainage ditches, sidewalks and easements
- location of approved erosion and sedimentation controls
- location of sump pump and discharge point
- the existing elevations as per topographic survey indicating existing buildings, drainage patterns and finished first floor elevations for all buildings on adjacent lands
- the surface runoff for all adjacent and proposed lots using arrows to show the direction of flow
- the house type and elevations of the finished first floor top of foundation wall, basement floor and underside of the footings
- the proposed elevations at the lot corners, landings, garage slab and all entrances (indicating the number of risers), the existing roads and catchbasins
- the location, length and percent slope of proposed driveways
- type and details of proposed retaining walls, including top and bottom of wall elevations

All elevations are to be referred to a geodetic City benchmark.

Note: Lots submitted within unassumed subdivisions must be approved by the Owner's Engineer for conformance to the overall subdivision design. The individual lot grading plans must be stamped with the following wording prior to being reviewed by the City:

"We certify that the proposed grades are correct, and that the lot grading of the subject lot is in conformity to the approved subdivision lot grading plans and City standards and will not adversely affect an adjacent property."

4.4.16 As-Built Drawings

"As-built" drawings are required of individual Lot Grading Plans and constitute the original mylar engineering and landscape drawings which have been revised to include "as-built" conditions. The "as-built" drawings shall be submitted to the City for the City's permanent records upon completion of construction and prior to the request for the City to initiate the assumption process.

The "as-built" revisions shall be based upon an "as-built" survey of all the subdivision services and works.

4.4.16.1 “As-Built” Drawing Requirements

The drawings must indicate the following information:

- House connections – location and invert at the property line
- “As-built” drawing (shown in revision column with date)
- All construction notes shall be removed
- The registered plan number must be shown on the plan view of each drawing as well as the General Plan/Underground Services Plan
- Lot and block numbers shall be in conformity with the Registered Plan
- Street names shall be in conformity with the Registered Plan
- All easements to be verified and provide Reference Plan and PIN Numbers
- All street trees and planting areas including revisions to species, quantity and condition
- Record of timing for planting, including date of replacement planting if applicable.

4.4.16.2 Digital Data/GIS Compatibility

“As-built” drawings shall also be submitted in a ‘DWG’ Digital Format and satisfy the requirements in sections 4.2 and 4.3 inclusive.

4.4.16.3 Acceptance of “As-Built” Drawings

The City will review each submitted drawing. Drawings shall be revised if discrepancies are found or insufficient details are provided.

Prior to assumption of the plan, a complete set of mylar shall be submitted along with the digital files (see drawing requirements for digital format).

Parks and Recreation will require “as-built” drawings of all park and blocks, to be constructed by the City, when conveyed to the City, which may be prior to Assumption. A legal and topographic survey of the blocks should contain the following information:

- Spot elevations taken on a 5 m grid for all park blocks unless otherwise specified;
- Water, storm, electrical, sanitary (if applicable) servicing locations and connections;
- All invert, rim elevations for services, pipe sizing and gradients;
- Complete topographic information of all structures (including paved areas, trails, and parking lots), vegetation, and landform within the block.

5 SUBMISSIONS – SITE PLANS

5.1 General

The City of Welland has compiled this information to assist applicants wishing to develop land within municipal limits and to ensure that the development of land within the municipality is conducted in an orderly, timely and appropriate manner.

5.1.1 Purpose of Site Plan Agreement

The purpose of this information is to provide a means in which to allow the Corporation of the City of Welland to participate in the overall design of development within the community and set out minimum guidelines in order to achieve the following:

- 1) to ensure compliance with all municipal by-laws, policies and regulations (i.e. Zoning, Official Plan, other government agencies, engineering standards, etc.);
- 2) to ensure that development proposals are constructed and maintained as approved;
- 3) to preserve and enhance the natural qualities of the site;
- 4) to control the placement and provision of required services;
- 5) to provide for the optimum utilization of community facilities and services; and,
- 6) to ensure compatibility with the character of abutting and/or adjacent uses.

5.1.2 Authority

Section 41 of the Planning Act, R.S.O. 1990 provides for a municipality to implement Site Plan Control. The City of Welland has passed By-law #9973 placing the whole of the City under Site Plan Control.

5.1.3 Site Plan Review Procedure

A detailed circulation and review process is carried out by City Staff from various Departments of the City as well as outside agencies. Its purpose is to review Site Plan applications for compliance with City requirements, through the Integrated Services – Planning Division. All inquiries on Site Plan submissions should be directed to the attention of the Planning Technicians Integrated Services – Planning Division. Staff will direct development-related questions to the appropriate Department(s) for review and response. Should the need for a meeting arise, staff will make all necessary arrangements.

5.1.4 General Policies and Requirements for All Development Proposals

A. Cost

Lands shall be developed at the expense of the Owner(s) and only in accordance with the registered Site Plan Control Agreement.

B. Change of Agent

Should the Owner(s) change Agents during the Site Plan process, a notice in writing must be forwarded to the Integrated Services – Planning Division prior to further transactions occurring.

The Engineer of record must provide certification of works prior to change or Owner(s) must provide written commitment from any new Engineer of record to certify installations installed to date.

NOTE: If correspondence is required to be forwarded to any other interested parties please specify on Site Plan Control Application (refer to Appendix B, 'Schedules').

C. Building Permits

As Site Plan Control requirements are applicable law under the Building Code Act a building permit cannot be issued until a Site Plan Control Agreement has been approved by the City. However, in order to expedite building permit issuance applicants are encouraged to submit a building permit application after the City has responded to the first submission and all City comments have been addressed in revised drawings. Prior to making building permit application, the applicant must consult with the Integrated Services – Building Division concerning the Building Permit Application Checklist.

D. Site Plan Agreement/Minor Change

The requirements of the Site Plan Control Agreement run with the title of the subject property and the Owner is obliged to fulfil the terms of the Agreements and to finalize and maintain all works in accordance with the Agreement.

Should, at any point in time, the Owner(s) desire to add a new building(s) or structure(s), or change the physical development of the property in any manner beyond what is provided for in the registered Site Plan Agreement or that shown on the “approved development plans”, or a new agreement, an application for Minor Change to the Site Plan Agreement may be required. Owners should check with the Integrated Services - Planning Division as to the nature of any proposed changes to determine which form of approval may/may not be necessary.

E. Legal Requirements

Prior to execution of the Site Plan Control Agreement, the following documentation must be submitted to the City:

- A copy of the most recent deed and PIN sheet showing how the current Owners hold title to the property.
- A Letter of Credit (in the City of Welland format), cash or certified cheque in an amount to the satisfaction of the City.
- Cash or Certified Cheque for any prepayments/fees/inspections.
- Direction from Applicant how they want to appear on title, i.e. numbered company, company name, personal, etc.
- Disclosure of any encumbrances, specifically mortgages/chargees that appear on title, or mortgages/chargees that have been discharged in the past six (6) months. Failure of the Applicant to disclose such information results in unnecessary delay, as registration cannot proceed until that status of the encumbrance is ascertained. The name(s) and position(s) of the signing authorities of all titleholders to the property having the authority to bind their respective corporation, company, etc.
- Deeds for lands to be deeded to the City, if required.

- A certificate of clearance from an Ontario Land Surveyor stating that he has reviewed the survey information and that it is correct as presented.

F. Irrevocable Securities (i.e. Letter of Credit)

An Irrevocable Letter of Credit in the form approved by the City Treasurer, certified cheque or cash in the amount of 50% of all proposed on-site and off-site works to be performed (excluding the costs for the construction of any proposed building(s) and cost for sewer and water servicing along the right-of-way unless otherwise noted) is to be submitted to the Corporate Services – Finance Division through Integrated Services - Planning Division prior to the execution of the Agreement. A City of Welland work permit for all work within municipal Right-of-Way shall be required.

The Letter of Credit will be required at the time of the execution of the Agreement/Amendment/Minor Changes.

G. Tariff of Fees

Submission fees are required for processing Site Plan Control applications including additional costs for processing subsequent submissions, Site Plan Control Agreement Amendments and Minor Changes. The appropriate fees are listed in Appendix B, 'Schedules' – Tariff of Fees and Other Charges.

H. Works on Municipal Right-of-Ways

A Road Occupancy Permit shall be required for all work within municipal Right-of-Way. All servicing work on City road allowances must be constructed by City of Welland forces unless otherwise approved by the City, and the costs associated with same are to be paid to the municipality at the building permit application stage in accordance with Appendix B, 'Schedules' – Tariff of Fees and Other Charges.

I. Reports and Designs

All reports and designs (i.e. Noise Reports, Traffic Impact Study, Geotechnical Report, Stormwater Management Reports, etc.) for proposed developments must be completed, signed and stamped by accredited professionals in the specific field of which the report or design was requested.

J. Cost Estimates

An itemized cost estimate for all proposed on-site, and off-site, works will be submitted at second circulation. Each specific item is to be broken down into estimated quantities and unit prices per item (refer to Appendix B, 'Schedules' – Cost Estimate). All figures shall be based on current construction costs.

The itemized cost estimate must reflect all proposed on-site and off-site works to be performed excluding:

- a) proposed buildings;
- b) sewer and water services within the municipal right-of-way which are to be performed by city forces.

The cost estimate shall be provided to the City of Welland Integrated Services – Planning Division for circulation and review.

K. Lot Grading and Drainage

The Owner shall not permit any grading or change in elevation or contours of the land which could result in the obstruction of natural or artificial drainage courses, discharge of surface water on adjacent lands or public highways or a detrimental visual or physical impact in adjacent properties or drainage to sanitary sewers (DS). Where the proposed grading or change in elevation will damage the natural drainage pattern, the Applicant has to provide clear evidence that these changes will not result in the blockage of natural drainage, ponding of water on adjacent properties or the discharge of surface water on the adjacent properties or highways. All surface water collected on the site must be discharged into an outlet approved by the agency having jurisdiction.

This Detailed Lot Grading Plan shall be prepared and certified by a Professional Engineer or an Ontario Land Surveyor. The Owner's or his Consultant shall submit the Lot Grading Plan for review and approval to the City.

**L. Municipal Addressing (Multiple Family Residential Buildings and Commercial and Industrial Sites)
(i.e. Apartments, Townhouses, Multiple Attached Dwellings)**

- Signage Requirements:
- a unit numbering identification scheme is to be posted at each entrance to the development;
- signage should be in keeping with the architecture of the building(s);
- unit numbering signs are also to be posted on end units of building blocks;
- letters on signs must be of a minimum size so as to be clearly visible and discernible at a distance of 90 metres;
- Addressing will be approved and assigned by Integrated Services - Planning Division.

Note: Adhering to the unit numbering identification scheme will allow emergency vehicles and visitors to immediately determine the location of a particular unit(s) within a building complex.

5.2 Procedure for Submission of Site Plan Applications

STEP 1 – Initial Consultation and Discussions

The City requires a preconsultation meeting before the formal submission of a Site Plan Control Application. The Applicant/Agent should contact the Integrated Services – Planning Division once he/she is ready to discuss the proposed development. The preconsultation meeting provides an opportunity to discuss the development proposal, identify any preliminary concerns or issues with the proposal, and determine what is required for a complete application (i.e. studies, drawings, fees, etc.). Where appropriate, the preconsultation meeting may require the involvement of the Region of Niagara and/or the Niagara Peninsula Conservation Authority.

A letter summarizing the discussion at the preconsultation meeting will be forwarded to the Applicant/Agent to provide an opportunity to address any comments/requirements prior to formal submission of a complete Application.

Prior to the formal submission of the application the owner shall employ the services of a consulting engineer and confirm the viability of the proposed development in relation to infrastructure (servicing) capacities that will be provided by the City of Welland. All

services shall be reviewed for the ability to support the type and size of the proposed development. This shall be submitted to the City in report form or letter form as a minimum.

STEP 2 – Completion and Submission of Formal Application and Plans

Site Plans must be stamped or otherwise reviewed by an Ontario Registered Architect or an Ontario Registered Professional Engineer where a new building/addition requires such professional design pursuant to the Table 1.2.1.1.[C] of the OBC.

If the development is to be phased, the plans submitted should indicate the expected phases of development.

After the pre-consultation meeting with the City of Welland, the Applicant/Agent is required to submit a Site Plan Application Form (see Appendix B 'Schedules' – Site Plan Control Application), and 10 (minimum) sets of development plans to the Planning Division.

The development plans are to include:

- General Site Plan
- Landscaping Plan
- Building Elevations
- Site Servicing
- Site Grading Plan
- Traffic Control Plan
- Existing Conditions Plan
- Reports/Studies
- Other Plans as required

The application, fees, drawings and related reports/studies are to be submitted to the Integrated Services - Planning Division. The applications must be accompanied with the following:

- a cheque/cash for the required application fee made payable to the Treasurer of the City of Welland (see Appendix B, 'Schedules' - Site Plan Control Application for applicable fees);
- all drawings, reports and studies must be stamped and signed by the required professionals;
- all digital data/plans (i.e. CAD working drawings) are to be submitted on CD with each submission;
- all development plans should be bound and in separate sets. Sheet sizes should not exceed ANSI "D" size sheets, i.e. 24" x 36".
- All plans shall be prepared in accordance with the City of Welland GIS standards. Please refer to Section 4.3 - Geodetic Control.

STEP 3 – Application Review and Circulation

Once the application and supporting material is received, staff will review same and if the submission is in order will begin the first circulation. The Applicant will be notified if the application is incomplete.

Once the review is completed and if changes to the proposal are necessary, the Applicant/Agent will be formally notified of the required changes in writing indicating the revisions required for a second submission of plans.

Questions concerning any comments should be directed to the Integrated Services – Planning Division and/or affected Departments as necessary. A second meeting can be arranged to address any issues relating to the first circulation of drawings.

Subsequent Submissions

Once the required revisions are made to the plans, the Applicant/Agent shall resubmit the appropriate sets of the revised plans. Additional plans may be required depending on the agencies/departments required for approval.

Note:

The number of plans to be submitted may vary on the nature of the subsequent review or department/agencies requiring further plans for review.

Resubmitted plans and materials will be circulated to the various Agencies or Departments for further comment. Upon approval of the plans, the Applicant/ Agent will receive a formal letter with instructions and materials required for final plan approval.

STEP 4 – Approval of Development Plans

Once all plans have been finalized, the following material is required to be submitted for final plan approval.

- one (1) CD with digital drawing in an AutoCAD format.
- ten (10) sets of rolled bound full size plans.
- ten (10) sets of legal size (8.5 x 14) reductions.
- Letter of Credit in amount determined by the cost estimates.
- A separate cheque for any applicable prepayments/fees/deposits.

NOTE:

All final plans are to incorporate City of Welland final approval stamps (refer to Appendix B, 'Schedules' - City of Welland Final Approved Stamps).

STEP 5 – Site Plan Agreement Document Preparation

Once the final development plans are received, a Site Plan Control Agreement is prepared. These documents, together with the final development plans, are then reviewed by City Staff and, once complete, are forwarded to the Applicant/Agent for execution.

A Site Plan Control Agreement is a legal document normally consisting of legal text and accompanying development plans.

It is imperative that the text of the Agreement and the development plans are accurate since the documents are registered on title and are binding upon current and future owners of the subject property.

It is the Applicant's responsibility to review the document and to obtain all required information, including the signatures of all mortgagees that appear on title. After the Applicant reviews the document, the signed copies and development plans are to be returned to the Integrated Services – Planning Division.

STEP 6 – Execution of Site Plan Control Agreement

On the return of the Site Plan Control Agreement documents, the General Manager, Integrated Services - Planning Division may execute the Agreement on behalf of the City. Copies of the Agreement are subsequently sent to the relevant City Divisions. The documents are registered, and a copy is then sent to the Owner and an original copy is filed with the City Clerk.

STEP 7 – Letters of Credit and Reductions

The purpose of the Letter of Credit, which is required at execution of the Agreement, is to provide the City with assurances that the site works and other obligations will be completed in accordance with the terms of the Site Plan Agreement. An Irrevocable Letter of Credit in the amount of 50% of the Total Works (including Engineering Fee and Contingency and H.S.T.) is required (see NOTE section). If the work required by the Agreement is not completed as required in the Agreement, the Letter of Credit or portion thereof will be retained until the deficiencies are remedied. Upon failure of the Owner to remedy the situation to the satisfaction of the City, the City may choose to cash and/or draw upon the Letter of Credit, or portion thereof, to have the deficiencies corrected.

The City will release portions of the Letter of Credit as work proceeds in accordance with the Agreement. Prior to any reduction of the Letter of Credit or cash deposit, the City shall require Schedule 'C' to be signed by the Project Designer (i.e. Professional Engineer/Architect), as applicable, and the Owner stating that the works with respect to the proposed reduction in Letter of Credit have been completed in accordance with the Site Plan Agreement. If any elements of the works have been constructed contrary to the Agreement, revised plans shall be submitted by the Project Designer detailing the changes which have been made and the reasons behind the changes.

The City will review the changes to determine if they are acceptable and whether or not a Minor Change or a new Agreement is required. If the changes are acceptable and no Amendment/Minor Change is required, the City will then inspect the site to determine whether or not a reduction in the Letter of Credit is justified.

If justified, staff will notify the Corporate Services – Finance Division to reduce the Letter of Credit. If the changes are not acceptable, a Minor Change is required to reflect the changes, no reduction in the Letter of Credit respecting the changes shall occur until all changes are approved by the City.

The City will retain a portion of the Letter of Credit (10%) until the project is complete.

Note:

It is critical, when constructing, to adhere to the approved Development Plans. All Owners must ensure their Project Supervisor/ Contractors have the approved and registered Site Plan Agreement in their possession. Frequently, Owners do not relay the approved information to the Builders resulting in developments which are not constructed in accordance with the approved building plans and subsequently resulting in the Owner's ability to get his Letter of Credit returned or reduced.

No reduction in the Letter of Credit and/or City Inspection of the subject property will be carried out until at least 50% of the total works have been completed as listed in Appendix B, 'Schedules' – Cost Estimate which is attached to the Site Plan Control Agreement.

Once greater than 50% of the total works have been completed a reduction in the Letter of Credit may be requested by completing and submitting Schedule 'C' which is attached to the Site Plan Control Agreement for review and approval. The City shall hold 100% of the remaining outstanding deficiencies.

5.3 Development Plan Requirements for Approval of Plans and Drawings

All drawings are to have a title block containing the name and address of the project, the lot and plan number, drawing name and number, scale, date and City of Welland approval stamps. All development plans, excluding building elevation plans, shall be co-ordinated using 1 master plan.

5.3.1 General Site Plan

Details of development to be included on the plan: (these items below must be incorporated in a Land Use Schedule/Coverage Table);

- Net lot area;
- Maximum building coverage;
- Maximum gross floor area of existing and/or proposed building(s) including specific uses by type (i.e. commercial, floor area devoted to public use, residential, warehouse/storage, etc.);
- Maximum building height;
- Maximum number of units, if residential;
- Required and actual number of parking spaces provided – calculations are to be shown indicating parking spaces required based on actual floor area of specific uses;
- Parking station coverage;
- Minimum number of loading spaces;
- Existing and/or proposed zoning;
- Rentable space (for residential apartment buildings);

Note:

- For information regarding any of the above items, please refer to City of Welland Zoning By-law 2667 (as amended) or Township of Crowland By-law 1538 (as amended), as applicable;
- Floor plans/cross-sectional diagrams are not to be shown on the general Site Plan. If these plans are required by a Department, they are to be filed with the Integrated Services – Planning Division. The existence of these plans in the Agreement could result in difficulties at the building permit issuance stage.

The General Site Plan must include:

- Key plan showing site location;
- City of Welland final approval stamps;
- Scale;
- Drawing Sheet Identification (i.e. Sheet 1, 1A, etc.);

(NOTE: Stamps should be located on right side of plans within title block border area and should be similar in size to those indicated to allow for proper signing and legibility.)

- Property boundaries, bearings and distances including all perimeter dimensions in metric;
 - Adjacent property owned by the Applicant or in which the Applicant has an interest;
 - The location of existing and proposed buildings, including accessory buildings, sheds, etc.;
 - Location or outline of existing buildings on adjacent properties;
 - Location and height of existing and proposed fencing including privacy fencing or screening. All parking stations containing more than four (4) parking spaces abutting a Residential District or building require perimeter fencing in accordance with Section 5.28(e) of Zoning By-law 2667 (as amended). All fencing is also to comply with the City of Welland Fence By-law;
 - Curbing/curve radii at all street access and driveway intersections;
 - Dimension and label all existing and proposed curb cuts and curb depression fills;
 - Building dimensions shall be indicated as “more or less” (+/-);
 - Existing and proposed sidewalks including depressions in sidewalks to grade level for handicapped access;
 - Building blocks to be numbered with number of units (i.e. Building No. 2, 4 dwelling units);
 - Existing and proposed exterior amenity areas;
 - Existing and proposed location of outdoor garbage storage areas screened to City of Welland standards;
 - North arrow (the drawing must be oriented to have a vertical north line or as closely as possible);
 - On-site lighting;
 - Hydro transformers;
 - Any existing or proposed 1 foot reserves;
 - Any other relevant data (i.e. location of snow piles during winter months);
 - Identification of subsequent phases of the project and how services will be provided.
- a) Zoning By-law Requirements:**
- Yard dimensions (front, side and rear) for all buildings and structures existing and proposed setbacks are to be shown as actual dimensions from nearest property line to foundation walls;
 - Front, side and rear lot lines (designated);
 - Existing and proposed loading doors and bays, loading areas and intended truck traffic;

- Existing and proposed roadways, driveways and parking areas with reference to surface treatment (i.e. gravel or asphalt);
(Off-Street Parking Requirements – parking spaces shall be made accessible for ingress and egress by means of a hard surface lane or right-of-way or street)
- The Geometric Design Standard for Parking, City of Welland Bylaw 6246, shall be used in the design of parking facilities for all Site Plan developments;
- Parking calculations based on use and floor area. All proposed uses to be shown are to be selected from a permitted use list in the application section of the Zoning By-law;
- Provision for parking for physically disabled persons. Designated barrier-free parking spaces should be located as close as practical to the main building entrance without requiring persons to cross traffic aisles or other parking spaces to access the building. A concrete or equal sidewalk shall be provided from every space to the main building entrance. The required amount of spaces are calculated on the total overall parking for the site;
- Indicate Zoning of the subject property and abutting/adjacent properties;
- Vegetation not to exceed 0.9m in height within a sight triangle or day lighting triangle.

b) Building Code/Fire Code Regulations

- Traffic circulation and Fire route signs/lanes including proper lane widths, turning radii and sign locations (any lanes to be designated as fire route lanes are to be clearly shown and approved by the City Fire Department);
- Existing and proposed location of any exterior walkways, stairs, escalators, building entrances;
- All new buildings (except buildings used as townhouses only) are required to provide barrier-free accessibility. Consideration must be given to providing a barrier-free path of travel from the parking area to the main entrance door, such as provisions for illumination, signage, etc., in accordance with Section 3.8 of the Ontario Building Code;
- Indicate if the building is classified under Part 9 of the Ontario Building Code (OBC) (generally buildings less than 600 m² in footprint), or under Part 3 of the OBC (generally buildings greater than 600 m² in footprint, or greater than three storeys; or any assembly or institutional building);
- If the building is classified under Part 3, the building size and construction relative to occupancy must be specified on the drawings in accordance with the Building Code – i.e. one of OBC 3.2.2.20. through 3.3.3.83. The Fire Department and the Building Division require this information in order to review plans of Part 3 buildings to determine if adequate fire access routes and fire hydrants have been provided;
- Building Code requirements dealing with fire fighting access, Siamese connections, fire access routes, streets, location of fire hydrants, etc. must be addressed in accordance with OBC 3.2.5 and OBC 3.2.2.10;

- An adequate supply of water is required for fire fighting purpose for new Part 3 buildings, generally greater than 200sqm in area, OBC 3.2.5.7.(1) and Appendix A. The requirements for additions to existing buildings are also specified. Water supply/demand shall be calculated as follows:
 1. For buildings without sprinkler systems serviced by the City waterworks the flow rate specified in Table 2 of Appendix A must be available at a minimum pressure of 20 psi for 30 minutes.
 2. For buildings without sprinkler systems in rural areas not serviced by the City waterworks, Appendix A specifies the pond/reservoir volume and flow rate requirements.
 3. For buildings with sprinkler systems serviced by the City waterworks or in rural areas, the design criteria of NFPA 13, "installation of Sprinkler Systems" will govern the flow rate and duration requirements for the combined demand of the sprinkler system and hose stream.
 4. A private hydrant(s) will be necessary for rural areas and may be necessary in urban areas to achieve the flow and location requirements specified in the OBC.
 5. The building designer must ensure, at an early stage, an adequate supply of water is available or can be made available by the proponent. The applicant for building permit may be required to verify water supply prior to issuance of the permit.
- Additional information required by the Fire Department and the Building Division as follows: building area (i.e. footprint), building use, location of fire walls, number of storeys, location of proposed and existing fire hydrants. All buildings must be specified as being sprinkler protected or non-sprinkler protected.
- Every building with an internal sprinkler or standpipe system shall be provided with a Siamese fire department connection, NFPA 13, 2-7.1 and OBC 3.2.9.2.(5).
- All Siamese fire department connections must be located on the outside of a building adjacent to a street/fire access route and within 45 meters of a fire hydrant and shall be unobstructed by plantings, vegetation, etc.
- Buildings greater than 600sqm in area or 3 stories in height require a street/fire access route be provided to the principle building entrance and each building elevation is required to face a street/fire access route, OBC 3.2.2.10., 3.2.5.4.
- Fire access routes must meet the 6m width, 12m centreline radius, 5m overhead clearance, 1:12.5 gradient, hard surface and turnaround facilities requirements of OBC 3.2.5.6. Fire access routes must be located so the building face is not less than 3m and not greater than 15m from the nearest portion of the fire access route, OBC 3.2.5.5.(1).
- A fire hydrant shall be located within 90m of the building perimeter required to face a street, OBC 3.2.5.7.(2). and within 45m of the Siamese fire hydrant connection. All private hydrants shall have at least 150mm connection with the main, be unobstructed by plantings, vegetation, etc ... and shall be located at least 12m from the buildings protected, NFPA 24, 4-1.1 and 4-2.2.

c) External Approvals

- Approval from other applicable authorities may be required prior to approval for development. It is the owner's responsibility to ensure all approvals for development are received. External approval beyond control of the City may postpone development. It is therefore in the best interest of the owner to pursue external approvals before application is submitted to the City, where permitted by the external agency.
- The City is not responsible to determine whether or not external approval applies, however the City has developed an Applicable Law Checklist to assist Developers and Owners. Examples of external approval are:
 1. MOE - Record of Site Condition for lands developed from industrial or commercial use to residential.
 2. NPCA - lands within a floodplain or other sensitive areas or discharging storm system to natural environment.
 3. MOE - certificate of Approval required for discharge of containment or noise into the environment.
 4. MTO - Building and Land Use Permits required near provincial highway.
 5. Niagara Region - Sewer Use By-law may require a Sewer Interceptor.
 6. Niagara Region - Signs require a permit if near a Regional Road.
 7. Niagara Region - development of property fronting on a Regional Road.
 8. Niagara Region - Road Occupancy Permit is required to perform work, store material, or erect hoarding on a Regional Road.
 9. Ministry of Children and Youth Services - Children Day care use.
 10. Ministry of Health and Long Term Care - Home for the Aged.

5.3.2 Landscape Plan

- Location of all proposed plant material, planting beds and sodded areas, and other surface treatments;
- Location of existing vegetation to be retained or removed;
- Location of traffic signs;
- Plant listing showing index, name, size, quantity, etc.
- Location of play areas, special activity/amenity areas, pathways, open space areas;
- Existing and proposed fencing;
- North arrow.

Note:

- Any sodding, planting or work on lands abutting the property from the property lines to sidewalk and curbing, shall be to the satisfaction of the City and/or Regional Municipality;
- Landscaping requirements as shown above may be incorporated on Site Plan depending on the overall detail and complexity of the development proposal.

5.3.3 Building Elevations (four sides of the project)

To show the overall design of the proposed structure including:

- Front, side and rear elevations of a typical building block showing generally the material to be used (i.e. brick, wood, concrete block, precast concrete, stucco, etc.), for information purposes. The materials should be noted on the plan;
- The elevations must be complete in showing windows, doors and height of existing/proposed building(s). (There are limitations on the percentage of openings permitted in any building face. Refer to Tables 3.2.3.A and 3.2.3.B of the O.B.C.)

5.3.4 Underground Parking Layout

- If applicable, the underground parking layout shall show ramps, stairwells, driveways and parking spaces for floor or floors.

5.3.5 Site Servicing/Grading Plans

The Servicing and Grading Plans must include and/or clearly indicate:

- North arrow;
- City of Welland bench mark description and elevation (to be provided by Infrastructure Services - Engineering Division upon request);
- Location and size of Municipal Sanitary Sewer Systems abutting the site (existing and proposed);
- Sanitary laterals and connections (existing and proposed) – location, size, grade (slope) and class of pipe;
- Location and size of Municipal Storm Drainage Systems abutting the site (existing and proposed);
- Storm sewer laterals and connections (existing and proposed) – location, size, grade (slope) and class of pipe;
- Control maintenance holes (if required), to be located on the right-of-way side of the property line;
- Location and size of existing and proposed Municipal Watermain Systems abutting the site;
- Watermain piping (existing and proposed) – location, size connections and class of pipe. All watermain work on City property to be constructed by City forces at Owner's expense;
- Location and size of water meter and valve chambers;
- Location of nearest Municipal hydrants and on-site hydrants;
- All proposed services to building (note that all services including bell, hydro, gas, cable, etc.) must be provided underground from the existing source to the building;
- Show invert and finish grade elevations of all maintenance holes;

- Catch basins (existing and proposed) – locations, proposed and existing elevations for grates, inverts, class of pipes and grades;
- All grade elevations should be shown as follows:
 - Existing 797.3;
 - Proposed;

797.3

 - As constructed (797.3)
- Existing parking area, where storm sewers are available, shall be drained by catch basins as follows:
 - parking areas with less than 1000 square metres shall be drained by a single catch basin;
 - parking areas with all surfaces larger than 1000 square metres shall have at least one catch basin for each 1,000 square metres unless designed by a Professional Engineer and approved by the City;
- Location of downspouts for roof drainage (Note: roof drainage is to spill directly onto the ground and not connected directly to storm sewers unless approved by the City). Splash guards must be installed at all roof leaders.
- All surface drainage routes including swales, ditches, watercourses and their invert elevations and flow direction;
- Location and size of entrance culverts (Note: that all culvert works shall be completed by the City of Welland at the Owner's expense). This is to be noted on the drawing;
- All abutting streets, right-of-ways, easements, road widening;
- Existing grades of abutting roads and proposed grades through new entrances;
- Elevations on an 8.0 metre grid throughout the site including lot corners and to a least 15 metres beyond the property boundaries so that existing drainage patterns may be evaluated;
- The overall existing and proposed surface drainage pattern on the site is to be shown by flow directional arrows;
- Proposed drainage swales with minimum grades of 1%;
- Ground floor elevations of the building and ground elevation at all building corners, entrances, catch basins, tops and bottoms of slopes and other locations, as required, to establish the surface drainage system;
- Location of all existing and proposed curbs with types, retaining walls and edge of asphalt if no curb required;
- Finished Asphalt grade at curbing. Top of curb elevation (proposed and existing) may be provided as additional information;
- Driveway cuts will be completed by City forces (if required) – to be indicated on drawing;

- All new and proposed sidewalks to be indicated on drawing with proposed elevations;
- The location of hydro transformers must be identified;
- Legend detailing all symbols used (i.e. catch basins, retaining walls, road, property line, building line, existing and proposed elevations);

NOTE:

- All driveways from property lines for the first 7.5 m from curb shall be within 5% maximum grade, thereafter, all driveways shall be within 10% maximum grades;
- The approval of plans does not exempt the Owner's bonded Contractor from the requirements to obtain the various permits normally required to complete a construction project, such as, but not limited to, the following:
 - a) Encroachment Agreements (if required);
 - b) Road Occupancy Permit
- The Building Code requires a maintenance hole to be installed within 30 m (98'-5") of a building for building sewers greater than 6" diameter.
- Based on available storm sewers, any lands may be require Stormwater Management;
- All existing sewer laterals must be inspected by City prior to connection (must be noted on plan);
- All works to be completed in accordance with City and Provincial Standards. See Infrastructure Services - Engineering Division for detailed City drawings. Refer to OPSD and OPSS specifications and drawings for all other details;

The drawing must clearly indicate that all work to be constructed on the right-of-way must be constructed by City forces unless otherwise noted;

Varying circumstances may require that requirements other than those listed above be indicated on the drawings.

5.3.6 Existing Conditions Plan

To include all of the following information:

- Legend;
- North arrow;
- Scale;
- Bench mark (to be provided by the Infrastructure Services - Engineering Division upon request);
- Bearings and lengths of property lines;
- Surrounding land uses;
- Legal lines, such as boundaries and easements;
- Location and dimensions of all roads (radii of turns), walks, buildings, walls, utilities (surface, sub-surface and overhead);

- Contours at every 0.5 m for slopes of less than 5%, and every 1.0 m for slopes of more than 5%. An indication of off-site grades and major topographic features;
- Spot elevations at key points such as lot corners;
- Presence of swamps, streams, water bodies and drainage ditches and swales;
- General vegetative cover of the site and its surroundings. The location, elevation and size of prominent trees and shrubs on the development site;
- Location of any geological features on the site;
- Elevations on the land around the development site and information concerning any storm run-off shedding onto the site from adjacent properties;

NOTE:

1. An Existing Condition may be required with the initial submission of applications and plans but will not form part of the registered Agreement. A review of the site (site inspection) will be conducted after the initial consultation and information to determine if this plan will be required.
2. All plans shall have a title block, north arrow, location description, date, scale and drawing number.
3. Depending upon the location of the proposed development, development plans may be circulated to various Crown authorities, Provincial ministries, Regional Niagara and the Niagara Peninsula Conservation Authority, and others as deemed necessary.
4. A Record of Site Condition shall be required for submission with all Site Plan applications.

5.3.7 City Work Permit – City Rights of Way

A City work Permit to perform work, store material on a City road allowance is required prior to initiation of work. The application shall be required and made to the Infrastructure Services - Traffic Division which is independent of the site plan process and pay all applicable fees.

5.4 Phasing of Site Plans

Where a project is phased or development is delayed, and construction does not commence immediately upon execution of the agreement, changes in legislation or City policies may not permit development as proposed in the agreement, in which case the existing agreement will be required to be amended or a Minor Change issued to reflect the necessary changes at the time of commencement of construction.

5.5 Preliminary Servicing Report/Feasibility Study

At the time a proposed development is submitted and approved in principal, the developer's consultant shall ensure that site servicing in the area of the proposed

development can accommodate such development. A preliminary servicing report and feasibility study shall be submitted confirming capacities in both the sanitary sewer and water main distribution system. This may entail reviewing the site servicing and existing municipal infrastructure and providing sufficient engineering evidence that will support the developer's position. This shall include but not limited to sanitary sewer design, storm sewer design and storm water management.

The City of Welland does not provide engineering services to developers to confirm that existing infrastructure may or may not accommodate the proposed development. This requirement is the sole responsibility of the Owner and their consulting engineer.

NOTES;

6 DESIGN STANDARDS - ROADS

6.1 General

The geometric design of municipal roads shall conform with standards set out in the latest edition of the "Geometric Design Standards for Canadian Roads and Streets" issued by the Roads & Transportation Association of Canada (TAC), or as amended herein.

Generally, residential roads are classified as arterial, collector or local.

Arterial roads are intended to carry large volumes of traffic, moving at medium to high speeds. Arterial roads serve the major traffic flows between the principal traffic generators and connect with collectors and freeways. Design of arterial roadways is to meet the requirements of the controlling authority.


Collector roads provide for both traffic service and land access. The primary traffic service function is to carry traffic between local streets and arterial roadways. The City of Welland classifies collector roads as any roadway which, in the opinion of the City as designated by the Official Plan.

A local road's function is to provide for land access to those properties which directly front on it.

All new development shall have a minimum of two (2) points of access/egress during construction and upon completion.

6.1.1 Design Standards

	Local Road	Collector Road	Arterial
Minimum Grade	0.4%	0.5%	0.5%
Maximum Grade	8.0%	6.0%	5%
Maximum Grade for Through Roads at Intersection	3.5%	3.0%	3.0%
Maximum Grade for Stop Roads at Intersection	2.5%	1.5%	1.5%
Minimum Curb Radius at Intersection with Arterial Road	9m	13m	15m
Minimum Curb Radius at Intersection with Collector Road	9m	13m	15m
Minimum Curb Grade	0.40%	0.50%	0.5%
Minimum Curb Grade at Radius of Intersections	0.80%	0.80%	0.8%
Cul-de-Sac Minimum Outside Curb Radius	15m	N/A	N/A
R.O.W. (minimum)	20.0m *	20.0m *	30.0m
Pavement Width	8.5m **	9.75m **	
Minimum Centreline Radius	60m ***	85m	

	Local Road	Collector Road	Arterial
Design Speed	50 kph	50 to 60 kph	60 to 80 kph
Vertical Curve Minimum sight stopping distance LVC=KA (MTC Manual) K. for Sag K. for Crest	65m 12 8	85m 20 15	85 to 140 9 or 16 13 or 36
Superelevation	None	None	None
Intersection Angle	70-110° at local, 80-100° at collector and arterial ****	80-100°****	90° 
Minimum Intersection Spacing	80m	120m	250m

- * City may request 23.0 m R.O.W.
- ** Measured curbface to curbface.
- *** Except at 90° corners for crescents and courts.
- **** All streets are to intersect at 90° unless existing road alignments or property restrictions required otherwise.

6.1.2 Road Pavement Design

The pavement design for arterial roads will be considered on an individual basis. The composition and construction thickness of the road pavement shall be designed based upon the following factors as outlined in the geotechnical soils report.

- a) Mechanical analysis of the sub grade soil;
- b) Drainage;
- c) Frost susceptibility;
- d) The future volume and class of traffic expected to use the pavement.

Pavements shall be designed for a minimum ADT - 1000 vehicles and an anticipated life of 25 years.

Local	40 mmHL3	Surface Course
	75 mm HL8	Binder Course
	450 mm Granular 'A'	Base
Collector	40 mm HL3	Surface Course
	75 mm HL8	Binder Course
	525 mm Granular 'A'	Base
Local, Collector and Arterial (Industrial)	40 mm HL3	Surface Course
	100 mm HL8	Binder Course
	525 mm Granular 'A'	Base
Arterial	40 mm HL3	Surface Course
	100 mm HL8	Binder Course
	550 mm Granular 'A'	Base

The above are minimum design requirements. The Owner is required to engage a Geotechnical Consultant with experience in pavement design to confirm the minimum design based on results of local soils tests. The consultant may be the same firm contracted to do compaction tests.

On roads that are designed Industrial and/or Arterial, a paved "boulevard strip" consisting of 50 mm HL-3 and 150 mm granular 'A', 450 mm in width, shall be constructed. (The 'boulevard strip' or 'kill strip' is where large quantities of salt and sand are used to maintain winter operations and therefore eliminating any vegetation behind the curb.)

6.1.3 Transit – Road Design Elements

On roads designated as transit routes, the base course asphalt thickness shall be a minimum 100mm. Bus bays shall be in accordance with the TAC Geometric Design Guidelines for Canadian Roads.

6.1.4 Traffic Calming

The primary function of Traffic Calming measures is to improve the liveability of neighbourhoods and improve public safety by reducing vehicle speeds, vehicle volumes and collision frequency. In addition, well-designed and landscaped Traffic Calming measures can enhance a neighbourhood's appearance and the quality of life for its residents.

The City of Welland Traffic Calming Program, Policy and Procedure approved by the City Council and identifies that new roadways are to be identified for traffic calming measures during the development phase. As a result, any roadway identified within a new development, in excess of 500m is to incorporate traffic calming measures.

6.1.4.1 Types of Traffic Calming Measures

The following categories are the types of Traffic Calming measures available for the City of Welland Traffic Calming Program, as outlined in the TAC/ITE Canadian Guide to Neighbourhood Traffic Calming.

Horizontal Deflection – refers to two types of Traffic Calming measures. The first type hinders the driver's ability to drive in a straight line by creating a horizontal shift in the roadway. This shift, forces drivers to slow their vehicles in order to safely navigate the measure. The second type is designed to narrow the width of the travel lane. Doing so reduces the usable surface of the roadway causing drivers to slow their vehicles to maintain a comfortable driving condition. Horizontal deflection measures are mainly used to address speed concerns.

Vertical Deflection – refers to Traffic Calming measures that create a change in the height of the roadway. Vehicles must slow down over these measures in order to avoid unpleasant bumping sensations. Vertical deflection measures are mainly used to reduce vehicle speeds, with minor effects on traffic volumes.

Physical Obstruction – refers to measures that prevent particular vehicle movements, thereby discouraging and eliminating cut-through traffic. The reduction in volume will depend on the nature of the Traffic Calming measure.

Signs and Pavement Markings – can be used as Traffic Calming measures that regulate traffic movements in lieu of physical changes to the roadway. These measures may produce the same effect as physical Traffic Calming measures. However, police enforcement may still be required.

The following is a list of Traffic Calming measures and a description of each:

- Curb extension/bulb-out: An intrusion of the curb extending across a parking lane and narrowing the travel lane.
- Chicane: A series of three (3) curb bulb-outs staggered on alternating sides of the roadway, narrowing the travel lane and forces motorists to slow down as they navigate side to side through the chicane.
- On-Street Parking: Allow vehicles to park parallel to the curb, reducing the travel portion of the roadway.
- Turning Prohibition: Restrict specific turning movements into neighbourhoods, reduces cut-through traffic, enforcement required.

- Traffic Circles: A raised island located in the middle of an intersection and forces vehicles to travel through the intersection in a counter-clockwise direction around the island.
- Textured Crosswalks: A crosswalk designed of a different texture or pattern surface than that of the roadway, warns motorists they are entering a heavy pedestrian area.
- Speed Humps: A raised section of roadway, which deflects both the wheels and frame of a vehicle, forces vehicles to slow down over hump.
- Raised Crosswalks: This section of roadway is raised 3 to 6 inches above street grade.
- Semi-Diverter/Partial: Physical barrier blocks half the roadway prohibiting a Street Closure vehicle movement (one way in/out).
- Right In/Right Out Island: A raised island at an intersection that prevents left turns and through movements to and from an intersection.
- Street Closure: Extension of physical barrier across the width of a roadway creating a cul-de-sac and closing a roadway.
- Raised Intersection: The section of roadway is raised to 6 inches above the roadway.
- Diagonal Diverter: Physical barrier placed across the centre of an intersection, prohibiting one direction of traffic.

6.1.5 Road Allowance Cross-Section

The typical road allowance cross-section shall be as per Appendix C, 'Standard Drawings' - Standard Utility Location Drawing No. 1. Details shall be provided for any approved special provisions required due to unique physical conditions on the site or for existing or future design conditions such as retaining walls, slope protection, culverts, bridges or special crossfall conditions.

6.1.6 Road Sub-Drains

In general, sub-drains will be required to run continuous along both sides of all roads, as per OPSD 216.010. However, the city will consider reducing sub-drain requirements for a particular development where a recognized soils consultant indicates that there will be no adverse effects to the road either during or after construction.

In all cases, sub-drains will be required for a minimum length of 6m on the upstream side of all catchbasins.

6.2 Daylighting

When subdivision streets intersect at any street intersection, the Engineer shall request land for daylighting triangles. The size of the daylighting required is based on the classification of the intersecting roads.

Local to Local

3.5 m x 3.5 m (if required)

Local to Collector	5.0 m x 5.0 m
Collector to Collector	7.0 m x 7.0 m
Local/Collector to Arterial	12.0 m x 12.0 m

The City may request additional day lighting above these requirements, if he deems it necessary, notwithstanding Regional Government requirements.

6.3 Curbs

Barrier curb as shown on OPSD 600.040 shall be used on all streets with the exception of cul-de-sacs. Saw cutting of curb or entrance depressions will be allowed. "Capping" of curb depressions will not be permitted. All depressions not used as property entrances shall be replaced with full barrier type curbing. Barrier type curbing shall be used on all Arterial, Collector, Local Collector roads and also residential streets where deemed necessary by the Engineer.

Mountable curbs as per Ontario Provincial Standard Drawing OPSD 600.060 may be used in the bulb section of the cul-de-sacs. Mountable curbing may also be used in specific situations and/or areas approved by the City. Mountable curbing may be installed in cases of straight sections of residential streets that do not involve any deflection or alignment changes to the roadway or street, and are limited to 50 km and under speed limit.

Any installations of curb faced sidewalk shall have full barrier curb installed as shown on OPSD 600.040. Installations of sidewalks closer than 2.9 m shall also have full barrier type curbing unless approved by the Engineer.

Poured two stage curb construction in accordance with OPSD 600.070 may be used with the approval of the City. Where the curb cut does not match the driveway or replacement of the curb is required, the curb and gutter shall be replaced to the nearest construction or expansion joint for a minimum length of 3.0 m. Prior to placement of top asphalt, all curb repairs shall be completed.

6.4 Boulevards and Requirements for Lands to be Conveyed to the City

The boulevard area (Appendix C, 'Standard Drawings' - Standard Utility Location Drawing No. 1) shall be excavated to a depth of 300 mm and backfilled with 175 mm clean fill material, free of stone, concrete, rocks and other extraneous material and compacted. The boulevard area shall then be filled with 100 mm topsoil, compacted and sod installed in accordance with City requirements. The boulevard shall also remain free of other features, street furniture or landscaping materials of any type unless expressly approved by the City.

6.5 Sidewalks

6.5.1 Concrete sidewalks shall be constructed as per City of Welland standard sidewalk drawing (see Appendix C) and to the following minimum standards in accordance with OPSS.351.

- a) 1.50 m width (residential & commercial),
- b) Minimum depth of 100 mm crushed stone base for standard installation and 200mm base for commercial driveways,
- c) Concrete sidewalk to be 100 mm thick across boulevards, 150 mm thick across residential driveways and adjacent to curbs,
- d) Through commercial development entrances the option of 'laying down' patterned line work, known as "street printing" is optional. This shall be undertaken after consultation with the City,

- e) at intersections with Regional Roads and commercial driveways a minimum of 200mm of concrete shall be used for sidewalks and wheel chair ramps.

6.5.2 Concrete Sidewalks are required.

- a) Along both sides of collector and arterial streets;
b) Along only one (1) side of local streets;
c) Along the inside of crescents;
d) On one (1) side of cul-de-sacs if:
• cul-de-sac is longer than 100 m to the bulb;
• cul-de-sac leads to a pedestrian node (i.e. a park, a school, a commercial area, an apartment building);
• cul-de-sac is of such a design within the subdivision that through pedestrian travel is required;
e) On one side up to the built section of cul-de-sacs. The terminus of the sidewalk shall not conflict with driveways and services and the exact location shall be determined by the City prior to construction.
f) On both sides of roads in Industrial subdivisions.

6.5.3 Concrete sidewalks are not required in the "Bulb" section of cul-de-sacs or along the longer side of crescents, unless otherwise specified by the City.

6.6 **Multi-Use Trails and Walkways**

All walkways shall be a minimum of 3.0 m in width unless otherwise noted. They shall be excavated to a minimum depth of 300 mm. The excavation is to be backfilled with a minimum 225 mm compacted Granular "A" limestone plus 50 mm H.L. 8 and 25 mm H.L.3A or H.L. 2 asphalt. On either side of the walkway, the owner shall construct either a 1.5 m high chain link fence consisting of industrial type posts, No. 9 gauge wire, except such fence shall be 0.9 m high in any required front yard. The said fencing shall have a 1-11/16" outside diameter (O.P.) top rail and single strand bottom tension wire 14.0 gauge fastened 450 mm or centre. (Refer to Appendix C, 'Standard Drawings' - Standard Walkway Access Drawing No. 2). The optional 1.5m high pressure treated board on board fence shall be located on private property. The posts shall be a minimum of 100mm x 100mm and be spaced no farther than 2.44m and be located 50mm inside the property line. All property bars that are disturbed by this construction shall be reset when construction has been completed.

6.7 **Bike Lanes (On Road)**

Bicycle lanes shall have same structural standard as the road base with a 1.5 m lane in addition to the normal road cross-section designated by appropriate markings, as per the Traffic Control Plan. The final design, timing of bicycle circulation signage and markings will be determined by the City.

6.8 **Cul-de-Sacs**

All local roads which permanently terminate at one end (dead end streets) shall be provided with a turning circle (cul-de-sac) of sufficient area to enable the turning of garbage

trucks, snow removal equipment and other emergency vehicles. A road allowance with a 19.0 m radius will be required for a cul-de-sac with a pavement radius of 15.00 m.

A landscaped island may also be considered where large turn around areas are to be provided on dead end streets. A minimum pavement width of 6.0 m shall be provided to allow for turning movement and snow clearing operations.

All dead end streets longer than 100 m shall provide an emergency access for firefighting. A minimum width of 3.9 m; 225 mm compacted Granular "A" limestone; 50 mm HL8 and 25 mm HL3A or HL2 asphalt. Where a walkway is incorporated with the emergency access, the width shall be 4.5 m and constructed in accordance with footpaths and walkways specifications.

6.9 Intersections

At the intersection of two roads, any transition of the minor classification road shall not interfere with the normal crossfall of the major road. A 1% to 2% backfall grade shall be provided on all road profiles where local streets intercept with arterial roads. The backfall grade shall be from the crown of the major road to the end of curb (E.C.) or first catchbasin on the local road. Where possible intersections shall be utilized as the high point of the roadway.

The City of Welland requires the use of roundabouts for intersection control. All intersections meeting warrants for signalization or all-way stop control MUST first be analysed for the intersection of a roundabout prior to proceeding with intersection control.

6.10 Traffic Control – Signs and Pavement Markings

6.10.1 Street Name and Rural Street Number Signs

Once the City has approved the street names, the Owner is responsible for supplying and installing all street name and rural street number signs. All temporary street name signs and rural street number signs must be installed prior to the release of building permits. Permanent signs must be installed prior to commencement of the maintenance period.

A Traffic Control Plan is to be prepared showing the location of all signs and markings to be installed in the subdivision. See Section 4.4.6 for a full description of this plan.

Local and Rural Street Number signs are to be on extruded aluminium blanks. All others are 3.1 mm (1/8”) thick aluminium. The sign face shall be Engineering grade blue background and reflective white lettering. The lettering shall be Helvetica Medium font, using upper and lowercase, both sides.

Table 6.1 Sign and Lettering Sizes			
Road Type/Sign Type	Sign Blank Size	Lettering Size	
		Name	Suffix
Local	150 mm (6")	100 mm (4")	75 mm
Local Decorative	250 mm (10")	100 mm (4")	50 mm

Mast Arm	450 x 2140	250 mm (10")	--
Arterial/Collector	250 mm (10")	100 mm (4")	50 mm
Rural Street Number	120 mm (5")	100 mm (4")	--
Notes: 1. Where a City road intersects a Region road, Region standards apply.			

Street name signs for private roads shall conform to the City's standards, however, the background colour is white and the lettering colour is blue.

All street name signs (excluding mast arm) are to be mounted on 7.6 mm (3") diameter hot dipped galvanized tubular steel posts 3.65 m (12') in length with a 23 mm cleat welded to the bottom; located on the opposite corner of intersection traffic control signs, i.e. Ra-1 (stop signs). Street name signs shall be mounted at a height of 2.7 m (9').

All rural street number signs are to be mounted on galvanized steel "U" channel posts at a height of 1.0 m (3') on private property.

6.10.2 Traffic, Pedestrian and Bicycle Control Signs

The Owner is responsible for supplying and installing all traffic, pedestrian and bicycle control signs where required by the City.

A Traffic Control Plan is to be prepared showing the location of all signs and markings to be installed in the subdivision. See Section 4.4.6 for a full description of this plan.

All traffic and pedestrian control signs are to be made with High intensity type reflective sheeting approved by the Ministry of Transportation Ontario. Stop signs are to be mounted on 100 mm x 100 mm (4 x 4) pressure treated posts. All others on galvanized steel "U" channel posts 3.65 m (12') in length. Signs and markings shall be manufactured and installed in accordance with the current Ontario Traffic Manual and the Highway Traffic Act Regulation for Ontario.

All Stop signs at Regional intersections and arterial roads are to be Ra-101. Stop signs at 'all way' stop intersections are to be mounted with an 'all way' tab and a red and white horizontal hazard marker.

6.10.3 Open Space Signs

The Owner is responsible for supplying and installing interpretive and regulatory signage related to the public use of woodlots, stormwater facilities, trails and open space.

The location of all signs within the subdivision is to be included in the Traffic Control Plan and the Pedestrian Routing Plan. A minimum of one interpretive sign per each stormwater facility and woodlot is required. Regulatory by-law signage is required at all open space frontages accessible by roads and trails, as well as all park entrances.

The timing of installation will be determined on a site-by-site basis with consideration for public access, safety and the construction schedule.

6.10.4 Pavement Markings

The Owner is responsible for supplying and installing all temporary and permanent pavement markings required by the City for roads and bicycle lanes.

Pavement markings shall conform to the Ontario Traffic Manual, Book 11 (latest edition). Pavement markings are to be placed after installation of base course asphalt. Pavement markings shall be applied with a double coat with glass beads after the placement of top course asphalt. Prior to Maintenance and/or Assumption, markings may need to be reapplied. The following pavement markings are required:

- a) Stop bars (0.3 m wide) at all intersections except local to local roads.
- b) Lead-in lines (tails), 15 metres long, at all intersections except local to local roads.
- c) Crosswalk lines and stop bars at 'all-way stop' intersections.
- d) Directional arrows for all designated turn lanes at a signalized intersection.

6.10.5 Traffic Signals

The City of Welland will supply Standard Specifications and Drawings for Traffic Signal installation and Traffic Conduit, as required. Intersections shall be signalized in accordance with the approved Transportation Impact Study and have the 3M Priority Opticom Intersection Traffic Control System fire pre-emption where required by the City's Fire Chief. Audible signals may be required where deemed by the City.

6.11 Driveway Entrances

The Developer shall be required to provide for the excavation, stoning and maintenance in good condition of each driveway from the travelled portion of the road to the lot line.

Residential driveways shall be constructed as per OPSD 351.010. The width of curb cut for apartment, commercial and institutional driveways shall take into account the basic width of the driveway and the radius of curvature as further outlined below. Where mutual driveways are constructed between two adjoining properties, the curb cut-out shall be continuous. (i.e. where the barrier curb is less than 1 metre between driveways).

The radius of curvature from the road into apartment, commercial and institutional driveways shall be designed to accommodate the anticipated vehicular traffic without causing undue interference with the traffic flow on the street. [(TAC) Traffic Turning Templates]]. As a minimum requirement, refer to OPSD 350.010.

Driveway entrances located in cul-de-sacs in all developments in the City shall be constructed in accordance with the standard drawing 'Proposed Driveway Entrance Limits' in appendix 'C'. The driveway shall be located within the extensions of the side property lines unless expressly approved, in writing, by the City.

The following minimum standards apply to driveway entrances:

- a) Asphalt (OPSS 311 applies to this item)
 - i) Residential – 50 mm HL8 and 25 mm HL3A (or HL2) and 225 mm Granular 'A' base.
 - ii) Commercial – 50 mm HL8 and 40 mm HL3 and 300 mm Granular 'A' base.

- iii) Industrial – 50 mm HL8 and 40 mm HL3 and 375 mm Granular 'A' base.
- b) Concrete (OPSS 350 applies to this item)
 - i) Residential – 150 mm concrete and 100 mm Granular 'A' base.
 - ii) Commercial and Industrial – 200 mm concrete and 100 mm Granular 'A' base.

c) Paving Stone

Residential – 300 mm Granular base with 16 mm type 'B' crushed limestone compacted 100% S.P.D. overlaid by 50 mm of limestone screenings with the same brushed in the voids between bricks.

NOTE:

The City of Welland assumes no responsibility for the maintenance of paving stone, pattern concrete, imprint asphalt or any entrance that is constructed of materials other than those listed as items a) and b) above.

6.12 Noise Barriers

In order to ensure attractive streetscape appearance, the City discourages development layouts that require noise barriers. The need for noise attenuation is identified in the Acoustical Report prepared at submitted in support of the development application of a Plan of Subdivision. The heights of walls will be minimized through the use of fence/berm combinations. All aspects of installation must conform to City policy.

It is important that continuity of appearance be achieved within neighbourhoods. Noise barrier wall shall be constructed of wood panels and may incorporate decorative masonry or pre-cast columns to provide design relief.

The minimum acoustical characteristics of the barrier wall shall be such that the wall has a surface density of at least 20 kg/m². The walls shall be designed for a reference wind pressure of 0.43 kPa Welland.

The maximum barrier wall height shall be 6.0 m, although greater heights can be obtained using a combination of berm and wall. Maximum height adjacent to rail lines shall be 6.0 m.

Barrier walls shall be installed entirely on private property. Where the noise attenuation features include a berm and/or barrier wall, to noise attenuation feature shall be located entirely on private property.

The base of the street side of the wall should include a 1.2 m wide continuous planting strip mulched with shredded bark. The bed is to be planted with deciduous and coniferous shrubs and vines to provide year-round visual interest. Appropriate vines include Boston Ivy (*Parthenocissus Tricuspidata Veitchii*) and Virginia Creeper (*Parthenocissus quinquefolia*). Minimum spacing on centre for vines to be 5 m and for shrubs to be 1.2 m. The planting design should require low maintenance. The costs associated with installing any landscape maintenance systems will be the sole cost of the owner. At the time of Assumption, the owner may be required to remove the maintenance system and any unapproved plant material at their own expense.

Minimum grade for berms in turf areas that are to be mowed regularly shall be 4:1; naturalized areas are to be 3:1. 2:1 slopes may be allowed on low maintenance naturalized slopes. This will be assessed on a site-specific basis. Seed mixes for berms are to be selected from the recommended seed mixes, and may require approval from

outside authorities. Interim seeding may be required for quick cover, erosion control or dust control.

Grading and berm construction associated with the barrier installation shall be completed to within 5 mm below the bottom of the barrier prior to constructing the barrier footings.

- a) There shall be no visible gaps between any barrier panels or beneath the bottom panels after completion of the barrier unless approved by the acoustical engineer.
- b) Where footings are to be installed on or within 1.0 m from a downward slope of 3:1 or steeper, the embedment depth shall be increased a minimum of 0.5 m greater than the requirements of the Canadian Highway Bridge Design Code. The design of the depths may be altered based on the design by a Consulting Engineer.

6.13 Entrance Features

Entrance features are not a requirement of the City. An Owner may submit for approval a design proposal for entrance features which may consist of walls, gates, fences, trees, shrubs, flowers and other related components. The Owner will be required to install these entrance features, if approved, on private property and will enter into an agreement with the owner for the construction and maintenance of entrance features.

6.14 Fencing

Fencing is required as follows:

- a) 1.8 m high decorative wood pressure treated fencing , is required along rear or side yards flanking all public open spaces including walkways, parkland, watercourse blocks and woodlots, and to be located 0.10 m from property line on private property. This fencing shall be maintained by the property owner in perpetuity.
- b) Galvanized chain link fencing is required for sports field applications as per the City's standard drawings.
- c) 1.8 m wood board-on-board privacy fence may be required in other locations where residential flankages and/or rear yards abut collector and arterial roads as deemed appropriate by the City.
- d) Fencing may be required for properties abutting utility corridors; Owner to consult with utility company.
- e) Fencing may be required for properties abutting school board lands; Owner to consult with School Board.
- f) Fencing may be required for entrances or natural features abutting the R.O.W.

The fencing materials used are to be consistent throughout a development.

Fencing is not required where noise barrier walls are to be installed.

Temporary and/or protective fencing may be required to protect park blocks and/or open space corridors at the City's discretion.

Protective and/or erosion and sediment fencing must be installed to City's approval in accordance with permit and drawing submissions.

6.15 Streetscape and Landscaping

The Owner shall file with the City a Tree Preservation Plan prepared by a qualified forester for approval by the City and the Region of Niagara. No tree cutting, clearing and grubbing shall be allowed until a Tree Preservation Plan is filed with, and approved by, the City

and/or the Region of Niagara. The Owner agrees to implement the approved Tree Preservation Plan to the complete satisfaction of the City.

6.16 Utility Installation

Location and installation details for utilities must be approved by the City prior to the installation.

All utility trenches within the road allowance are to be backfilled and compacted to 95% Standard Proctor Density. Backfill material shall be in accordance with the requirements of the City and utility authority.

The Owner is responsible to ensure that there is no conflict of plants and appurtenances with other utilities, driveways, tree planting pits, etc.

The location of all street furniture locations shall be submitted with plans for driveway cut locations.

7 DESIGN STANDARDS – STORM SEWERS

7.1 General

The City of Welland requires that a storm sewer system be used to collect runoff from lots and within the right-of-way, and that the storm sewer system be constructed on every street of new development.

The construction of all storm sewer system components and service connections in the City of Welland shall be in accordance with the following documents and latest revisions:

The Owner and/or Consultant shall meet with the City Infrastructure Services - Engineering Division prior to commencement of detailed design to establish the acceptable methodology for determination of storm water design flows, required by the City and to determine a suitable storm outlet.

Final approval for storm sewer systems and alterations to an existing watercourse as well as new outlets and storm water management facilities are under the jurisdiction of the Ontario Ministry of Environment and/or Ontario Ministry of Natural Resources and/or the Niagara Peninsula Conservation Authority. In addition, outlets to Federal owned lands and waterways are also subject to approval of the Department of Public Works Canada and the St. Lawrence Seaway Authority.

The Consultant should contact these agencies early in the design phase to obtain their requirements.

7.2 Design Requirements

7.2.1 Minor and Major System

The design of the storm drainage system shall comprise both the minor system and major system. Storm sewers shall be designed to convey run-off for City of Welland's two (2) year design storm without surface ponding.

The major system shall convey the City of Welland 100 year design storm overland within the right-of-way leading to the watersheds major outlet. Relief shall be provided in low points to prevent the depth of ponding from exceeding 0.60 metres.

7.2.2 Rational Method

Where applicable, the design of the storm sewers for the minor system may be designed according to the rational formula where:

$$Q = 2.78 AiR$$

A = Area in hectares

i = Average rainfall intensity - mm/h

R = Run-off coefficient

Q = Run-off quantity in l/s

7.2.3 Watershed and Drainage Areas

The watershed area shall be determined from contour plans and shall include all areas that naturally drain into the system and shall also consider all lot grading plans for proposed developments.

A plan of the watershed area shall be prepared and shall include all affected streets, lots and watercourses. The proposed storm sewer system shall be shown on this plan including each maintenance hole numbered consecutively for design reference. Maintenance holes shall be located at each and every change of pipe size, grade and alignment.

Maintenance holes shall be the tributary points in design. The areas tributary to each maintenance hole shall be clearly outlined on the storm drainage area plan with the area in hectares (to the nearest tenth) and run-off coefficient or parameter shown in a circle of 15 mm diameter.

Thus $\frac{4.6 \text{ ha}}{0.5}$

In cases where areas of different run-off coefficients are tributary to one maintenance hole, the areas tributary to the maintenance hole shall be individually outlined. The tributary area and run-off coefficient for each area shall be shown as set out above.

In determining tributary areas to maintenance holes, the proposed grading of lots must be considered and taken into account in order to maintain consistency in design.

In the case of large tributary areas under single ownership, such as shopping centres, apartment developments, schools, etc., the design shall be prepared on the basis of the whole area being tributary to a maintenance hole in an abutting storm sewer. When more than one sewer connection will be necessary to service the property in question, the appropriate area tributary to each sewer connection shall be clearly shown and taken into account in the design of the storm sewer.

In lieu of precise information on development of the whole or any part of a watershed area, the latest approved Zoning By-law and Plans shall be used to select the correct values of the run-off coefficients and parameters to be used in the design and to determine the specific areas where they will apply.

7.2.4 Rainfall Intensity

The values of the rainfall intensity shall be determined using the City of Welland IDF curves.

Storm frequency values for both the minor and major systems are as follows:

- i) Minor System - 2 Year Storm
- ii) Major System - 100 Year Storm (for all watercourses)

Generally inlet time or initial time of concentration is to be 10 minutes.

IDF Curves and Storm Depths for Welland

- a) IDF Curves

Return Period (Yrs.)	a	b	c
2	755	0.789	8.0
5	830	0.777	7.3

10	860	0.763	6.5
25	900	0.745	5.2
50	960	0.736	5.1
100	1020	0.731	4.7

$$i = \frac{a}{(t + c)^b}$$

Where: a, b, c = above
i = intensity (mm/hr)
t = storm duration (min)

Ratio of time to peak = 0.375

b) Storm Depths (mm)

Storm Duration (hr)	Return Period (Yrs)					
	2	5	10	25	50	100
1	27.0	31.5	35.0	40.1	44.4	48.4
2	32.8	38.4	42.8	49.3	54.9	59.9
3	36.4	42.7	47.8	55.2	61.7	67.4
4	39.0	45.9	51.5	59.7	67.0	73.2
6	42.8	50.6	57.1	66.6	74.9	82.0
12	50.0	59.5	67.7	79.9	90.4	99.3
24	58.1	69.7	80.1	95.6	108.8	120.0

7.2.5 Run-off Coefficients

Values for the run-off coefficient "R" shall be as below unless otherwise approved in writing by the City;

SURFACE TYPE OR RECOMMENDED COEFFICIENT LAND USE

Parks	a) over 4 hectares	c = 0.20
	b) under 4 hectares	c = 0.25
Schools		c = 0.40
Single Family Residential		c = 0.40
Semi-Detached		c = 0.50
Maisonettes, Townhouses, etc.		c = 0.60
Churches		c = 0.60
Apartment		c = 0.70
Industrial		c = 0.70
Commercial		c = 0.80
Paved Area		c = 0.90 or 1.00

7.3 Maintenance Holes

7.3.1 General

All maintenance holes are to be supplied or constructed in accordance with OPSD 701 Series.

7.3.2 Purpose

Maintenance holes shall be provided at each change in alignment, grade and pipe material.

7.3.3 Spacing

Generally, maintenance holes shall be spaced at

- a maximum of 100 m for pipe sizes 250 mm diameter to 750 mm diameter;
- a maximum of 120 m for pipe sizes 825 mm diameter to 1200 mm diameter;
- a maximum of 150 m for pipe sizes greater than 1200 mm diameter.

7.3.4 Structures

Maintenance holes shall be constructed of poured or precast concrete as per OPSD 701 Series, with watertight connections.

7.3.5 Benching

All benching inside maintenance holes shall be as determined in OPSD 701.021, and be completed to obvert.

7.3.6 Diameter

The type and size of maintenance hole shall be specified on the profile of the engineering drawing. The minimum maintenance hole sizes shall be determined using OPSD 701.021.

7.3.7 Access

All maintenance hole chamber openings shall be located parallel to flow direction.

7.3.8 Change in Direction of Flow

Storm sewer pipe shall not be turned more than 90° in any maintenance hole. The maximum change in direction of flow in maintenance holes for sewer sizes 1050mm and over shall be 45°. The direction of flow in any maintenance hole will not be permitted at acute interior angles.

7.3.9 Drop Across Maintenance Hole

When pipe size does not change through a maintenance hole and the upstream flow velocity does not exceed 1.5 m/s, the following allowances shall be made to compensate for hydraulic losses.

Alignment Change	Drop Required
a) Straight run	grade of sewer
b) $14 < 45^\circ$	0.03 m

- c) 45 to 90° 0.06 m

When the upstream flow velocity exceeds 1.5 m/s or for all junction and transition maintenance holes the drop shall be hydraulically designed.

7.3.10 Drop Structures

The maximum drop allowed across a maintenance hole is 900 mm. If the design of the sewer is such that the difference in elevation between inlet and outlet exceeds 0.9 m, a drop structure is then required. The drop structure shall be in accordance with OPSD 1003.010 or 1003.031. If a large drop occurs in a maintenance structure other types of structures to accommodate this drop shall be explored and approved by the City. If a drop structure is necessary, by the designer, a 600mm sump shall be accommodated to eliminate the possibility of erosion to the bottom of the structure.

7.3.11 Safety Gratings

Safety gratings shall be required in all maintenance holes in accordance with OPS specifications but no greater than 5.0 m in depth. Safety gratings shall not be more than 5.0 m apart and constructed in accordance with OPSD 404 Series.

7.3.12 Matching Obverts

The obvert(s) on the upstream side of a maintenance hole should in no case be lower than the obvert(s) on the downstream side of the maintenance hole. A design may be submitted for approval on an individual basis in relation to sewer installations. Matching obverts in the City of Welland is preferred. The City may approve alternative designs with outlet issues.

7.4 Pipe Design and Materials

7.4.1 General

The class and type of pipe and type of pipe bedding shall be shown on the profile for all lengths of sewer. All storm sewers shall be located as shown on the appropriate road cross-section standard. Generally, the pipe sizes shall not decrease from a larger size upstream to a smaller size downstream regardless of the increase in grade. Subject to the approval of the City, radius pipe will be permitted to achieve changes in horizontal alignment for sewers 1050 mm in diameter or larger. The minimum radius allowed for various diameters of pipe shall be as detailed in the manufacturer's specification. Pipe bedding and class shall be designed to suit ultimate loading conditions.

7.4.2 Sewer Design Capacity

Manning's Formula shall be used to compute the capacity of storm sewers. The capacity of the sewer shall be calculated on the basis of the pipe flowing full.

7.4.3 Roughness Coefficient

The roughness coefficient to be used for storm sewer pipes shall be:

- | | |
|-------------------|----------------------------------|
| a) Concrete Pipe: | n = 0.013 for all sizes of pipes |
| b) P.V.C.: | n = 0.013 for all sizes of pipes |

- c) Corrugated Metal: based on M.T.O. recommended roughness coefficient

7.4.4 Velocity, Grade and Size

The velocity in storm sewers shall be generally limited to a minimum of 0.75 m/s and a maximum of 6.0 m/s in accordance with MOE Guidelines.

The minimum size for storm sewer is 300 mm diameter. The minimum design velocity for storm sewer is 0.75 m per second. The following are the minimum slopes which shall be provided for storm sewers:

<u>Pipe Size</u>	<u>Minimum Slope (%)</u>
300 mm	0.303
375 mm	0.226
450 mm	0.178
525 mm	0.144
600 mm	0.120
675 mm	0.102
750 mm	0.089
825 mm	0.080
900 mm	0.070
1050 mm	0.056
1200 mm	0.048
1350 mm	0.042
1500 mm	0.036
1650 mm	0.031
1800 mm	0.028
1950 mm	0.025
2100 mm	0.023

7.4.5 Minimum Depth

The minimum cover to the top of pipe shall be 1.5 m.

In all cases, the proposed storm sewers shall be installed at sufficient depth to service lands external to the site as determined by the City.

7.4.6 Location

Where practical, storm sewers shall be located on the south and west side of the road allowance, 2.0 m from the centreline as shown in Appendix C, 'Standard Drawings' - Standard Utility Location Drawing No. 1. If common trenching is required for the storm and sanitary sewer, the Consultant shall prepare special design standards and provide to the City the specification for such requirements. Any non-standard design for locations will require the approval of the City.

7.4.7 Crossings

Generally a minimum clearance of 150 mm shall be provided between the outside of the pipe barrels at the point of pipe crossing for sanitary sewers and other utilities except for watermain crossings, where the minimum clearance shall be no less than 500 mm.

In the event that the minimum clearance of 150 mm cannot be obtained, then the pipes at the crossing shall be concrete encased to ensure that the pipes are properly bedded.

7.4.8 Pipe Materials

Mainline storm sewers shall be constructed of concrete pipe, PVC or equivalent. Corrugated metal piping may be used for culverts. The classification of pipe to be used shall be clearly indicated on the plans.

The following types of material may be used;

- Reinforced concrete sewer pipe 300 mm in diameter and larger shall be steel reinforced and shall conform to CSA Specification, or latest revision thereof, Class 50D, 65D, 100D or 140D, as required.
- Concrete catch basin leads shall conform to CSA A257.1 for Class 3 pipe. The use of polyvinyl chloride pipe (P.V.C.) is permitted for catch basin lead application only. The pipe shall be CSA B182.1M and B182.2M, and have a minimum SDR of 35 or PVC ribbed equal..
- Corrugated steel pipe shall conform to A.A.S.H.O. Specifications M218, M136, M190, and M167.
- Concrete and PVC pipes shall have approved rubber gaskets in each and every joint from spigot to end.
- Corrugated metal pipe for culverts shall be one continuous piece.
- CSA approved Ribbed PVC SDR 35 piping up to a maximum 675mm diameter and installed in accordance to manufacturers specifications and OPSS 410. With the installation of ribbed PVC piping mandrel testing shall be required as required by the Engineer.

7.5 Inlet and Outfall Structures

Owners should contact the Niagara Peninsula Conservation Authority to ascertain permit requirements.

Inlet and Outfall structures including headwalls shall be fully designed and submitted in detail.

Grates shall be provided on all inlet and outfall structures 450 mm in diameter and larger and shall be fully designed and detailed including locks where applicable.

In general, inlet grates shall consist of vertical parallel bars or rods sloping approximately 45° away from and in the direction of the flow. Outlet grates shall consist of horizontal bars or rods placed perpendicular to the flow. Spacing between the bars or rods shall be as per OPSD 804.050.

7.6 Catchbasins

7.6.1 General

Catch basins shall be precast and cast-in-place as per OPSD Series 700. The storm sewer connections to the main sewer shall be made with an approved manufactured tee for main sewer sizes up to and including 450 mm diameter and in accordance with City requirements for larger sizes (i.e. when sewer diameter less than 2X lateral diameter).

7.6.2 Catchbasin Spacing

The maximum spacing of catchbasins shall be as follows:

<u>Road Gradient</u>	<u>Maximum Spacing</u>
0.5% to 3%	90 m
3% to 5%	75 m
5% to 6%	60 m

7.6.3 Pipe Size

Storm sewer connections for catchbasin leads within roadways, multiple family and other blocks, commercial and Institutional Areas are to be sized individually according to the intended use.

Single catch basins	200 mm diameter at 0.50% slope minimum
Double catch basins	250 mm diameter at 0.50% slope minimum

7.6.4 Location

Where changes of grade occur, the average gradient shall determine the maximum spacing. Catch basins should not be located within 1.5 m of the curb depression for a driveway or sidewalk. At intersections, catch basins shall be installed so that no more than 15 m of gutter will drain past the upstream point of tangency.

In sags, when drainage is received from more than one direction, double catch basins shall be installed and the maximum length of gutter contributing from each side shall be 75% of the spacing permitted above.

Catch basins are required at the throat section of cul-de-sacs.

Catch basins are permitted in rear yards to permit drainage to the storm system on the street.

7.6.5 Catch Basin Frame and Grate

The catch basin frame and grate used for all installations shall be the OPSD series 400.020 (see Appendix C).

7.6.6 Rear Yard Catchbasins

Rear yard catch basins (RYCB) and leads shall be included in the overall grading and drainage design to provide outlets for rear yard swales. The maximum distance from the swale high point to the RYCB or between RYCB shall be the lesser of 50.0 m or four single family lots between high points.

Easement requirements for RYCB and leads shall be a minimum width of 3.0 m as per Section 7.8 herein and shall be conveyed in favour of the City of Welland for storm drainage purposes. Required easements shall be clearly shown on the drawings including a typical RYCB lead offset, minimum 400 mm from the easement line.

For the installation of connections to Rear Yard Catch basins (RYCB) every effort must be made to install the lead so that it will outlet to a maintenance hole within the right-of-way.

7.7 Culverts

The minimum driveway culvert size is 400mm diameter. Culverts required on major system watercourses shall be designed to convey the 1:100 year storm or the backwater effects for the 1:100 year storm flows must be determined.

7.8 Easements

Table 7.1 Easement Requirements		
Size of Pipe	Depth to Obvert	Minimum Width of Easement
250 to 375 mm	2.6 m maximum	1.8 – 3.0 m
450 to 1500 mm	2.6 m maximum	6.0 m
1650 mm and up	2.6 m maximum	6.0 plus 3 times O.D. of Pipe

Regardless of the above Easement Requirements, all situations will be reviewed and judged on individual cases at the discretion of the City.

The owner must grant permanent easements for any drainage works which are not within the road allowance, to the City.

7.9 Storm Sewer Service Connections

7.9.1 General

All sewer service connections shall be installed in accordance with OPSD 1006.010 or OPSD 1006.020. Sewer service connections may be installed in a common trench provided the trench detail is provided to and approved by the City.

Sewer service connections shall be provided with suitable stoppers (airtight plugs for sanitary) 1.5m inside the property line complete with 50 mm x 100 mm timber markers identifying such connections.

All service material for storm sewer laterals shall be white or grey in color.

The following minimum pipe sizes are required for residential services:

Storm sewer services	100 mm PVC DR 28 for single service 150 mm PVC DR 28 for dual service and 150 x 100 Wye PVC DR 28 for dual service
Minimum grade	1.0% for 150 mm & 2.0% for 100 mm
Maximum grade	8.0%

7.9.2 Depth

The depth of service connections at the street line in residential areas, measured from the final centreline road elevation shall be:

Minimum 1.30 m
Maximum 2.50 m

Risers shall be used when the invert depth of the sewer main exceeds 4.0 m. Risers shall not exceed 3.0 m in depth.

7.10 Storm Drainage and Storm Sewer Connections to Multiple Family, Commercial and other Blocks

Parking lots, driveways, and/or other hard surfaced areas servicing multiple family, commercial and other blocks, shall be drained by a properly designed internal drainage system (including catch basins, maintenance holes and pipe) which shall connect to the storm sewer system or other City approved outfall.

7.11 Roof Leaders and Foundation Drains

Roof drain connections to the storm service connection are prohibited subject to the review of the City of Welland Infrastructure Services - Engineering Division. Roof leaders shall discharge on grade at least 900 mm away from the building foundation walls with drain extensions. Flows shall be directed away from the building towards side or rear yard swale without any erosion or inconvenience to adjacent property.

In Welland, foundation drainage must be directed to sump pumps and discharged to grade or a storm water lateral if so installed. Please refer to drawings located in Appendix 'C' of this document for details.

8 DESIGN STANDARDS - WATERMAIN

8.1 General

The Safe Drinking Water Act, 2002, section 12 requires that “No person shall operate a municipal drinking-water system or a regulated non-municipal drinking-water system unless the person holds a valid operator’s certificate issued in accordance with the regulations”. **It is a requirement that only certified operators “operate” or are present to directly supervise work being completed on the regulated drinking-water system.**

Infrastructure projects including, but not limited to, installation and repair of sewers, roads etc may impact upon and necessitate that water mains are shut down or be disconnected and reconnected. It is imperative that such actions are undertaken by or directly supervised by an appropriately certified operator and appropriate precautions are taken to ensure that contamination is not allowed to enter the drinking water system.

Any department and /or contractor that is undertaking capital projects or implementing repairs or undertaking activities that require the operation of the drinking water system must ensure that the necessary certified personnel are available.

All materials shall be as specified or equivalent as approved by the contract Administrator. **Lead or lead composite components are strictly prohibited.** All Waterworks materials must meet AWWA current quality criteria standards and American National Standard ANSI/NSF Standard 61 no lead certification for waterworks material products. Only those products stamped mechanically with the letters NSF61 on the body or shipped in cartons bearing the marking ANSI/NSF Standard 61, certified by an accredited laboratory, will be accepted by the Corporation.

The construction of all watermains, appurtenances and service connections in the City of Welland shall be in accordance with the current and appropriate Ontario Provincial Standard Specifications and Standard Drawings, the American Water Works Association Standards or as modified herein. All materials shall be as specified or equivalent, as determined by the City. For detailed information on acceptable materials, refer to Appendix D – Watermains and Appurtenances.

Determination of the watermain design and design flows shall be based on:

- The maximum working pressure shall not exceed 690 kPa (100 psi). Pressure reducing valves are required where localized areas exceed 690 kPa.
- The minimum working pressure shall not fall below 275 kPa (40 psi) under normal operating condition nor fall below 140 kPa (20 psi) under fire flow condition.
- Should sub-standard flow and pressure be anticipated, a water distribution analysis may be required on the system. The result of such analysis complete with drawings and calculations shall be submitted to the Infrastructure Services - Engineering Division for review and approval.
- Sizing a water distribution system shall be based on a uniform Pipe Friction Factor of 130 for any pipe size or pipe type. Field tests shall be made when calibrating the model of an existing system.
- Average consumption shall be based on the following Table – Unit Consumption Rates:

Table 8.1 Unit Consumption Rates		
Domestic	Average Day	320 lpcd
	Maximum Day	570 lpcd
	Peak Rate	860 lpcd
Fire Demand	Fire flows should be considered in accordance with the Insurer's Advisory Organization's (formerly Canadian Underwriters Association) requirements.	

8.2 Hydraulic Design

8.2.1 System Pressures

The maximum sustained operating pressures shall not exceed 690kPa. Where pressures in localized area are above this level, pressure reducing valves shall be installed.

The distribution system shall be sized to meet normal peak demands. Under conditions of simultaneous maximum day and fire flow demands, the pressure shall not drop below 140 kPa. Under normal operating conditions, the pressure shall not drop below 275 kPa.

The City may require the consulting engineer to verify the existing distribution system is sufficient to supply the above requirement to the development. The Owner is responsible for all associated costs for verifying the above.

All watermains shall be capable of withstanding minimum design pressures of 1035 kPa regardless of the working pressure in the system or the rating necessary to meet the structural requirements of the trench condition. (Design Pressure = maximum sustained internal hydrostatic pressure to which the pipe is to be subjected, excluding transient pressures).

8.2.2 Friction Factors

The following "C" values shall be used for the design of water distribution systems regardless of pipe materials:

<u>Pipe Diameter (mm)</u>	<u>C-Factor</u>
150	100
200 to 250	110
300 to 600	120
Over 600	130

The above C-factors represent long-term values. A C-factor of 130 shall be used to calculate maximum velocities for transient pressure estimations, and for checking pump motor sizes for run-out conditions.

8.3 Pipe Design and Materials

All materials shall be as specified or equivalent as approved by the City.

Lead and/or lead composite components are strictly prohibited. All Waterworks materials must meet AWWA current quality criteria standards and American National Standard ANSI/NSF Standard 61 no lead certification for waterworks material products. Only those products stamped mechanically with the letters NSF61 on the body or shipped in cartons bearing the marking ANSI/NSF Standard 61, certified by an accredited Laboratory, will be accepted by the Corporation.

8.3.1 Sizes

Sizes and looping of watermains will be determined at the preliminary stage of the development. The following are the minimum size requirements.

Residential Areas

150 mm diameter minimum, 200 mm diameter will be required on dead end streets and looped with a 50 mm diameter watermain.

Commercial and Institutional Areas

Sized according to the anticipated demand for commercial and institutional developments.

8.3.2 Depth of Cover

The minimum depth of cover to watermains should not be less than the depth of frost penetration.

Generally the depth of cover shall not be less than 1.70 m measured in a vertical plane above the pipe from the top of the pipe to the finished ground elevation.

It will be the responsibility of the Consulting Engineer to justify any reduction in the depth of cover less than 1.70 m by submitting a report outlining the reasons for the reduction and alternative frost protection measures to be taken.

8.3.3 Separation Between Watermains and Sewers

Separation between the sewer and the watermain shall be in accordance with MOE guidelines.

8.3.4 Utility Crossings

Where watermains cross over or under utilities other than sewers, the clearance and type of crossing provided shall conform to the requirements of the particular utility involved and provide proper bedding and structural support of the watermain and utility.

8.3.5 Dead Ends

Where possible, the distribution system shall be designed to eliminate dead-end sections. Where dead-ends cannot be avoided, they shall be provided with a fire hydrant, flushing hydrant or a 50 mm blow-off for flushing purposes. For watermain requirements for cul-de-sacs, refer to Section 8.3.1.

8.3.6 Pipe

Pipe materials shall conform to Materials for Watermains, Appendix D for subdivisions. For Site Plan applications, the pipe material shall be in accordance with the Ontario Building Code and acceptable to the Chief Building Official.

NOTE: Tracer wire (12 gauge) must be used with all P.V.C., including services as applied in accordance with manufactures specifications.

Insulation

Where insulation is required due to depth of main, SM3 styrofoam insulation shall be used. The design shall be in accordance with NPSS SPC 61.

8.3.7 Tracer Wire

Watermain & Water Service Tracer Wire Specifications (refer to Appendix C, 'Standard Drawings' - Drawing No. 3 and Drawing No. 4.)

General

- 1) Tracer wire shall be installed on all non-metallic (PVC, HDPE, PE, and AC) watermains, hydrant laterals and water services except where such water services pipe is of copper material. The wire shall be installed in such a manner as to be able to properly trace all watermains, hydrant laterals and water services without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire.
- 2) Tracer wire shall be RWU90 (Direct Burial Wire), number eight (8) gauge (AWG) American Wire Gage, single or seven strand, insulated copper wire with 60mil of white/ or black, cross link polyethylene (XLPE) insulation specifically manufactured for direct burial applications.
- 3) All tracer wire welds onto existing cast or ductile iron pipe shall be completely sealed with the use of an approved mastic type sealer specifically manufactured for underground use. The mastic shall be T.C. Mastic (Tape Coat of Canada) or approved equivalent and shall be applied in a thick coat a minimum of 12mm thick and be protected from contamination by the backfill material with the use of plastic membrane.
- 4) All spliced or repaired tracer wire connections in the tracer wire system shall be made using a Copper Split Bolt (SBC 2-C) (for two to four number eight wires) or approved equivalent and made waterproof using Vulko Wrap Insulating Material Part Number 98412BK, black 40mil (thickness), 2.54cm (width) for burial applications.

Installation

- 1) The tracer wire shall be laid on top of and along the entire length of all new pipes and shall be extended to the surface at all main gate valves, secondary gate valves, hydrants, blow-offs and meter boxes sufficiently for locator equipment to be attached.
- 2) The tracer wire shall be laid on top of and along the entire length of all new pipes and shall be extended to the surface at all curb boxes sufficiently for locator equipment to be attached.

- 3) At the point of connection between cast and ductile iron watermain, with any non-metallic watermains the tracer wire shall be properly connected to the metallic pipe/fitting with a cad weld or approved equivalent.
- 4) Tracer wire shall be laid out flat and securely affixed to the pipe at 6.10m intervals. The wire shall be protected from damages during the execution of the works. No breaks or cuts in the tracer wire and insulation shall be permitted.
- 5) Except for approved spliced in connections, tracer wire shall be continuous and without splices from valve chamber to valve chamber, valve to valve, valve chamber/or valve to fire hydrant or fire hydrant to fire hydrant.
- 6) At fire hydrants, no spliced in tracer wire connections shall be allowed regardless of the type of material of the hydrant lateral. The main line tracer wire shall follow and be secured to the fire hydrant lateral up to and back from the hydrant and then continue along the watermain. The tracer wire shall be wrapped around the hydrant above grade and below the breakaway flange with at least 2.0m of slack in the tracer wire above grade.
- 7) At existing iron and copper water service connections where any portion of the water services is replaced with a non-ductile iron or non copper material, a water service tracer wire shall be spliced into the watermain tracer wire and then connected to the remaining iron water service by means of cad weld or the remaining copper water service using a ground clamp sized appropriately for the copper water service.
- 8) At water service connections where there is no tracer wire on the existing watermain and the water service connection is neither iron nor copper pipe, tracer wire shall be cad welded to the water main tee or tapping gate valve and placed among the water service to a point where the water service enters either inside the building or water meter chamber and shall be configured at the valve box.
- 9) In valve chambers, a 12mm diameter stainless eyebolt complete with stainless steel nut and 50mm diameter stainless steel flat washer shall be installed between the layers of frame and cover adjustment rings. The tracer wire shall be securely affixed to the eye of the bolt with enough slack in the tracer wire to extend a minimum 1.0m above grade.
- 10) Where a valve box is used instead of a valve chamber, the tracer wire from both direction shall be secured every 500mm to the outside of the valve box and be brought up on the outside of the valve box to a point 100mm below grade and then brought into the valve box through the valve box's pre-manufactured tracer wire hole and left with an additional 500mm of slack.
- 11) At all watermain end caps, a minimum of 2.0m of tracer wire shall be extended beyond the end of the pipe, coiled and secured for future connections. The end of the tracer wire shall be spliced to the wire of a 6pound (2.7kg) zinc anode and is to be buried at the same elevation as the watermain.

Repairs & Watermains

- 1) At all repair locations where there is existing tracer wire, the tracer wire shall be properly reconnected and spliced.

- 2) Whenever any valve or pipe repairs occur within or at a valve chamber, tracer wire shall be welded to the existing cast iron or ductile iron pipe on both sides of the replaced section.
- 3) Whenever any valve or pipe repairs occur at the valve box location, tracer wire shall be welded to the existing cast or ductile iron pipe on both sides of the replaced section.
- 4) At all repair locations in cast or ductile iron pipe, double tracer wires shall be placed across the repaired section and securely cad welded to the metallic pipe within 300mm of both ends of the repair.

Spliced Connections

- 1) Spliced connections between the main line tracer wire and branch connection tracer wire shall only be allowed at watermain tees, crosses or at iron or cooper water service where a portion of the branch connection watermain or watermain is replaced with a non metallic material. The branch connection tracer wire shall be single tracer wire properly spliced to the main line tracer wire. Where the existing branch connection is neither iron nor copper, then the new branch connection tracer wire shall be properly spliced to the existing tracer wire on the branch connection.

Tracer Wire Testing

- 1) The tracer wire system shall be tested for functionality by City forces only after the Contractor has confirmed and demonstrated that the entire tracer wire system is installed and functioning properly.
- 2) If deficiencies are found in the tracer wire system when tested by City forces, then the Contractor shall be charged the full cost incurred by the City for all subsequent visits to site to confirm functionality and acceptability of the tracer wire system. Such cost shall be deducted from the Contractor's final payment.

8.3.8 Water Meters

Meters

- 1) When installing, replacing and removing water meters to existing services consisting of copper, lead, steel cast iron, galvanized steel, etc., it is mandatory to use a temporary jumper wire consisting of a number 8 gauge wire to isolate the area of the service where the meter is being installed.
- 2) Upon completion of installing, replacing and temporarily removing a water meter connected to a water service consisting of copper, lead, steel, cast iron, galvanized steel, etc., should the existing ground connection be connected after the meter, relocate the ground wire and reconnect to the service in front of the meter. Upon completion of the installation, replacement or removal, install a permanent grounding wire consisting of a number 8 gauge wire in front of and after the meter to maintain grounding continuity.
- 3) When permanently removing a water meter connected to a water service, firstly shut the water off and install a security lock within the curb box and then remove the meter and install a ground strap to each end of the plumbing.

- 4) The City will continue to install permanent ground straps to all meter installations where required.

Note:

- 1) The installation of a temporary jumper wire is also mandatory to isolate the working area when relocating the permanent grounding wire.
- 2) When encountering grounding to a copper water line when the water service entering the building consists of polyethylene and needs to be temporarily removed to install or repair a meter, reconnect the clamp and wire to it's original position above the meter.

Services

- 1)
 - (a) When repairing a water service it is mandatory to isolate the repair by installing a temporary jumper wire and disconnect the wire only upon the completion of the repair. All repairs to a metallic service must be repaired with the same size service consisting of copper tubing for services up to 50 mm in diameter and ductile iron for services greater than 50 mm in diameter at all times.
 - (b) When encountering a water service that is deficient through corrosion or structurally deficient, i.e. copper or polyethylene service, replace the service entirely with type "k" copper tubing, rather than conducting a repair.
- 2) When replacing an existing water service to an existing building, replace the service with the same size pipe with type "k" copper tubing only, complete with a DZP550-12 Zinc Anode c/w 13 mm -25 mm zinc anode clamp for copper at all times. Services greater than 50 mm in diameter, replace the service with ductile iron pipe. For domestic services that are 16 mm in diameter and less, provide with a 19 mm copper type "k" service.

Note: Copper tubing shall be type "k" manufactured according to CSA Standard HC-7.6 and furnished in soft temper only.
- 3) When installing new services up to 50 mm in diameter to new homes or new commercial developments, install services using copper tubing only at all times.
- 4) When encountering a polyethylene water service where the curb box is less than 5 m from a building, for example when repairing the service or exposing it through a main break etc., replace the polyethylene water services with the same size service using copper tubing at all times.

Note:

Grounding:

Where the existing water service may be used for grounding, a minimum of 3 m of copper water tubing is required buried outside of the foundation wall in accordance with the Ontario Electrical Safety Code. Alternatively, OPSS 609, Construction Specification for Grounding is to be applied.

8.4 Valves

8.4.1 Line Valves

Gate valves shall be used on all watermains 350 mm diameter or less in size. Butterfly valves shall be used on all watermains of 400 mm diameter and greater.

All valves shall be of the approved type with non-rising stem and a 50 mm square operating nut opening counter clockwise.

8.4.2 Sizes

The sizes of the line valves shall be the same size as the watermain.

8.4.3 Number, Location and Spacing

Generally, a minimum of two valves are required at a tee intersection and a minimum of three valves are required at a cross intersection. The valves shall be located at the point where the projections of the streetline intersects the watermain. Valve boxes and chambers shall be located in boulevards whenever possible.

Line valves shall be located such that 30 houses can be shut-off from another block and isolated from the system. In no case shall the spacing exceed 305 m. Line valves on feeder mains shall be located in accordance with existing and future servicing requirements. The maximum distance between valves shall not exceed 762 m.

8.4.4 Air Release Valves

Air release valves shall be placed at all significant high points of the distribution system. In addition, an attempt shall be made to locate hydrants at high points or at dead ends, thereby eliminating the need for vacuum-air relief valves and/or blow-offs.

8.4.5 Drain Valves

Drain valves shall be located at the low points of all watermains of 600 mm diameter and greater.

8.4.6 Valve Boxes and Chambers

All valves 350 mm diameter and smaller shall have valve boxes and specified direct bury operators shall be used.

All valves 400 mm diameter and larger shall be installed in valve chambers.

The tops of valve boxes and valve chamber maintenance hole covers shall be set flush with finished grade. The top of the roof slab of valve chambers shall be at least 0.60 m below the profile of the finished pavement.

Chambers or pits containing valves, blow-offs, meters or other such appurtenances to a distribution system shall not be connected directly to any sanitary or combined sewer, nor shall blow-offs or air-relief valves be connected directly to any such sewer.

Such chambers or pits shall be drained to the surface of the ground where they are not subjected to flooding by surface water, to absorption pits or to a sump within the chamber where ground water level is above the chamber floor or storm sewer.

In order to minimize the total number of chambers on any project, care should be exercised in locating the line valves, air relief's, drains, etc., with a view to combining these functions in a single chamber.

Valve boxes shall conform to City of Welland Materials for Watermains, Appendix D.

Valve chambers must conform to OPSD 1101 Series.

8.4.7 Fittings

Iron fittings, cast or ductile, shall be with ends specifically manufactured for use with asbestos cement pipe, ringtite or if required with hub, mechanical joint, flanged, tyton joint. PVC fittings will be considered. The Consultant shall provide a written request to the City in writing prior to construction.

8.4.8 Valves

Gate and tapping valve shall conform to City of Welland Materials for Watermains, Appendix D.

8.5 Fire Hydrants

8.5.1 General

Fire protection for institutional and commercial development shall be reviewed upon application.

8.5.2 Hydrants

Hydrant installation shall be located at the extension of the side lot line, away from the driveway.

8.5.3 Hydrants-Number and Spacing

Hydrants shall be installed on all watermains 150mm diameter and larger in accordance with the MOE Guidelines for the Design of Water Distribution Systems and/or with the following maximum allowable spacing;

- a) 150 m in residential areas, measured along the water main or to provide for a maximum hose length of 75 m;
- b) 75 m in industrial and commercial areas measured along the water main to provide for a maximum hose length of 37.5 m.

All hydrants when installed in new subdivisions shall have a clearance of at least one (1) metre from any boulevard apron as to not cause any conflict with ingress and egress of driveway access.

8.5.4 Branch Valves and Boxes

All hydrants installed on watermains shall be installed with 150 mm diameter anchor tee, secondary valve and box.

8.5.5 Hydrant Types

Hydrants shall conform to City of Welland Materials for Watermains, Appendix D.

Hydrant specifications:

Depth of bury; 1.8m (6')

Boot; 150mm (6") diameter mechanical joint

Colour; red with silver dome and caps

Drain ring bolts and nuts; stainless steel type 304

Shall be epoxy coated in compliance with AWWA Standard C550

Where hydrants do not conform to the furnished ground grade the proper length extension will be inserted either at the drain ring flange before backfilling or the ground line flange with proper rod extension. Extension must be installed in strict accordance to manufacturer's specifications.

If the hydrant requires a shorter barrel due to a necessary grade change in the main the proper length barrel will be installed before backfilling the hydrant trench.

Hydrant valves shall conform to City of Welland Materials for Watermains.

Secondary valve specifications:

Opening size; 150mm (6") diameter

Joint; mechanical

Tee off watermain shall be anchor type. Secondary valve shall be bolted to the anchor tee. All piping required (from tee to valve to hydrant) shall be Class 150 P.V.C.

8.6 Water Sampling Station

Placement of water sampling stations within any new development or watermain rehabilitation project will be determined by the City and shall be based on establishing the most optimal water quality monitoring program.

Where and when they will be installed is dependent on the most strategic location that will provide water quality data to efficiently monitor the distribution system based on surrounding sampling stations. Consultation with the City shall be required in the determination of need and location.

8.7 Water Service Connection

8.7.1 General

In new developments, the service connections shall be installed in accordance with the Standard Drawings terminating 1.5m behind the property line on the building side. Curb stops shall be located at the property line.

No service connection shall be made to watermains greater than 400 mm diameter.

8.7.2 Pipe Sizes

- a) The minimum size for service connections shall be 25 mm diameter.
- b) Service connections for multiple family dwellings shall be sized to provide capacity equivalent to 25 mm diameter connection to each dwelling unit.
- c) Service connections for blocks, commercial and industrial areas shall be sized according to the intended use.

8.7.3 Location

Water service connections shall not be located under a driveway, if possible. The location of water service connections for single family and semi-detached lots shall suit the house style in accordance with Appendix C, 'Standard Drawings' - Standard Lateral Locations Drawing No. 6.

8.7.4 Depth

Curb and Gutter Roads - water service connections shall be installed 1.70 m minimum below finished centreline road grade.

Open Ditch and Unimproved roads - in no case shall the cover of the water service connection be less than 1.70 m.

8.7.5 Mainstops

All domestic water service connections shall have main stops installed at the watermain equal to the water service connection diameter.

A main stop shall be the same size as the service line, bronze, round way. The main stop valve shall conform to City of Welland Materials for Watermains, Appendix D.

For sizes 20mm diameter and 25mm diameter:

- service saddle is required;
- tapping must not exceed 15° from horizontal centre line of main;

For sizes 38mm diameter and 50mm diameter:

- service saddle is required;
- must be tapped at horizontal to centre line of main;
- AWWA standard thread inlet and female iron pipe thread outlet;
- plastic pipe to iron coupling or adapter.

8.7.6 Curb Stops and Boxes

All service connections shall have curb stops and boxes installed at the property line or an approved location.

Curb valve to be compatible (same size) as the service and valve shall conform to City of Welland Materials for Watermains, Appendix D.

All curb stops on the open end must be protected with the use of a plastic cap or plug.

8.7.7 Tapping Sleeves

All tapping sleeves shall conform to City of Welland Materials for Watermains, Appendix D.

All tapping sleeves shall be Robar 6606 stainless steel sleeve with T304 stainless steel bolts or approved equivalent for cast iron (CI), asbestos cement (AC) and polyvinylchloride pipe (PVC), sizes 100mm (4") to 400mm (16") inside diameter (ID).

8.7.8 Materials - Services

For the installation of 25 mm (1"), 38 mm (1½"), and 50 mm (2") diameter water service lines within the City of Welland.

NOTE: The contractor must supply all materials for the complete installation of the service line. All materials must be new and unused and shall conform to City of Welland Materials for Watermains, Appendix D.

8.7.8.1 Service Saddles

To tap cast iron pipe, asbestos cement pipe and P.V.C. pipe, saddles shall conform to City of Welland Materials for Watermains, Appendix D.

8.7.8.2 Coupling and Adaptors

All couplings and adaptors shall conform to City of Welland Materials for Watermains, Appendix D.

8.7.8.3 Pipe Fittings and Nipples

All pipe fittings and nipples shall conform to City of Welland Materials for Watermains, Appendix D.

8.7.8.4 Curb Box

All curb boxes shall conform to City of Welland Materials for Watermains, Appendix D.

8.7.8.5 Larger Service Lines

Materials for water service lines larger than 50 mm (2") diameter shall be in accordance with Section 8.3 Pipe Design and Materials - Watermain.

8.8 Service Installation

All 25 mm (1") P.E. service connections must have stainless steel inserts of the proper length and they must not extend beyond the coupling nut when properly tightened. The end of the 1.5m extension onto private property shall have a plug, or other type of appurtenance, to eliminate the possibility of contamination to the service.

25 mm (1") main stops for 25 mm (1") services when tapped in main must not exceed 15° from horizontal centre line of main.

Where the existing water service may be used for grounding, a minimum of 3 metres of copper water tubing is required buried outside of the foundation wall in accordance with the Ontario Electrical Safety Code. Alternatively, OPSS 609, Construction Specification for Grounding is to be applied. Due to the potential usage of existing copper services for household electrical grounding, proper pre-cautionary measure of re-routing of electrical current must be exercised by the contractor.

All exposed foundation cracks are to be caulked or grouted in addition to the entrance hole for the service entering the building, where applicable.

8.9 Bedding, Cover Material and Backfill

Bedding material shall be 100 mm (4") of limestone screening or fine traffic bound. Cover material shall be 300 mm (12") of limestone screening or fine traffic bound. Backfill in roads and driveways shall comprise of select native material and compacted to 100% S.P.D.

8.10 Corrosion Protection

All metallic pipe, fittings, etc., installed underground must be thoroughly coated with asphalt base paint and wrapped with 6mm polyethylene film taped in place. The polyethylene wrapping must not cover the drain ring on fire hydrants. Zinc anode cathodic protection to be installed, where required, by the City or the application of denso type or approved City equal. Fittings with FRC coating will also be accepted.

8.11 Installation

The installation of watermains and appurtenances shall be in strict accordance with OPS and as outlined herein. Failure to follow the correct procedures will result in the City refusing to place the water system in service.

8.11.1 Interruption of Service

Unless directed by the Contract Administrator and under the direct supervision of a MOE licensed water operator, the contractor may not operate valves, hydrants, blow-offs or curb stops.

8.11.2 Conflicting Utilities

If the elevation of any existing utilities is doubtful, it must be checked early enough to allow for adjustment in the elevation of the watermain to accommodate. No down time claim will be considered resulting from such delays.

8.11.3 Laying Pipe

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into it, the Engineer may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size or equivalent shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe.

Pipes shall be lowered singly into the bottom of the trench, made to rest firmly throughout their length on the prepared trench bottom.

After placing a length of pipe in the trench, the spigot shall be centred in the coupling or bell and pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under it except at the joints. Pipe and fittings which do not allow a sufficient and uniform space for joints shall be removed and replaced with pipe and fittings of proper dimensions to insure such uniform space.

Pipes shall not be laid in wet trench conditions that preclude proper bedding, or when, in the opinion of the Engineer, the trench conditions or the weather are unsuitable for proper installation.

Precautions shall be taken to prevent dirt from entering the joint space. At any time when pipe laying is not in progress, the open ends of pipe installed shall be closed by a watertight plug as per OPS or other means approved by the Engineer.

8.11.4 Jointing

Pipes shall, in general, be jointed and restrained in strict accordance, and conformance, with the recommendations of the manufacturer of the pipe in use, OPSS 701 and as herein specified.

a) Mechanical Joints

The entire section of the pipe shall be pushed forward to seat the spigot end in the bell. The gasket shall then be pressed into place within the bell, being careful to have the gasket evenly located around the entire joint. The cast iron gland shall be moved along the pipe into position for bolting, all of the bolts inserted, and the nuts screwed up tightly with the fingers. All nuts shall be tightened with a suitable (preferably torque limiting) wrench. The torque for various sizes of bolts shall be as follows:

<u>Size In.</u>	<u>Range of Torque</u>	<u>Foot Pounds</u>
5/8		40 - 60
3/4		60 - 90
1		70 - 100
1¼		90 - 120

Nuts spaced 180° apart shall be tightened alternately in order to produce an equal pressure on all parts of the gland.

b) Asbestos - Cement Pipe

The machined ends of pipe to be jointed, the coupling grooves and rubber rings shall be cleaned immediately before assembly, and assembly shall be made as recommended by the manufacturer. Each pipe joint shall be sealed with a coupling consisting of an asbestos cement sleeve and two rubber rings. The location of field assembled rings shall be checked with a suitable gauge to verify that rubber rings are in the required position. All lubrication will be applied to pipe joints according to manufacturer's specifications.

c) Permissible Deflection at Joints

Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or plumb stems, or where long-radius curves are permitted, the amount of deflection allowed shall not exceed 3 degrees that recommended by material manufacturer.

d) Excessive Joints

No joint may be introduced to new main section which is less than 6m in length except for the installation of pre-manufactured service saddle, valve, elbow and existing main connection.

e) Thrust Restraint

Thrust restraints are to be mechanical joint type:

- EBAA Iron Series 2000 PV
- Uni-Flange Series 1300
- Megalug
- Grip Ring Pipe Couplings

Safety factor 2:1

High strength ductile iron per ASTM A536, Grade 65-45-12 and ASTM 536-80.

Bolts and connecting hardware to be high strength low alloy per ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.53.

Per Uni-B-13-92, Recommended Performance Specification for Joint Restraint Devices for use with Polyvinyl Chloride (PVC) Pipe.

NOMINAL PIPE SIZE (mmø)	RESTRAINT BOLT/ROD	
	NO.	SIZE (in.)
100 to 200	2	¾ x 7
250 to 300	4	¾ x 7
375 to 400	6	¾ x 17

8.11.5 Setting Valves and Fittings

Valves shall operate freely prior to installation. Boxes shall be carefully set over the bonnet with the shaft truly vertical and the top at the proper elevation.

Valve boxes shall be braced to the sides of the trench prior to backfilling in order to maintain their setting. Guide plates shall be used with all boxes.

8.11.6 Setting Hydrants on Slopes

Where hydrants are set in a bank, the slopes shall be graded within a 1.8m (6') radius from 75mm (3") below the ground flange not steeper than 1:2.

8.11.7 As-Builts

Prior to commissioning any new watermain, Public Works must be provided one (1) copy of the As-Built construction drawings showing locations of newly installed hydrants and valves.

8.11.8 Disinfecting Water Lines

Before the pipeline is placed in service, all new water systems, extensions to existing systems, valved sections of extensions, replacements and any exposed section of the existing system shall be disinfected in accordance with ANSI/AWWA C651-99.

8.11.9 Charging and Flushing of Mains

The Contractor shall charge and flush the new mains when so instructed by the City. Mains shall only be charged under the supervision of the inspector. The contractor shall be responsible for satisfactory disposal of all water used in flushing.

8.11.10 Installing Service Materials

After the service line is installed and connected to the watermain, the curb box set in place, and the service line is connected to the consumer's water line at the road limit, the installation must be inspected by the Water Department's inspector before the trench is backfilled. Where services have been installed by means of boring or tunnelling, the contractor shall expose both ends of each to enable its length to be measured.

8.12 General Procedures on All Watermain Repairs, All Replacements & Installations - Normal Conditions

Under no circumstances shall any repair, replacement, installation or work will be conducted on the watermain distribution system and appurtenances without a Certified Operator present to oversee the work. A Certified Water Operator must be present to oversee any work performed on the distribution system as per the Safe Drinking Water Act.

All Contractors/Developers will familiarize themselves with the most current requirements posted on the City of Welland internet website prior to the commencement of construction.

Please refer to Appendix 'H' for detailed requirements of watermain installation and repair.

8.13 Water Infrastructure Location Sheets

Upon completion of the primary servicing of the development all water service utility location sheets (locate sheets) shall be completed and will be provided to the City of Welland Infrastructure Services - Engineering Division. This includes sheets for the location of valves, hydrants, and water services. These sheets will be provided prior to the commissioning of the water distribution system.

NOTES

9 DESIGN STANDARDS – SANITARY SEWERS

9.1 General

The design and construction of all sanitary sewers and service connections in the City of Welland shall be in accordance with the following documents and latest revisions:

9.2 Design Requirements

9.2.1 Design Flows

Calculation of sewage design flows shall conform to the latest editions of the Regional Municipality of Niagara, Public Works Department's "Guidelines for the Design and Construction of Sewer and Water Main Systems", and the Ontario Ministry of the Environment's "Guidelines for the Design of Water Storage Facilities, Water Distribution Systems, Sanitary Sewage Systems and Storm Sewers".

9.3 Maintenance Holes

9.3.1 General

All maintenance holes are to be supplied or constructed in accordance with OPSD 701 Series.

In site plan applications, a 'service' maintenance hole will be required at the property line on services larger than 125mm diameter upon entrance of the service to private property.

9.3.2 Purpose

Maintenance holes shall be provided at each change in alignment, grade, pipe material and at all junctions, and at the points of connection of sewer over 200 mm in diameter where the size of connection is equal to or one size smaller than the City sewer.

9.3.3 Spacing

Generally, maintenance holes shall be spaced at

- a maximum of 100 m for pipe sizes 200 mm diameter to 450 mm diameter;
- a maximum of 130 m for pipe sizes greater than 450 mm.

9.3.4 Structures

Maintenance holes shall be constructed of poured or precast concrete as detailed on the OPSD 701 series with watertight connections KOR-N-SEAL type or approved equal.

9.3.5 Benching

All sanitary maintenance holes shall be benched as per OPSD 701.021 and be completed to obvert.

9.3.6 Diameter

The type and size of maintenance hole shall be specified on the profile and a detail of the benching is to be shown on the plan portion of the engineering drawing. The minimum maintenance hole sizes shall be determined using OPSD 701.021.

9.3.7 Access

All maintenance hole chamber openings shall be located parallel to flow direction.

9.3.8 Change in the Direction of Flow

The maximum change in the direction of flow in any sanitary sewer maintenance hole shall be 90°. A change of flow direction at acute interior angles shall not be permitted.

9.3.9 Drop Across Maintenance Holes

When pipe size does not change through a maintenance hole and the upstream flow velocity does not exceed 1.5 m/s, the following allowances shall be made to compensate for hydraulic losses.

<u>Alignment Change</u>	<u>Drop Required</u>
a) Straight run	grade of sewer
b) 14 < 45°	0.03 m
c) 45 to 90°	0.06 m

When the upstream flow velocity exceeds 1.5 m/s or for all junction and transition maintenance holes the drop shall be hydraulically designed.

9.3.10 Drop Structures

The maximum drop allowed across a maintenance hole is 0.9 m. If the design of the sewer is such that the difference in elevation between inlet and outlet exceeds 900 mm, a drop structure is then required. The drop structure shall be in accordance with OPSD 1003.010 or 1003.031.

9.3.11 Safety Gratings

Safety gratings shall be required in all maintenance holes greater than 5.0m in depth. Safety gratings shall not be more than 5.0m apart and constructed in accordance with OPSD 404 Series.

9.3.12 Matching Obverts

The obvert(s) on the upstream side of a maintenance hole shall in no case be lower than the obvert(s) on the downstream side of the maintenance hole.

9.4 Pipe Design and Materials

9.4.1 General

The class, type of pipe and type of pipe bedding shall be shown on the profile for each section of sewer and shall be CSA approved.

The use of radius pipe or deflected pipe will be permitted to achieve changes in horizontal alignment for sewer sizes 1050 mm diameter and larger. The minimum radius allowed for various pipe diameters shall be as detailed in the manufacturer's specifications. When pipes are deflected at the joints, the angle of joint displacement shall not exceed 3°.

In general, no decrease of pipe size from a larger size upstream to a smaller size downstream will be allowed regardless of increase in grade.

Pipe bedding and class of pipe shall be designed to suit ultimate loading conditions.

Sanitary Laterals shall be a minimum of 100mm and all laterals shall be designed to accommodate the appropriate intended use of the property being serviced.

Generally, service connections shall not be permitted to sanitary sewers exceeding 7.60 m in depth. Depth is measured from the final centreline finished road elevation to the top of the sanitary sewer.

9.4.2 Sewer Design Capacity

Sewer capacities shall be computed by using Manning's Formula on the basis of sewer pipe flowing full.

9.4.3 Roughness Coefficients

A roughness coefficient of $n = 0.013$ shall be used for all types of pipe regardless of the material used.

9.4.4 Velocity, Grade and Size

All sanitary sewers are to be designed with a minimum velocity of 0.60 m/s and maximum velocity of 3.0 m/s when flowing full. The minimum size of the sanitary sewer main shall be 200 mm @ 0.40% minimum slope.

9.4.5 Minimum Depth

Depth is measured from the final centreline finished road elevation to the top of the sanitary sewer at standard location.

For residential, commercial and institutional areas, the minimum depth is 2.5 m unless approved by the City.

In all cases, the proposed sanitary sewers shall be installed at sufficient depth to service lands external to the site as determined by the City.

9.4.6 Location

Sanitary sewers shall be located within the road allowance, as shown on Appendix C, 'Standard Drawings' - Standard Utility Location Drawing No. 1. If common trenching is required for the storm and sanitary sewer, the subdivider's consultant shall prepare special design standards and provide to the City the specification for such requirements. Any non-standard design for locations will require the approval of the City.

9.4.7 Crossings

Generally a minimum clearance of 150 mm shall be provided between the outside of the pipe barrels at the point of pipe crossing for storm sewers and other utilities

except for watermain crossings when the minimum clearance shall be not less than 500 mm.

In the event the minimum clearance of 150 mm cannot be obtained, then the pipes at the crossing shall be concrete encased to ensure that the pipes are properly bedded.

9.4.8 Pipe Materials

Sanitary sewers shall be constructed of polyvinyl chloride, or concrete pipes.

a) Polyvinyl Chloride Pipe (P.V.C.)

Polyvinyl Chloride Pipe shall be solid wall manufactured in accordance with the latest revision of CSA B182.1 or B182.2 and green in colour for main line as well as service laterals.

The design of sanitary sewer systems using P.V.C. pipe shall be based on the modified Spangler Equation for flexible pipe.

b) Concrete

Reinforced concrete sewer pipe 300 mm in diameter and larger shall be steel reinforced and shall conform to CSA A257 Specification, and be designated as, Class 50D, 65D, 100D or 140D, as required.

Concrete and PVC pipes shall be jointed by means of approved rubber gaskets.

NOTE: For main sewers, the Standard Dimension Ratio (S.D.R.) of the P.V.C. pipe shall not exceed S.D.R. 35.

For service connections, the Standard Dimension Ratio of the P.V.C. pipe shall not exceed S.D.R. 28.

The bedding required for P.V.C. main sewer and service connections shall be as detailed on the standard drawings OPSD 1006.020.

9.5 Easements

The minimum width of easements for pipes shall be determined by the owner's consulting engineer and approved by the City to account for number of pipes, pipe size, depth, excavation of open cut method and location of proposed building foundations. In no case shall the easement width be less than 3.0 m.

The owner must grant permanent easements for any drainage works which are not within the road allowance, to the City.

9.6 Backwater Valve

The City of Welland requires all new houses (single detached, semi-detached and townhouses) to be fitted with a normally open backwater valve, in accordance with the Ontario Building Code 7.4.6.4, located in the building drain inside the house.

9.7 Pump Stations

Pump Stations designed for use in the City of Welland shall conform to the design requirements of the Regional Municipality of Niagara and be in conformance of the latest requirements of the Ministry of Environment.

NOTES;

10 LOT GRADING AND DRAINAGE

10.1 General

The following statements of objectives of the Lot Grading and Drainage Policy are used as the premise upon which the policy contained herein is based.

- a) To ensure the establishment and certification of a grading scheme for developed lands by means of relative ground elevations in accordance with good drainage practices.
- b) To determine a point in time up to which the City and Subdivider/Owner/Builder are responsible for the establishment of the grading scheme and after which the maintenance of the grading and drainage becomes the owner's responsibility.
- c) To ensure maintenance of, or acceptable revisions to, the grading and drainage scheme established on lands developed under this policy through the Building Permit applications for future works which require excavation. (i.e. garages, in-ground swimming pools, building additions, etc.)
- d) To ensure surface drainage is self-contained within the lands being developed and to ensure surface drainage from or on adjacent lands is accommodated or not adversely affected.
- e) The grading, drainage and building construction should be such that unanticipated storm water does not enter the sanitary sewer system.
- f) The grading and drainage on lands developed under this policy should be congenial with nature and thus preserve the natural terrain as much as possible.
- g) Grading and drainage schemes shall include erosion and sediment control measures.

10.1.1 Requirements Under the Policy

All subdivision agreements for the development of subdivisions in the City of Welland shall include the following requirements. These requirements apply to the entire subdivision with the exception of blocks that are under site plan control.

10.2 Roof Leaders and Sump Pumps

Roof drain connections to storm laterals are expressly prohibited. Roof drains should discharge at the front of the building to grade, with 900mm drain extensions, with flows directed away from the building foundations, as per the Ontario Building Code, and without erosion or inconvenience to others. Unless otherwise approved by the City, run-off from roof drains and sump pumps shall flow across pervious ground surfaces prior to entering the storm system.

NOTE; All foundation drainage must be directed to sump pumps and discharged to grade or a storm lateral if so installed.

10.3 Design Requirements

10.3.1 Step 1 - Creation and Approval of Subdivision Design Plans

- a) The initial step is the preparation, as part of the subdivision design plans, of a subdivision grade control plan. These plans outline the development and construction of the subdivision, which includes the overall drainage pattern through the establishment of relative surface elevations as well as how the subdivision will appear upon completion.

While the subdivision design plans include various drawings, the preceding plans may be of particular importance to the lot grading and drainage design as per the requirements of the corresponding Subdivider's Agreement:

- Trees to be Saved and Protected Plan;
- Rehabilitation and Naturalization Plan;
- Landscaping Concept Plan/Planting Plan;
- Subdivision Grading Plan.

Upon completion of the subdivision design plans, they will be submitted to the City for comments and once the comments have been addressed the City will stamp and approve the subdivision design plans. There may also be other municipal, provincial, federal and conservation regulatory authorities whose approval is also required.

- b) At the time of execution of the Subdivider's Agreement, the Subdivider shall convey to the City, at the Subdivider's expense and in a form satisfactory to the City Solicitor, easements for all rear yard catchbasins.

10.3.2 Step 2 - Creation and Approval of the Subdivider's Agreement

The Subdivider's Agreement is the legal document that clearly defines the roles, responsibilities and obligations of the City of Welland and the Subdivider with respect to the land outlined in the agreement. The Subdivider's Agreement is typically drafted in conjunction with the preparation of the subdivision design plans, to ensure the Subdivider's Agreement accurately encompasses all the design elements, and is only finalized upon the approval of the subdivision design plans.

The Subdivider's Agreement outlines among other things, the documentation and procedures required by the City to facilitate:

- onsite commencement of primary grading work;
 - the release of a lot from the Subdivider's Agreement;
 - the return of security deposits.
- a) At the time of execution of the Subdivision Agreement or phase thereof, the Owner shall deposit with the City as surety for carrying out the provisions of the Subdivision Design Plans the amount as approved by council from time to time on a per lot basis, with a maximum deposit as per Appendix B, 'Schedules' - Cost Estimate for the entire subdivision or phase. The deposit shall be either cash or a Letter of Credit, and the format shall be in accordance with Appendix B. This Owner's Grading Deposit shall be returned upon inspection by the City to ensure that this work has been

properly carried out as set out in Section 10.3.3, subject to any amounts retained under item (b) below.

Land development cannot commence until the Owner has posted all applicable deposits or letter of credits.

- b) Should the City become aware of drainage problems arising as a result of non-compliance to the requirements of this policy, the City will inform the Owner's Design Consultant who will be responsible for resolving the problem, acting as the Owner's Representative for all engineering and drainage works. **The City will give the Design Consultant fourteen (14) days notice to correct the problems.** Upon failure of the Design Consultant to rectify the problems, the City will inform the Owner or his consultant that the City will use the Owner's Grading Deposit to cover the costs of rectifying the problems. Any remedial work in excess of the amount of the Owner's Grading Deposit shall be the responsibility of the Owner.

10.3.3 Step 3 - Land Development

Once all the appropriate documents are complete and have received all required approvals, construction may begin. The standard order of construction is as follows:

- i. Installation of erosion control measures;
- ii. Area grading operations including earthworks;
- iii. Installation of deep services (sanitary, storm and water);
- iv. Preparation of the road base, including granular, base asphalt and concrete curb and gutter.

Depending on site-specific conditions certain stages may not be relevant and upon written consent from the City of Welland, as discussed on a case-by-case basis, may be omitted.

10.3.3.1 Erosion Control

Erosion control shall be based on NPCA specifications.

10.3.3.2 Owner's Responsibility

It shall be the Owner's responsibility to ensure that the grading of lots within the subdivision are in accordance with the latest revision of the Subdivision Lot Grading Plan. In this regard, the Owner shall ensure that all offers to purchase lots within the subdivision include a statement outlining the responsibility of subsequent owners to adhere to the Lot Grading and Drainage Policy and be registered on title.

10.3.3.3 Revisions to Subdivision Design Plans

- a) Prior to acceptance of the subdivision by the City, any requests for revision to the Subdivision Lot Grading Plan to accommodate proposed or as constructed deviations from the plan, shall be made in writing by the Design Consultant, to the City.
- b) A revision will only be granted by the City if deemed reasonable.

- c) A fee shall be charged to the Subdivider for any revisions required in this regard; the amount of the fee shall be dependent upon the extent of the required revisions.

10.3.3.4 Rough Site Grading Requirements

The Consultant shall certify that the following grading works shall be undertaken and maintain throughout construction:

- a) Installation, to grade, of all rear yard catchbasin including connections to the main sewers;
- b) Rough grading of all lots and blocks to generally conform to the Subdivision Grade Control Plan;
- c) Construction and maintenance of erosion control devices deemed necessary (subject to weather conditions).

10.3.3.5 Detailed Lot Grading Requirements

- a) Prior to the issuance of a Building Permit for each lot, the Builder or Owner shall submit to the City two (2) copies of the Detailed Lot Grading Plan, as approved by the Consultant along with the building permit application.
- b) The plans must take into consideration, among other factors the suitability of the type of building proposed for a lot.
- c) Since the Subdivision Design Plans were prepared without the knowledge of the individual house designs, the City will recognize minor variations, as approved by the Consultant, provided that they do not alter the intent of the above Grade Control Plan.
- d) Where a revision to the Subdivision Lot Grading Plan is necessary to accommodate a proposed grading plan which does not conform to the Subdivision Lot Grading Plan, the Builder/Owner must submit a written request to the Consultant for a revision. The request shall be accompanied by written assurance that the owners of adjacent lands have no objection to the proposed revision.

10.3.3.6 Construction Recommendations

- a) Top of Foundation wall is consistent with the requirements of the Grading Plan and a minimum 200 mm above finished grade for vinyl or wood installations.
- b) Prior to commencing framing and prior to the City backfill inspection, the Professional Engineer or Ontario Land Surveyor, who approved the detailed lot grading plan, shall ensure that the top of the foundation is at the correct elevation and a signed verification is to be submitted to the City Building Division.
- c) If an error is found at this stage, before proceeding with construction:
 - i) the error is to be corrected, or;
 - ii) if it is not reasonably possible to correct the error, then the builder must submit a request for a revision, in writing,

through the Subdivider in accordance with Section 10.3.3.2 of the policy.

- iii) Failure to follow the above procedure (c) may result in forfeit of the lot grading deposit. The grading of a lot shall be considered to be complete when the building has been erected and the lands have been graded and seeded/sodded. Seeding/sodding shall be done within two months after occupancy of the building, or by the following July 1st should occupancy take place in the winter months.

10.3.3.7 Lots of Record

Lots of Record are lots which have been created through severances or an alternate process. The lots will have urban services, i.e. sanitary and water. The Building Division will require the submission of two (2) copies of the Lot Grading Plan, prepared and stamped by an Engineer or Ontario Land Surveyor.

The lot grading deposit will be required at the time of submission of the plan.

Upon completion of the lot grading; a Certificate of Conformance will be required from the issuing Engineer or Ontario Land Surveyor prior to release of the lot grading deposit.

10.3.3.8 Unserviced Lots

Unserviced Lots are lots without sanitary and water, located within the urban area of the City. In order to service a lot, a short-form agreement shall be required to address the sanitary and water servicing of the lot and work within the municipal right-of-way. Fees may be required for the servicing of the lot and shall be based on the cost of construction.

The Building Division will require the submission of two (2) copies of the Lot Grading Plan, prepared and stamped by an Engineer or Ontario Land Surveyor. A lot grading deposit will be required at the time of submission of the plan.

Upon completion of the work, a Certificate of Conformance for the lot grading will be required from the issuing Engineer or Ontario Land Surveyor as well as the Service Record forms for the sanitary and water services. Their information will be required prior to the release of the deposit.

10.3.3.9 Vacant Lots in Assumed Subdivisions

From time to time the City will assume subdivisions which have not been fully built-out. Under these circumstances and after assumption the City will consider the lots as 'in-fill' lots controlled by the Integrated Services - Building Division. The Lot Grading Plan shall be in accordance with the overall Lot Grading Plan approved by the City at the time of Subdivision design approval. A lot grading deposit will be required at the time of submission to the Integrated Services - Building Division.

10.4 Approvals

10.4.1 Step 4 - As-Constructed Detailed Lot Grading Plan

- a) Upon completion of the grading as noted in Section 10.3.3.5, prior to landscaping or fencing, the Consultant shall be required to submit to the City a copy of the As-constructed Lot Grading Plan, prepared by a qualified Ontario Land Surveyor or Professional Engineer, which shall indicate the house footprint and the finished elevations of the grade control points as shown on and in accordance with the approved Detailed Lot Grading Plan.
- b) This As-constructed Detailed Lot Grading Plan shall be prepared and certified by a Professional Engineer or an Ontario Land Surveyor, certifying that it corresponds to the approved lot grading plan. The Owner's Consultant will require the as-constructed Lot Grading Plan and upon his approval forward the plan to the City.
- c) Where a revision to the Subdivision Lot Grading Plan is necessary to accommodate completed grading not in conformance with the Detailed Lot Grading Plan and Subdivision Lot Grading Plan, the Builder must submit the request for a revision, in writing, through the Subdivider in accordance with Section 10.3.3.2 of the policy.
- d) The Consultant will appropriately stamp and sign the as-constructed Lot Grading Plan once they are satisfied that the as-constructed Lot Grading Plan complies with the approved Lot Grading Design Plan and submit it to the City.

10.4.2 Step 5 - Grading Conformance Certificate

- a) The As-constructed Grading Plan of a lot that has been certified by the Design Consultant and accepted by the City to be in conformance with the latest revision of the Subdivision Lot Grading Plan shall be known as the Grading Conformance Certificate.
- b) The date on the Grading Conformance Certificate shall mark the end of the Owner's/Builder's responsibility to the lot grading and the beginning of the Owner's responsibility to maintain the grading and drainage scheme.
- c) Individual conformance certificates can be issued. If the City deems it appropriate a number of lots will be confirmed together. Numerous properties can drain to a certain catch basin and these properties shall be known as drainage areas. These separate drainage areas will be submitted together.

10.4.3 Step 6 - Building Permits – vacant lots

Once the Owner has received a signed and stamped copy of the approved Detailed Lot Grading Plan from the consultant, the plan is submitted to the City for the purpose of obtaining a building permit. Before a building permit can be issued certain criteria must be met:

- The subdivision plan has been registered with the Land Registry Office;
- All storm and sanitary sewers and watermain lines are installed and operational;
- Roads are complete to base asphalt;

- All valves have been located in operated in the presence of City Staff;
- The Detailed Lot Grading Plan has been approved by the Consultant and submitted to the City;
- City Staff have commissioned the watermains;
- Street and traffic sign installation is complete.
- An Agreement with the governing electrical Utility is in place.
- Approval from the Hydro Electrical Authority that the street lighting is installed and energized.

10.4.3.1 Release of Owner's Grading Deposit

- a) When Grading Conformance Certificates have been issued for a substantial number of lots within the subdivision, the City may release the Owner's Grading Deposit. The City will retain that amount required as surety for the remaining uncertified lots in accordance with Section 10.3.2 (a).
- b) Annually thereafter, the City may release further portions of the Owner's Grading Deposit in the same manner as described above.
- c) The balance of the Owner's Grading Deposit less any amounts retained under Section 10.3.2 (a) will be released upon acceptance of the subdivision by the City. The City will not accept a subdivision until the following matters have been complied with:
 - i) the completion of all works stipulated in the Subdivision Agreement;
 - ii) the issuance of Grading Conformance Certificates for all lots within the subdivision for which building permits have been issued. Acceptance of the subdivision may be granted if Grading Conformance Certificates have not been issued for some of these lots. In this event, the City may retain a sufficient portion of the Owner's Grading Deposit to cover these uncompleted lots.

10.4.4 Step 7 - New Building Construction After Acceptance of the Subdivision

Building Construction may start once the building permit is issued for a property. The construction of a new house on a lot within the subdivision after acceptance of the subdivision by the City shall be subject to all the technical and grading requirements and design guidelines for the Detailed Lot Grading Plans and approved As-construction Plans

The Permit Applicant will be required to submit to the City a (as per council approval and noted in Appendix B, 'Schedules' - Site Plan Control Application) Lot Grading Deposit along with two (2) copies of the Detailed Lot Grading Plan, prepared by a Professional Engineer or Ontario Land Surveyor, with the Permit Application for approval by the City in accordance with the original subdivision agreement lot grading plan. Upon completion of the grading, an As-constructed Detailed Lot Grading Plan, prepared by a Professional Engineer or Ontario Land Surveyor, will be submitted by the Applicant to the City for acceptance. Upon acceptance by the City, the Lot Grading Deposit may be returned to the Applicant.

10.4.5 Step 8 - Subdivider Requests Final Inspection from the Consultant

Once the house is fully constructed and the property is fine graded, top-soiled and sodded, the Subdivider will secure the services of the Consultant responsible for reviewing all the data and the Consultant will either certify or reject the lot grading upon inspection.

If the inspection reveals any deficiencies, the Owner's Consultant will notify the Subdivider what further work is required. It is the Owner's responsibility to ensure the required work is completed in accordance with their Consultants recommendations.

Upon completion of the required work, the Owner's Consultant will re-inspect the property. This process will continue until the Consultant certifies the work conforms to the Detailed Lot Grading Plan.

10.5 Grading Design Requirements and Guidelines

10.5.1 Technical Requirements for Subdivision Grade Control Plans

Subdivision Grade Control Plans shall be prepared in conformance with this section, and with regard to the Design Guidelines. All elevations are relative to the geodetic benchmark elevation(s).

The Subdivision Grade Control Plan shall be prepared at a scale of 1:500, be on a standard A1 (596mm x 841mm) size sheet and clearly illustrate the following:

- a) legend, north direction, name of subdivision, location, description and elevation of geodetic benchmark(s), date of preparation of plan and any subsequent revisions clearly identified in the revision column;
- b) property boundaries and lot and block numbers or designations;
- c) existing and proposed contours and elevations;
- d) existing elevations and drainage from lands adjacent to the subdivision and, if the drainage from these lands is towards the proposed subdivision, the existing information shall be obtained to the high point of this drainage or at least to the adjacent street;
- e) location of sewer maintenance holes, hydrants, sidewalks, catchbasins and rear yard catchbasins;
- f) proposed elevations at the centre line of the finished road and relative data showing distances and slopes between these elevations;
- g) existing and proposed ground elevations at the corner of each lot or block with suitable intermediate elevations as required;
- h) existing and proposed ground elevations at the house;
- i) location, elevation and longitudinal slopes at the invert of swales together with rear yard catchbasins elevations and drainage arrows showing the direction of swale drainage;
- j) any drainage obstruction such as berms, retaining walls, sound barriers, silt traps, vegetation, etc.;
- k) artificial or natural impoundments;

- l) existing trees and vegetation, as they affect proposed drainage and catchbasin schemes and which are to be saved;
- m) if any lots or blocks are not suitable for the construction of certain types of buildings or features (i.e. split-levels, walkout basements, etc.) because of the sanitary sewer depth, grading and drainage pattern, this should be clearly indicated on the plan.

10.5.2 Technical Requirements for Individual Site and Grade Control Plans

Detailed Lot Grading Plans for individual lots shall be prepared in conformance with this section, and with regard to the Design Guidelines set out in Section 10.5.3 of the policy.

1. The plan shall be at a scale of 1:250.
2. The plan shall be on a legal size sheet, or a standard A1 size sheet if required.
3. The plan shall include the identification and certification information consistent with the overall grading plan.
4. The plan shall clearly illustrate the:
 - a) General Information
 - i) shape and dimensions of lot;
 - ii) house location and shape (type);
 - iii) abutting street names;
 - iv) existing or proposed curbs, catchbasins, sidewalks, utility plant, hydrant, driveway location(s) within the municipal road allowance;
 - v) proposed patios, decks, porches, chimneys, environmental control units (air conditioners, heat pumps, etc.), swimming pools, etc.;
 - vi) existing trees to be saved;
 - vii) location of proposed entrances, and outside stairwells;
 - viii) location of easements for rear yard catchbasins and leads or other utilities.
 - b) Drainage and Grading Information
 - i) specific lot grading with drainage arrows to indicate direction of surface drainage flow;
 - ii) location and direction of flow of swales;
 - iii) existing or proposed geodetic ground elevations at each corner of the lot, at high and low points, at changes in slope of ground, where a change in the direction of flow occurs, at the corners of the house and at entrances to outside stairwells;
 - iv) existing or proposed elevation of the centre line of road, sidewalk or top of ditch abutting the subject lands;
 - v) elevations of top of footing, top of the foundation wall, and ground floor;
 - vi) elevation for finished garage floor and entrance elevations, if different from floor elevations;

- vii) elevation of the rim of any rear yard or on site catchbasin(s) to which flow from the lot is directed;
- viii) ground elevations on adjacent lands, if drainage is to cross these lands to a catchbasin or other outlet of these lands;
- ix) location of downspouts and direction of discharge. (NOTE: No downspouts shall be directed so as adversely affect adjacent property or outlet directly to driveways);
- x) location of terraces and retaining walls;
- xi) any slope that exceeds three horizontal to one vertical, including side slopes of swales;
- xii) elevation of top step of outside stairwells (to be a minimum of 150mm above the adjacent ground).

10.5.3 Design Guidelines for Subdivision Lot Grading

The following guidelines should be considered when designing the grading on lots. Many of the guidelines set out are illustrated in the sample drawings in Appendix C, 'Standard Drawings'.

- a) All surface drainage, including downspout discharge, shall be directed away from the building(s), including adjacent existing or future buildings.
- b) Unless otherwise stipulated, the lot shall have a minimum slope of 2% and a maximum slope of 6%. Average slopes between 6% and 10% can be achieved by combining a 6% maximum slope with a 3 to 1 slope at the rear of the lot/block.
- c) Should the average slope exceed 10%, the City may require a retaining structure to reduce the grade differential to an acceptable amount. Notwithstanding the above, elevation changes exceeding one metre in height shall require a retaining structure.
- d) The maximum slope between the dwelling unit and the side property line shall be 3 to 1. Otherwise, appropriate steps or retaining structures shall be required.
- e) Terraces between lots shall be located on the lower lot with the top of the terrace slope at the lot line.
- f) Drainage flows shall be confined to defined swales which shall be located as far from the dwelling units as possible.
- g) Swales shall have a minimum grade of 1.0%, and a maximum grade of 6%.
- h) The swale depth shall not exceed 500 mm.
- i) The side slope of swales shall not be steeper than 3 to 1.
- j) The alignment of swales shall not change more than 45 degrees unless otherwise approved.
- k) Rear yard swales shall be located:
 - i) Centred on the rear lot line if adjoining lots are within the same subdivision;
 - ii) Entirely on the subject lot if the adjoining land is outside the subdivision.

- l) The maximum length of a rear yard swale from the high point to the outlet (rear yard catchbasin or other suitable outlet shall be 50 m unless otherwise approved. This maximum length of swale may be varied at the discretion of the City depending on lot size, topography, and drainage area.
- m) Generally speaking, all semi-detached and minimum sized lots shall have rear lot drainage schemes. Side yard swales shall only be permitted with approval of City, if the construction of such swales can be accommodated properly.
- o) The minimum grade on driveways shall be 2%. The desirable maximum grade on driveways shall be 7% with an absolute maximum grade of 10%.
- p) Depressed driveways sloping toward the dwelling units are not allowed.
- q) Side and back entrances and stairwells shall not be located adjacent to main swales or downspouts.
- r) Window-wells should preferably be avoided but where they are required, special care shall be taken to ensure that surface water from overland flow and other sources such as downspouts shall not enter these wells. The edge of the window-well shall be higher than the adjacent ground.
- s) The brick-line must be at least 150 mm above the finished grade. If Vinyl or wood is used the minimum shall be 200mm.
- t) Downspouts must discharge to grade with 900mm extensions to grass surfaces.
- u) Downspouts must direct the flow away from the building, not onto walks or driveways and not onto adjacent property.
- v) All lots must conform to a split drainage design unless otherwise approved by the City.

NOTES;

11 STORMWATER MANAGEMENT

11.1 General

The City of Welland has established these storm drainage policies and criteria for use in the planning and design of storm drainage infrastructure within the municipality. Compliance will ensure that drainage infrastructure associated with future urban growth or redevelopment will be provided with sustainable, safe, economical, and effective storm drainage systems.

Low Impact Development practices shall be incorporated wherever possible and as needed. Every effort must be made to incorporate types of water saving systems that will limit the amount of storm water entering the City system.

It is the City's objective to integrate passive recreational/open space uses with Storm Water Management Facilities.

11.1.1 Objectives and Goals

The primary goals and objectives for stormwater and drainage management within the City of Welland are derived from three sources:

- City of Welland Official Plan
- Federal and Provincial policies mandates and regulations
- Riparian obligations

The goals of these Storm Drainage Policies and Criteria are to:

- i) Provide present and future residents of the City of Welland with a high quality living environment that protects and enhances natural features.
- ii) Minimize the property damage from relatively frequent storms and the hazards to property and public safety from major floods resulting from a 100 year storm.
- iii) Control increases in runoff due to new developments to satisfy downstream constraints on flow rates and to minimize the need for new drainage works or erosion control downstream. New development should not have detrimental impacts on the remainder of a watershed.
- iv) Minimize the total cost of the drainage system and related works through economic cost-benefit evaluation.
- v) Adopt current design techniques to implement the most cost-effective and reliable design to minimize future maintenance costs and complaints.
- vi) Minimize detrimental impacts on the water quality of receiving streams during and after construction, which would affect other riparian interests and users.
- vii) Encourage the use of stormwater as a resource such that it is used to maintain and/or enhance:
 - In-stream Water Quality
 - Fisheries and Aquatic Habitat
 - Hydrogeologic function (i.e. baseflow, groundwater quality)
 - Channel Forming Processes (stream morphology)
 - Linkages/Terrestrial Habitat

- viii) Provide direction for designs of stormwater infrastructure, which is easily and effectively maintainable by the Municipality.

In order to achieve these goals, the objectives of the Policy and Criteria are to:

- a) Commit to comprehensive water resource planning.
- b) Minimize health hazards, loss of life and property damage from flooding, erosion and adverse environmental effects.
- c) Reduce the potential for contamination of the groundwater system and minimize adverse changes to the hydrologic cycle.
- d) Manage downstream flooding and changes to natural stream channel forming processes and erosion.
- e) Minimize excess degradation of water quality resulting from discharges to receiving waters.
- f) Minimize sediment discharge to receiving waters from construction activities.
- g) Protect and enhance aquatic and terrestrial habitat.
- h) Encourage infiltration of stormwater on sites where conditions permit in order to maintain or enhance baseflow in receiving waters.
- i) Conserve, rehabilitate and preserve where applicable the non-renewable resources of the Municipality in such a way that the amenities of the environment are not detrimentally affected.
- j) Correct existing and potential sources of pollution by applying acceptable standards as established by the Ministry of the Environment or other organizations having competent jurisdiction.
- k) Permit new development only on lands that can physically and safely accommodate such development, ensuring that human life or property will not be endangered.
- l) Ensure that development of any nature in the City does not create undue financial hardship to the Municipality resulting from the implementation of storm drainage infrastructure.

11.1.2 Description of the City of Welland

The location of the City of Welland is unique, on the Welland River between the Niagara Escarpment headwaters and Lake Erie, and drained in part by the Welland Canals. The outlet areas of all of the watersheds impose in-stream riparian obligations with respect to water quality, flood and erosion control, as each watercourse passes through the municipality prior to entering its ultimate receiving water body.

11.2 Storm Drainage Policies

11.2.1 Reporting and Legislative Framework

Table 11.1 provides a summary of the current primary policy documents and guidelines with reference to the agencies responsible for administration of each policy.

The policies and criteria documented herein are intended to complement the foregoing. Hence, the key objective of this document is to guide the user as to:

- Complementary Federal and Provincial policies and legislation

- City of Welland's policy, criteria and role in implementation of the foregoing policies
- Application of stormwater management techniques or practices unique to the City of Welland.

Although stormwater management planning and design is influenced by the mandate of various Ministries and public agencies, the City of Welland plays a central role in integrating the objectives of each policy into new development and associated stormwater management works, as well as bearing ultimate responsibility for operation, ownership and maintenance of such works. Hence, the City's primary objectives must include ensuring the economic sustainability and functional effectiveness of stormwater management works within the City.

Table 11.1 summarizes policies and guidelines affecting Stormwater Management in the City of Welland:

TABLE 11.1 SUMMARY OF PRIMARY POLICIES AND GUIDELINES AFFECTING STORMWATER MANAGEMENT IN THE CITY OF WELLAND			
Category	Objectives	Document Reference	Agency Responsible for Administration
Watershed Planning	Integrated Ecosystem Planning of water and water related features and functions	Subwatershed Plans Water Management on a Watershed Basis: An Ecosystem Approach, 1993, MOE Subwatershed Planning, 1993 (Interim Guidelines), MOE Towards an Ecosystem Approach to Land Use Planning: A Biophysical Environment Perspective, 1992, MOE	Niagara Peninsula Conservation Authority Ministry of Environment Region of Niagara
Environmental Assessment	Protection and Conservation of the Environment	Environmental Assessment Act, MOE Class Environmental Assessment for Municipal Water and Wastewater Projects, Municipal Engineers Association, 2000 Canadian Environmental Assessment Act, 1992	Ministry of Environment City of Welland
Water Quality	Guidelines for water provincial water quality	MOEE Water Management Policies; Guidelines, Provincial Water Quality Objectives July, 1994 ("The Blue Book") Planning Act 1996 Provincial Policy Statement "Water Quality and Quantity"	Ministry of Environment
Stormwater Management	Management of stormwater quantity and quality from new development. Protection of groundwater quality and quantity	Stormwater Management Planning and Design Manual, MOE, March 2003 Stormwater Best Management Practices MOE 1991 Urban Drainage Design Guidelines, MOE, MMA, MTO, MEA, ACAO, UDI, 1987	City of Welland Niagara Peninsula Conservation Authority Ministry of Environment Ministry of Natural Resources
Natural Hazards (Flooding and Erosion)	Protection of life and property from flood and erosion damage	The Planning Act, 1996 Provincial Policy Statement "Natural Hazards"	Ministry of Natural Resources Niagara Peninsula Conservation Authority
Stream Morphology	Design and Management of stream channels/floodplain based on natural fluvial principles.	Adaptive Management of Stream Corridors in Ontario, MNR, 2001 Natural Channel Systems, an approach to Management and Design, MNR 1994	Department of Fisheries and Oceans Niagara Peninsula Conservation Authority
Fisheries	Protection of Fish and Fish Habitat including water quality, hydrologic regime	Fish Habitat Protection Guidelines for Developing Areas, MNR, March 1994	Department of Fisheries and Oceans Niagara Peninsula Conservation Authority
Sediment and Erosion Control	Prevention/Control of Erosion and Sediment Deposition Damage	Draft Stormwater Management, Erosion and Sediment Policies and Criteria, NPCA, 2006 Erosion and Sediment Control Guidelines for Construction Sites, 1987, MOEE	City of Welland Niagara Peninsula Conservation Authority

Users of this document are encouraged to contact the responsible agencies to ensure that the most current legislation/policy and the most current versions of reference manuals, guidelines, and policies are referenced.

11.2.2 Quantity Control

11.2.2.1 Flood Management

a) Criteria

All newly developing or redeveloping areas must assess their potential impacts on local and regional flooding, and mitigate accordingly.

b) Design

In areas where no Watershed or Subwatershed Planning or Subwatershed Impact Study has been completed, it is the policy of the City of Welland to require that runoff peak flows are controlled to pre-development levels, unless the proponent can demonstrate through appropriate modelling and analysis that uncontrolled flow will not cause detrimental impacts on flood conditions on downstream properties and watercourse systems. Before the City will accept any increase in runoff rates, it must also receive endorsement from the agencies having jurisdiction.

Where the Subwatershed Plans or Subwatershed Impact Studies have been completed, the development proponent will be required to comply with the recommendations of the specific plan. Any variations will need to be appropriately supported by detailed analysis and also be approved by any agencies having jurisdiction.

11.2.2.2 Erosion Control

a) Criteria

Depending on the downstream water level and the nature of the soil strata affected, stream banks can be subject to increased erosion potential. In these cases the proponent(s) will be required to provide appropriate protection in accordance with the Watershed or Sub-watershed Plans or with the Sub-watershed Impact Study, as well as policies of the Niagara Peninsula Conservation Authority.

In areas where no Sub-watershed Plan exists, it shall be the responsibility of the development proponent to provide adequate erosion protection in accordance with Provincial Guidelines, unless it can be demonstrated through appropriate modelling and/or analysis that erosion processes will not be adversely affected by the proposed development.

b) Design

Erosion Control and management involves:

- Extended Detention storage for the 25 mm rainfall event as outlined in the Provincial Guidelines (ref. SWM Planning & Design Manual, MOE, 2003), in the absence of specific direction from a Sub-watershed or Watershed Plan.
- Assessment of downstream erosion susceptibility and critical flow values in conjunction with event modeling.
- Assessment of downstream erosion critical velocity or shear forces in conjunction with continuous simulation techniques (duration analysis)

In areas where the downstream receiving watercourse is determined to be unstable, or where control/over control of flow rates is ineffective or not feasible, design of channel alterations may be considered, subject to design in accordance with natural channel design principles (ref. Ministry of Natural Resources, 1994).

Storm sewer outfalls in natural channels should be provided with proper protection against erosion which includes appropriate bank scouring protection on either side of the outfall and creek. When storm sewer outfalls outlet to steep and/or deep valleys, drop structures should be designed in such a manner as to provide integral bank stability. Such local erosion protection measures should be designed so as not to interfere with the natural channel forming processes of the receiving watercourse system.

11.2.2.3 Conveyance System - Major System

a) Criteria

Flows in excess of the minor system capacity (i.e. during periods of surcharging) are referred to as **major system** flow. The major system inherently comprises the minor system, as well as the overland route followed by runoff not captured by the minor system (i.e. either due to excessive flow or operational failures). Common elements of the major system include natural streams, valleys, swales, ponds, roadways, dedicated blocks and drainage channels.

The level of protection should be established based upon sound economic analysis and the nature of the area drained (i.e. risk to loss of life and property damage).

b) Design

The City of Welland supports the policies of the Niagara Peninsula Conservation Authority, which generally require that no new building be subject to flood damages from the Regulatory flood as per the revised Technical Guidelines for Flood Plain Management in Ontario (February, 1986). The Regulatory flood is the modelled 100 year flood, observed flood, or frequency-based 100 year flood.

No development, other than necessary access or services, should intrude upon Hazard Lands without the approval of the Niagara Peninsula Conservation Authority and the City of Welland. In conjunction with this objective, the City shall require the Development Proponent to delineate floodplains in a proposed development resulting from the 100 year storm for both the pre- and post-development conditions.

Major overland flooding should not exceed 200-250 mm depth over the crown during a 100 year event for any roadway and should remain within the designated right-of-way and to prevent ponding in low points from exceeding 600 mm. Blocks dedicated through easement or ownership to the City will be required to convey overland flow from roadways to open watercourse systems. These blocks should be designed for stability and safety to the satisfaction of the City of Welland.

11.2.2.4 Conveyance System - Minor System

a) Criteria

The **minor system** (commonly referred to as the convenience system), handles urban drainage from relatively "minor" storms having a frequency (return period) of 2 years. These works typically consist of drainage pipes, roadway gutters and swales, enclosed conduits and roof leaders. Their purpose is to prevent frequent flooding which may "inconvenience" motorists, home and business owners, and pedestrians.

The Corporation will not allow residential development to proceed until adequate provision, in the form of storm sewers has been made available.

b) Design

The minor or convenience system, comprising street gutters, catchbasins and storm sewers, shall be designed to a 1 in 2 year unsurcharged standard. In some higher value commercial areas, the criteria may be increased to 1 in 10 year floods at the direction of the City.

11.2.3 Quality Control

a) Criteria

Water quality treatment will be required for all new development within the City of Welland. Water quality treatment performance shall conform to Provincial requirements (ref. Stormwater Management Planning and Design Manual, MOE, 2003, Water Management Policies, Guidelines Provincial Water Quality Objectives (Blue Book), MOE, 1994).

In areas of existing development where re-development is proposed, provisions for water quality measures will be evaluated on a site-specific basis, based on the feasibility of implementation. Where on-site measures are considered infeasible, the City of Welland may consider the potential for contributions to off-site improvements (i.e. cash-in-lieu), subject to agency concurrence. A master plan approach to compensation towards off-site works is advocated by the City.

In areas where a Subwatershed Plan has been prepared and approved, the guidelines and criteria cited within the plan shall be adopted by the Development Proponent.

b) Design

Specific guidelines for SWMP application have been developed by the Province based on the type of fisheries habitat downstream of the proposed development. Three levels of protection are given, with the goal to maintain or enhance existing aquatic habitat, based on the suspended solids removal performance for the different end-of-pipe stormwater management facilities developed in the continuous simulation modelling. These levels of protection are based on a general relationship between the end-of-pipe stormwater management facilities long-term suspended solids removal and the lethal and chronic effects of suspended solids on aquatic life. The levels of protection correspond to the following long-term suspended solids removal:

- **Enhanced** protection corresponds to the end-of-pipe storage volumes required for the long-term removal of 80% of suspended solids.

- **Normal** protection corresponds to the end-of-pipe storage volumes required for the long-term removal of 70% of suspended solids.
- **Basic** protection corresponds to the end-of-pipe storage volumes required for long-term removal of 60% of suspended solids.

As a general consideration, maintenance of the natural hydrologic cycle including infiltration is encouraged where soil conditions permit. Therefore the use of stormwater management practices which enhance or maintain infiltration should be considered for each development. Generally active infiltration measures will be applicable in permeable soils areas only and their use will require supporting soils documentation. Passive measures such as disconnection of roof leaders have been historically utilized in many areas and shall be implemented as a matter of course.

In all cases the potential for groundwater contamination shall be considered, particularly where infiltration of road runoff is contemplated.

In areas where hydrogeologic concerns are identified and/or critical linkages to fisheries habitat are present, additional study and analysis may be required to determine the appropriate level of mitigation.

11.3 **Stormwater Quantity and Quality Management**

11.3.1 **General**

Current stormwater management practice advocates the consideration of SWMP's on a hierarchical basis, whereby more pro-active techniques are considered first. The SWMP's are grouped under the following headings in order of preferred application.

- (i) Lot Level Techniques, and Source Controls, and Alternative Development Standards
- (ii) Transport or Conveyance Controls
- (iii) End-of-Pipe Management Techniques

The philosophy behind this hierarchy is that stormwater management techniques are usually more effective when applied at the source. Table 11.2 constitutes a comprehensive list of currently available techniques associated with each of the foregoing categories. It is recognized that stormwater management remains an emerging science, hence this list will change over time. It will be the responsibility of the proponent to demonstrate that any technique, not currently approved by the City, will address the intended function within expected maintenance and cost parameters, to the satisfaction of the City of Welland.

TABLE 11.2 COMPREHENSIVE LIST OF AVAILABLE SWMP'S	
Stormwater Management Technique	Description
Source Controls	
• reduced lot grades	Increases the inlet time for runoff.
• roof leader discharge to surface at front of dwelling	Increases the inlet time for runoff.
• roof leader and sump pumps discharge	Discouraged in residential land use due to maintenance and impacts on use of rear yards.

TABLE 11.2 COMPREHENSIVE LIST OF AVAILABLE SWMP'S	
Stormwater Management Technique	Description
to soakaway pits	
• rear yard ponding	Creates short term ponding, less than 24 hours.
• rooftop storage	Applicable for peak flow control only in industrial/commercial applications.
• parking lot storage	Parking lot design grades crates ponding.
• porous pavement	New technology not fully developed for Canadian applications.
Conveyance Controls	
• pervious pipe systems	Encourages the infiltration of water through storm system. Granular soils required for method to work.
• pervious catchbasins	Encourages the infiltration of water through catchbasin. Granular soils required for method to work.
• grassed swales (semi-urban road sections)	Encouraged where applicable (ref. Official Plan) ref. Hybrid Roadway Cross-section
• oversized pipes (Superpipes)	Appropriate in redevelopment of existing areas only.
End-of-Pipe Facilities¹	
• wetlands	Applicable for water quality/quantity treatment
• wet ponds	Applicable for water quality/quantity treatment.
• dry ponds	Applicable for water quantity control only.
• infiltration basins	Encourages infiltration where soil type permits.
• infiltration trenches	Encourages infiltration where soil type permits.
• filter strips	Only considered appropriate for low density, small drainage areas
• buffer strips	Only considered appropriate for low density, small drainage areas
• sand filters	Filters have finite life cycle, need justification for use.
• oil/grit separators and equivalent systems	Applicable; most appropriate for Commercial/Industrial land use; require consideration of treatment train philosophy

11.4 Sediment and Erosion Control During Construction

a) Criteria

New urban developments generally produce increased sediment loading to the surrounding streams particularly during construction. In order to avoid the inherent detrimental side effects from development (i.e. poor water quality and aesthetics, restricted channel conveyance etc.), it is recommended that sediment control measures be instituted. Some of these measures typically include, sediment traps (temporary or permanent), vegetation screens, catch basin filter bags and phased stripping of developable lands. In all cases, it is recommended that sediment

¹ The City requires appropriate signage for all surface end-of-pipe techniques.

loading be controlled as per guidelines published by the Niagara Peninsula Conservation Authority (Section 11.0 of the "Draft Stormwater Management, Erosion and Sediment Control Policies and Criteria, December 2006", and "Ontario Guidelines on Erosion and Sediment Control for Urban Construction Sites" 1987).

b) Design

As a minimum all Erosion and Sediment Control Plans should incorporate recommendations and protection measures pertaining to:

- Construction Scheduling
- Minimizing soil exposure and re-establishment of vegetative cover
- On-site sediment and erosion techniques
- Site Supervision
- Monitoring and Maintenance
- Site Restoration
- Special Considerations (i.e. in-stream construction/crossings, fisheries timing constraints).

11.5 Stormwater Information Requirements

11.5.1 General/Criteria

Any proposed changes in land use will affect the mechanics of storm runoff. Regardless of the status of land use planning, any proposed change in land use will need to be accompanied by stormwater and environmental management studies.

11.5.2 Design

Typically, storm water management planning and design occurs through a multi-phase process which is completed in concert with the land use planning process. The following preferred hierarchy of planning studies in the City of Welland has been identified:

- Watershed Plans
- Sub-watershed Plan
- Sub-watershed Impact Studies
- Stormwater Management Plans
 - Functional
 - Detailed Design

In some instances where there are limited numbers of landowners, and drainage areas are discrete, there may be an opportunity to combine the Sub-watershed Impact Study with the Functional Stormwater Management Plan. Prior to initiating such a process, the proponent is required to review specifics with the City and Niagara Peninsula Conservation Authority.

11.5.3 Specifications/Terms of Reference

11.5.3.1 Watershed and Subwatershed Plans

The City of Welland supports the implementation of Watershed and Subwatershed Planning Studies in concert with the land use planning

process. Watershed and Subwatershed planning plays an important role in the development of Official Plan Land Use Designations and Concept Planning.

The determination as to whether a Watershed or Sub-watershed Planning Study is necessary for Official Plan Amendments, Concept Plans or individual developments will be determined in consultation between the City of Welland, the development proponent(s), Niagara Peninsula Conservation Authority and other Ministries or public agencies having jurisdiction.

Rationale and justification to undertake Watershed or Sub-watershed Planning Studies must include consideration of:

- Type and extent proposed land use changes
- Area of land use change with respect to the total watershed/sub-watershed area
- Physical sensitivity/significance of the receiving watercourse
- Existing downstream conditions and land use (i.e. flood and erosion hazards, water usage).
- Location and characteristics of the development area with respect to the potential to provide integrated servicing and storm water management which would minimize long term maintenance and operation cost incurred to the City.

It is important to recognize that each Watershed or Sub-watershed plan will have widely varying goals and objectives specific to the issues within each area. For these reasons, the study objectives, organization, and funding arrangements will necessarily differ for each study.

11.5.3.2 Subwatershed Impact Study

This intermediate level of study may be required in areas where multiple land ownership within the sub-watershed occurs. This level of study would focus on integrating servicing and storm water management of adjacent development to a greater level of detail than is normally achieved through the Sub-watershed Plan. Typically this study would be required if the Sub-watershed Plan has been completed prior to the development of preferred land use and lot plans. The objectives of this level of study will be to determine:

- Preferred servicing plan
- Road layout
- Integration of storm water management facilities
- Opportunities to integrate recreation opportunities with storm water management
- Phasing and cost sharing in areas of multiple ownership.

The decision as to whether a Sub-watershed Impact Study is warranted would be determined through consultation between the various development proponents, the City of Welland and Niagara Peninsula Conservation Authority, and would depend on:

- level of planning information completed in the Secondary Plan process such as road layout, facility locations, and municipal servicing concept

- number of development proposals/proponents involved in the study area and opportunity to integrate facilities and phase developments

11.5.3.3 Stormwater Management Plans

Stormwater Management Plans are prepared in support of individual development applications. The plans complement the planning process associated with Draft Plans of Subdivision or individual Site Plans. Stormwater management reporting associated with this planning stage would be the "Functional Design" plan. Subsequently, in support of final subdivision design, a "Detailed Design" plan is required.

Functional Design

This level of design typically involves demonstrating the feasibility of providing storm water management for a particular development. In areas where no Sub-watershed Plan has been completed, the Stormwater Management Plan will be required to address additional issues such as environmental baseline conditions and screening of various storm water management strategies and techniques. Key elements of this level of design study and Terms of Reference are outlined in Appendix E, 'Terms of Reference for Stormwater Management Studies'.

Detailed Design

The detailed design submission shall demonstrate how the required information, outlined in Functional Design report, has been integrated as well as addressing details related to minor system design details, landscaping, safety and maintenance aspects of facility design, and monitoring requirements (ref. Appendix E, 'Terms of Reference for Stormwater Management Studies').

11.5.4 Preconsultation

Mandatory preconsultation with the City Infrastructure Services - Engineering Division is a condition of all development. The objective of preconsultation is to exchange information between the City and the development proponent, including physical information such as legal plans, but also including proposed timelines and expectations. The goal of pre-consultation is to reduce the number of meetings and submissions later in the process.

Prior to the first meeting, the development proponent shall provide a general location map, a detailed location plan, development concept, and proposed timeline.

The development proponent shall undertake a similar preconsultation meeting with the Conservation Authority, to determine information about environmental resources, including drainage outlet(s).

The City recommends that a concurrent preconsultation meeting be scheduled with the Conservation Authority and other agencies, such as MOE and MTO, as required.

11.5.4.1 Preliminary Stormwater Management Submissions

A "complete submission" should include a copy of the Stormwater Management Report, detailed storm water management facility drawings,

and Maintenance Activity and Frequency Report. The Stormwater Management Report shall include the following items. A more detailed description is found in Appendix E, 'Terms of Reference for Stormwater Management Studies'.

1. Plans showing:
 - a) lot and road layout with land use
 - b) elevations at key points
 - c) any surveyed constraint lines (e.g. top of bank, flood lines, wetlands)
 - d) minor drainage system with storm sewers, maintenance holes, catch basins
 - e) major drainage system with overland flow routes at key points
 - f) details of storm water management practices, e.g. storage facilities
 - g) erosion and sediment controls
2. Descriptions of:
 - a) receiving system and outlet including confirmation of legal status
 - b) classification of site and downstream aquatic habitat per DFO/MNR/MOE guidelines
 - c) SWM criteria for quantity, quality, flooding and erosion control
 - d) hydraulic analysis if required for floodplains for major flow elements
 - e) design of SWMPs to meet applicable criteria, policies and guidelines

Note: all plans and reports are to be stamped and signed by a Professional Engineer
3. Tables showing:
 - a) hydrologic parameters for existing and future land use
 - b) pre and post-development peak flows and volumes at all outlets
 - c) hydraulic grade line analysis if foundation drains are proposed to be connected
 - d) stage/storage/discharge relationships for SWMPs
4. Figures/drawings showing:
 - a) general location plan
 - b) drainage areas for existing and future land use
 - c) details of overland flow routes
 - d) details of erosion and sediment controls
 - e) schematic of computer models

In addition to the City of Welland, the development proponent is responsible for obtaining all other necessary permits and approvals from some or all of the following agencies:

- Niagara Peninsula Conservation Authority
- Ontario Ministry of Transportation
- Ontario Ministry of the Environment

- Ontario Ministry of Natural Resources
- Canada Department of Fisheries and Oceans
- Canada Department of Transport
- Environment Canada
- Region of Niagara Planning

11.6 Stormwater Management Facilities Perpetual Care

11.6.1 General

New development shall be designed to mitigate impacts to the watercourse including erosion, flooding and water quality. Existing watercourses shall be left in their natural state as much as possible.

Stormwater quantity control is required to mitigate the detrimental impacts of flooding and erosion on the watercourse due to increased storm water runoff from new development.

Stormwater quality controls are to be implemented based on all approved Sub-watershed or Master Drainage Plans. Environmental Impact Assessments shall determine the most appropriate best management practices as per the Ministry of the Environment's "Stormwater Management Practices Planning and Design Manual", where no plan exists.

Source controls are encouraged where soil conditions allow infiltration. Owners are required to maintain and monitor the operation of quality ponds and shall ensure the facility meets current Ministry of the Environment criteria prior to the City assuming control of the facility. The length of period required before the City assumes responsibility of the facility depends upon the timeframe of housing completion.

11.6.2 Maintenance Costs/Maintenance Report

The maintenance costs represent the costs to ensure the proper operation, longevity and aesthetic functioning of the storm water control measures. The necessary tasks to achieve these objectives include sediment removal, trash removal, maintenance of the vegetation and inspections of the inlet and outlet. The Owner's Consulting Engineer shall provide a report to the City detailing maintenance recommendations based on the approved storm water management plan. The report shall include the following recommendations:

- Inspection of all structures and how frequently (minimum of once annually);
- Removal of all sediments and how frequently;
- Method of re-stabilizing of all disturbed areas;
- Sediments to be tested to determine method of disposal;
- Effluent sampling protocol.

The costs associated with storm water pond maintenance will vary depending on the type and size of the facility and are subject to review and approval of the City of Welland. The cost identified shall be provided by the Owner(s) to the City of Welland to ensure sufficient funds are available for perpetual maintenance of the storm water management pond. The payment of this fee will be determined at the time of entering into the subdivision agreement and the Subdivision Agreement approval process.

Please refer to Appendix 'G' for the associated costs relating to perpetual maintenance fees for the development.

Notes:

12 PARKS AND OPEN SPACE

12.1 General

Parks are an essential component of the urban area. They provide opportunities for both residents and visitors to explore other aspects of daily life and to have social, educational, and recreational experiences in a designated outdoor setting.

Parks are a vital component of a well-planned community. Parkland that provides maximum benefit to the public, integrates existing natural features (such as streams and creeks) and cultural heritage resources (such as woodlots and hedge rows) in a functional manner. The ideal park will have a wide range of features and facilities from open meadow to shady groves of trees and will accommodate use by residents with a variety of interests and capabilities.

Prior to the initiation of any design work, the City requires pre-consultation with the Owner and their agents to address the design features for park and open space facilities.

12.2 Park Classifications

Each park will be unique in its size, context, and use; however, the City of Welland has identified three classifications of parks, each with specific programming and facilities. These classifications are Regional, City-wide and Neighbourhood. The classification of each park into one of these categories is based on a combination of the following criteria:

- a) The established 'draw' or attractiveness of the park and its facilities (or the potential 'draw', if it is undeveloped or underdeveloped);
- b) Size – typically, the larger the site, the higher it is in the hierarchy, although a small park can be characterized as City-wide or Regional if it has been developed as a specialty park that attracts most park visitors from beyond the local area;
- c) Location in an area that is clearly not within or associated with a residential neighbourhood; and
- d) Uniqueness.

These parks have both common and park specific requirements. These are outlined in the following sections.

12.2.1 Common Park Characteristics

A base level of development will include rough and fine grading, site services (water, electrical, and storm drainage systems), fencing, identification and regulatory signage, and seeding/sodding with appropriate seed mix to provide regulatory maintained turf areas.

All parks will include a pedestrian circulation system including a major paved walkway at a minimum of 2.4 m in width connecting the main (pedestrian) entrances to the main features and/or facilities within the park. This main walkway may also serve as a multi-use trail and maintenance vehicle access route. Parks may also include minor walkways of minimum 1.5 m in width providing connections for secondary entrances and features.

A minimum of one vehicular access for maintenance is required for each park, and may require a curb cut. These vehicles may use the major pathway.

The City will determine the level of winter maintenance required, if any, for each park on a site-by-site basis.

12.2.2 Regional Level Parks

The scale, size and appeal of the parks/open spaces and facilities in this category are intended to attract *most* visitors from across the Municipality and beyond.

This category includes municipal parks, Welland Recreational Canal lands, Seaway Authority lands, post secondary education lands, potential conservation authority lands, designated and publicly owned wetlands and other natural heritage areas, utility corridors, other prominent linear open space corridors/parks, golf courses, heritage sites/museums, and other similar sites.

They typically attract day-use activities.

12.2.2.1 Key Characteristics

- a) Generally, should incorporate indoor and outdoor facilities that are high order/major in scale and quality – often clusters of similar facilities such as two or more soccer fields or ball diamonds.
- b) Can accommodate ancillary features such as a food concession, washrooms, change facilities, and/or a club house.
- c) Ensure that playgrounds, sitting/viewing areas and picnic areas are well shaded.
- d) Generally should be large sites, but could also be a small specialized property or facility (ie. An historic site or memorial).
- e) Are sometimes resource-based (natural or built heritage) and therefore not necessarily located based on good access or visibility.
- f) If not resource-based, the location should be driven by criteria such as: good access and visibility, and suitability of the site to support desired development/uses.
- g) Sites intended to accommodate lighted/major sports venues should not directly abut a residential area.
- h) Whenever possible, sites should be linked into the city-wide/regional trail system.
- i) Incorporate sufficient on-site parking to support uses.

12.2.3 City-Wide Parks

The scale, size and appeal of the parks/open space and facilities in this category are intended to attract *most* visitors from a large segment of the city or from across the entire city.

For the most part, this category includes municipal parkland, secondary schools, libraries and stormwater management sites (with recreational and aesthetic value/potential).

Sometimes, City-wide parks are combined into a jointly planned and developed park-school campus with shared indoor and outdoor facilities.

12.2.3.1 Key Characteristics

- a) Generally, may incorporate outdoor and indoor facilities that are intermediate to high order in scale and quality such as: lighted ball diamonds, lighted tennis courts, full size soccer fields, an arena, a community hall, a tennis club facility, an outdoor performance venue, a picnic area, a major playground, a large floral garden, etc.

- b) If the site is large enough, two or more of one type of facility could be accommodated.
- c) If large enough, the site may include ancillary features such as: washrooms, change facilities, a food concession.
- d) Ensure that playgrounds, sitting/viewing areas and picnic areas are well shaded.
- e) Incorporate sufficient on-site parking to support uses.
- f) Although most sites should be predominantly or entirely 'table land' to support the focus on 'active' facilities, some sites (and parts of sites) can incorporate wooded areas, watercourses and sloped lands, especially suitable for nature appreciation and tobogganing, and to provide visual and topographic relief.
- g) Whenever possible, sites should be linked into the city-wide/regional trail system.
- h) Sites should be physically accessible to the community with active parks located on or near main transportation routes.
- i) All sites should be visible, ideally with *at least* 25% of the perimeter of the site fronts onto a street, and where possible, a major roadway (particularly so if an 'active' park).
- j) Minimize the use of fencing around the perimeter of the site.
- k) Lighted sports facilities should not abut residences.
- l) Generally, this category of park should be a minimum of 4 hectares (10 acres) in size. However, a specialized park with city-wide appeal can be smaller.

12.2.4 Neighbourhood Parks

Neighbourhood parks are of a scale, size and appeal of the parks/open space and facilities intended to mostly attract visitors from nearby residences (within a five to ten minute walk), predominately for less organized leisure activities. Children should not have to cross a busy street to access 'their' neighbourhood park.

For the most part, this category includes municipal parks and elementary schools. Church sites with turfing, usable open space could be included in this category. It also includes neighbourhood-scale open space linkages and walkways.

Where possible and desirable, combine parks and schools into a jointly planned/developed park-school campus with shared facilities and no fencing between jurisdictions. It is appropriate to also include a church with a useable and accessible 'yard' into an open space campus (with or without a school).

12.2.4.1 Key Characteristics

- a) Generally, Neighbourhood parks should incorporate outdoor facilities that are junior to intermediate in scale and quality such as: playground(s), outdoor basketball court, small picnic area, and if large enough and there is demand, a 'scrub' or junior ball diamond, and/or mini, junior or intermediate level soccer field.
Note: ball diamonds and playing fields are becoming less desirable in Neighbourhood parks as sports groups increasingly want facilities clustered at large sites.
- b) There should be no indoor facilities.
- c) Playgrounds, sitting areas and picnic areas should be well shaded.
- d) Most sites should be linked into the city-wide trail system.

- e) Ensure that a *minimum* of 20% of the perimeter of the site fronts onto a street, and most of the site is visible from the street(s).
- f) Minimize the use of fencing around the perimeter of the site.
- g) Most of the site should be table land quality.
- h) Most Neighbourhood parks should range in size from 0.6 to 2.0 hectares (1.5 to 5 acres). Occasionally, it is appropriate to create a smaller parkette to augment a park-deficient area, or to meet a specific need such as providing a specialized site for a children's play area, a sitting area or a local amenity/accent/signage function. However, even parkettes should not usually be less than 0.2 hectares (0.5 acres) in size.

12.3 Naturalization

12.3.1 Criteria

- a) Areas of naturalization are encouraged within all parks and open space areas.
- b) Naturalization may be in the form of a low maintenance planting area, a buffer area for adjacent woodlots or stream corridors, or a stormwater management facility.
- c) The locations and design of these naturalization areas are to be co-ordinated with the stormwater management plan, the site's programming needs, and with consideration for any abutting natural areas or woodlots.
- d) Naturalization areas will consist of either open meadows of herbaceous plants, (grasses, forbs and native wild flowers) or of native woody plant material (shrubs, vines and trees) to eventually establish a woodlot.
- e) Standard maintenance activities in the naturalization areas are to be limited to the removal of invasive non-native species, and a 1.0 metre mowed strip adjacent to all trails and walkways abutting the naturalized area.
- f) The Niagara Peninsula Conservation Authority should be consulted and the City must approve selection of all plant material for naturalized areas. All plant species are to be appropriate to the site. The use of native, non-invasive species indigenous to the region may be a requirement. These authorities will provide specific direction regarding stormwater management pond planting, species selection, and submission requirements.

12.3.2 Design

The following minimum percentages of total area are to be provided for naturalization:

- Neighbourhood Park - 25%
- City-Wide Park - 20%
- Regional Park - 20%

*The City encourages the preservation of existing vegetation within park blocks, regardless of classification. To preserve this vegetation, a naturalized planting area may be required.

Naturalization may also be required for park areas that abut Greenlands systems and watercourses, regardless of park classification.

Newly naturalized areas will incorporate the following design techniques:

- The use of several plant associations which are commonly found in that area.
- Clustering of plants to replicate natural communities.

12.3.3 Active Naturalization

Active naturalization includes creating and managing biodiversity within newly planted areas. The following practices apply:

- Planting a variety of specific shrubs, trees and grass/forb mixes to closely replicate a naturally occurring undisturbed meadow, woodlot or riparian area. This encourages natural ecological processes and provides habitat to native birds, insects, amphibians and reptiles.
- Removing invasive, non-native plant species.

12.3.4 Passive Naturalization

Passive naturalization is appropriate for existing naturalized areas within parks and open space. It focuses on retaining or conserving existing naturalization areas with little or no maintenance. The following practices may apply:

- no new planting
- may include removal of invasive species
- no removal of dead wood in trees except where a hazard to pedestrians exists (in order to allow for the natural process of decay and regeneration and to provide habitat for invertebrates and micro-organisms).

12.4 Accessibility

In keeping with the spirit of the Ontario for Disabilities Act, the City of Welland will be expecting facilities and park designs to be sensitive towards groups with disabilities. Designs will be considered on a site-by-site basis in order to evaluate the need and application of “accessible designs”. The City may consider a special, dedicated facility within a park to accommodate a variety of users.

12.4.1 Trails and Walkways

Parkland and park facilities will be designated to provide barrier free access to wheelchair users and others with mobility limitations. Each park will contain a pedestrian system of walkways, trails, bridges and ramps to provide continuous direct access from the access or entry point at the edge of the park or parking lot to the park facilities.

12.4.2 Playground Equipment

The design of play areas is to include consideration for accessible paths to the play area from the rest of the park, as well as, accessible surfacing to access the play equipment.

As a minimum, playground equipment will be selected to allow for children who are wheelchair users to have access to the play equipment by means of a ramp or transfer platform used with the assistance of a parent or caregiver. Specific play components will take into consideration the needs of limited-mobility users, other special needs, and age groups.

12.4.3 Other Features and Fixtures

The selection of site furnishings (e.g. picnic tables), hardware (e.g. door handles) and fixtures (e.g. drinking fountains) will be based on ease of use for a wide range of capabilities and age groups.

12.4.4 Limits to Public Use

The City of Welland may enter into partnerships with specific sports clubs (e.g. Soccer Teams or Tennis Clubs) to provide or maintain certain facilities. From time-to-time, these same facilities may be closed to general public use according to these agreements. These closures may be publicized via City publications, newspaper ads or park signage.

12.5 Site Preparation

The Owner may be required to provide securities prior to the commencement of any site disturbance in accordance with a Site Alteration Permit, Subdivision Agreement or Site Plan Approval.

12.5.1 Site Examinations

a) General

Prior to commencement of work on site, verify existing subgrade and site conditions including vegetation, and report in writing immediately to the Landscape Architect, all discrepancies and conditions which are at variance with drawings and specifications.

Failure to do so will imply acceptance by the Contractor of surfaces and site conditions and no claim made thereafter for damages or extras resulting from such discrepancies will be accepted.

Verify on the site all underground services, such as water lines, sewers, electrical cables, telephone, gas and other utility lines and have such services located on the site by the appropriate authorities.

Be prepared to meet and blend smoothly with existing grades at the project boundaries where required.

b) Archaeology

The owner shall carry out a heritage resource assessment of the subject property prior to the issuance of a site alteration permit and, if recommended, mitigate/salvage/excavate any significant heritage resources to the satisfaction of the Regulatory Operations Group of the Ministry of Citizenship and Culture. No grading or other soil disturbance shall take place on the subject property prior to the letter of release from the Regulatory Operations Group of the Ministry of Citizenship and Culture.

c) Inspection

Upon completion of rough grading, adjustment and preparation of sub-grades, the work will be inspected by the City. Obtain City approval before proceeding with further work, giving timely notice.

d) Compaction

Compact sub-grade under all paving, and where specified uniformly and adequately to ninety-eight percent (98%) minimum Standard Proctor Density.

Sub-grade under landscaped areas (planting and grass) shall meet eight-five percent (85%) Standard Proctor Density.

e) Protection

Protect existing vegetation as directed on site by Landscape Architect prior to commencing any site works.

Protection should be in accordance with an approved Site Alteration Permit, if applicable.

Protect all excavations from caving in by shoring and bracing in strict accordance with all applicable regulations and building codes and support existing structures, paving, services, etc. where necessary.

Protect excavations from freezing and keep free of water at all times by providing and operating all necessary equipment.

Be responsible for all damage and subsequent repair to underground utilities and structures resulting from contractor's operations.

Erect barriers, fencing and/or signs where required and requested and be responsible for maintenance and removal of such works upon completion of work.

f) Clearing

Clear site of all rubbish, rocks, boulders, tree stumps and other useless materials and debris, remove from site and dispose of unless instructed otherwise.

Cut all dead trees and remove stumps and roots to a minimum depth of 600 mm below proposed finished grade.

g) Topsoil and Stripping

All areas designed for paving or the construction of structures, shall be stripped of all topsoil and organic matter to its full depth taking care not to contaminate it with any sub-soil.

All stripped topsoil shall be stockpiled in areas so designated by the City.

Stockpile topsoil in loose layers, not exceeding 225 mm in depth, total height of stockpile not to exceed 4500 mm.

Topsoil will be re-used for landscape work, unless specified otherwise.

Commence topsoil stripping only after designated areas have been cleared of scrub, weeds, brush stumps, rocks and other deleterious materials. Such materials shall be removed from the site and disposed of by the contractor.

h) Grading

After stripping of topsoil, do all necessary rough grading, excavating, and filling, where required, to establish the sub-grade under all areas as shown on drawings.

Level of sub-grade shall be to the depths specified, after compaction of sub-grade and of materials placed thereon.

Remove all soft and unstable areas in sub-grade to approved depth and backfill with clean, approved fill material.

Establish and maintain sub-grade parallel to finished grade and shape to allow adequate surface runoff and prevent ponding, scouring and erosion.

Provide for uniform slopes between points for which finished grades are shown on drawings. Meet and blend with existing grades in a smooth manner.

Establish smoothly rounded grades at top and toe of slopes and banks.

Do not grade when soil is wet or frozen.

Preparation of sub-grade:

- Scarify sub-grade on which topsoil is to be placed, to the minimum depths specified.
- Scarify sub-grades under areas which are to be raised by placing fill to minimum depth of 75 mm to provide a good bond and prevent slipping of fill.

i) Filling

Fill material shall be clean, free of topsoil and organic matter and debris, and shall be approved by the City before placing. On site excavated material may be used for filling when approved by the City. Testing of proposed fill materials may be required.

Where required, supply and spread approved fill materials to raise existing grades to the specified level, as shown on the drawings.

Place fill in loose layers, not exceeding 150 mm in depth and compact each layer to a minimum dry density of ninety-eight percent (98%) of the maximum Standard Proctor Density, before placing subsequent layers.

The surface shall be shaped at all times to ensure adequate surface runoff and prevent ponding and scouring.

j) Excavation

Before proceeding with excavating work for paving and footings, the areas shall be staked out and approval obtained from the Landscape Architect.

Excavate where required to the minimum specified depths to establish the sub-grade under all paving where shown on drawings.

Prepare and compact final sub-grades as shown on drawings.

The excavations for footings shall be carried to undisturbed soil, to depths as shown on drawings.

All excavations shall be sufficiently shored and braced to prevent caving-in and support existing structures, roads, services, etc., in accordance with the Ontario Occupation Health & Safety Act.

Warning signs and protection barriers shall be erected in accordance with local regulations.

The Contractor is responsible for all damage and subsequent repair to underground utilities and structures resulting from Contractor's operations.

All excavations shall be protected from freezing and water. Provide and operate as many pumps as are necessary to keep excavations free of water at all times.

All excavated material shall be removed and disposed of as directed, unless approved by the Landscape Architect for filling or backfilling.

k) Backfilling

This shall include the backfilling around new structures with granular materials and/or other approved fill.

Remove all debris, rubbish, shoring, etc., from excavation before backfilling.

Backfill material shall be clean, free from debris, organic matter, and other deleterious material, and shall not be placed over frozen or wet soil.

Backfill material shall be placed in 300 mm lifts and each layer consolidated to ninety-eight percent (98%) Standard Proctor Density.

Be responsible for making good any subsequent settlement of fill and work placed on top of it.

12.5.2 Site Protection

a) General

The Contractor is to be fully responsible to ensure that all erosion and sedimentation resulting from the proposed works, dewatering operations, etc., is controlled and contained within the work site to the satisfaction of the City and/or Niagara Peninsula Conservation Authority.

Any clean-up or damage costs resulting from the Contractor's failure to control erosion or siltation may be completely at the Contractor's expense.

At all times, the Contractor shall prevent entry of sediment to watercourses. Controls shall include, but not be limited to, the following:

- Runoff from construction materials and stockpiles shall be contained and discharged so as to prevent entry of sediment to watercourses.
- Erosion and sedimentation control measures shall be placed in watercourses as directed by the City and/or Niagara Peninsula Conservation Authority.
- A dedicated stockpile area(s) shall be prepared prior to dredging. The stockpile area(s) shall be adequately sized to account for spreading of wet sediments and shall be determined in consultation with the City.
- Silt fences shall be installed along the perimeter of the stockpile site. Silt fences shall be installed across truck access routes to the stockpile at the end of the work day.
- A 20 m stand-by supply of prefabricated silt fence barrier, in addition to any other silt fence barrier, shall be maintained at the site prior to commencement of operations and throughout the duration of the site works.
- All conventional and in-water sediment control fence shall be installed as per any drawings approved by the City and Niagara Peninsula Conservation Authority. All sediment and erosion control measures shall remain in place until authorized for removal by the City.

b) Silt Fence

Silt fence is to consist of snow fencing lined with geotextile fabric or geotextile fabric fastened to wooden stakes shall prevent any soil from eroding from regraded or disturbed areas during construction.

This fence is to be installed by the contractor and inspected and approved by the landscape architect prior to the start of any construction. After approval, the silt

fence is to be maintained intact by the contractor until the grass cover is well established and approved by the landscape architect. The fence shall be entrenched and backfilled to stop any erosion.

Contractor is responsible to remove silt fence and restore and reseed disturbed areas as required upon final acceptance.

12.5.3 Tree and Shrub Protection

a) General

The Contractor shall be required to protect the root systems and habitat of existing trees from damage due to excavation, compaction or contamination resulting from construction. For the installation of conduits, the Contractor may be required to bore/tunnel under the tree's root system using methods and equipment acceptable to the City.

The Contractor shall also supply equipment that maintains existing tree canopy when working under overhanging limbs.

No trees shall be pruned without prior approval from the City.

b) Scheduling of Site Work

It is the responsibility of the Contractor to become directly acquainted with the site, to carefully examine the location of the proposed work, and to notify the City of any discrepancies in the site conditions. No allowance will be made should the Contractor fail to do so.

The Contractor is responsible for damage caused to the surrounding facilities. Facilities damaged by the Contractor shall be repaired to the approval of the City, at the Contractor's expense.

Prior to commencing any excavation work, the Contractor shall establish as near as possible, the location and state of use of all utilities or services, and is responsible for damage or relocation incurred during the execution of the project.

The Contractor shall confine his operations to the Owner's property as shown on drawings and as directed by the Owner's Representative.

The setting out of work shall rest solely with the Contractor who will be responsible for the same. It is the Contractor's responsibility to verify all grades, lines, levels, and dimensions as indicated on the drawings and report any errors or discrepancies to the Owner's Representative.

The Contractor shall have such staking approved by the Owner's Representative before the commencement of work.

c) Materials

Protective barrier to consist of rigid snow fencing complete with iron "T" bars placed at 2 m oc (maximum spacing). Snow fencing is to be 1.2 m high.

d) Installation

Prior to the start of any site work, the Contractor shall supply and install tree protection barriers around each tree and shrub grouping designated on the site plan to be protected, or as directed by the City.

Protective barrier, as a minimum, is to be located at the outer limit of the drip line of the tree. The drip line is defined as the outside edge of the tree canopy.

Protective barriers for shrub massing are to be located 1 m minimum from the outside edge of the plants.

No fill, machinery, or materials are to be placed within the protective barrier.

No re-grading, including filling or excavation, is to take place within the protected area.

All underbrush that is to be removed from within the protective barriers must be cleared by hand. The method of removal of brush from the protected area is to be approved by the City.

Contractor is responsible to remove tree and shrub protection upon final acceptance.

e) Workmanship

The Contractor will be required to replace with material of equal value, at no extra cost to the contract, all plant material damaged as a result of improper installation or maintenance of protective barriers.

f) Guarantee

The Contractor is responsible to ensure that the protective barrier is installed prior to the start of construction and is maintained intact until final acceptance of the project.

12.6 Site Grading

12.6.1 Topsoiling and Grading

a) Criteria

All areas designated for parkland are to have a minimum of 150 mm of topsoil.

Any topsoil stripped from the area surrounding the park and stockpiled on the site is to be removed from the site prior to park development. Alternatively, all or part of the stockpiled topsoil may be incorporated into the overall site grading plan. Maximum slopes not exceeding 4:1. The City requires topsoil testing to the City's satisfaction at the expense of the Owner.

Match with surrounding grades.

Spreading of topsoil, rough grading, fine grading and seed bed preparation (including removal of all stones and debris) are to be completed and inspected by the City prior to seeding/sodding.

Topsoil shall be stabilized within the construction year's growing season.

b) Testing

Test topsoil for N, P, K, MG, soluble salt content, organic matter, pH Value, and agricultural herbicide residue.

Perform pH Test to determine required lime treatment to bring pH value of soil within 5.5 to 7.5 level. Test topsoil after it has been placed.

Submit two copies of soil analysis and recommendations for corrections to the City.

Inspection and testing of topsoil will be carried out by a testing laboratory approved by the City. Testing costs associated with conveyance of parkland are the Owner's responsibility.

c) Materials

All topsoil to be obtained from stockpiles, or supplied by the Contractor, shall be a fertile, friable natural loam containing four percent (4%) minimum organic matter for clay loams and two percent (2%) minimum organic matter for sandy loams with acidity range of 5.5 pH to 7.5 pH and shall be capable of sustaining vigorous plant growth. It shall be free of any admixture of sub-soil, clay lumps, stones, and roots and other extraneous matter and shall be free of weeds and weed seeds.

d) Topsoil Spreading and Fine Grading

Obtain approval by the City of prepared subgrade prior to spreading topsoil.

Spread topsoil to the following depths:

150 mm for all areas to be seeded and sodded.

Depth indicated is compacted depth.

Spread topsoil on prepared sub-grade of the work site.

Fine grade topsoil to produce a smooth even surface free from debris, sod, stones and roots.

Compact (85% Standard Proctor Density).

Meet and match all existing turf areas, curbs, maintenance holes and catchbasin frames in a smooth uniform line.

12.7 Site Servicing

12.7.1 Water

The Neighbourhood Park requires a minimum 50 mm service and each City-Wide Park requires a 150 mm service complete with backflow device, shut-off valve or curb stop, as per OPSD 1104.020, located at the property line. This will facilitate the future addition of an irrigation system, drinking fountain, water play feature, or service building. Each water service pipe diameter to be confirmed with City staff prior to approval of servicing plans. Water meter chambers to be provided, in order to accommodate water service equipment – location of chamber to be confirmed by City staff, based on approval of park concept plan and park facility layout.

Quick couplers are required to service specific areas; quantities and locations to be determined on a site-by-site basis. Booster pumps and/or oversized meter chambers may be required and will be assessed on a site-by-site basis.

12.7.2 Irrigation Standards and Specifications

Refer to the Landscape Ontario Irrigation Commodity Group standard specifications.

All irrigation proposed within the City should follow the Turf and Landscape Irrigation Best Management Practice (T & L BMP) and following the practice guideline. For design, contracting and management, individuals shall be required to have obtained the certification specific to their field:

The certifications include:

Certified Irrigation Designer (CID)
Certified Irrigation Contractor (CIC)
Certified Landscape Irrigation Auditor (CLIA)
Certified Landscape Irrigation Manager (CLIM)
Certified Golf Irrigation Auditor (CGIA)

A listing of certified individuals can be found on The Irrigation Association's website at: <http://www.irrigation.org>

12.7.3 Drainage

All drainage associated with park amenities and open space shall conform to City of Welland Lot Grading and Drainage standards outlined in Section 10 of this manual.

Parkland is to be conveyed in a condition where no surface water can be left standing and in accordance with a Park Grading Plan and stormwater review by the City. An Owner will be responsible for all costs associated with installing a drainage system to meet City approval.

The preliminary park drainage system required for conveyance is to be designed with the overall subdivision drainage taking advantage of nearby street sewers where possible.

Park and open space property is not to be used for draining private properties.

The Owner is required to install a storm maintenance hole within 1 metre of the City property line.

All drainage is to be designed to encumber the site as little as possible recognizing that park amenities require excavation.

The entrances to the park or open space are to be clear of sewer appurtenances.

12.8 Parking Areas

12.8.1 Criteria

Any on-street parking is to be designed in accordance with current City policies and by-laws.

Parking is typically required within Neighbourhood, City-Wide and Regional Parks, within the park site.

Parking areas are to be paved and may have continuous concrete curb, and located conveniently adjacent to the active sports facilities. As an alternative to paving, 'cable concrete', or equivalent articulated concrete block system could be used as paving material. (Reference <http://www.iecs.com>). Open cell cable concrete can be planted with grass in parking areas and where low traffic conditions are expected.

Each parking lot is to be accessed by a driveway adequate for two-way traffic.

Each parking space is to be delineated by line paintings.

Parking areas will be illuminated utilizing Solar Powered LED luminaries (see listing 12.10.4).

Parking areas may be designed in conjunction with adjacent schools.

12.8.2 Design Requirements

The minimum recommended number of parking spaces to be provided per park is as follows:

- 30 per ball field
- 30 per soccer field
- 15 for general park visitors
- per group of three tennis courts

Where parkland abuts a school, the number of paved parking spaces to be provided for the park may be adjusted with approval of the City.

Where possible, drainage for the parking areas is to be by means of overland flow using a vegetated swale as part of the stormwater management plan and/or area drains to be determined on a site-by-site basis. Erosion protection is required at the entrance to the swale at the edge of the parking lot.

Materials to be as specified in a geotechnical report for a specific location or as follows:

- Light Duty Asphalt for parking areas and driveways.
HL3 - 50 mm
Granular 'A' - 150 mm
Granular 'B' - 300 mm
With continuous concrete curb.
- Heavy Duty Asphalt is to be used in heavy traffic service driveways and fire routes.
HL3 - 40 mm
HL8 - 50 mm
Granular 'A' - 150 mm
Granular 'B' - 300 mm
With continuous concrete curb.
- Gravel Surface:
Base: 300 mm Granular 'B' or 300 mm of 50 mm crusher run.
Surfacing: 150 mm of crusher run aggregate, 19 mm maximum diameter.
With continuous concrete curb or precast concrete curbs pinned in place.
- Layout and Drainage
 - All parkland parking to be off-street, unless approved by the City.
 - 90° entrance drive with clear visibility.
 - 1 minimum handicapped space per 20 regular spaces.
 - Driving aisle minimum width 6 m, double loaded.
 - Backup aisle at end of lot minimum, 1.5 m depth.
 - Minimum 3 m clearance at end of parking lot for snow storage.
 - Where parking abuts a walkway, a continuous curb or precast curb is required to prevent cars from overhanging the path. The path is to

be offset minimum 1 m from back of curb. Offset area to be a hard surface.

- Sheet drainage to adjacent parkland if feasible or a swale along edge of parking lot leading to a catchbasin.
- Minimum setback to residential area 12 m.

12.9 Planting - General

The City of Welland encourages the use of native species within parks and open space. Where proposed planting area is adjacent to woodlots, watercourses or other natural areas, only non-invasive species and indigenous to Niagara Region will be approved.

Other recommended resources for native plant species include:

- “Distribution and Status of the Vascular Plants of the Greater Toronto Area”, prepared for the Ontario Ministry of Natural Resources, August 2000, Steve Varga, et al.
- “Distribution and Status of the Vascular Plants of Central Region, Ontario Ministry of Natural Resources, December 1989, J. L. Riley, et al.

Non-naturalized planting areas are to be designed in continuous mulched beds where possible to reduce maintenance.

Bare root plant material will be considered on site-by-site basis.

A variety of tree species is required. Clustering of similar species is discouraged and should be limited to clusters with a maximum of 5 – 9 per grouping.

12.9.1 Park Trees

12.9.1.1 Criteria

The Owner is required to supply and install trees within parkland areas as required to provide user comfort, screening/buffering, accenting of entrance plazas, wildlife habitat, etc., as determined by the City.

Refer to Table 12.2 for a list of suitable parkland tree species. Moisture regime, sunlight availability and salt tolerance (where applicable) must also be considered as a factor in selecting species.

Trees are to be placed so as not to interfere with underground utilities, intersection sight lines, overhead wires and light standards.

Where possible, medium to large shade trees are to be selected.

All trees are to be installed with a minimum 1.2 m root saucer covered with 75 mm shredded bark mulch.

Deciduous trees should have a clear trunk with a high branching height of 1.8 m minimum.

Parkland trees located at entrance areas, around play areas, buffering sports facilities and parking areas shall be minimum 60 mm calliper. All tree roots to be wire basket or balled and burlapped for these locations.

In urban areas, fronting roads non-native or ornamental species that exhibit tolerance to salt spray may be used. Refer to Table 12.2 for species that are salt tolerant.

Park trees proposed near watercourses and other natural areas must be non-invasive and native to Niagara Region.

12.9.1.2 Approved Species

The following size classification is based on average mature height, and identifies size as well as spacing requirements:

Table 12.1 Park Trees – Size / Spacing	
Size at Maturity	Recommended Spacing for Specimen or Accent Trees
SMALL – up to 8 m (26')	Min. 6.0 m (20') – Max. 8.0 m (26')
MEDIUM – 8 m (26') – 18 m (60')	Min. 8.0 m (26') – Max. 10.0 m (33')
LARGE – 18 m (60') and larger	Min. 10.0 m (33') – Max. 12.0 m (40')

* Minimum spacing may be reduced at City's discretion.

The following deciduous trees are suitable as parkland trees:

Table 12.2 Recommended Parkland Trees					
Botanical Name	Common Name	Native *	Size Class at Maturity	Growth Rate	Canopy Size at 20 Years
<i>Acer campestre</i>	Hedge Maple		Small	Slow	7.5 m
<i>Acer x freemanii</i> 'Celzam'	Celebration Maple		Medium	Med-Fast	5.5 m
<i>Acer x freemanii</i> "Jeffersred"	Autumn Blaze Maple		Medium	Medium	9 m
<i>Acer saccharinum</i>	Silver Maple	3	Large	Fast	10 m
<i>Acer saccharum</i>	Sugar Maple	3	Large	Slow-Med	10.5 m
<i>Amelanchier arborea</i>	Downy Serviceberry	3	Small	Slow-Med	4 m
<i>Amelanchier laevis</i>	Serviceberry	3	Small	Slow-Med	3.75 m
<i>Carya cordiformis</i>	Bitternut Hickory	3	Large	Slow-Med	12 m
<i>Carya ovata</i>	Shagbark Hickory	3	Large	Slow	10 m
<i>Catalpa speciosa</i>	Western Catalpa		Large	Fast	12 m
<i>Celtis occidentalis</i>	Hackberry	3	Medium	Med-Fast	11 m
<i>Cercidiphyllum japonicum</i>	Katsura Tree		Medium	Slow	4.3 m
<i>Corylus columa</i>	Turkish Hazel		Medium	Medium	5.5 m
<i>Fraxinus Americana</i>	White Ash	3	Large	Medium	15 m
<i>Fraxinus nigra</i>	Black Ash	3	Large	Slow-Med	7.5 m
<i>Fraxinus pennsylvanica</i>	Green/Red Ash	3	Large	Fast	7 m
<i>Ginkgo biloba</i>	Ginkgo		Large	Slow	8 m
<i>Gleditsia triacanthos</i> var. <i>inermis</i>	Thornless Honeylocust		Large	Fast	10.5 m
<i>Gymnocladus dioicus</i>	Kentucky Coffeetree	3	Large	Slow-Med	10 m
<i>Juglans nigra</i>	Black Walnut	3	Large	Med-Fast	14 m
<i>Ostrya virginiana</i>	Ironwood	3	Small	Slow	5.4 m
<i>Prunus maackii</i>	Amur Chokecherry		Small	Slow	7.5 m
<i>Pyrus calleryana</i> var.	Ornamental Pear		Medium	Medium	4.5 m
<i>Quercus</i> species	Oak	3	Large	Med-Fast	varies
<i>Syringa reticulata</i>	Japanese Tree Lilac		Small	Medium	4.5 m
<i>Tilia Americana</i>	Basswood	3	Large	Medium	10 m
<i>Tilia cordata</i> var.	Littleleaf Linden		Medium	Medium	6.4 m
<i>Ulmus x 'Pioneer'</i>	Pioneer Elm		Large	Medium	9.5 m

The "Native" designation refers to species that naturally occur in Niagara Region.

The use of *Acer platanoides* and its cultivars will not be approved.

12.9.2 Grasses and Forbs

12.9.2.1 Criteria

The following grass and forb species are suitable native species for naturalized areas within parks and open space:

Table 12.3 Recommended Grass and Forb Species	
Botanical Name	Common Name
Andropogon scoparius	Little bluestem
Sorghastrum nutans	Indian grass
Elymus virginicus	Virginia wild rye
Anemone Canadensis	Canadian anemone
Aquilegia Canadensis	Eastern columbine
Asclepias incarnate	swamp milkweed
Asclepias tuberosa	butterfly weed
Aster ericoides	white heath aster
Aster novae-angliae	New England aster
Calamagrostis Canadensis*	Canada blue-joint
Carex vulpinoides	fox sedge
Desmodium canadense	showy tick trefoil
Elymus Canadensis	Canadian wild rye
Elymus riparius	riverbank wild rye
Eupatorium perfoliatum	boneset
Helianthus divaricatus	woodland sunflower
Heliopsis helianthoides	Ox eye sunflower
Leersia oryzoides*	cut grass
Lolium multiflorum	annual rye grass
Lupinus perennis	wild lupine
Monarda fistulosa	wild bergamot
Panicum capillare	switchgrass
Panicum linearifolium	panic grass
Penstemon digitalis	beard tongue
Rudbeckia hirta	black-eyed susan
Solidago nemoralis	grey goldenrod
Verbena hastata	blue vervain

* Regionally native but uncommon

12.9.3 Planting Specifications

12.9.3.1 Plant List

All developments requiring a landscape submission must include a completed Plant List as prepared by a Landscape Architect. Refer to the sample table below for required information.

Table 12.4 Plant List						
Key	Qty.	Botanical Name	Common Name	Size (Calliper, Height, Spread)	Spacing	Condition/Remarks

Any species substitutions or changes to the condition or size of plant material must be approved by the City or NPCA prior to installation.

For park planting and street ROW plantings, minimum calliper for trees is 60 mm, minimum height for coniferous trees is 150 mm, and minimum height for a shrub is 60 cm. Container-grown is preferred for shrubs and preferred condition for trees is B&B or W.B.

12.9.3.2 Testing

Testing of topsoil is required.

Test for N, P, K and minor element values, agricultural herbicide residue, soluble salt content, organic matter and pH value.

Inspection and testing of topsoil will be carried out by testing laboratory designated by the Owner. Contractor is to pay for cost of tests.

Submit two soil testing reports before commencing work.

Conform to recommendations from soil testing agency with respect to improvement of tested topsoil. Any testing associated with conveyance of parkland will be at the Owner’s expense. The City reserves the right to test any soil associated with boulevard planting at the Owner’s expense.

Adjust fertilizer requirements and rates as well as addition of other additives, to conform to soil testing recommendation, at no extra cost to the contract.

12.9.3.3 Product Delivery, Storage and Handling

Store and protect fertilizer, limestone, bone meal, mulching materials and similar products to prevent damage from moisture. Labels shall indicate weight, analysis and name of manufacturer.

Supply plant material as specified on the approved plant list. Receipts are to be provided to the City to verify species and quantities.

Plants specified B/B (Ball and Burlap) or W/B (Wire Ball) on the plant list shall be moved with root systems as solid units, with balls of earth firmly wrapped with burlap, as per industry practice. The diameter and depth must be sufficient to encompass a fibrous and feeding root system necessary for the healthy development of the plant. No plant shall be accepted when the ball of earth surrounding its roots has been cracked or broken preparatory to, or during planting, or after the burlap, staves, ropes or platform required in connection with its transplanting has been removed. All balled plants that cannot be planted at once shall be kept watered and shaded from the hot sun. The least possible time shall elapse between the digging of the tree and its final planting. The entire root system of all plant material shall be

kept moist and at no time shall the root system be exposed to drying winds or air.

Should temporary storage of plant material be necessary on the site, such plant material shall be heeled in by the Contractor, using good loam. Contractor shall be responsible for all necessary watering and maintenance to preserve the stock in good condition.

All plant material shall be properly top pruned to compensate for any loss of root when dug at the nursery, thus enabling the plant to attain more quickly a natural balance between root and top growth. Pruning shall be done at the centre rather than heading back.

Transport plants with branches tied to prevent damage, and padded to avoid abrasion from equipment. Protect drying out of roots, rootballs, trunks, branches and leaves of plants from time of removal at place of origin until they are planted. While temporarily stored at site, protect them with soil or similar materials and keep moist.

12.9.3.4 Post Installation Care

Water all plant material upon planting and water sufficiently until acceptance of plant material at the time of substantial performance of the contract. Water sufficiently to maintain optimum growing conditions for each plant. If installation is completed in the fall, ensure adequate moisture in root zone at freeze-up.

Maintain all plant materials and planting areas immediately after plants have been planted and continue such maintenance until substantial performance of the contract is complete. Maintenance shall include all measures necessary to establish and maintain plant materials in a vigorous, healthy growing condition.

The Owner is responsible for regular maintenance activities (watering, grass cutting, pruning, fertilizing, etc.) once plant material is accepted. The Owner is responsible to monitor plant material during the guarantee period and advise the owner of any changes in the maintenance activities required to ensure plant survival.

The Owner is responsible to maintain all plant and tree accessories, such as tree wrappings and stakes, and similar items from time of installation until expiration of guarantee (minimum one year).

Cultivate and keep planting beds and tree saucers free of weeds, debris, broken branches, and maintain planting beds in a neat condition at all times until Final Acceptance.

12.9.3.5 Guarantee

Guarantee planting for a period of (2) two years from the date of commencement of the Maintenance Period for the landscape work, whichever is the later. Trees and shrubs found to be dead, defective, or not in a healthy, growing condition at the end of the guarantee period shall be replaced and re-guaranteed for an additional (2) two years dated from the date of replacement. The City and the owner may negotiate a cash-out quantity in lieu of the original and/or extended warranty.

12.9.3.6 Replacements

Replace, during next planting season, trees and shrubs which failed to survive and/or as directed by the City. Replacements are subject to same approval and guarantee conditions specified for initial planting. Continue this replacement until all specified trees and shrubs are well established.

12.9.3.7 Materials

Topsoil: All topsoil to be obtained from approved stockpile or supplied by the Contractor, shall be a fertile, friable natural loam containing four percent (4%) minimum organic matter for clay loams and two percent (2%) minimum organic matter for sandy loams with acidity range of 5.5 pH and shall be capable of sustaining vigorous plant growth. It shall be free of any admixture of sub-soil, clay lumps, stones, roots and other extraneous matter and shall be free of weeds and weed seeds.

Peatmoss: Decomposed plant material, fairly elastic and homogenous, free of decomposed colloidal residue, wood, sulphur and iron. Brown in colour containing minimum 60% organic matter by weight and moisture content not exceeding 15%. Shredded particles, may not exceed (6 mm) in size. Minimum pH value of peat, 4.5, maximum 6.0. The use of peat moss is highly discouraged and is to be used only on approval by the City. A preferred substitute is leaf mulch.

Bone meal: Raw commercial, finely ground, and with a content of minimum 4% Nitrogen and 20% Phosphoric Acid.

Fertilizer: Shall be complete commercial fertilizer 50% of the elements of which shall be derived from organic sources, and shall contain no less than 60% urea formaldehyde with the following percentages by weight of nitrogen, phosphoric acid, and potash in that order for:

Trees: 10-6-4; Shrubs: 12-6-6 or as indicated in soil test.

12.9.3.8 Plant Accessories

anchors: For support of large shrubs and trees up to (90 mm) in calliper use new metal 'T' bars (38 mm x 38 mm x 5 mm) painted black.

Hose: New black rubber hose (12.7 mm) in diameter, two ply reinforced.

Mulch: Shredded Bark Mulch of fine, uniform particle size. Depth of mulch to be 50 mm over root ball.

Water: Potable.

Rodent Protection: Shall be required in areas of naturalized planting. Any use of pesticides must be approved prior to use by the City.

12.9.3.9 Plant Material

Conform to the horticultural standards of the Canadian Nursery Trades Association with respect to grading and quality. Supply in strict accordance with plant list.

Substitutions for the specified plants will not be accepted unless approved in writing by the City. All materials that are not available shall be brought to the attention of the City, at the earliest time possible.

Give timely notice, in writing, to the City when applying for substitutions.

Measure plants when branches are in their natural positions. Height and spread dimensions refer to main body of plant and from branch tip to branch tip. Measure calliper 300 mm above ground level. Use trees and shrubs of No. 1 grade.

Label each plant to type, grade and size.

Use trees and shrubs with strong fibrous root systems free of disease, insects, defects, or injuries and structurally sound. Crowns are to be fully leafed with a uniform shape. Use trees and straight trunks well and characteristically branched for the species with a uniform, fully developed crown. All trees are to have a single straight leader. Plants must have been transplanted or root pruned regularly but not later than 9 months prior to arrival on site.

Container grown stock is acceptable if containers are large enough for root development. Trees and shrubs must have grown in container for minimum of one growing season but not longer than two. Root system must be able to "hold" soil when removed from container. Plants that have become root bound are not acceptable. Container stock must have been fertilized with slow releasing fertilizer.

Balled and Burlapped: Conifer, Broad-leaf evergreens, and trees in excess of 10'0" (3 m) height must have been dug with large firm ball. Measure calliper at 12" (300 mm) above ground level. A tree with 3" (75 mm) calliper requires root ball of 40" (1 m) diameter. Increase diameter of root ball by 10" (250 mm) with each increase of 1" (25 mm) in calliper. Root balls of proper size must include 75% of fibrous and feeder root system. This excludes use of native trees grown in light sandy or rocky soil. Secure root balls with burlap, heavy twine and rope. Use Hessian burlap. Frozen root balls will be permitted provided root balls are sufficiently protected to prevent breakage. Protect root balls from sudden changes in temperature and exposure to heavy rainfall.

12.9.3.10 Planting Time

Ensure that watering facilities are available. Take particular care when planting in the heat of summer.

Plant only under conditions that are conducive to health and physical conditions of plants as practised in the nursery profession.

Plant material noted by the Landscape Architect for spring planting must only be planted in its dormant period.

Provide the City with a planting schedule. Extended planting operations over a long period using a limited crew will not be accepted.

12.9.3.11 Excavation

Verify locations of all below grade utilities prior to excavating. Stake locations of utilities in areas where excavation will occur. Do not plant above buried utilities or trees below above ground wires.

Individual Shrubs: excavate planting holes 450 mm deep and at least 450 mm wide. Shrubs in Planting Beds: excavate continuous planting bed to a depth of at least 450 mm with a minimum width of at least 300 mm from planting bed edge to the outermost root ball edge.

Large Trees: excavate to depth equal to height of root ball, with a minimum width of 600 mm greater than diameter of root ball.

Increase the size of planting holes in heavy soils 150 mm for every 300 mm of diameter of diameter of root ball.

Provide drainage for planting holes in heavy soil if natural drainage does not exist.

Remove all excavated material from planting pits and beds and dispose of material off site.

12.9.3.12 Planting Mix Preparation

Backfill planting beds and tree pits with a planting mix consisting of 20% to 30% peatmoss (leaf mulch preferred) with topsoil.

Add bone meal to the mixture at a rate of .6 Kg. per cu.m.

Commercial fertilizers will be added in accordance with the soil testing report.

Backfilling and mixing planting mix shall be done under favourable weather conditions.

Allow for settlement when backfilling. Place mix in 150 mm layers and tamp each layer before placing next layout.

The use of native soil may be used as backfill for trees, at the discretion of the City.

12.9.3.13 Planting Procedure

Plant trees and shrubs vertically, in the centre of pits.

Place all plant material to a depth equal to the depth originally grown in the Nursery. Allow for settlement when installing plants.

Tamp planting soil mix around root system in layers of 150 mm depth eliminating air pockets. Frozen or saturated planting soil mix is unacceptable. When 2/3 of the topsoil mixture has been placed, fill hole with water. After water has completely penetrated the soil, complete backfilling.

Build a 100 mm lip around outer edge of hole to assist in maintenance watering.

When planting is completed, give surface of planting hole a dressing of organic 10-6-4 fertilizer at the rate of 4.5 kg/100 sq.m. for shrubs and at

.2 kg/24 mm of calliper for trees. Mix fertilizer with top layer of topsoil mixture and water immediately after planting.

12.9.3.14 Tree Supports

Install support as detailed for specified tree.

Ensure tree is plumb after staking.

Place stakes so as not to damage root ball.

Keep cables taut at all times.

Place stake on side of prevailing winds, or uphill side.

Prune only as necessary to remove dead and broken branches and to compensate for the loss of roots from transplanting.

Preserve the natural form and character of plants.

Use only sharp, clean tools and make cuts flush without leaving stubs and treat all cuts, 25 mm in diameter and larger with approved tree paint.

Cut back cambium to living tissue where there are cuts, bruises and scars on the bark and treat with approved tree paint. Shape wood to prevent retention of water.

12.9.3.15 Mulching

Obtain the City's approval of planting before mulching material is applied.

Loosen soil in planting beds and pits and remove all debris and weeds prior to mulching.

Material to be shredded bark.

12.9.3.16 Maintenance Period

During the Maintenance Period, the Owner must maintain all plants in a vigorous and healthy growing condition, including but not limited to:

- Cultivating and weeding of planting beds and tree pits. Use herbicides only as per City policy. Make good any damage resulting from herbicides, use at no cost to the City.
- Watering when required and in sufficient quantities to saturate the root system.
- Pruning, including the removal of dead or broken branches, and treatment of pruning with an approved dressing.
- Disease and insect control when required. Use chemical methods in accordance with City policy, and the manufacturer's directions. Make good any damage at no cost to the City.
- Keep all accessories in good conditions and property adjusted. Repair or replace accessories when required at no cost to the City.

12.9.3.17 Final Acceptance

Planting will be inspected at the end of the Maintenance Period and plant material will be accepted only if it is in a vigorous, healthy, growing condition, in full leaf with no more than 20% dieback.

All beds, and tree pits must be freshly cultivated and free of weeds, rubbish and debris.

12.9.4 Sodding

12.9.4.1 Delivery and Storage

Schedule delivery in order to keep storage on the job site to a minimum without causing delays.

Deliver, unload and store sod in pallets.

Deliver sod to site within 24 hours of being lifted and lay sod within 36 hours of being lifted.

Do not deliver small, irregular or broken pieces of sod.

During dry weather, protect sod from drying and water sod as necessary to ensure its vitality and prevent dropping of soil in handling. Sod which dries out will be rejected.

12.9.4.2 Scheduling of Work

Schedule sod laying to coincide with topsoil operations. Do not begin to install sod without inspection and approval of topsoil preparation. Topsoil to be free of stones, debris and weeds and fine graded to grades indicated on plan prior to start of sodding operation.

12.9.4.3 Acceptance

Sodded areas will be accepted at the end of the maintenance period provided that:

- Sod is properly established.
- Turf is free of bare or dead spots and weeds.
- Sodded areas have been cut within 24 hours prior to acceptance inspection.

12.9.4.4 Materials

Turf grass nursery sod: specially sown and cultivated in nursery field all in compliance with the specifications latest issue of the Nursery Sod Growers Association of Ontario for (A) Number One Kentucky Bluegrass-Fescue Sod.

12.9.4.5 Sodding

Sodding during dry weather is acceptable only if sufficient and continuous watering is assured.

Where slippage of sod is likely to occur because of the degree of slope, pegging is required. When sod is established, drive pegs flush with sod.

Obtain the approval of the City of topsoil spreading and fine grading prior to beginning sodding. Topsoil is to be weed-free. Apply herbicide according to manufacturer's specifications or cultivate to a depth of 100 mm and remove weeds. Do not apply herbicides immediately prior to installing sod.

Lay sod even with adjoining landscape areas. The rows shall have staggered joints. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections.

Provide close contact between sod and soil by means of light roller. Heavy rolling to correct irregularities in grade is not permitted.

Water immediately after laying to obtain moisture penetration through sod into top 150 mm of topsoil.

Provide adequate protection of sodded areas against erosion and other damage. Remove this protection after sod has become established.

12.9.4.6 Maintenance

It is the Contractor's responsibility to maintain the sodded areas in good condition until the Final Acceptance of the project. Maintenance includes but is not limited to weeding, fertilizing as required by soil tests, cutting as required to maintain sod at a maximum height of 60 mm and watering. Sod is to be cut at least twice during the maintenance period.

Water sodded areas to sustain its prosperous growth and prevent deterioration. Contractor is responsible for supplying water to the site.

12.9.5 Seeding

12.9.5.1 Grass Seed Mixtures

a) Outfield Mix

'Sports Turf' by Pickseed Canada Inc., Box 304, Lindsay, Ontario, K9V 4S3, Tel: (705) 878-9240, Fax: (705) 878-9249.

For sports fields and high traffic areas that require deep roots, and wear resistance.

Contents:

25% Indigo Kentucky bluegrass
25% Touchdown Kentucky bluegrass
25% Jasper Creeping Red fescue
25% Cutter Perennial ryegrass

Seeding rate: 1.5 kg/100 sq.m. or 3 lbs/1000 sq.ft.

b) Park Mix

'Greenscape' by Pickseed Canada Inc., Box 304, Lindsay, Ontario, K9V 4S3, Tel: (705) 878-9240, Fax: (705) 878-9249.

For general parkland areas with normal foot traffic (such as around sports fields) on a regular maintenance schedule.

Contents:

30% Edge Perennial ryegrass Endophyte Enhanced
30% Premium Kentucky bluegrass GroKoted
40% Creeping Red Fescue

Seeding rate: 1.8 kg/100 sq.m. or 4 lbs/1000 sq.ft.

c) Low Mow

'Lowgrow' by Pickseed Canada Inc., Box 304, Lindsay, Ontario, K9V 4S3,
Tel: (705) 878-9240, Fax: (705) 878-9249.

For areas where a lower and slower grass requiring less mowing is desirable.

Contents:

100% Perennial ryegrass

Seeding rate: 6 to 7 lbs. per 1000 sq.ft.

d) No Mow Mix

'Nature's Blanket' by Pickseed Canada Inc., Box 304, Lindsay, Ontario, K9V 4S3, Tel: (705) 878-9240, Fax: (705) 878-9249.

For areas which do not require regular maintenance and which are not subject to a great deal of foot traffic.

Contents:

30% Mustang Tall fescue (turf-type)

35% Spartan Hard fescue

15% Strawberry clover

3% Arrow mixed colours

17% Pickseed 14 species Wildflower blend

Seeding rate: 15 – 25 kg/ha.

e) Naturalization Mixes

Refer to Naturalization Section 12.3 for design criteria.

Seed mixes to be created on a site-by-site basis recognizing the following criteria:

- Water regime
- Soil conditions
- Human activity
- Existing vegetation
- Salt tolerance
- Sunlight availability
- Erosion control requirement
- Active or passive naturalization

Installer to provide the City and/or the appropriate conservation authority the packing receipts verifying the species content, percentages and supplier.

Table 12.3 illustrates some suitable grass and forb species.

Seeding rate: specific to the proposed mix.

Use on-site seed bank material where appropriate.

f) Interim Seeding

All interim seeding placed for quick cover must be compatible with, but not jeopardize, the survival of the approved seeding mix. The interim mix must

consist of no-maintenance, native, non-invasive herbaceous species. Annual rye and winter wheat may be suitable.

12.9.5.2 Product Handling

Use all means necessary to protect material before, during and after installation. Provide adequate protection to material which may deteriorate if exposed to elements.

In the event of damage or rejection, make immediate repairs or replace materials at no extra cost to the City.

12.9.5.3 Delivery and Packaging

a) Fertilizer:

Packaged in waterproof bags, with a label clearly indicating net mass, analysis and manufacturer.

Store on pallets and protect from the elements.

Grass Seed packaged and labelled clearly indicating:

- Analysis of seed mixture
- Percentage of pure seed
- Year of production
- Net mass
- Date tagged and location
- Percentage germination
- Name and address of distributor

b) Site Conditions

Immediately after seeding, erect snow fencing to protect seeded areas from traffic until seed is established.

Contractor is responsible for maintaining snow fencing until project is accepted.

Keep site well drained and landscape excavations dry.

Clean-up immediately any soil or debris spilled onto pavement or concrete.

c) Maintenance

Maintain seeded areas for 60 days until acceptance of seeding work. Maintenance includes, but is not limited to, weeding, fertilizing as required by soil tests, cutting as required to maintain grass at a maximum height of 60 mm and watering. Grass is to be cut at least twice during the maintenance period.

Water seeded areas to sustain its prosperous growth and prevent deterioration. Contractor is responsible for supplying water to the site.

Ensure maintenance equipment is suitable to City.

Keep soil moist during germination period and adequately water grassed areas until accepted by City.

Apply water to ensure moisture penetration of 75 to 100 mm. Control watering to prevent washouts.

Cut grass when it reaches height of 60 mm. Do not cut more than 33% of blade at any one mowing. Remove clippings. After one year or substantial completion of project, request inspection by Owner's Representative immediately after cutting grass.

Maintain grassed areas free of pests and disease, in accordance with City policies.

Reseed areas which show root growth failure, deterioration, bare or thin spots, or which have been damaged by any means, including replacement operations.

Apply herbicide when it will not cause damage to new grass or other plants. Use products only in accordance with City policies.

Contractor is to provide three (3) applications of fertilizer in the first year of maintenance. The timing of fertilizing will depend on when hydro-seeding is completed. If hydro-seeding is completed in the spring, the second application of fertilizer is to be applied in late June or early July as weather permits. Coverage is not to exceed 3 kg per 100 m² to be applied evenly and water in well. The third application of fertilizer is to be applied in September or October, weather permitting.

If hydro-seeding is applied in early August, the second application of fertilizer will occur in September or October, weather permitting, and the third application in the following spring as weather permits.

d) Acceptance

Areas will be accepted by the City provided that:

- A full growing season has passed;
- There are no invasive species present;
- Seeded areas are properly established and the germination reflects the seed composition, including cover crop, grass and forb species;
- Installer to provide the City and/or the appropriate conservation authority the packing receipts verifying the species content, percentages and supplier;
- Turf areas are free of eroded, bare or dead spots and 98% free of weeds;
- No surface soil is visible when grass has been cut to height of 60 mm.

To meet Acceptance, the following activities may be required:

- Re-seed bare areas;
- Over-seeding if the cover crop, grass and/or forb species have not established;
- Weed control (manual or non-chemical methods only) will be required in areas where non-native or invasive species have established. The use of any other method is at the discretion of the City.

e) Warranty

- Warrant all hydro-seeded areas for one (1) year from date of acceptance.

- Re-seed all areas which have failed to establish into a healthy vigorous stand.

f) Materials

Fertilizer: complete commercial fertilizer as recommended by soil test, minimum of 50% of elements derived from organic sources.

Grass Seed: Canadian No. 1 seed mixture in accordance with the Canadian Seeds Act, having minimum purity of 97% and germination of 75%.

Mulch: The hydraulic mulch material shall be capable of dispersing rapidly in water to form a homogeneous slurry and remain in such a state when agitated or mixed with other materials. When applied, the hydraulic mulch shall be capable of forming an absorptive mat, which will allow moisture to percolate into the underlying soil. It shall contain no growth of germination inhibiting factors. The mulch shall be dry, free of weeds and all other foreign material and shall be supplied in packages labelled to indicate weight.

The hydraulic mulch shall be a mixture consisting of cellulose pulp and natural sun dried plant fibres processed in lengths 15 mm minimum and 25 mm maximum.

Water: Potable, free of impurities that would inhibit germination.

12.9.5.4 Workmanship

Keep site well drained.

Clean up immediately, soil, mulch or other debris spilled onto pavement, dispose of deleterious materials.

Take reasonable care to prevent contamination by seeding slurry of structures, signs, guide rails, fences and utilities.

When contamination occurs, remove seeding slurry to satisfaction of the City.

a) Preparation of Surfaces

All areas to be seeded and mulched shall be fine graded to a uniform surface and the surface materials shall be loosened to a depth of 25 mm whether or not topsoil has been applied. These areas shall be so maintained until they are seeded and mulched. Stones and all other surface litter shall be removed and disposed of outside the right-of-way at locations arranged for by the Contractor.

Obtain City's approval of seed bed preparation including topsoil grades, and depth before starting seeding. No hydroseeding will be accepted unless seed bed preparation has been inspected and approved prior to completion of work.

b) Seeding

Seed area during early spring or after 15th of August to September 15th.

Apply when winds less than 10 km/h using equipment suitable for area involved to the approval of the City.

Measure quantities of material by mass or mass-calibrated volume measurement to the satisfaction of the City.

Seed, fertilizer and hydraulic mulch shall be thoroughly mixed in a water slurry and be distributed uniformly over the surface area via an approved hydraulic mulcher.

The Contractor shall measure the quantities of each of the materials to be charged into the hydraulic mulcher, either by weight or by a system of mass calibrated volume measurements. After charging, no water or other material shall be added to the mixture in the hydraulic mulcher.

12.10 Electrical

12.10.1 Design

For all parks and open space, a minimum electrical service is required for walkway lighting and future connections within the park. Install a single phase service drop one metre inside the park property line.

Lighting priority is given to multi-use trails which are seen as a link between residential areas and schools or other pedestrian/cyclist destinations. Lighting of trails will only occur when trail is adequately populated by a continuum of users and can be sufficiently viewed from residential or public areas. For example, trails through woodlots or trails that lead to an unpopulated area will not be lit.

12.10.2 Criteria

a) General

An independent electrical consultant with recent experience in municipal park and sports lighting design must be retained to prepare the electrical drawings and specifications.

The completed drawings and specifications will be submitted to the City for their review, prior to the issue for tender.

The electrical work on the site will be performed by skilled licensed electrical trades' persons working for electrical contractors holding valid electrical contractor's licences.

The workmanship and method of installation will conform to the best standards and practices and will be performed to the approval of the City.

Work will conform to the latest rules, regulations and definitions of Canadian Electrical Safety Code and applicable Municipal and Provincial Codes and Regulations and with requirements of other authorities having jurisdiction in the area where work is to be performed. Standards established by drawings and specifications will not be reduced by applicable codes or regulations.

File contract drawings with proper authorities and obtain their approval of installation and permits for same before proceeding with work. Prepare and submit necessary detailed drawings as required by Authorities.

Furnish necessary certificates as evidence that work installed conforms to laws and regulations of authorities having jurisdiction.

Upon project completion secure and supply to the City the following:

- copy of the final Certificate of Inspection from the Electrical Safety Authority;
- copy of Owner's Manual;
- copy of detailed 'As-Built' drawing;
- certification of the as-built lighting performance criteria.

An un-metered flat rate service, where acceptable to the supply authority, is to be used for walkway lighting. All other facilities require metering.

All parks require service entrance disconnect switches.

b) Conduit

If required, conduit installed below grade and below concrete grade slabs will be rigid heavywall PVC type, with solvent weld joints and Welland Hydro approved for use above grade. (CSA SPEC C22.2-No. 211.2). Rigid TYPE 2 PVC underground conduit, ENT, EBII, DBII and poly pipe are not acceptable.

Provide a separate code gauge supplementary green stranded TW grounding conductor run in each conduit, terminating a ground block at panel boards.

Fasten every conduit to structural members by means of approved conduit clamps or clips. Wire lashing is not acceptable.

Provide a 150 mm wide yellow plastic "CAUTION" tape located 300 mm above each buried conduit for the full length of the conduit.

c) Wire and Cable

All wire and cable will comprise stranded copper conductors, rated 90 deg. C., 600 volt minimum and CSA approved for applications.

Wire and cable will be Type RWU stranded which cable will not be installed at temperatures below 20 deg. F.

Wire and cables in feeders, sub-feeders and branch circuits shall be colour-coded in accordance with Ontario Electrical Safety Code. Each end of feeder terminations (e.g. in Switchboard, Panel boards, switches, splitters and the like) Code Phase A-Red, Phase B-Black, Phase C-Blue, Neutral – White.

All wire and cable will be designed and indicated on the drawings. The maximum voltage drop between the furthest outlet of any circuit when fully energized and the service panel to which it is connected will not exceed three percent (3%).

Solderless connectors nylon-jacketed "Vibration-Proof" screw-on wire connectors "Ideal-Wing Nuts" rated 600 volts shall be used for joints in Branch Wiring.

d) Disconnect Switches

Provide fusible and non-fusible of one manufacture NEMA Type "HC" with quick-make, quick-break contacts. Provide holders to accept HRC fuses. Switches to include mechanical cover interlocks and line side barriers.

Switches will be CSA "Approved for High Service Factor".

Switches will be CSA approved for service entrance use where required.

e) Panels

All lighting and power panels will be supplied with surface enclosures and trims. The trims will be supplied with hinged covers with flush lockable latches conceal the breakers.

Panels will be supplied with fixed bolted connection thermal-magnetic, quick-make, quick-break, 40 deg. C., calibrated ULC rated "SWD" switching duty, moulded-case circuit breaker. "Plug-in" breakers are not acceptable. Multi-pole breakers shall be common trip type. Circuit breakers in 347/600 volt panels boards shall be rated 350 volt single pole and 600 volt for two and three pole.

f) Time Clocks

All time clocks will be Intermatic # ET171C or equal single pole single throw, 30 amp rated contacts, 120 volt clock motor and AA battery for reserve clock power.

g) External Cabinets

Provide EEMAC 3R weatherproof, gasketed control cabinets with the required mounting. Cabinets to include welded locking bars that cover and overlap the opening edge of the doors and suitable for padlocking. The lock location must have a welded lock shield to prevent tampering the lock. The cabinets are to be primed after fabrication and finished with two coats of water-proof grey enamel paint.

h) Replace Components

All products will conform to the general design concept of this specification and will operate with generic consumable components readily available from local electrical distributors.

12.10.3 Sports Lighting

a) Poles & Cross arms

The poles will be pre-stressed spun, mould finished concrete, direct buried as per Typical Sports Lighting Pole Base.

Each pole will be specified with a cast metal tamper proof handhole cover and a cast-in-concrete ground conductor to the top of the pole.

The poles will be specified to exceed the structural requirement to support the E.P.A. in an 80 M.P.H. wind with 1.3 gust factor.

All wire within the pole will be RWU copper only.

The cross arms will be 3" x 4" braced, structural box steel, hot dipped galvanized after fabrication.

Refer to the field layout details for the recommended pole locations.

b) Floodlights

The sports floodlights will be spun aluminium construction, utilizing a 1000 watt metal halide lamp and ballast.

Only floodlights with sharp cut-off optics and beam control will be specified for sports lighting.

The lighting fixture cut-off performance must be verified with a computer generated print-out and a location of a similar installation within 100 km of the City.

There is to be no more than a maximum of .1 foot-candle of maintained horizontal illuminance, 60 metres from the primary play lines.

Each fixture is to be factory pre-wired with a sufficient length of 600 volt cable and is to be supplied with a stainless steel safety cable.

The complete installation must be target aimed to confirm the computer print-out and the basic design criteria.

The consultant will verify the lighting levels with individual light meter reading at every point on a six metre grid on the playing surface.

Substantial completion must not be certified until the lighting levels have been verified and accepted on site by the City.

c) Lighting Control

The lighting fixture will be controlled with branch circuit contactors, a digital time clock and momentary contact ON/OFF push buttons. A separate time clock is required for reach sports field.

12.10.4 Walkway Lighting

a) Poles

Poles shall be direct buried, pre-stressed coloured concrete with polished or etched finish, unless a request for lighting walkways with bollards is received.

All poles will be specified with a cast metal tamper proof hand hole cover and a ground wire cast into the concrete.

The pole colour specified will co-ordinate with the luminaire specified.

The wire within the pole will be RWU copper only.

Refer to Parks and Open Space Lighting – Type A or B (L-8 or L-9).

b) Fixtures

- The walkway fixtures will be Solar Powered LED Fixtures of either of the following;
 - Carmanah, Evergren 1500 Series Solar Powered LED Lighting System, utilizing the RUUD, The Edge fixture,
 - RUDD, The Edge Round Fixture
- Walkway fixtures may also include the use of Bollard luminaires, The Edge Bollard Luminaire, subject to the City's discretion.
- The IES TYPE II or TYPE III full cut-off distribution pattern. The colour of the fixture will be co-ordinated with the pole.
- The pole spacing is not to exceed 30 metres on centres, subject to review by Lighting Consultant.
- Fixtures will have the following
 - 120-277V Standard
 - IP66, Wet Listed
 - UL, cUL, CSA certified

c) Lighting Control

Each fixture will be equipped with an integral button-type photo control.

13 STREETLIGHTING AND ELECTRICAL STANDARDS

Note; The installation of the street lighting system must be completed prior to the energizing of the development by Welland Hydro. Welland Hydro will not energize the development until such time that the street lighting is in place.

13.1 Design Approval Process

The following sections outline the basic procedure required to obtain signed streetlight design drawings:

13.1.1 Prior to Detailed Design

- The Consultant is responsible for determining the style of Walkway and Streetlight assembly required by the City.
- The Consultant is responsible for accurately determining the applicable cross-sections to be utilized for the project. This information will be provided by the City.
- Once the above information is known, the Consultant is responsible for determining which lighting levels apply, together with the spacing required to achieve these levels utilizing IES recommended practices. Note that where City Standard Drawings are utilized, the Consultant is responsible to complete a photometric analysis to determine spacing which meets City requirements and to include this information on the Detailed Design Drawings.

13.1.2 Detailed Design

- The Consultant is responsible for ensuring that the streetlight design is in complete accordance with City Standards and Specifications in terms of all materials, location of plant, levels of lighting and absence of conflict.
- All Streetlight Design Drawings and Documentation will be submitted to the City as part of the complete Subdivision Submission Package.
- The Consultant is responsible for ensuring that the Streetlight Design is accurately shown on the Hydro Distribution Design Drawings prepared and submitted to Welland Hydro.
- Streetlight Drawings shall be identified utilizing an "SL-00" nomenclature in the lower right hand corner of the drawings.
- Streetlight Submissions will include the following drawings identified as follows:
 - Detailed Streetlighting Design Drawing (SL-01 to SL-x as required). Photometric Analysis shall be included on these sheets in a table format.
 - General Streetlighting Detail Drawing (SL-(x+1))
 - All drawings must be submitted on the City Standard Border complete with the City Standard Signature Block.
 - All drawings must be sealed by a qualified Lighting Consultant or Professional Engineer.

13.1.3 Cost Estimate

As part of the Subdivision Submission Package, the Consultant will provide a detailed cost estimate for the installation.

13.1.4 Streetlight Design Certification Letter

- As part of the Subdivision Submission Package, the Consultant will provide a letter stipulating that the design is in complete accordance with current City Standards and Specifications.
- If the design deviates from City Standards, the Consultant is responsible for listing the exception and detailing why it is necessary. The City will review the exception and advise the Consultant whether or not it is acceptable.
- The list of exceptions pertaining to the Streetlighting must also be noted on the Civil Drawings. The Consultant is responsible for ensuring an accurate representation of the streetlighting exceptions on the Civil Drawings.

13.1.5 Submission to the City of Welland

- The Consultant will provide the following and the information will be included in the submission to the City:
 - The Detailed Design Drawings
 - The General Detail Drawings
 - The Streetlighting Cost Estimate
 - The Engineers Certification Letter

13.1.6 Review by the City of Welland

- City staff will review the Streetlighting Submission as part of the complete Subdivision Submission Package. Comments will be made, as required. Note that comments from the City do not preclude the Certifying Lighting Consultant or Engineer's responsibility for the design. If the City suggests changes compromising the integrity of the design, then it is incumbent upon the Engineer to advise the City of Welland, in writing, and to have the matter resolved.
- Once the City is satisfied that the drawings are acceptable for approval, the Consultant shall be notified.

13.1.7 Mylar Signature by the City of Welland

The Consultant will organize the resubmission of all drawings in mylar form. At this time, the Consultant will resubmit the Certification Letter and Estimate together with the mylar copies of drawings to the Consultant.

13.1.8 Shop Drawing Approval

- The Consultant will be responsible for reviewing and approving all manufacturer's streetlight assembly shop drawings to ensure compliance with City Standards and Specifications.

- The Consultant will note on all fixture shop drawings the I.E.S. file to which the fixture must adhere.

13.1.9 Lighting Consultant/Engineer's Certification

The Consultant will be responsible for providing formal Certification to the City that the Streetlighting System is in good working order at various points in the Subdivision process.

- **Design Certification:**

The Consultant will certify that the Streetlight System has been designed in accordance with the City Standards and Specifications (Ref. Section 13.1.4).

- **Pre-Maintenance Certification:**

The Consultant will certify that the streetlight assemblies are all straight, undamaged, operating in a proper manner and located as per the design drawings.

- **Pre-Assumption Certification:**

The Consultant will certify that the streetlight assemblies are all straight, undamaged, operating in a proper manner and located as per the design drawings.

13.2 Design Guidelines

The following section outlines the Design Guidelines to which the Streetlighting Design Consultant must adhere.

13.2.1 Professional Certification

Streetlight System designs must be completed by a Lighting Consultant or Professional Engineer licensed to practice professional engineering in the Province of Ontario, who has expertise in this field of endeavour.

13.2.2 Approved Streetlight Assemblies

The following types of street lighting assembly shall be utilized for new roadways:

- Post Top Fixtures to be mounted on a tapered octagonal, black, direct buried pole.
- Cobrahead Fixtures to be mounted on concrete poles, with extension arm direct buried pole. Primarily utilized outside of local residential roadways

Wattage	Manufacturer	Fixture Type	Roadway Type
Max. 60	King Luminaire	K118R 5000 Series	Residential
Max. 44	Appalachian Lighting	LP2-01-2500-1-3-450-0	Residential

Max. 32	Appalachian Lighting	LP4-02-3000-1-3-0	Residential
Max. 50	Appalachian Lighting	LP4-02-4000-1-3-0	Residential
Max. 30	Appalachian Lighting	SL4-3000	Local/Residential
Max. 50	Appalachian Lighting	SL4-4000	Local/Residential/Minor Collector
Max. 77	Appalachian Lighting	SL4-7000	Collector/Arterial
Max 120	Appalachian Lighting	SL4-8000	Arterial
AFC	Appalachian Lighting	AFC-01-1000-1	120V
AFC	Appalachian Lighting	AFC-01-1000-2	240V to 277v

Note: All Appalachian products are to include the ALLink Adaptive Control System. Control units (AFC) will be required to be installed in each subdivision and will be reviewed by City of Welland staff for installation location.

13.2.3 Service Area

All roadways and walkways within the limits of the subdivision and boundary roads shall be designed to have full illumination as per I.E.S.N.A. and the corresponding recommended practices for lighting design.

13.2.4 Specifications

- The street lighting system is to be designed to meet the average maintained illumination level and minimum uniformity ratio for each type of road and walkway. All fixtures utilized will be LED.
- I.E.S. RP8 will be utilized for Lighting Guidelines and illumination criteria. Energy efficiency and illumination will be the prime consideration governing the lighting design on residential and industrial roadways.
- Intersections shall have an illumination equal to the sum of the current design levels of the intersecting roadways. This criterion also applies where new development roads intersect with existing roads. For the purposes of photometric analysis, asphalt within the limits of the daylight corners of intersections shall constitute the intersection.

-
- Street lights and Street light Pedestals must be installed on the extension of side lot lines. If the road pattern and subdivision lotting prevent the illumination requirements from being met with this stipulation, the Consultant is required to notify City Staff in writing, and obtain approval for the non-standard pole location prior to installation. Lot flankages and intersections are excluded from this stipulation. In the event that the house faces the flankage, the Consultant must ensure that the streetlights are placed such that they are on the daylight bar or the back lot line.
 - A minimum of 3.0 m clearance is required between streetlights and hydro transformers, fire hydrants and street trees. A minimum of 1.5 m clearance is required between streetlights and driveways. In locations where streetlights and hydrants/transformers must be located on the same extension of the side lot line, an offset of 3.0 m will be permitted for both appurtenances. In locations where streetlights are to be placed adjacent to a catch basin lead, the streetlight shall be offset 3.0 m from the extension of the property line to ensure adequate clearance. In locations where streetlights conflict with storm/sanitary lateral connections, the storm/sanitary lateral connections are to be relocated by the Civil Consultant to avoid the conflict.
 - Spacing of streetlights shall be adjusted, as required, around bends in the roadway and grade changes to ensure that the illumination criterion is maintained.
 - Ninety-Degree Bends will be treated as an intersection with regard to lighting.
 - Where pavement widths widen at major intersections to accommodate turning lanes, the Consultant may locate streetlights on both sides of the street as required, in order to maintain the required illumination.
 - Where medians are utilized, double fixture streetlights mounted at 180 degrees apart should be installed on the centreline of the medians where possible.
 - Where walkways intersect with the Municipality Right of Way, the Consultant must ensure that there is either a walkway light or a streetlight located within 2.0 m of the walkway entrance to ensure pedestrian safety.

13.2.5 Lamp Wattages

Lamp wattages must be specified on the streetlight drawings by the Consultant to meet the required lighting levels and be considered Full-Cut Off fixtures without causing adverse glare.

13.2.6 Fixture Voltages

Where ballasts are utilized, any ballasts must be dual voltage 120/240. In residential subdivisions, the ballast should typically be wired for 120V usage. In industrial subdivisions, the ballast should typically be wired for 240V usage. The recommended ballast for use is CWI +/-10v, which provides a voltage range of 108 to 132 volts.

13.3 Material Specifications

The following section outlines the Streetlight Material Specifications to be utilized in the City:

13.3.1 Canadian Standards Association

All street lighting material must be CSA Approved.

13.3.2 Warning Tape

In accordance with E.S.A. standards and specifications, warning tape must be placed 0.3 m below final grade over all streetlight ducts.

13.3.3 Ducts

- Duct for streetlight is to be 50 mm PVC DB2 Type Duct.
- 50 mm Black Poly Pipe is to be used to protect the cable entering the wiring aperture in the concrete pole.

13.3.4 Streetlight Supply Pedestal

- Pedestal to have a steel, weatherproof lockable enclosure facility finished in powder coat green.
- Base to be an approved pre-cast base suitable for disconnect pedestal.
- Panel to have 60Amp 22 k Main Breaker with four (4) 15-Amp Breakers for the streetlight feeds.
- Grounding must be in accordance with all applicable E.S.A. standards and specifications.

13.3.5 Streetlight Cables

- Streetlight Pedestal Supply Cables from transformer to Pedestal are to be 3-#2 Copper RWU-90. No ground is to be installed between transformer and pedestal.
- Streetlight Cables from power supply to hand hole in pole are to be 2-#6 Copper RWU-90 c/w 1#6 stranded copper green jacketed ground wire.
- Streetlight Cables from hand hole in pole to fixture are to be 2-#12 Copper RWU-90 c/w 1-#12 stranded copper green jacketed ground wire.
- All cables and wiring are to be connected with CSA approved and weather proof connectors. All wiring is to be secured to poles as required and connections properly covered utilizing electrical grade tape or electrical grade jacket covers.

13.3.6 Fusing

In-Line Fuse Holders are to be Elastimold Catalogue #65U c/w 15Amp Fuses. Each pole is to be fused in the hand hole.

13.3.7 Individual Photo Control

Each fixture is to be controlled by an individual photo control mounted in the fixture's twist lock photo control receptacle or as per manufacturers recommendation.

13.3.8 Lamps

- All lighting shall be LED as per section 13.2.2, the City of Welland reserves the right to remove or add fixtures that are not listed at anytime.
- All lamps shall be rated for a minimum life of 100,000 hours.
- Wattage of the lamps shall be specified by the Consultant to conform to the standards, specifications and requirements of the City.

13.3.9 Mounting Arms

- Tapered elliptical arms to be used in conjunction with the Standard Streetlight assemblies. The length of the arm is dependent upon the offset from pavement and the height of pole.

13.3.10 Fixtures

- Where the City requires that the street lighting system match existing, then the Consultant will be responsible for specifying the matching fixture complete with photometric devices that meet City Specifications.
- In cases where a ballast must be utilized, all Fixtures must have a CWI Ballast rated for dual voltage 120/240 and wired as required for the project. Typically, 120V is used throughout residential subdivisions and 240V is used in industrial subdivisions.
- All Fixtures must be equipped with a twist lock receptacle for the photo control.
- All fixtures must be equipped with the ALLink System
- The City requires 2 fixtures for every 10 fixtures installed.

Note that the photometric nomenclature has been removed from the catalogue numbers since the Consultant must specify the photometric file to which the manufacturer must adhere.

13.3.11 Utility Poles

- Only concrete poles will be accepted by the City of Welland. The poles shall be of a decorative style and figuration acceptable to the City.
- The City requires that the owner provide 2 poles for stock for every 10 poles installed.
- Where the City requires that the street lighting system match existing, then the Consultant will be responsible for specifying the matching pole.

-
- The City will accept the use of communication poles (i.e.-Trafalgar, Alexander), to minimize the street furniture requirement. A breaker is required in the pole when these are used.
 - The cable runway in the pole must be of sufficient diameter to accommodate a double run of streetlight cable.
 - The hand hole shall have an inside diameter of 267 mm x 89 mm and shall be box type of 50,000 P.S.I. High Density Cast Zinc A.S.T.M. ingot spec. #B669-82 complete with a close fitting inset cover (flush with the outside of the pole) of the same material and tamperproof screws.
 - The pole must have a copper ground wire at the access hole in accordance with CSA Standards.
 - ***Plain Concrete poles may be accepted in certain situations such as industrial, light industrial, and commercial developments etc.***

13.4 Installation Specifications

The following section outlines the Streetlight Installation Specifications to be utilized in the City.

13.4.1 E.S.A. Inspection

The electrical contractor is to apply for E.S.A. Inspection prior to commencing the installation of the plant. The obtaining of an E.S.A. connection authorization will be the sole responsibility of the installation Contractor.

13.4.2 Ducts

- All streetlight cables are to be installed in 50 mm PVC Type 2 Direct Buried Ducts (DB2) in the main trench from the power source to the streetlight location.
- From the main trench to the inside of the streetlight aperture, the streetlight cables are to be installed in black poly pipe.
- All ducts are to be solvent welded together as part of the installation procedure.
- Where streetlight conductors cross the road, the 50 mm duct is to be installed through the 100 mm road crossing duct in a continuous installation.
- All turning radii in duct are to be sized sufficiently so as to facilitate the pulling of the streetlight conductors.

13.4.3 Trench

- Streetlight ducts are to be co-located in Joint Use Trenches.
- Trenches are to be of sufficient depth so as to provide a minimum cover of 750 mm over the direct buried streetlight duct.
- Streetlight ducts are to be surrounded by a 150 mm Brick Sand Envelope.

- Warning tape must be installed 300 mm below final grade, over all streetlight duct locations.

13.4.4 Streetlight Cables

- Streetlight cables may only be installed through ducts after trench is backfilled.
- Streetlight cables cannot be spliced.
- All connections must be covered by electrical grade tape or electrical grade sleeves/jackets, exposed wiring is not permitted.

13.4.5 Fusing

- Streetlight cables must be fused in the transformer and in the streetlight handhole.

13.4.6 Pole Installation

Poles must be installed via auger method or the vacuum method of installation.

13.4.7 Grounding

Streetlight pedestals are to be grounded to E.S.A. requirements by utilizing a ground plate at the pedestal location.

A continuous ground from the pedestal to each circuit shall be installed with the streetlight corridor. The last streetlight on each circuit from the pedestal shall be grounded with a ground plate.

No ground is to be installed between the transformer and the pedestal as per Welland Hydro.

13.4.8 Energization of the Streetlighting System

Energizing of the street lighting system will be subject to Electrical Safety Authority approval. Once the E.S.A. has authorized the system to be energized, the local hydro authority will make all required connections at the supply points for the system on behalf of the City. The streetlights must be energized and functioning prior to occupancy of any residence in the development.

13.5 Walkway Lighting

The following section outlines the Walkway Lighting Specifications to be utilized in the City:

13.5.1 Pre-Design

The Consultant will consult with Infrastructure Services, Parks Division to determine the type of walkway lighting to be utilized on a given submission as per Section 12.10.4.

13.5.2 Design

- The Consultant is to complete the Walkway Lighting System Design in complete accordance with Section 12.10.4, Section 13.1.2 and Section 13.2 of this document.
- Due to the variety of walkway arrangements, it is incumbent upon the Consultant to complete a photometric analysis to determine the spacing which meets City requirements, and to include this information on the Detailed Design Drawings.
- Where walkways intersect with the Municipal Right-of-Way, the Consultant must ensure that there is either a walkway light or a streetlight located within 2.0 m of the walkway entrance to ensure pedestrian safety.

13.5.3 Materials

- All material pertaining to the Walkway Lighting System must be C.S.A. approved in accordance with the E.S.A. standards and specifications.
- All material pertaining to the Walkway Lighting System must be in complete accordance with Section 12.10.4 of this manual.

13.5.4 Installation

Installation of the walkway lighting system is to be in accordance with Section 13.4 of this manual.

APPENDIX 'A' - DEFINITIONS

Definitions

Acceptance: Law compliance by one party with the terms and conditions of another's offer so that a contract becomes legally binding between them.

Agreement: A contract is a legally binding exchange of promises or agreement between two parties.

City: Means the Corporation of the City of Welland. A City consists of residential, industrial and business areas together with administrative functions.

City Engineer: The City Engineer serves as the technical advisor and supervisor for the City's primary infrastructure.

City Treasurer: means the Treasurer of The Corporation of Welland. Responsible for the collection, control and disbursement of all corporate funds.

Community Services: Municipal sanitary and storm sewers, municipal roads, municipal water, hydro and other utilities.

Completion Certificate: When lot grading is completed to satisfactory, a completion certificate will be provided by the municipality to indicate compliance with standards and specifications and the permission to continue.

Consultant: A consultant is an independent contractor who sells professional expert advise in a particular area of specialization such as accounting, medicine, engineering and waste management.

Contractor/Sub-Contractor: Individual or Entity that enters into a contractual agreement with the owner to perform construction work on the project in accordance with the specified requirements and standard.

Drawings: Drawings are used to facilitate the design definition and delivery process by providing typical details and templates into design packages.

Grading Plan: A Grading Plan is a drawing of the site illustrating existing and proposed topography and environmental controls.

Lot/Block: Means parcel or tract of land.

Lot Certification: The Lot Certification means that any and all conditions of approval have been completed to the satisfaction of the Engineer.

Owner: is the state or fact of exclusive possession or control of property, which may be an object, land/real estate, etc.

Plan(s) (drawings): A Plan(s) is used for portraying an existing place or object, or for providing instructions to build or fabricate a place or object.

Public Works: Public works provide the fundamental services for City life, including: Water and Wastewater Treatment; Water Distribution; Wastewater Collection; Stormwater and Drainage; Solid Waste Collection and Disposal; Recycling; Street Access and Street Lighting; Traffic Control; Transit; Municipal Fleet; Transportation Planning; Road/Water/Sewer Infrastructure Asset Management and Planning; Environmental Approvals; Road/Water/Sewer Construction Program; Park Design; Park's Operation and Maintenance; Cemeteries; and Street Beautification.

Purchaser: Individual/company/corporation who has obtained ownership of a security or other asset in exchange for money or value.

Records: Records refer to information that has been filed or recorded by public agencies, such as corporate and property records. Most essential public records are maintained by the government and many are accessible to the public, determined by federal, provincial and local regulations.

Standards & Specifications: Standards and Specifications provide guidance and instruction on how services are to be designed, constructed, manufactured, handled, conducted or tested. Specifications outline essential and technical requirements for specific items and services; standards provide guidance for more general applications and provide standard data for reference.

Tender Documents: Tenders are special procedures to generate competing offers from different bidders looking to obtain an award of business activity in works, supply or service contracts.

Vendor: An individual/company/corporation that supplies goods and services to another individual/company/corporation.

APPENDIX 'B' - SCHEDULES

SECTION 5 - GENERAL PROVISIONS TO ALL ZONES

5.1 SCOPE

No *PERSON* shall *USE* any land or *ERECT*, *USE*, alter or enlarge any *BUILDING* or *STRUCTURE* except in conformity with the provisions of this By-law

5.2 ACCESS

- (a) Unless otherwise specified in this By-law, no *PERSON* shall *ERECT* or *USE* a *BUILDING* or *STRUCTURE* unless the *LOT* upon which the *BUILDING* or *STRUCTURE* is situated, *ERECTED* or proposed to be *ERECTED* fronts on a *STREET*. **(By-law 2010-99)**
- (b) No person shall *ERECT* or *USE* a *BUILDING* or *STRUCTURE* unless the *STREET* referenced in Section 5.2 (a) is paved with a base course of asphalt, all water and sewer mains and service laterals to the property line are installed and tested, and all *STREET* name and traffic control signs are installed, all to the satisfaction of the City Engineer, save and except the provisions related to model homes contained in a Registered Subdivider's Agreement or Model Home Agreement. **(By-law 2010-99)**

5.3 ACCESSORY BUILDING/STRUCTURE

(a) Height

- (i) No *ACCESSORY BUILDING* with a flat roof shall exceed a height of 3.0 metres with the exception of a raised flat roof which shall not exceed 3.3 metres (see Schedule C).
- (ii) No *ACCESSORY BUILDING* with a mansard, gambrel, hip (cottage), or any other style roof except as noted above shall exceed a height of 4.0 metres (see Schedule C).
- (iii) There is no height limitation for silos, grain storage bins, grain elevators, fuel tanks and barns used for agricultural purposes.
- (iv) No *ACCESSORY STRUCTURE*, not otherwise provided for in this By-Law, shall exceed a height of 3.0 metres.

(b) Human Habitation

The *USE* of any *ACCESSORY BUILDING* for human habitation is not permitted.

(c) Location

- (i) All *ACCESSORY BUILDINGS/STRUCTURES* shall be located in the *REAR YARD* or in any *INTERIOR SIDE YARD* and shall be at least 0.9 metres from the nearest *LOT LINE*. *ACCESSORY BUILDINGS* greater than 10 square metres in area also shall be located at least 0.9 metres from any main *BUILDING*.
- (ii) In the case of a *CORNER LOT*, any *ACCESSORY BUILDING* or

STRUCTURE located in the *REAR YARD* shall have setbacks from the *LOT LINES* in accordance with Schedule "E".

(d) LOT COVERAGE

The total *LOT COVERAGE* of all *ACCESSORY BUILDINGS* and *STRUCTURES* on a *LOT* shall not exceed 75% of the *FOOTPRINT* of the main *BUILDING* and 10% of the *LOT AREA*. This does not apply to *DECKS* or open air swimming pools. **(By-law 2003-137)**

(e) Exemptions

Notwithstanding the provisions of Section 5.3, on the lands described in Schedule "B" of By-law 6881, a parking *STRUCTURE* shall be allowed in the *SIDE YARD*, with a minimum *SIDE YARD* of 3.0 metres. **(155 HAGAR STREET)**

5.4 ACCESSORY USES

(a) BUILDINGS OR STRUCTURES

ACCESSORY BUILDINGS or *STRUCTURES* used for any purpose that is incidental or secondary to that of the main *BUILDING* on the same *LOT*, shall be permitted and without limiting the foregoing such *USE* may include a private garage, greenhouse or swimming pool, if not used for commercial purposes. *ACCESSORY BUILDINGS* or *STRUCTURES* shall not be used for a *HOME OCCUPATION*.

(b) POOLS

Open air swimming pools shall be located outside of the *FRONT YARD* with a minimum setback of 1.2 metres from any *LOT LINE* or main *BUILDING*. In the case of a *CORNER LOT*, any swimming pool located in the *REAR YARD* or *EXTERIOR SIDE YARD* shall comply with the setback requirements shown on Schedule "E1"; **(By-law 2000-59)**

5.5 DAY CARE FACILITIES

DAY CARE FACILITIES are permitted *USES* in any Zone on any property owned by the District School Board of Niagara, the Niagara Catholic District School Board, the Conseil scolaire de district du Centre Sud-Ouest, or the Conseil scolaire de district catholique Centre-Sud, within the Urban Area Boundary of the City of Welland, so long as the proposal complies with the provisions of this By-law in every other respect. **(By-law 2010-99)**

5.6 DECKS

DECKS shall be located outside of the *FRONT YARD*, with a minimum setback of 1.2 metres from any *LOT LINE*. The walking surface of a *DECK* shall not exceed 1.5 metres in height above *GRADE*. The maximum height of a *DECK* including a guard (railing) shall not exceed 2.6 metres in height above *GRADE*.

NOTE: Any *STRUCTURE* with a walking surface in excess of 1.5 metres above *GRADE* shall be considered part of the main *BUILDING*, whether attached or not, and shall comply with all relevant provisions of Zoning By-law 2667, as amended. **(By-law 2003-137)**

5.6 (a) **PERGOLAS** (By-law 2003-137)

PERGOLAS, attached to the *MAIN BUILDING*, shall meet the *YARD* provisions as determined in each appropriate *ZONE*. *PERGOLAS*, not attached to the *MAIN BUILDING*, shall be located in the *REAR* or *INTERIOR SIDE YARDS* a minimum of 0.9 metres from *LOT LINES* and shall be no greater than 3 metres in height above *GRADE*. In either case, the size of a *PERGOLA* shall not exceed five (5) percent of the *LOT AREA*.

5.6 (b) **SCREENING DEVICE** (By-law 2003-137)

A *SCREENING DEVICE* shall be located in the rear or interior side yards a minimum 0.9 metres from *LOT LINES* and shall be no greater than 3.0 metres in height above grade with an overall aggregate area of no larger than ten (10) square metres.

5.7 **ENCROACHMENTS**

YARD encroachments are not permitted for cantilevered *FLOOR AREA* however, notwithstanding the *YARD* provisions of this By-law to the contrary, the following *YARD* encroachments are permitted: (By-law 2003-137)

- (a) Projections such as eaves, bay windows (without floor area), sills, gutters, chimneys or pilasters not projecting more than: (By-law 2003-137)
 - (i) 0.6 metres into any required *SIDE YARD* and 1.2 metres into any required *FRONT YARD* or *REAR YARD* in relation of main *BUILDINGS* provided that such encroachments are permitted by the Ontario Building Code or other such legislation; (By-law 2003-137)
 - (ii) 0.6 metres into any required *YARD* for eaves in relation to *ACCESSORY BUILDINGS* and *STRUCTURES*;
- (b) uncovered steps, including a platform limited in width to 75% of the width of the main *BUILDING*, not exceeding 1.3 metres in height above *GRADE* and not projecting more than 2.5 metres into any *REQUIRED FRONT YARD*; (By-law 2000-59)
- (c) uncovered steps, adjacent to a door providing direct access to a main *BUILDING*, not exceeding 1.3 metres in height above *GRADE* and not projecting more than 0.9 metres into any *REQUIRED INTERIOR OR EXTERIOR SIDE YARD*; (By-law 2000-59)
- (d) awnings, clothes poles, garden trellises or similar accessory *STRUCTURES*;
- (e) uncovered fire escapes or exterior stairs projecting not more than 1.6 metres into any required *INTERIOR OR EXTERIOR SIDE YARD* or *REAR YARD*; (By-law 2003-137)
- (f) ramps for physically challenged persons.
- (g) *BALCONIES* projecting not more than 1.8 metres into the required *REAR YARD* save and except for *APARTMENT BUILDINGS* where *BALCONIES*

may project 1.8 metres into any required *YARD* provided that the projection is no closer than 3 metres to any *LOT LINE*.

5.8 FLOODPLAIN

No *BUILDING* or *STRUCTURE* shall be constructed or *ERECTED* within the limits of a floodplain.

5.9 GARBAGE & REFUSE STORAGE

For all non-residential *USES* and *APARTMENT BUILDINGS* garbage or refuse shall be stored within a *BUILDING* or *STRUCTURE* on the *LOT*, or in a container in the *SIDE YARD* or *REAR YARD* of such *LOT* screened from view by a masonry and/or decorative closed board fence. Any garbage or refuse container, whether required or not, must be located in the *SIDE YARD* or *REAR YARD* of a *LOT* screened from view.

5.10 HEIGHT REQUIREMENTS

- (a) No *BUILDING* or *STRUCTURE* in any Zone save and except *BUILDINGS* and *STRUCTURES* in C3, I2 and RZ Zones, *APARTMENT BUILDINGS*, and silos, grain storage bins, grain elevators and barns used for agricultural purposes, shall exceed 11.0 metres in *BUILDING HEIGHT*. No fuel storage tank in any Zone, other than an I2 Zone, shall exceed 3 metres in height above *GRADE*. **(By-law 1999-178)**
- (b) Nothing in this By-law shall limit the height of any belfry, *PLACE OF WORSHIP*, ornamental dome, cupola, clock tower, water storage tank or any wireless receiving or transmitting antennae.

5.11 EXEMPTIONS

- (a) Notwithstanding anything contained in Section 5.10 of this By-law, the firstly described lands in Schedule "B" of By-law 6525 shall be exempted therefrom. **(366 THOROLD ROAD - ALSO SEE: 6.1.1 (b))**
- (b) Notwithstanding anything contained in Section 5.10 of this By-law, the lands described in Schedule "B" of By-law 8527 shall have a height limitation for all *BUILDINGS* which shall not exceed three (3) storeys above ground. **(217 AND 231 DENISTOUN STREET)**

5.12 LOTS REDUCED BY PUBLIC ACQUISITION

- (a) Where a *LOT* is reduced in area as a result of the acquisition of part of the *LOT* by any public authority and where such acquisition causes the *LOT*, as reduced, or any *BUILDING* or *STRUCTURE* which legally existed on the *LOT* on the date of such acquisition, to become *NON-COMPLYING* with the requirements of the Zone in which the *LOT* is located, nothing in this By-law shall prevent the continued *USE* of the *LOT*, as reduced, as if no such acquisition had taken place provided that:
 - (i) no further change is made in the dimensions, area or any other characteristics of the *LOT* as reduced, subsequent to the date of such acquisition, which would increase the extent of the non-conformity; and

- (ii) no *BUILDING* or *STRUCTURE* or addition thereto is *ERECTED* on the *LOT* as reduced subsequent to the date of such acquisition, except in accordance with the provisions of the Zone in which the *LOT* is located.

5.13 **NON-COMPLYING/NON-CONFORMING USES**

(a) **Repair and Restoration**

The provisions of this By-law shall not apply:

- (i) to prevent the *USE* of any land, *BUILDING* or *STRUCTURE* for any purpose prohibited by this By-law if such land, *BUILDING* or *STRUCTURE* was lawfully used for such purpose on the date of the passing of this By-law, so long as it continues to be used for that purpose;
- (ii) to prevent the strengthening or restoration, to a safe condition, of a *BUILDING* or *STRUCTURE*, or any part of a *BUILDING* or *STRUCTURE*, provided the strengthening or restoration will not increase the *BUILDING HEIGHT*, size or volume or change the *USE* of the *BUILDING* or *STRUCTURE*.

(b) **Permitted Extensions**

The provisions of this By-law shall not apply:

- (i) to prevent an extension or addition being made to a residential *BUILDING* or *STRUCTURE* which is a permitted *USE* for the Zone in which it is located, but which does not comply with one or more of the *YARD* requirements, the minimum *LOT AREA*, or the minimum *LOT FRONTAGE* requirements of the Zone, or Section 5.3(c) of this By-law, whichever applies, provided such extension or addition does not further reduce any existing legal *NON-COMPLYING YARD(s)*, a minimum *FRONTAGE* of no less than 7.5 metres is provided, and all other provisions of this By-law are satisfied. **(By-law 1999-178)**

(c) **NON-CONFORMING Residential USES**

Notwithstanding any other provisions of this By-law, where a lawfully established *NON-CONFORMING SINGLE DETACHED DWELLING* is located on a *LOT*, nothing shall prevent:

- (i) the enlargement or extension of any main *BUILDING* provided that such enlargement or extension does not exceed 25 percent of the existing *GROSS FLOOR AREA* and that such enlargement or extension is in compliance with Section 8.2.3;
- (ii) the *ERECTION* of any *BUILDING* accessory thereto provided that such *ACCESSORY BUILDING* complies with the requirements of Section 5.3.

5.14 **PROHIBITED USES**

Except where expressly permitted elsewhere in By-law 2667, no land shall be *USED* and no *BUILDING* or *STRUCTURE* shall be *ERECTED*, located or *USED* in any

Zone for any of the following uses:

- (a) any *USE* which is in contravention of the *Environmental Protection Act* or any successor thereto;
- (b) any *USE* which is classified as a health hazard by the *Health Protection and Promotion Act* or any successor thereto;
- (c) any *USE* which is offensive or dangerous by reason of the emission of obnoxious odour, smoke, dust, gas, fumes, liquid, noise, vibration or by reason of the unsightly storage of goods, wares, merchandise, salvage, refuse matter or other such material;
- (d) the manufacturing of explosives;
- (e) the manufacturing of pesticides, herbicides or fungicides.

5.15 **REDUCTION OF LOT AREA**

- (a) No *LOT* shall be reduced in area, either by Consent or the conveyance of any portion thereof, so that any *BUILDING* or *STRUCTURE* on such *LOT* shall not comply with the provisions of this By-law for the Zone in which such *LOT* is located.

5.16 **USES PERMITTED IN ALL ZONES**

Notwithstanding any other provisions of this By-law:

- (a) nothing shall prevent the *USE* of land or the *USE* or *ERECTION* of a scaffold or other temporary *BUILDING* or *STRUCTURE* incidental to construction in progress on such land until such time as the work has been finished or abandoned. (Abandoned here shall mean the failure to proceed expeditiously with the work);
- (b) The City of Welland, The Regional Municipality of Niagara, the District School Board of Niagara, the Niagara Catholic District School Board, the Conseil scolaire de district du Centre Sud-Ouest, the Conseil scolaire de district catholique Centre-Sud, the Province of Ontario, the Government of Canada, or any department or board of any of the above, any utility company, Niagara College of Applied Arts and Technology and Brock University may *USE* any land or may *ERECT* or *USE* any *BUILDING* or *STRUCTURE* for any public purpose provided that: **(By-law 2010-99)**
 - (i) any *BUILDING* or *STRUCTURE USED* or occupied shall be located, designed and landscaped in accordance with the general character of the Zone in which such *BUILDING* or *STRUCTURE* or land is located; **(By-law 2010-99)**
- (c) where such *USE* is located in a Residential Zone, it shall comply with the area requirements of Section 6.8;
- (d) Nothing shall prevent the installation of a temporary construction trailer, a temporary fenced compound for construction materials, and a temporary sales office in new subdivisions not yet assumed by the City, provided any such trailer, compound and/or office is located, at the time of installation, at

least 45 metres from an existing *DWELLING UNIT* or a *DWELLING UNIT* under construction.

Notwithstanding Fence By-law 10545, such fence enclosing a compound in a Residential Zone shall meet the following criteria:

- (i) Maximum height of 2.6 metres;
- (ii) Chain link construction;
- (iii) No barbed wire;
- (iv) No electric fencing; and
- (v) May be located within the *REQUIRED FRONT YARD*. **(By-law 2010-99)**

5.17 **PARTIAL DESTRUCTION TO EXISTING BUILDINGS**

A *BUILDING* destroyed to the extent of more than fifty (50) per cent of the *STRUCTURE* (exclusive of walls below grade) as at the date of damage and which does not conform with the requirements of this By-law in respect to *USE*, *LOT* occupancy or height shall not be restored except in conformity with the regulations of the Zone in which the said *STRUCTURE* or *BUILDING* is located.

5.18 **LICENSES, PERMITS AND OTHER BY-LAWS**

Nothing in this By-law shall exempt any *PERSON* from complying with requirements of the Building By-law or any other By-law in force within the City or from obtaining any permit, license, permission, authority or approval required by this or any other By-law of the City or by any other law in force at this time.

5.19 **PARKS AND PLAY GROUNDS**

Nothing in this By-law shall prevent the establishment of private parks or playgrounds in any Residential, Business Park, Commercial, Reinvestment or Industrial Zone provided that such parks or playgrounds are not operated for commercial purposes and provided that such parks or playgrounds shall conform to the requirements of the Open Space Zone (02).

5.20 **PARKING REQUIREMENTS**

- 5.20.1 Unless otherwise provided for in this By-law, for every *BUILDING* or *STRUCTURE* *ERECTED*, altered so as to increase capacity, or enlarged, there shall be provided and maintained off-*STREET* parking in conformity with the following Schedule and each *PARKING SPACE* shall be made accessible for ingress and egress by means of a hard surface lane or right-of-way or roadway being a minimum of 3.0 metres in width for a one-way ingress or egress to the *STREET* and a minimum of 6.0 metres in width if such ingress or egress is for two-way vehicular movement.
- 5.20.2 The allocation of *PARKING SPACES* and aisles within any parking area, whether required or otherwise, shall be designed in accordance with Schedule B – Geometric Design Standard For Parking as amended. **(By-law 2003-137)**
- 5.20.3 Nothing in this Section shall be interpreted as requiring off-*STREET* parking for the

capacity that exists on October 21, 1958, and the parking requirements shall apply only to the additional capacity provided by *ERECTION*, alterations or enlargement.

5.20.4 **Residential**

5.20.4.1 The required *PARKING SPACES* in a Residential *ZONE* shall be provided on the same *LOT* as the *DWELLING UNIT(S)* and shall be located outside the *FRONT YARD*.

(a) Additional *PARKING SPACES* shall be permitted on any part of a driveway accessory to a *SINGLE DETACHED DWELLING*, a *SEMI-DETACHED DWELLING*, a *DUPLEX*, a *LINK DWELLING* or a *STREET TOWNHOUSE* which leads to the required legal *PARKING SPACES(S)* provided that: **(By-law 2003-137)**

(i) no such *PARKING SPACE(S)* shall obstruct access to a *PARKING LOT* or a *PARKING SPACE* on any other *LOT* or for any other *DWELLING UNIT*; and **(By-law 2003-137)**

(ii) any driveway or parking area within the *FRONT YARD* or *EXTERIOR SIDE YARD* does not exceed 50 percent of the width and/or area of such *FRONT YARD* or *EXTERIOR SIDE YARD*. **(By-law 2003-137)**

(b) Notwithstanding the above for Residential *DWELLINGS* constructed prior to October 21, 1958 on *LOTS* which can not accommodate required *PARKING SPACES* in accordance with the provisions of this By-law, parking may be permitted in the required *FRONT YARD* provided that:

(i) it is designed in accordance with Schedule B - Geometric Design Standard For Parking, as amended; and

(ii) any driveway or parking area within the *FRONT YARD* does not exceed 50 percent of the width or *AREA* of such *FRONT YARD*. **(By-law 1999-178)**

5.20.4.2 **Non-Residential**

Any *PARKING SPACES* in a Non-Residential *Zone* shall be provided on the same *LOT* occupied by the particular *USE* or on a *LOT*, within 100 metres of the subject *LOT*, which is in a *Zone* which permits a *PARKING LOT* and where there is a written lease authorizing the Owner or users of the subject *LOT* to utilize the land for parking purposes.

5.20.5 **Parking To Serve The Physically Challenged**

All *PARKING LOTS* shall include designated *PARKING SPACES* to serve physically challenged persons in accordance with the following table (Designated *PARKING SPACE* Requirements to Serve Physically Challenged *PERSONS*).

PARKING SPACES to serve physically challenged *PERSONS* shall be hard surfaced, level and shall be designed and located in a manner so as to ensure immediate access to sidewalks, paths, walkways, entrances, etc. by means of ramps, curb depressions or other appropriate means.

**DESIGNATED
PARKING SPACE REQUIREMENTS
TO SERVE PHYSICALLY CHALLENGED PERSONS**

Total No. Of <i>PARKING SPACES</i> in <i>PARKING LOT</i>	Minimum No. of Designated <i>PARKING SPACES</i> Required to Serve Physically Challenged <i>PERSONS</i>
---	---

1 - 11	0
12 - 19	1
20 - 49	2
50 - 79	3
80 - 99	4

for each additional 30 spaces or part thereof

1 minimum to a maximum of 12

- 5.20.6** LOT B, according to Registered Plan 55 for the Township of Crowland, now in the City of Welland, be and the same is hereby exempted from Section 5.20, Off-STREET Parking Requirements, contained in said By-law 2667. **(By-law 3267). (824 EAST MAIN STREET)**
- 5.20.7** Notwithstanding the provisions of Section 5.20 the lands described in Schedule "B-1" of By-law 6608 shall be exempted from the parking restrictions in the FRONT YARD. **(100 LANCASTER DRIVE - ALSO SEE: 14.5.9 (a))**
- 5.20.8** Notwithstanding the provisions of Section 5.20, the lands described in Schedule "B" of By-law 7095 shall be exempted from the parking restrictions in the FRONT YARD. **(152 THOROLD ROAD)**
- 5.20.9** NOTWITHSTANDING anything contained herein, the parking on the lands described below shall be in accordance with a site plan agreement, dated the 3rd of November 1980, and authorized by By-law 7139, for the purposes of a senior citizens' APARTMENT BUILDING.
- 5.20.10** ALL AND SINGULAR that certain parcel or tract of land and premises situate lying and being in the City of Welland in the Regional Municipality of Niagara and being composed of part of Block "A", Registered Plan 13, for the Township of Thorold, now in the City of Welland, now known as Plan 648 and designated as Part 2 on Reference Plan 59R-3363. **(235 FITCH STREET - ALSO SEE: 5.20.24 OFF-STREET PARKING REQUIREMENTS 15., 7.3 (a))**
- 5.20.11** Notwithstanding the provisions of Section 5.20, the lands described in Schedule "B" of By-law 7176 shall be exempted from the parking restrictions in the FRONT YARD. **(By-law 7176) (281 RIVERSIDE DRIVE - ALSO SEE: 6.8.1, 8.2.7 - PARCEL 9)**
- 5.20.12** That Section 5.20 of Schedule "A" of By-law 2667 is hereby further amended by allowing the parking for the lands, described in Schedule "B" of By-law 8021 to be developed in accordance with a site plan agreement, dated the 16th day of October 1984, authorized by By-law 8019, for a multi-unit, phased, residential development, to be 1 PARKING SPACE for each DWELLING UNIT, rather than 1 1/2 PARKING SPACES for each DWELLING UNIT. **(PRINCE CHARLES VILLAGE (NOT INCLUDING 30 NOVA CRESCENT) BUT INCLUDING SOUTHERN PART SOLD TO PENINSULA HOMES)**
- 5.20.13** Notwithstanding the provision of Section 5.20, the lands described in Schedule "B" of By-law 8297 shall be exempted from the parking restrictions in the FRONT YARD.

(210 DENISTOUN STREET - ALSO SEE: 14.5.9 (c))

- 5.20.14** Notwithstanding the provision of Section 5.20, the lands described in Schedule "B" of By-law 8298 shall be exempted from the parking restrictions in the *FRONT YARD*. **(200 DENISTOUN STREET - ALSO SEE: 14.5.9 (d), 14.15)**
- 5.20.15** Notwithstanding the provision of Section 5.20, the lands described in Schedule "B" of By-law 8299 shall be exempted from the parking restrictions in the *FRONT YARD*. **(220 DENISTOUN STREET - ALSO SEE: 14.5.9 (e))**
- 5.20.16** Notwithstanding the provision of Section 5.20, the lands described in Schedule "B" of By-law 8300 shall be exempted from the parking restrictions in the *FRONT YARD*. **(230 DENISTOUN STREET - ALSO SEE: 14.5.9 (f))**
- 5.20.17** That Section 5.20 of Schedule "A" of By-law 2667 is hereby further amended by allowing the parking for the lands described in Schedule "B" of By-law 8504 to be developed in accordance with a site plan agreement, dated the 9th of October 1986, authorized by By-law 8503, for an indoor athletic club and associated recreational uses for club members and their guests only, to be a maximum of 86 on-site *PARKING SPACES* which *PARKING SPACES* shall be exempted from the parking restrictions in the *FRONT YARDS*. **(370 HELLEMS AVENUE – ALSO SEE 12.8.9)**
- 5.20.18** Notwithstanding the provisions of Subsection 5.20.1 of Section 5.20, in the case of the *ERECTION* and use of *SEMI-DETACHED DWELLINGS* on Blocks A and B, according to Registered Plan M-68,
- (a) two *PARKING SPACES* shall be provided and maintained in respect to any *SEMI-DETACHED DWELLING* erected and used on Parts 1, 10, 11 and 20, Reference Plan 59R-5779, one of which shall be located within an attached private garage;
 - (b) in the case of the remaining Parts 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, and 19, Reference Plan 59R-5779, at least three *PARKING SPACES* shall be provided and maintained on each *LOT*, except that where a private attached garage is erected in connection with any such *SEMI-DETACHED DWELLING*, the provisions of paragraph (a) shall apply. (By-law 8901) **(ALL OF MAYFAIR DRIVE - ALSO SEE : 11.5.13))**
- 5.20.19** Notwithstanding the provisions of Section 5.20, the lands described in Schedule "B" of By-law 9518 shall be exempted from the provisions of the Geometric Design Standards for Parking to allow for an aisle width of 6.0 metres instead of the required 7.3 metres. **(194 THOROLD ROAD - ALSO SEE: 5.21.3, 7.3 (b))**
- 5.20.20** Notwithstanding the provisions of Section 5.20, the land described in Schedule "B" of By-law 9566 shall be exempted from the provisions of the Geometric Design Standards for Parking to allow for an elimination of the requirement of an aisle. **(138 THOROLD ROAD - ALSO SEE: 12.8.10)**
- 5.20.21** Notwithstanding the provisions of Section 5.27, the lands described in Schedule "B" of By-law 9806 shall be permitted to have a minimum of 70 *PARKING SPACES*, such spaces to be permitted in the *FRONT YARD*. **(654 SOUTH PELHAM ROAD - ALSO SEE: 5.21.4, 6.1.1(d), 8.2.7 - PARCEL 16)**
- 5.20.22** Notwithstanding the provisions of Section 5.20, the lands described in Schedule "B" of By-law 9837, shall be permitted to have a minimum of 50 *PARKING SPACES*,

such spaces to be permitted in the *FRONT YARD*. (**26 MILL STREET - ALSO SEE: 14.18, 27.3.1**)

- 5.20.23** Notwithstanding the provisions of Section 5.20, the following described lands shall be exempted from the parking restrictions in the *FRONT YARD*:

In the City of Welland, in the Regional Municipality of Niagara and being designated as Parts 15, 16, 23, 24, 25, 26, 27, 28 and 29 on Reference Plan 59R-7976. (**By-law 9841**) (**52 PROMENADE RICHELIEU**)

5.20.24 OFF-STREET PARKING REQUIREMENTS

USES	MINIMUM REQUIREMENTS
1. art gallery, museum, library, and similar uses	1 <i>PARKING SPACE</i> for every 25 square metres of <i>GROSS FLOOR AREA</i>
2. race track, <i>PLACE OF WORSHIP, ASSEMBLY HALL, PRIVATE CLUB, FRATERNAL ORGANIZATION, PLACE OF ENTERTAINMENT, INSTITUTION, RECREATIONAL ESTABLISHMENT,</i> stadium and exhibition grounds	Where there are fixed seats, 1 <i>PARKING SPACE</i> for every 4 seats or 2.1 metres of bench space of its maximum designed capacity; or 1 <i>PARKING SPACE</i> for every 10 square metres of area devoted to public whichever is the greater
3. <i>ATHLETIC AND RECREATIONAL AREA,</i> except <i>GOLF COURSE</i>	1 <i>PARKING SPACE</i> for every 30 square metres of area devoted to public use and not less than 5 <i>PARKING SPACES</i>
4. campground	1.25 <i>PARKING SPACES</i> for every designated unit* (*designated unit shall be determined by site plan and/or agreement)
5. factories, <i>WAREHOUSE,</i> accessory storage, <i>TRUCK OPERATION, DAIRY OPERATION, BAKERY, PRINTING ESTABLISHMENT,</i> and similar uses	1 <i>PARKING SPACE</i> for every 90 square metres of <i>GROSS FLOOR AREA</i> or for each 4 employees, whichever is greater
6. <i>FAST FOOD OUTLET</i>	1 <i>PARKING SPACE</i> for every 3.0 square metres of area devoted to public <i>USE</i>

USES	MINIMUM REQUIREMENTS
7. FUNERAL HOME	Where there are fixed seats, 1 <i>PARKING SPACE</i> for every 4 seats or 2.1 metres of bench space of its maximum designed capacity, or 1 <i>PARKING SPACE</i> for every 10 square metres of area devoted to public whichever is greater, with a minimum of 20 spaces. (By-law 2003-137)
8. GOLF COURSE	4 <i>PARKING SPACES</i> per hole, plus additional parking as per requirements for building
9. hospital	1 <i>PARKING SPACE</i> for every 50 square metres of <i>GROSS FLOOR AREA</i>
10. CLINIC	1 <i>PARKING SPACE</i> for every 25 square metres of <i>GROSS FLOOR AREA</i> , plus 4 <i>PARKING SPACES</i> per practitioner
11. HOTEL (MOTEL), tourist home, cabin, BOARDING AND LODGING HOUSE	1 <i>PARKING SPACE</i> for every living unit or bedroom
12. NURSING HOME, home for the aged	1 <i>PARKING SPACE</i> for every 1.5 beds
13. BUSINESS OFFICE, BUSINESS INCUBATOR, BUSINESS SERVICE ESTABLISHMENT	1 <i>PARKING SPACE</i> for every 16.0 square metres of <i>GROSS FLOOR AREA</i>
14. GROUP HOME, and other homes regulated by the Ministries of Health, Correctional Services and Community and Social Services	1 <i>PARKING SPACE</i> for every staff member plus 1 <i>PARKING SPACE</i> for every 5 residents, excluding staff; minimum of 3 <i>PARKING SPACES</i>
15. residential	1 <i>PARKING SPACE</i> for each <i>DWELLING UNIT</i> in <i>BUILDINGS</i> containing not more than two <i>DWELLING UNITS</i> , and 1.5 <i>PARKING SPACES</i> for each <i>DWELLING UNIT</i> in <i>BUILDINGS</i> containing three or more <i>DWELLING UNITS</i> provided that any resulting half <i>PARKING SPACE</i> shall be increased to a

USES	MINIMUM REQUIREMENTS
	<p>full <i>PARKING SPACE</i> except that:</p> <p>1 <i>PARKING SPACE</i> shall be required for each <i>DWELLING UNIT</i> which contains an attached garage within a <i>STREET TOWNHOUSE</i>.</p> <p>That Section 5.20 of By-law 2667 is hereby further amended by allowing the parking for Lots 43, 44, 45, 46, 47 and 50, according to Registered Plan 30 for the Township of Crowland, now in the City of Welland, to be reduced from 23 <i>PARKING SPACES</i> to 22 <i>PARKING SPACES</i> for a fifteen unit <i>APARTMENT BUILDING</i>. (By-law 5277 and 10016) (5 AFTON AVENUE)</p> <p>That Section 5.20 of By-law 2667 is hereby further amended by allowing the parking for the lands known municipally as 102 and 110 Silvan Drive for an 8 unit <i>STREET TOWNHOUSE</i> development to be 1 <i>PARKING SPACE</i> for each <i>DWELLING UNIT</i>. (By-law 10016) (102 AND 110 SILVAN DRIVE - ALSO SEE: 6.1.1 (c))</p>
	<p>NOTWITHSTANDING anything contained herein, the parking on the lands described below shall be in accordance with a site plan agreement, dated the 3rd of November 1980, and authorized by By-law 7139, for the purposes of a senior citizens' <i>APARTMENT BUILDING</i>.</p> <p>ALL AND SINGULAR that certain parcel or tract of land and premises situate lying and being in the City of Welland in the Regional Municipality of Niagara and being composed of part of Block "A", Registered Plan 13, for the Township of Thorold, now in the City of Welland, now</p>

USES	MINIMUM REQUIREMENTS
	<p>known as Plan 648 and designated as Part 2 on Reference Plan 59R-3363.</p> <p>(235 FITCH STREET - ALSO SEE: 5.20.9, 5.20.10, 7.3 (a))</p>
<p><i>BED & BREAKFAST</i></p>	<p>In addition to the required 1 <i>PARKING SPACE</i> for the <i>SINGLE DETACHED DWELLING</i>, an additional 1 <i>PARKING SPACE</i> per guest room with no more than two (2) guest vehicles parked in the <i>FRONT YARD</i>. (By-law 2003-137)</p>
<p>16. <i>RESTAURANT, OUTDOOR PATIO in association with a RESTAURANT or ASSEMBLY HALL.</i></p>	<p>1 <i>PARKING SPACE</i> for every 5 square metres of area devoted to public use (By-law 2010-99)</p>
<p>17. <i>SCHOOL:</i></p>	<p>1 <i>PARKING SPACE</i> for every employee, plus:</p>
<p>(a) private and public</p>	<p>(i) in the case of a secondary <i>SCHOOL</i>, 1 <i>PARKING SPACE</i> for every 15 students; (By-law 2003-137)</p>
	<p>(ii) in the case of a community college or university, 1 <i>PARKING SPACE</i> for every 30 square metres of <i>GROSS FLOOR AREA</i>; (By-law 2003-137)</p>
	<p>(iii) in the case of an elementary school, an additional 0.5 <i>PARKING SPACES</i> for every employee. (By-law 2003-137)</p>
<p>(b) <i>DAY CARE FACILITY</i></p>	<p>1 <i>PARKING SPACE</i> for every employee, plus 4 additional <i>PARKING SPACES</i></p>

USES	MINIMUM REQUIREMENTS
(c) <i>COMMERCIAL SCHOOL, VOCATIONAL TRAINING CENTRE</i>	1 <i>PARKING SPACE</i> for every employee, plus 1 for every 3 students
18. <i>SHOPPING CENTRE</i>	
A. for centres with a <i>GROSS LEASEABLE AREA</i> of less than 9,290 square metres	5.5 spaces/90 square metres G.L.A.
B. for centres with a <i>GROSS LEASEABLE AREA</i> of 9,290 square metres to 37,159 square metres	4.0 spaces/90 square metres G.L.A.
C. for centres with a <i>GROSS LEASEABLE AREA</i> of 37,160 square metres to 55,740 square metres	4.5 spaces/90 square metres G.L.A.
D. for centres with a <i>GROSS LEASEABLE AREA</i> in excess of 55,740 square metres	5 spaces/90 square metres G.L.A.
19. <i>PERSONAL SERVICE ESTABLISHMENT</i>	A minimum of 3 <i>PARKING SPACES</i> , plus 1 <i>PARKING SPACE</i> for every 20 square metres of <i>GROSS FLOOR AREA</i> in excess of 45 square metres of <i>GROSS FLOOR AREA</i>
20. <i>CONVENIENCE STORE</i>	1 <i>PARKING SPACE</i> for every 30 square metres of <i>GROSS FLOOR AREA</i>
21. <i>DEPARTMENT STORE</i> or <i>SUPERMARKET</i> with a	1 <i>PARKING SPACE</i> for every 15 square metres of <i>GROSS</i>

USES	MINIMUM REQUIREMENTS
minimum <i>GROSS FLOOR AREA</i> of 500 square metres	<i>FLOOR AREA</i>
22. <i>RETAIL STORE, COMPUTER SERVICE, HOME DECORATING STORE, RENTAL STORE, SECOND HAND STORE, BAKE SHOP</i>	1 <i>PARKING SPACE</i> for every 20 square metres of <i>GROSS FLOOR AREA</i>
23. <i>TAVERN, and other premises licensed by the L.L.B.O.</i>	1 <i>PARKING SPACE</i> for every 4.0 square metres of floor area devoted to public use
24. <i>AUTOMOBILE SERVICE STATION, MOTOR VEHICLE REPAIR SHOP CLASS A, MOTOR VEHICLE REPAIR SHOP CLASS B,</i>	1 <i>PARKING SPACE</i> for every 30 square metres of <i>GROSS FLOOR AREA</i> or 4 <i>PARKING SPACE SPACES</i> per service bay, whichever is greater
25. <i>CALL CENTRE, DATA PROCESSING CENTRE,</i>	1 <i>PARKING SPACE</i> for every 16.0 square metres of <i>GROSS FLOOR AREA</i>
26. <i>MINI WAREHOUSE AND PUBLIC STORAGE</i>	A minimum 5 <i>PARKING SPACES</i> shall be provided. (By-law 2003-137)

5.21

SUPPLEMENTARY PARKING REGULATIONS

Where this By-law requires or permits parking facilities other than for a *SINGLE DETACHED, SEMI-DETACHED* and *STREET TOWNHOUSE DWELLING*:

- (a) the *PARKING LOT* shall be maintained with a stable surface that is treated to prevent the raising of dust or loose particles;
- (b) the lights used for illumination of the *PARKING LOT* shall be so arranged as to divert the light away from the adjacent *LOTS*;
- (c) no sign other than directional signs and the name of the owner, not exceeding 1.2 square metres in size, shall be *ERECTED* on any *PARKING LOT*;
- (d) no gasoline pump or other service station equipment shall be located or maintained on a *PARKING LOT*;
- (e) where a *PARKING LOT* containing more than four (4) *PARKING SPACES* abuts a Residential Zone or *BUILDING*, a fence shall be required to be provided and maintained between the *PARKING LOT* and the said abutting

Zone or *BUILDING* which:

- (i) is a decorative closed board type fence;
 - (ii) is a minimum of 1.5 metres in height to a maximum of 2.4 metres in height above the adjacent *GRADE* except where such a fence is adjacent to a *FRONT YARD* of a residential property where the said fence shall be a maximum of 0.9 metres in height above the adjacent *GRADE* for the distance of the *FRONT YARD* setback required for the adjacent residential property;
 - (iii) is on or adjacent to the property line; and
 - (iv) obstructs the passage of light to the adjacent properties;
- (f) the *PARKING LOT* shall be drained in such a manner so as to control the ponding of surface water and prevent the flow of surface water onto adjacent *LOTS*.

5.21.1 EXEMPTION

Notwithstanding the provisions of Subsection 5.21(f), the owner of the lands firstly described in Schedule "B" attached to By-law 7886, shall not be required to provide and maintain a fence along the southerly limit of the said lands which southerly limit abuts a Residential Zone. (***WESTERN PORTION OF NORTHTOWN PLAZA ON THOROLD ROAD - ALSO SEE: 20.11***)

5.21.2 EXEMPTION

Notwithstanding the provisions of Section 5.21 the owner of the lands firstly described in Schedule "B" attached to By-law 7886, shall be required to provide and maintain a fence along the westerly limit of the said lands which westerly limit abuts a Residential Zone, but shall not be required to construct fence which obstructs the passage of light to the adjacent properties in accordance with Section 5.21(e) (iii). (***WESTERN PORTION OF NORTHTOWN PLAZA ON THOROLD ROAD - ALSO SEE: 20.11***)

5.21.3 EXEMPTION

Notwithstanding the provisions of Sections 5.21 the owner of the lands firstly described in Schedule "B" attached to By-law 9518, shall be required to maintain a hedge in lieu of the required fence adjacent to the westerly boundary of his property. (***194 THOROLD ROAD – ALSO SEE: 5.20.19, 7.3 (b)***)

5.21.4 EXEMPTION

Notwithstanding the provisions of Section 5.21 (e), the lands described in Schedule "B" of By-law 9806 shall be given an exemption to delete the requirement of a fence adjacent to the *PARKING LOT*. (***654 SOUTH PELHAM ROAD - ALSO SEE: 5.20.21, 6.1.1(d), 8.2.7 - PARCEL 16***)

5.21.5 EXEMPTION

Notwithstanding the provisions of Section 5.21(e) of By-law 2667, the lands described as Part of Lots 29 and 30, Concession 6, former Township of Crowland

(easterly 257 metres of Part 1, Plan 59R-1057) and shown on Schedule "A" attached to By-law 9887 shall be given an exemption to delete the requirement of a closed board fence adjacent to a *PARKING LOT*. (**244 RIVERSIDE DRIVE**)

5.22

OFF-STREET LOADING REQUIREMENTS

For every *BUILDING* or *STRUCTURE HEREAFTER ERECTED* for an Industrial or Commercial *USE*, involving the frequent shipping, loading or unloading of *PERSONS*, animals, goods, wares or merchandise, there shall be provided and maintained for the premises, loading facilities on land that is not part of a *STREET*, comprised of one or more loading spaces 9.0 metres long, 3.5 metres wide and having a vertical clearance of at least 4.2 metres, with access to a lane of minimum width 6.0 metres or a *STREET*, and in accordance with the floor area of the *BUILDING* or *STRUCTURE* as follows:

<u>Floor Area</u>	<u>Number of Loading Spaces</u>
420 square metres or less	None
from 421 square metres to 2,320 square metres inclusive	1
over 2,320 square metres	2

5.23

AUTOMOBILE SERVICE STATIONS:

Wherein this By-law *AUTOMOBILE SERVICE STATIONS* are permitted, the following provisions shall apply

- (a) For each *AUTOMOBILE SERVICE STATION* located on an *INTERIOR LOT* the minimum *LOT FRONTAGE* shall be 30 metres and the minimum *LOT DEPTH* shall be 38 metres. For each *AUTOMOBILE SERVICE STATION* located on a *CORNER LOT* the minimum *LOT FRONTAGE* and the minimum *LOT DEPTH* shall be 45 metres.
- (b) Gasoline pumps shall be permitted in a *FRONT YARD*, and, in the case of a *CORNER LOT*, in the *SIDE YARD* abutting the flanking *STREET*, but in no event shall such gasoline pumps be located closer to any *LOT LINE* than 6.0 metres nor within 15 metres of the intersection of any two *STREET* lines.
- (c) The width of any entrance or exit or combined exit and entrance measured at the *LOT LINE*, shall not be greater than 10.0 metres. (**By-law 2003-137**)
- (d) Vehicular access points between the *LOT* and any one *STREET* shall not exceed two (2) in number.
- (e) Canopies over gasoline pumps shall be permitted in a *FRONT YARD*, and in the case of a *CORNER LOT*, in the *SIDE YARD* abutting a flanking *STREET*, but in no event shall the fascia of such canopies be located closer to any *LOT LINE* than 6.0 metres nor within 15.0 metres of the intersection of any two *STREET* lines.

5.23.1

- (1) Notwithstanding the provisions of Section 5.23(a), the lands described in

Schedule "B" of By-law 9008, shall be exempted from the required minimum *LOT FRONTAGE* and the minimum *LOT DEPTH* of 45 metres for a *CORNER LOT*, subject to the Site Plan Agreement authorized by By-law 9007.

- (2) Notwithstanding the provisions of Section 5.23(b), the lands described in Schedule "B" of By-law 9008, shall be exempted from the requirements thereof, subject to the Site Plan Agreement authorized by By-law 9007.
(1000 ONTARIO ROAD - ALSO SEE: 19.3.6)

5.23.2 PROPANE FACILITIES/ STATIONS and Above Ground Fuel Tanks (By-law 2003-137)

All *PROPANE TRANSFER FACILITIES PROPANE DISPENSING STATIONS* and above ground fuel tanks, including the dispensing pumps and storage tank, shall be located a minimum distance of 30 metres from any Residential *ZONE* or *USE*; such delineation shall be determined by the zoning line for such Residential *ZONE* or the *LOT LINE* for the residential *USE*, and a minimum distance of 92 metres from any *SCHOOL BUILDING*; such delineation shall be determined by the *NEAREST WALL* of the *SCHOOL BUILDING* and in no event shall such dispensing pumps be located closer to any *LOT LINE* than a distance of 6 metres nor, within 15 metres of the intersection of any two *STREETS*.

All above ground fuel tanks including propane tanks are prohibited in the *FRONT* and *SIDE YARDS* as determined in each appropriate *ZONE*.

PROPANE EXCHANGE STATIONS may be permitted in the *FRONT YARD* provided that current Technical Standards Safety Authority (TSSA) distance separation requirements are met.

5.24 OUTDOOR SEASONAL DISPLAY AND SALES AREA

Nothing in this By-law shall prevent an area set aside outside of a *BUILDING* or *STRUCTURE* within a Commercial Zone or the Reinvestment (RZ) Zone, which is used in conjunction with a lawful business located within the *BUILDING* or *STRUCTURE* and located on the same *LOT*, to be used for the display or retail sales of seasonal produce or new merchandise, provided such area:

- (1) is seasonal in nature and does not include a permanent retailing area; and
- (2) is not located within a fire lane, *PARKING SPACES* or loading spaces required to fulfill the provisions of the Zoning By-law, or a driveway or passageway which provides an access route for vehicular traffic across the *LOT* or to an improved *STREET* which abuts said *LOT*.

5.25 SIGHT TRIANGLES (By-law 2003-137)

On a *CORNER LOT* which does not include a *DAYLIGHTING TRIANGLE*, a fence, hedge, shrub, bush or tree, or any other vegetation, or any *STRUCTURE* shall not be erected or permitted to grow to a height greater than one (1) metre above the elevation of the *STREETS* that abut the *LOT* within the triangular created by the intersection of the two (2) adjacent *STREETS* a distance of five (5) metres from their point of intersection. Said triangular area shall hereinafter be called a "sight triangle".

Notwithstanding the foregoing, a sign supported by not more than two (2) pylons or standards with a total cross-sectional dimension not exceeding 0.3 metres each and the bottom of which shall be 3.65 metres above the finished *GRADE* shall be permitted in the sight triangle.

5.26 MORE THAN ONE ZONE ON A LOT

When a *LOT* is divided into more than one Zone, each such portion of the *LOT* shall be *USED* in accordance with the provisions of this By-law for the applicable Zones.

5.27 MINISTRY OF TRANSPORTATION SETBACK REQUIREMENTS (By-law 1999-178)

On lands which abut or fall within the Ministry of Transportation's permit control area the following minimum setback requirements shall apply:

SINGLE and *SEMI-DETACHED DWELLING UNITS* - 7.5 metres;

Other Developments (including multiple-attached residential, commercial and industrial) - 13.7 metres.

5.28 WAYSIDE PITS, QUARRIES AND PORTABLE ASPHALT PLANTS (By-law 1999-178)

Wayside pits and quarries and portable asphalt plants used on public authority contracts will be permitted, without the need for official plan amendment, rezoning, or development permit under the Planning Act, in all areas except those areas of existing development or particular environmental sensitivity which have been determined to be incompatible with extraction and associated activities.

5.29 CAR WASHING ESTABLISHMENT (By-law 2003-137)

A *PERSON* applying to develop a *CAR WASHING ESTABLISHMENT* under this By-law shall comply with the following special provisions:

- (a) Vehicle waiting space is provided upon lands contiguous to the *CAR WASHING ESTABLISHMENT* for vehicles waiting to enter the wash rack with a minimum of 10 stacking spaces per wash rack except in the case of a self service car wash where a minimum of two stacking spaces in front of each bay shall be provided.
- (b) Each vehicle waiting space shall be designed in accordance with the Geometric Design Standards for parking stalls as set out in this By-law.
- (c) Waiting lines are clearly defined by approved markings or barriers.
- (d) The minimum inside turning radius for a waiting line is six (6) metres.
- (e) The waiting line is unobstructed by parked vehicles.
- (f) All driveways in connection with a *CAR WASHING ESTABLISHMENT* shall conform to this By-law.
- (g) One-way driveways must be clearly designated by a sign at the *STREET*

line.

- (h) Where a *CAR WASHING ESTABLISHMENT* abuts a Residential *ZONE* or *USE*, screening, in accordance with this By-law, shall be provided and maintained between the *CAR WASHING ESTABLISHMENT* and the said abutting *ZONE* or *USE*.
- (i) Where a *CAR WASHING ESTABLISHMENT* abuts a Residential *ZONE* or *USE*, a fence shall be required to be provided and maintained between the *CAR WASHING ESTABLISHMENT* and the said abutting *ZONE* or *USE* which: is a sound barrier type fence in accordance with Ministry of Environment standards; is on or adjacent to the property line; and obstructs the passage of light to the adjacent properties.
- (j) All outside areas used for parking, storage or operation of motor vehicles shall be paved.
- (k) The *CAR WASHING ESTABLISHMENT* shall, during hours of business, provide lights used for illumination of the property which shall be arranged so as to direct the light away from adjacent lots.
- (l) All external drainage shall be approved by the City.
- (m) All internal drainage shall be connected directly to the sanitary sewer.
- (n) Signs shall be of such size, colour and design and shall be placed so as to cause neither distraction nor confusion to motorists or pedestrians.

5.30 TIME LIMITS ON ZONING BY-LAW PROVISIONS (By-law 2003-137)

Where Building Permits have been issued under the provisions of a preceding Zoning By-law, construction must commence within one (1) year of the date of issue otherwise the latest Zoning By-law provisions shall be applied.

5.31 MUNICIPAL SERVICES REQUIRED (By-law 2010-99)

No *PERSON* shall *ERECT* or *USE* any *BUILDING* or *STRUCTURE* containing plumbing on a *LOT* located within the Urban Area unless full municipal water and sanitary services are installed to the property line.

5.32 USE OF CITY LANDS (By-law 2010-99)

The *USE* of land owned by the City to *ERECT* or maintain a *BUILDING*, *STRUCTURE*, fence, landscaping, retaining wall, step, or any other similar item, or for the *USE* or storage of material or property, is not permitted, unless authorized in writing by the City.

OFF-STREET PARKING REQUIREMENTS – By-Law 1538

For every building or structure erected, altered or enlarged there shall be provided and maintained off-street parking in conformity with the following schedule and each parking space shall be made accessible for ingress and egress by means of a hard surfaced lane or right of way or street at least 2.4 metres in width.

Parking required in a Residential District shall be provided on the same lot as the dwelling unit or units. Parking space for any Multiple-Family Dwelling shall be provided only in the rear yard. In a Commercial District parking spaces shall be provided within the limits of the Commercial District in which the commercial use is situated and not more than 155 metres distant.

SCHEDULE

TYPE OR NATURE OF BUILDING OR STRUCTURE	MINIMUM REQUIRED PARKING FACILITIES
1. A place of residence other than a hotel, private hotel or motel	1 parking space for each dwelling unit
2. A hotel, private hotel or hospital	1 parking space for each three bedrooms
3. A motel	1 parking space for each living unit
4. A tavern, public house, restaurant or eating place	1 parking space for each 10 persons (in a C3 District only fifteen (15) persons) that can be accommodated at any time
5. A retail, service store, or other similar establishments	1 parking space for each 18.5 square metres of floor area
6. A department store	1 parking space for each 13.5 square metres of floor area
7. A church hall or other place of assembly	1 parking space for each 12 seats in excess of 100 seats or where the seating is provided by open benches every 0.5 metres of bench space shall be considered as one seat for the purposes of this By-law
8. A factory	1 parking space for each 37.0 square metres of floor area
9. For every building or structure not specified above	1 parking space for every 27.5 square metres of floor area

SUPPLEMENTARY PARKING REGULATIONS

Wherein this By-law parking facilities for more than 4 vehicles are required or permitted,

- (a) the parking area shall be maintained with a stable surface that is treated to prevent the raising of dust or loose particles,
- (b) the lights used for illumination of the parking lot or parking station shall be so arranged as to divert the light away from adjacent lots,

- (c) a shelter, not more than 4.6 metres in height and not more than 4.7 square metres in area may be erected in the parking area for the use of attendants in the area,
- (d) no gasoline pump or other service station equipment shall be located or maintained on a parking lot or parking station.

OFF-STREET LOADING REQUIREMENTS

For every building or structure hereafter erected for an Industrial or Commercial use, involving the frequent shipping, loading or unloading of persons, animals, goods, wares or merchandise, there shall be provided and maintained for the premises, loading facilities on land that is not part of a street, comprised of one or more loading spaces 9.0 metres long, 3.5 metres wide and having a vertical clearance of at least 4.2 metres, with access to a lane of minimum width 6.0 metres, or a street, and in accordance with the floor area of the building or structure as follows:

<u>FLOOR AREA</u>	<u>NUMBER OF LOADING SPACES</u>
418 square metres or less	None
from 419 square metres to 2,320 square metres inclusive	1
over 2,320 square metres	2

Loading spaces required by this provision shall not be provided at the front of a commercial building

COMBINED USES

Notwithstanding any other provision of this By-law, where any use or proposed use of any lot, building or structure is composed of two or more uses which are separately classified for different district, none of such uses shall be classified as accessory to any other use but the permissible district for such composite use shall be the less restricted district in the case of a combination of two uses or the least restricted district in the case of a combination of more than two uses.

RESIDENTIAL DISTRICT

Wherein this By-law the term "Residential District" is used, it shall include the following Districts: Rural Agricultural (RA), Rural Residential First Density (RR1), Rural Residential Second Density (RR2), Single-Detached Dwelling First Density (R1), Single-Detached Dwelling Second Density (R2), Single-Detached Dwelling Third Density (R3), Multiple-Family Dwelling First Density (RM1) and Multiple-Family Dwelling Second Density (RM2), unless the contrary intention appears.

FLOOD OR ROCKY LAND

No person shall, in any district, erect any building or structure for any residential or commercial purpose on land which is subject to flooding or on land where by reason of its rocky, low-lying, marshy or unstable character, the cost of construction of satisfactory water works, sewage or drainage facilities is prohibitive.

MINIMUM FRONTAGE

No person shall convey a part of a lot if the effect of such conveyance is to leave remaining a part of a lot or a parcel of land with a frontage, on a public thoroughfare, that is less than the required minimum frontage for the district in which such lot or parcel is situated.

ROOMS BELOW GRADE

A room which has its floor entirely below the finished grade adjacent to such room shall not be used as a dwelling unit or part thereof except as a furnace room, laundry room, storage room, recreation room or for a similar use, and in any event such room shall not be used to provide sleeping accommodation.

PROPANE STORAGE AND DISTRIBUTION OUTLETS (By-law 7593)

- (1) All retail propane transfer facilities, including the dispensing pumps and storage tanks, shall be located a minimum distance of thirty (30) metres (one hundred (100) feet) from any Residential District; such delineation shall be determined by the zoning line for such a Residential District, and in no event, shall such dispensing pumps be located closer to any lot line than a distance of six (6) metres nor, within fifteen (15) metres of the intersection of any two street lines.
- (2) All propane tanks are prohibited in the front and side yards as determined in each appropriate district.

FLOODPLAIN (By-law 1999-133)

No building or structure shall be constructed or erected within the limits of a floodplain.

Example Letter of Credit Reduction Request

June 12, 2000

City of Welland
Infrastructure Services
60 East Main Street
Welland, Ontario
L3B 3X4

Attention; Mr. , Manager, Infrastructure Services

RE; Example Subdivision
Reduction of letter of Credit

Dear X,

Attached please find the following;

1. Consultant's certification of works completed to date.
2. Itemized cost breakdown for all outstanding works.
3. Developer Statutory Declaration.
4. Contractor statement of payment.
5. Engineering Consultant statement of payment.

On Behalf of XYZ Developing Inc. and in accordance with Section 8 of the Subdivider's Agreement, please accept this letter to reduce the letter of credit on file by XXXX dollars. Attached is the itemized cost breakdown of the works completed and remaining for the development.

Should you have any further questions please contact the undersigned.

Sincerely,

(Developer's Consulting Representative)

c.c.:

Attachments

**MAPLE GROVE - CONTRACT 06-0139-01
OUTSTANDING SECONDARY SERVICES**

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	VALUE	QUANTITY COMPLETED	QUANTITY OUTSTANDING	COMPLETED VALUE	OUTSTANDING VALUE	
SECTION E. FINAL ROADS (STAGE II)										
1.	Hot Mix Asphalt HL3A top course asphalt 25mm compacted depth including sweeping, removal of fillets, padding, catchbasins, water valves and appurtenances.	1450	m2	\$7.50	\$10,875.00	0	1450	\$0.00	\$10,875.00	
2.	Driveway apron - 225mm thick granular 'A' including preparation of the subgrade and 50mm HL8 and 25mm HL3A asphalt.	400	m2	\$48.00	\$19,200.00	0	400	\$0.00	\$19,200.00	
3.	Topsoil & sodding boulevards with 100mm topsoil and No. 1 Ontario nursery sod to include tree pits 1.2m dia. x 0.4m depth and filled with topsoil at front of each lot prior to sodding boulevard.	1050	m2	\$7.50	\$7,875.00	0	1050	\$0.00	\$7,875.00	
4.	Contingency for reinstatement a) Remove and replace 375mm thick granular including disposal off site. b) Remove and replace base course asphalt 50mm HL8 HS including fine grading of granular, saw cutting and disposal of asphalt off site. c) Remove and replace curb & gutter	100	m2	\$15.00	\$1,500.00	0	100	\$0.00	\$1,500.00	
5.	Flushing, video inspection, air testing and mandrel testing of all sewers.	175	m	\$10.00	\$1,750.00	0	175	\$0.00	\$1,750.00	
TOTAL SECTION E					\$47,950.00			\$0.00	\$47,950.00	
10% ENGINEERING & CONTINGENCY ALLOWANCE								\$	4,795.00	
TOTAL OUTSTANDING WORKS VALUE								\$	52,745.00	

**MAPLE GROVE
JOB 139
CONTRACT SUMMARY**

KIS Excavating

<i>A.</i>	<i>Sanitary Sewer</i>	<i>\$0.00</i>
<i>B.</i>	<i>Storm Sewer</i>	<i>\$0.00</i>
<i>C.</i>	<i>Water System</i>	<i>\$0.00</i>
<i>D.</i>	<i>Preliminary Roads</i>	<i>\$0.00</i>
<i>E.</i>	<i>Final Raods (Stage #)</i>	<i>\$0.00</i>
	<i>SUB -TOTAL</i>	<i>\$0.00</i>
	<i>H.S.T.</i>	<i>\$0.00</i>
	<i>TOTAL TENDER PRICE</i>	<i>\$0.00</i>

**LETTER OF CREDIT REQUIREMENT IN ACCORDANCE WITH
SECTION 8 SUB-SECTION (2) OF THE SUBDIVIDER'S AGREEMENT**

MAPLE GROVE HEIGHTS

SECTION I

Primary Services

(a) Estimated value of outstanding works including Engineering and Contingency Allowance	<u>\$ -</u>
(b) Amount of Holdback (works completed and not paid for)	<u>\$ -</u>
(c) Maintenance Deposit (ie. 10% of the original estimated total cost of Primary Services = 10% of \$204,722.00)	<u>\$ 20,472.20</u>

SECTION II

Secondary Services

(a) Estimated value of outstanding works including Engineering and Contingency Allowance	<u>\$ 52,745.00</u>
(b) Amount of Holdback (works completed and not paid for)	<u>Nil</u>
(c) Maintenance Deposit (ie. 10% of the original estimated total cost of Secondary Services = 10% of \$47,950.00)	<u>\$ 4,795.00</u>

SECTION III

Lot Grading Deposits (if applicable) (4 lots x \$1,000)	<u>\$ 4,000.00</u>
---	--------------------

TOTAL SECTION I, II, and III above **\$ 82,012.20**

SAMPLE

Revised May 13, 2009

PRINTED ON
FINANCIAL
INSTITUTION
LETTERHEAD

Financial Institution Address,
Phone Number, Fax Number

IRREVOCABLE STANDBY LETTER OF CREDIT

NAME OF BANK: _____ DATE ISSUED: _____

IRREVOCABLE STANDBY LETTER OF CREDIT NO. _____

AMOUNT: _____

Issued subject to the The Uniform Customs and Practices for Documentary Credits, 2007 revision, ICC Publication number 600L, implemented July 1, 2007.

TO: _____ THE CORPORATION OF THE CITY OF WELLAND

ADDRESS: _____ 60 EAST MAIN STREET, WELLAND ONTARIO L3B 3X4

WE HEREBY AUTHORIZE YOU TO DRAW ON THE

(Name of Bank & Address)

for the account of _____
(Name of Customer)

UP TO AN AGGREGATE AMOUNT OF _____

DOLLARS(\$ _____)available on demand.

PURSUANT TO THE REQUEST OF our customer: _____
(Name of Customer)

_____ we the _____
(Name of Bank)

hereby establish and give you an Irrevocable Standby Letter of Credit in your favour in the above amount which may be drawn on by you at any time and from time to time, upon written demand for payment made upon us by you which demand we shall honour without enquiring whether you have the right as between yourself and the said customer to make such demand, and without recognizing any claim of our said customer, or objection by it to payment by us.

DEMAND shall be by way of a Letter signed by the Treasurer of the Municipality under the corporate seal. Presentation shall be made to the bank at: _____

(Bank's Address)

THE IRREVOCABLE STANDBY LETTER OF CREDIT we understand relates to those Municipal services and financial obligations set out in an Agreement between the customer and the Municipality and referred to as _____

(Name of Project, Subdivision or Development)

THE AMOUNT of this Irrevocable Standby Letter of Credit may be reduced from time to time as advised by notice in writing to the undersigned by the Treasurer of the Corporation of the City of Welland.

THIS IRREVOCABLE STANDBY LETTER OF CREDIT will continue in force for a period of one year, but shall be subject to the condition hereinafter set forth.

IT IS A CONDITION of this Irrevocable Standby Letter of Credit that it shall be deemed to be automatically extended without amendment from year to year from the present or any future expiration date hereof, unless at least 30 days prior to the present or any future expiration date, we notify you in writing by registered mail that we elect not to consider this Irrevocable Standby Letter of Credit to be renewable for any additional period.

DATED at _____, this the _____ day of _____, 20____

AUTHORIZED SIGNATURE
(Name & Title of Bank Representative)

AUTHORIZED SIGNATURE
(Name & Title of Bank Representative)

Sample Letter of Retention

(Developer's Company Letterhead)

(date)

City of Welland
Engineering Department
Civic Square
60 East Main Street
Welland, Ontario
L3B 3X4

Attention: Manager, Development Engineering
Dear Sir:

Re: (Name of Client)
(Name of Project Site)
(City Project Reference Number)
Letter of Retention

This letter will confirm that (Consultant's Name) has been retained by (Client's Company's Name) as its Consultant for the design and complete general construction supervision of all municipal services. The following services are included: roads, sanitary sewers, watermains, storm sewers, stormwater management, lot grading and drainage and approvals.

(Consultant's Name) will provide the services of a qualified and professional team, who will devote such time and effort as shall be necessary to diligently perform the job.

Sincerely,

(Signature of Client)
(Name of Client)
(Name of Client's Firm)



APPLICATION FOR SITE PLAN CONTROL

SUBMISSION REQUIREMENTS

The Applicant is required to provide appropriate answers to **all** questions on the application form. It should be noted that if all of the information is not provided, the application shall not be circulated for review. The completed application should be submitted together with the required fee and the following:

1. Ten (10) copies of all development plans based upon an actual survey of the property by an Ontario Land Surveyor, bound in rolled sets. The development plans will consist of the following:
 - General Site Plan
 - Landscape Plan
 - Building Elevations
 - Site Servicing/Grading Plan(s)
 - Existing Conditions Plan

NOTE: All development plans must be drawn to a useable metric scale (i.e. 1:100, 1:300, 1:500). Sheet sizes should not exceed an ANSI "D" size (i.e. 24" x 36"). Depending upon the scope of the requested Site Plan, fewer or more copies of the plan may be required. Please contact the Site Plan Co-Ordinator for advice.

2. A Registered Deed, including a full legal description of the subject lands, must be provided. As well, a copy of the current parcel register "PIN Sheet" from the Registry Office is required.
3. The name(s) and title(s) of the person(s) who will be signing the Site Plan Control Agreement (authority to bind the Corporation).
4. All Applicants are strongly urged to discuss the preliminary proposal with Municipal Staff as well as consult with affected provincial Ministries and agencies prior to any formal submission. Attached, please find a list of some of these public bodies and the contact person.
5. The Application fees (both City and Region) must accompany the Application. Separate cheques should be made payable to the City of Welland and the Regional Municipality of Niagara. All cheques should be forwarded to the City with the Application. The Niagara Peninsula Conservation Authority (NPCA) Plan Review Fee, if required. City Staff will screen the Application and advise if the NPCA fee is applicable. The NPCA fee schedules are attached.
6. All projects shall submit an electronic version of the required development plans in AutoCAD .DWG format Version 14 or higher, with the following spatial characteristics:

Map Projection: *Universal Transverse Mercator*
Horizontal Datum: *NAD83 Zone 17 North*
Horizontal Units: *Metres*

The graphics in the drawing must be geographically positioned to 3rd order accuracy. The City's horizontal control network (UTM NAD83) may be used as a

control reference and can be accessed on the City of Welland Internet Map Server at the following web address:

<http://gis.welland.ca/wims/login.asp>

Please email the electronic information to michael.horsley@welland.ca and christopher.mazzuca@welland.ca indicating the name of the Applicant.

LIST OF CONTACTS

CITY OF WELLAND 60 EAST MAIN STREET WELLAND, ONTARIO L3B 3X4 (905) 735-1700	INTEGRATED SERVICES	MICHAEL HORSLEY CHRISTOPHER MAZZUCA	EXT. 2243 EXT. 2255
	INFRASTRUCTURE SERVICES	ENGINEERING DIVISION MARVIN INGEBRIGTSEN SCOTT RICHARDSON TRAFFIC DIVISION DAVID FERGUSON	EXT. 2209 EXT. 2222 EXT. 2202
CITY OF WELLAND 99 FEDERAL ROAD WELLAND, ONTARIO L3B 3P2 (905) 735-1700	INFRASTRUCTURE SERVICES	PUBLIC WORKS DIVISION JERRY BOC	EXT. 3003
WELLAND FIRE DEPARTMENT 636 KING STREET WELLAND, ONTARIO L3B 3L1 (905) 735-9922	FIRE AND EMERGENCY SERVICES	DENYS PREVOST	
REGIONAL MUNICIPALITY OF NIAGARA P. O. BOX 1042 2201 SCHMON PARKWAY, CAMPBELL WEST THOROLD, ONTARIO L2V 4T7 (800) 263-7215 (905) 685-4225	DEVELOPMENT SERVICES DIVISION PUBLIC WORKS DEPARTMENT	LINDSAY EARL (PLANNING) EUGENE CHAJKA	EXT. 3387
MINISTRY OF NATURAL RESOURCES NIAGARA AREA OFFICE 4890 VICTORIA AVENUE NORTH P. O. BOX 5000 VINELAND STATION, ONTARIO L0R 2E0 (905) 562-4147			
NIAGARA PENINSULA CONSERVATION AUTHORITY 250 THOROLD ROAD, 3RD FLOOR WELLAND, ONTARIO L3C 3W3 (905) 788-3135			
MINISTRY OF THE ENVIRONMENT WEST-CENTRAL REGION TECHNICAL SUPPORT SECTION AIR, PESTICIDES & ENVIRONMENTAL PLANNING 12 TH FLOOR, 119 KING STREET WEST HAMILTON, ONTARIO L8P 4Y7 (905) 521-7864		BARBARA SLATTERY	
MINISTRY OF TRANSPORTATION CENTRAL REGION, CORRIDOR MANAGEMENT OFFICE 7 TH FLOOR, BUILDING D 1201 WILSON AVENUE DOWNSVIEW, ONTARIO M3M 1J8 (416) 235-5558		KEVIN KELLY	

N.B. This list is not comprehensive.



THE CORPORATION OF THE CITY OF WELLAND
APPLICATION FOR SITE PLAN CONTROL

(NOTE: PRIOR TO COMPLETING THIS FORM THE APPLICANT SHOULD READ THE ATTACHED SUBMISSION REQUIREMENTS)

FOR OFFICE USE ONLY:	
APPLICATION FEES	
SITE PLAN CONTROL APPLICATION	\$1,800.00
(including preparation and registration of Agreement)	
MINOR CHANGE TO SITE PLAN AGREEMENT	\$800.00
REGIONAL MUNICIPALITY OF NIAGARA	\$750.00
NIAGARA PENINSULA CONSERVATION AUTHORITY, IF APPLICABLE	
MINOR	\$485.00
MAJOR	\$3,335.00
DATE RECEIVED:	_____
CITY FEE RECEIVED:	_____
REGION FEE RECEIVED:	_____
OTHER FEE RECEIVED:	_____
DATE OF COMPLETED APPLICATION:	_____
APPLICATION REVIEWED BY:	_____
DATE:	_____

Please submit one (1) copy and one (1) electronic copy, if required, of a 'completed' application together with the required fee(s) and other required information

NOTE: If fee(s) are required for Regional Niagara or the Niagara Peninsula Conservation Authority, please submit required fee(s) with Application.

To: City of Welland
 Integrated Services
 60 East Main Street
 Welland, Ontario. L3B 3X4
 Telephone: 905-735-1700
 Fax: 905-735-8772
 www.welland.ca

PLEASE NOTE: Should this Application not be completely filled out and the required fee and information not be provided, the Application shall not be reviewed until completed.

1. Name of Owner: _____

Address _____ Phone Number: _____
 : _____
 _____ Fax Number: _____

2. Name of Agent: _____
 (if any)

Address _____ Phone Number: _____
 : _____
 _____ Fax Number: _____

[An Agent, other than the Owner's Solicitor, must have written authorization from the Owner(s).]

3. To Whom is all Information to be Sent?

[All information shall be directed to the Agent unless specified below.]

Owner Other

4. Name of Mortgagee/Chargee: _____
 (if any)

Address _____

5. Location of Property: Legal Description _____

(Lot No, Registered Plan No. Concession, Reference Plan, etc.)

Street Address: _____

6. Size of Property: Frontage _____ Metres Lot Depth _____ Metres
 Area _____ Square Metres

7. What is the Current Official Plan Designation of the land? _____

8. Existing Zoning of Lands: _____ By-law: _____

9. If known, whether the subject land is the subject of an Application under the Act for the following and the status of the Application:

APPLICATION	IF YES - FILE NUMBER	STATUS
• Official Plan Amendment		
• Minor Variance		
• Plan of Subdivision		
• Consent		
• Zoning By-law Amendment		

10. If known, has the property ever been the subject of a Site Plan Control Agreement?

Yes No

11. a) Existing Land Use: _____

b) The length of time the existing uses have continued: _____

12. Proposed Land Use: _____

13. Existing Adjacent Land Uses:

North _____

East _____

South _____

West _____

14. a) Are there any existing buildings or structures on the subject land?

Yes No

b) If answer to (a) is Yes, please fill out the following:

	BUILDING 1	BUILDING 2	BUILDING 3
Type (i.e. House, Garage, Commercial Building, Accessory)			
Front Yard Setback	m	m	m
Rear Yard Setback	m	m	m

Side Yard Setback	(N,S,E,W)	m	(N,S,E,W)	m	(N,S,E,W)	m
Side Yard Setback	(N,S,E,W)	m	(N,S,E,W)	m	(N,S,E,W)	m
Height		m		m		m
Ground Floor Area		m ²		m ²		m ²
Gross Floor Area		m ²		m ²		m ²

15. The date the existing buildings or structures were constructed on the subject land.

Building 1 _____ 2 _____ 3 _____
 (refer to 14 b)

16. Are any buildings designated under the Ontario Heritage Act? _____

17. a) Are there any buildings or structures proposed to be built or erected on the subject land?

Yes No

b) If answer to (a) is Yes, please fill out the following:

	BUILDING 1	BUILDING 2	BUILDING 3
Type (i.e. House, Garage, Commercial Building, Accessory)			
Front Yard Setback	m	m	m
Rear Yard Setback	m	m	m
Side Yard Setback	(N,S,E,W) m	(N,S,E,W) m	(N,S,E,W) m
Side Yard Setback	(N,S,E,W) m	(N,S,E,W) m	(N,S,E,W) m
Height	m	m	m
Ground Floor Area	m ²	m ²	m ²
Gross Floor Area	m ²	m ²	m ²

18. The date the subject land was acquired by the current Owner: _____

19. What type of water supply exists or is proposed?

Publicly owned and operated system Lake or other water body
 Well (private or commercial) Other (specify) _____

20. What type of sewage disposal exists or is proposed?

Publicly owned and operated system
 Septic system (private or commercial)
 Other (specify) _____

21. What type of storm drainage is provided?

Sewers Swales
 Ditches Other (specify) _____

22. Type of access to subject lands?

Provincial highway Other public road
 Municipal road maintained all year Right-of-way
 Municipal road maintained seasonally Water access

23. Affidavit or Sworn Declaration For Requested Information

AFFIDAVIT OR SWORN DECLARATION

I, _____
(PRINT NAME OF APPLICANT)

of the City of _____

in the Regional Municipality of _____

make oath and say (or solemnly declare) that the information contained in Sections 1 through 22 inclusive of this Application is true and that the information contained in the documents that accompany this Application in respect of the above Sections is true.

Sworn (or Declared) before me at the _____)
_____ of _____)
in the _____)
_____)
this _____ day of _____)
A.D. 20 _____)

To be signed in the presence of a
Commissioner for taking Affidavits.

APPLICANT

A Commissioner, etc.

24. Complete the Consent of the Owner concerning personal information set out below.

**CONSENT OF THE OWNER TO THE USE AND
DISCLOSURE OF PERSONAL INFORMATION**

I, _____
am the Owner of the land that is the subject of this Application for approval of an Application for Site Plan Control and for the purposes of the Freedom of Information and Privacy Act I authorize and consent to the use by or the disclosure to any person or public body of any personal information that is collected under the authority of the Planning Act for the purposes of processing this application.

Date

Signature of Owner

25. Complete the Authorization for Agent only if Applicant is not the registered Owner.

AUTHORIZATION FOR AGENT

I, _____ the Owner of the subject property hereby
(PRINT NAME)

authorize _____ to act on my behalf with respect to this
(AGENT)

Application.

Date

Signature of Owner

NOTE: Information provided in this Application will become part of a public record.

Letter of Credit Reduction Summary - Site Plans

ITEM	DESCRIPTION	AMOUNT
A.	Sanitary Sewer	0
A.	TOTAL SANITARY SEWERS	0
B.	Storm Sewer	0
B.	TOTAL STROM SEWER	0
C.	Watermain	0
C.	TOTAL WATERMAIN	0
D.	Secondary Services	0
D.	TOTAL SECONDARY SERVICES	0
E.	Off-Site	0
E.	TOTAL OFF-SITE	0
<u>ON-SITE</u>		
A.	Sanitary Sewer	0
B.	Storm Sewers	0
C.	Watermain	0
TOTAL UNDERGROUND SERVICES: A, B, & C		0
D.	Secondary Services (Asphalt Parking etc.)	0
E.	Off Site	0
TOTAL UNDERGROUND, SECONDARY SERVICES AND OFF_SITE		0
ENGINEERING FEE AND CONTINGENCY (10%)		0
SUB-TOTAL		0
H.S.T.		0
SUB-TOTAL		0
50% OF TOTAL SITE WORKS		0
TOTAL LETTER OF CREDIT (LOC)		0

CERTIFICATE FOR REDUCTION OF LETTER OF CREDIT

AGREEMENT BETWEEN _____ AND THE CORPORATION OF THE CITY OF WELLAND DATED THE ____ DAY OF _____, A.D. ____ FOR LANDS KNOWN MUNICIPALLY AS _____, WELLAND

This is to certify that the following works, totalling \$ _____, in accordance with the Cost Estimate and the Certificate of Compliance of the Agreement, have been completed in accordance with said Agreement.

(list works - as itemized in the Cost Estimate)

- NOTE: (1) Attach separate sheet listing works if additional space is required.
 (2) Any deviations/changes/modifications of the listed itemized works in the Cost Estimate must be noted.
 (3) The sum to be shown above is based upon the total sum of the works completed as listed in the "amount" column in the Cost Estimate.

ITEM FROM COST ESTIMATE	DESCRIPTION (WORKS) FROM COST ESTIMATE	ESTIMATED AMOUNT FROM COST ESTIMATE (\$)
-------------------------	--	--

Dated at the _____ of _____ this ____ day of _____ A.D. ____

I/WE _____ of the _____ of _____ in the Regional Municipality of _____ solemnly declare that all of the statements contained herein are true and I/WE make solemn declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath and by virtue of the Canada Evidence Act.

Declared before me at the

_____ of _____ in the Regional Municipality of _____ this ____ day of _____ A.D. ____

 A Commissioner etc.

 Professional Engineer (if applicable)

 Architect (if applicable)

 Owner (if no Architect/Engineer)

**Sample Letter for Revisions to Grading after Issuance of the Grading
Conformance Certificate**

(Developer's Company Letterhead)

(date)

City of Welland
Infrastructure Services
Civic Square
60 East Main Street
Welland, Ontario
L3B 3X4

Attention: Manager, Development Engineering
Dear Sir:

Re: (Name of Client)
(Name of Project Site)
(City Project Reference Number)
**Revisions to Grading after Issuance of the Grading Conformance
Certificate**

This letter was written with the intent to notify all invested parties/the City in regards to revisions made to the Grading Plans.

Attached to this letter are:

- i) A copy of the revised Detailed Lot Grading Plan indicating the proposed grading changes.
- ii) A Lot Grading Deposit in the amount of \$500.00 will also be issued to the City.

All revisions have been certified by the Engineer and are clearly marked and described in the Revised Grading Plan.

Sincerely,

(Signature of Client)
(Name of Client)
(Name of Client's Firm)

Sample Letter for Revisions on Grading Plans
(Developer's Company Letterhead)

(date)

City of Welland
Infrastructure Services
Civic Square
60 East Main Street
Welland, Ontario
L3B 3X4

Attention: Manager, Development Engineering
Dear Sir:

Re: (Name of Client)
(Name of Project Site)
(City Project Reference Number)
Revisions on Grading Plans

This letter was written with the intent to notify all invested parties/the City in regards to revisions made to the Grading Plans.

Attached to this letter are (3) three copies of the revised Detailed Lot Grading Plan. A Lot Grading Deposit will also be issued, determined in cooperation with the City based on an estimated time for review.

All revisions have been certified by the Engineer and are clearly marked and described in the Revised Grading Plan.

Sincerely,

(Signature of Client)
(Name of Client)
(Name of Client's Firm)

* Official Plan Amendment	\$2,700.00
	plus Regional Fee
* Zoning By-law Amendment	\$2,700.00
	plus Regional Fee
* Concurrent Official Plan and Zoning By-law Amendment	\$4,100.00
	plus Regional Fee
Removal of Holding Symbol	\$510.00
Temporary Use By-law	\$2,700.00
* Site Plan Control Application	\$1,800.00
(including preparation and registration of Agreement)	plus Regional Fee
* Minor Change to Site Plan Agreement	\$800.00
* Processing of Subdivision Application/Development Agreements	\$6,000.00
(including preparation and registration of Agreement)	\$900 for each Phase over one \$50/Lot or Block excluding 0.3 metre reserves
	plus Regional Fee
Subdivision Fee for each Plan Registration greater than 1 dealing with the same Draft Plan	\$2,000.00
* Modification to Draft Plan Conditions Involving Circulation	\$1,200.00
	plus Regional Fee
Extension to Draft Plan Approval	\$600.00
	plus Regional Fee
Processing of Short Form Subdivision Agreement	\$670.00
Processing of Condominium Application/Exemption Request	\$6,000.00
(including preparation and registration of Agreement)	plus Regional Fee
Processing Part Lot Control By-law (including registration)	\$510.00
Processing Servicing/Development Agreement	\$1,500.00
(including preparation and registration of Agreement)	
Processing Front-Ending Agreement	\$1,500.00
(including preparation and registration of Agreement)	
Certificates of Compliance - Tax - \$40.00 Water - \$25.00 (\$155.00)	\$90.00
* Minor Variance/Change of Use Application	\$700.00
Regional Niagara Planning Review - \$225.00	
• OMB Appeal - Primary Appeal	\$125.00
• Any Related Appeal	\$25.00
* Consent to Sever/Validation of Title	\$1,000.00
Regional Niagara Planning Review - Within Urban Area Boundary +\$325.00 Outside +\$525.00	
• OMB Appeal - Primary Appeal	\$125.00
• Any Related Appeal	\$25.00
* Concurrent Minor Variance and Consent	\$1,400.00
Rescheduling of Consent or Minor Variance Application	\$400.00
Change of Conditions for Consent	\$235.00

JANUARY 1, 2012 - DECEMBER 31, 2012

CITY OF WELLAND DEVELOPMENT CHARGES

(BY TYPE OF RESIDENTIAL USE - PER DWELLING UNIT)

SINGLE/SEMI/ DUPLICATE DWELLINGS/ MODEL HOMES	LOW DENSITY MULTIPLE DWELLINGS	BACHELOR AND ONE BEDROOM APARTMENT	TWO OR MORE BEDROOM APARTMENTS	RETIREMENT HOME OR LODGE/ SPECIAL CARE/SPECIAL NEEDS	NON-RESIDENTIAL (PER SQ.FT. OF GFA)
2012	2012	2012	2012	2012	2012
CITY WATER SERVICE AND SANITARY SEWER					
\$6,515	\$5,082	\$2,871	\$4,373	\$2,506	\$4.26
NO SANITARY SEWERS OR WATER SERVICE					
\$5,620	\$4,384	\$2,477	\$3,772	\$2,162	\$3.32
WATER SERVICE AVAILABLE, NO SANITARY SEWERS					
\$5,979	\$4,664	\$2,635	\$4,013	\$2,300	\$3.70
SANITARY SEWERS AVAILABLE, NO WATER SERVICE					
\$6,156	\$4,802	\$2,713	\$4,132	\$2,368	\$3.88
ST. ANDREWS TER					
\$4,150					
\$5,317	\$4,150				\$4.26

NOTE 1: Should the existing private roads become public (assumed by the City of Welland) full Development Charges shall apply - Plan 59M-269 and 59M-373

COMMENCING JANUARY 1, 2011, DEVELOPMENT CHARGES WILL BE ADJUSTED ANNUALLY, EFFECTIVE JANUARY 1ST, BASED UPON STATISTICS CANADA QUARTERLY, "CONSTRUCTION PRICE STATISTICS" (CATALOGUE NO. 62-007)

REGIONAL NIAGARA DEVELOPMENT CHARGES

SEPTEMBER 1, 2011 -
AUGUST 31, 2012

RESIDENTIAL CHARGE PER DWELLING UNIT

NON-
RESIDENTIAL
CHARGE
(EXCLUDING
INDUSTRIAL)

NON-
RESIDENTIAL
CHARGE
(INDUSTRIAL)

SINGLE
DETACHED

OTHER
MULTIPLE

APARTMENT/
LODGING UNIT

PER SQUARE
FOOT OF GROSS
FLOOR AREA

PER SQUARE
FOOT OF
GROSS FLOOR
AREA

\$9,090

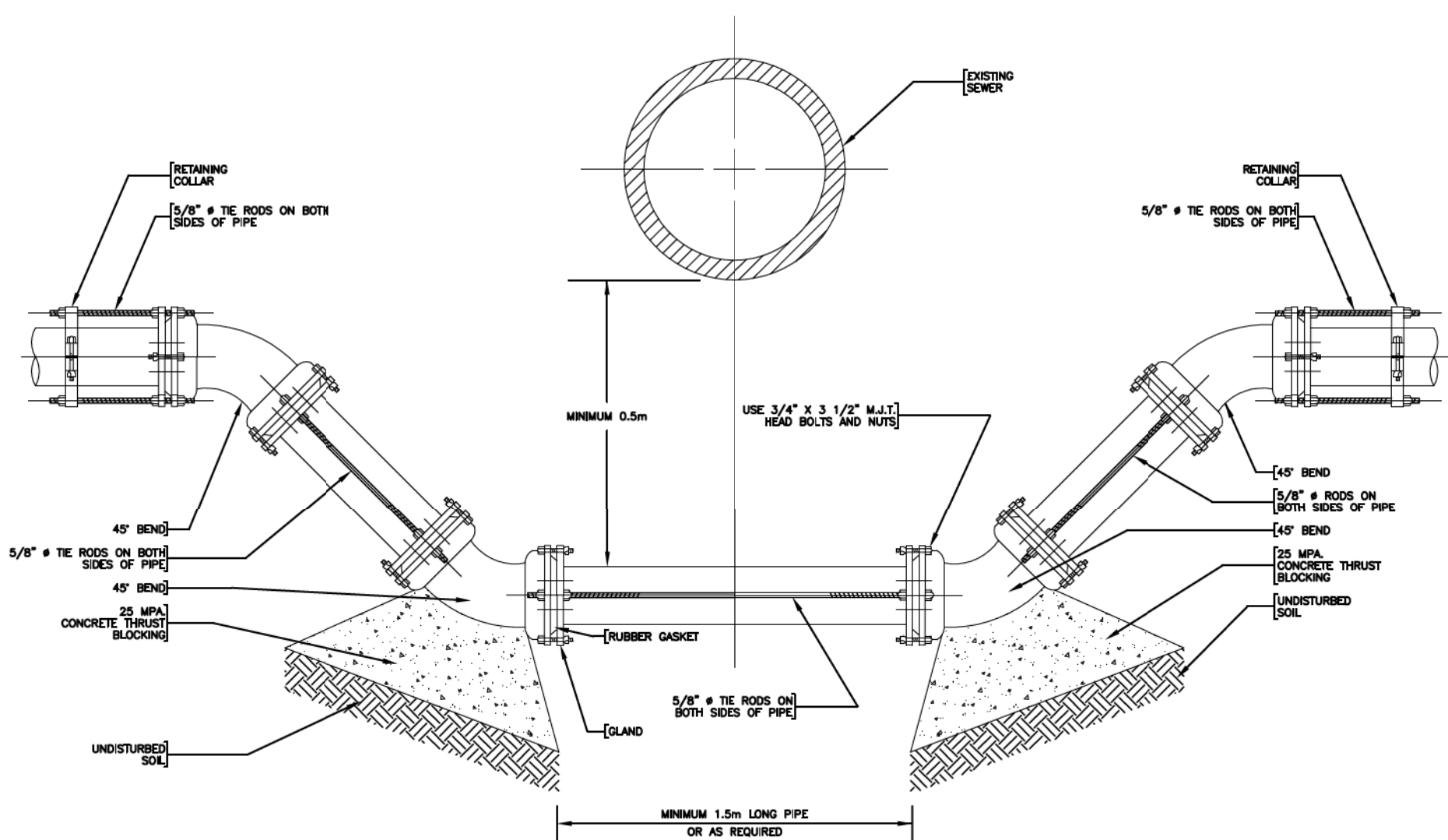
\$6,368


\$5,356

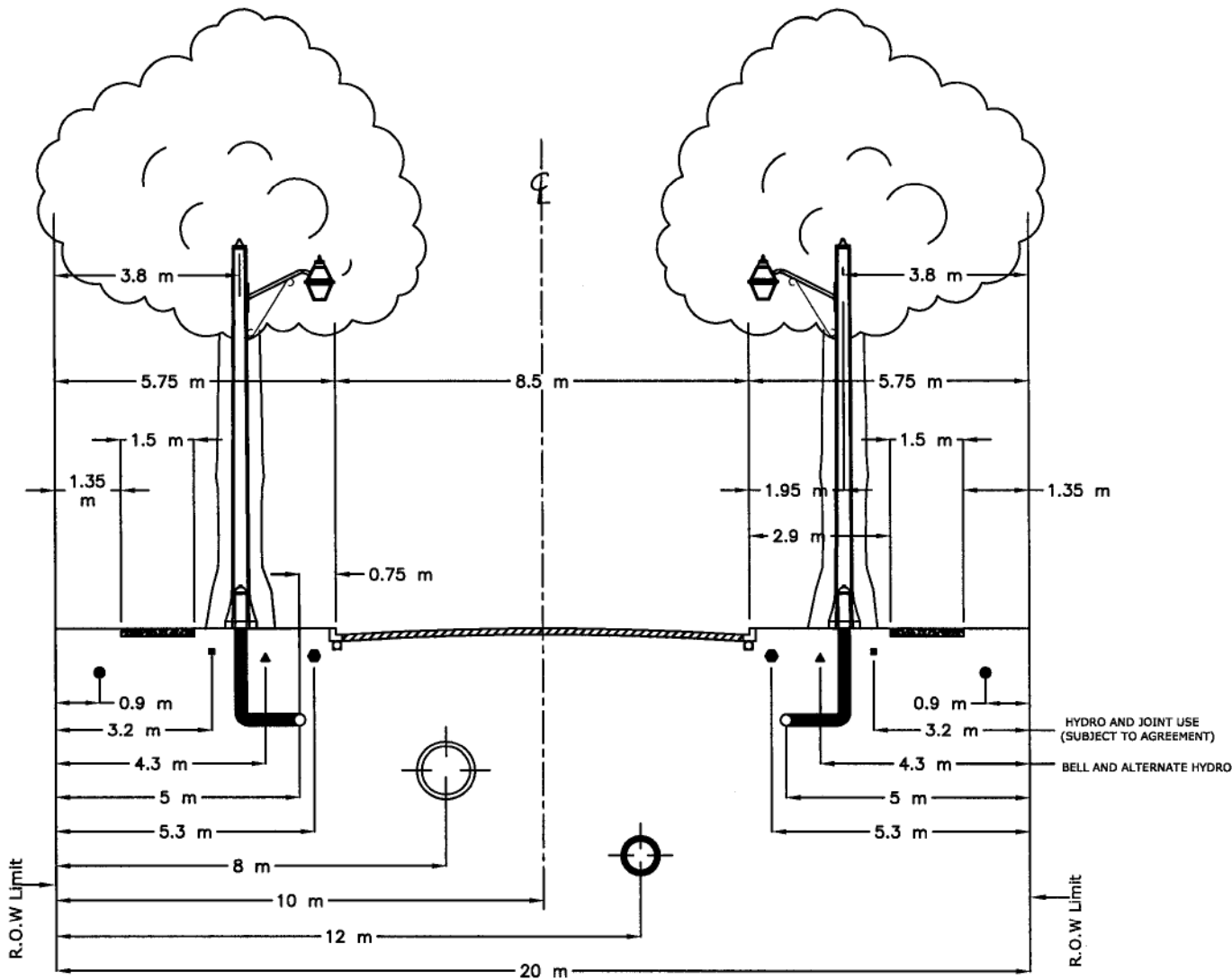
\$8.59

\$2.20

APPENDIX 'C' - STANDARD DRAWINGS



	CITY OF WELLAND ENGINEERING DEPARTMENT	
	<i>WATERMAIN DROP</i> <i>STRUCTURE DETAIL</i>	
DRWG. No. 1 OF 1	DATE: October 2, 1997	SCALE: N.T.S.
FILE No.	DESIGN BY: J. Boc DRAWN BY: M.J.P.	REVIEWED BY: D. TSANG



LEGEND

- GAS MAIN (YELLOW)
- CABLE T.V. (ORANGE)
- ▲ TELEPHONE (ORANGE)
- HYDRO (RED)
- WATERMAIN (BLUE)
- STORM SEWER (GREEN)
- SANITARY SEWER (GREEN)
- SUB-DRAIN

NOTES:

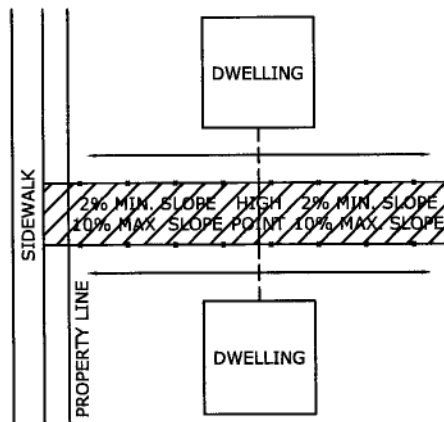
1. WHENEVER POSSIBLE CABLE T.V. AND BELL TELEPHONE WILL GO JOINT USE WITH HYDRO IN TRENCH 3.2 m OFF THE STREET.
2. STREET LIGHTING POLE, BELL AND CABLE TV PEDESTALS, FIRE HYDRANT AND TREES WILL BE PLACED 3.8 m OFF THE STREET ON ONE SIDE OR BOTH SIDES OF THE STREET.
3. ALL DIMENSIONS ARE IN METERS.

**STANDARD UTILITY LOCATIONS
20m ROAD ALLOWANCE**

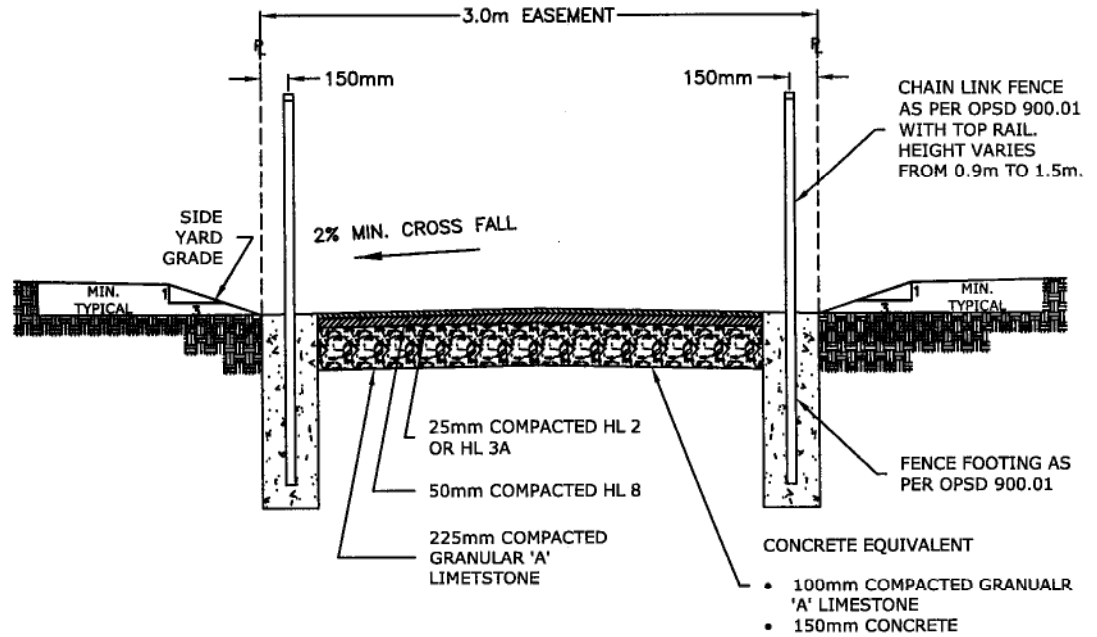
City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	



TYPICAL WALKWAY GRADE



TYPICAL CROSS SECTION

NOTES:

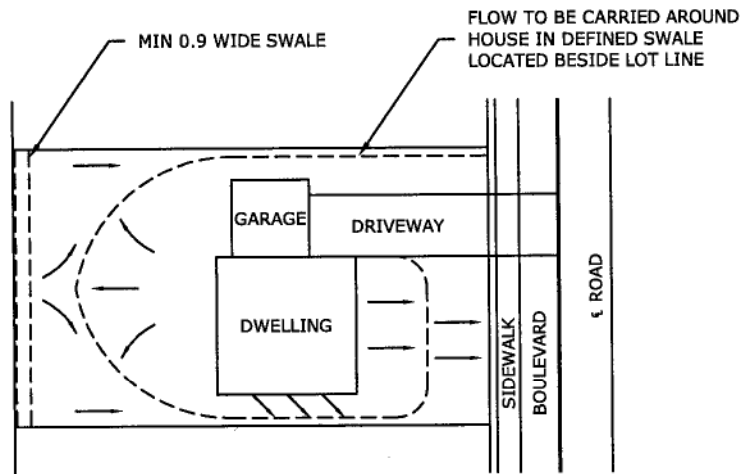
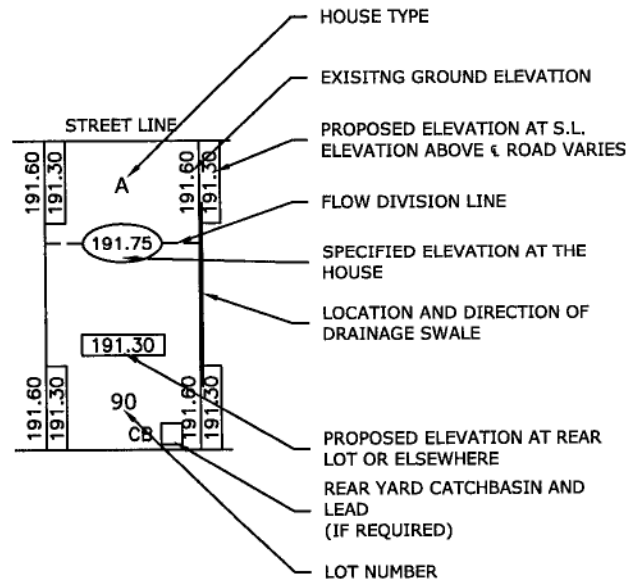
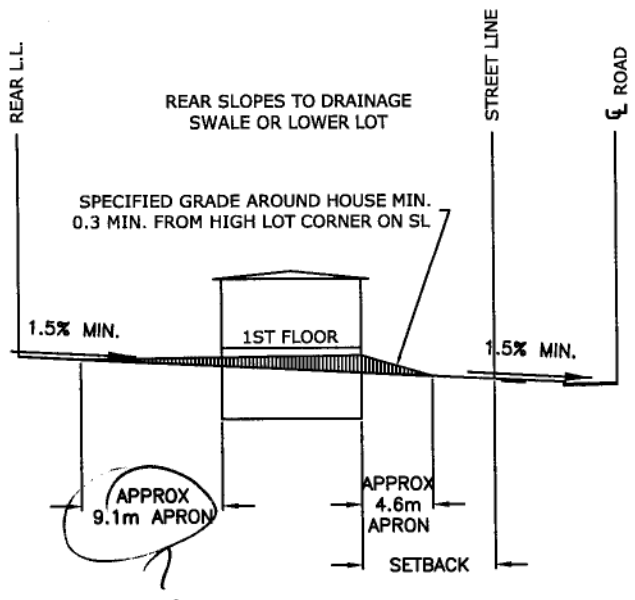
1. TYPICAL FOR SPLIT DRAINAGE GRADING DESIGNS
2. APPLY NOTED MINIMUM REQUIREMENTS TO ALL OTHER GRADING DESIGNS WHICH ARE NOT TYPICAL.

STANDARD WALKWAY ACCESS

City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	02

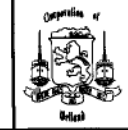


GENERAL NOTES
(FOR ALL GRADING TYPES)

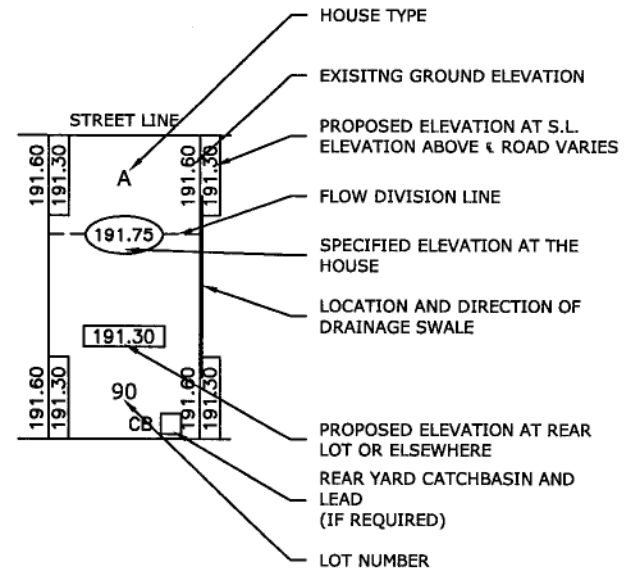
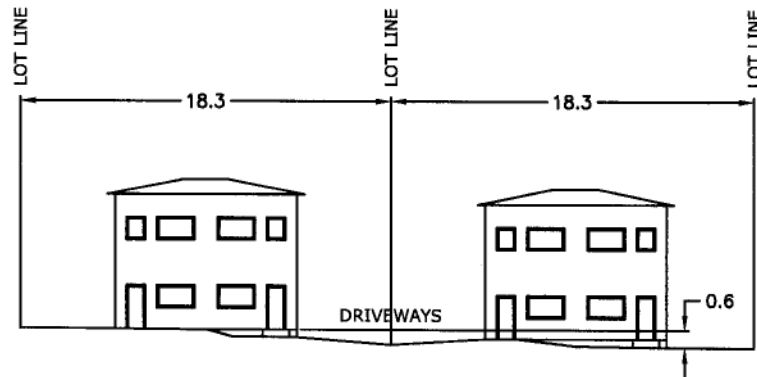
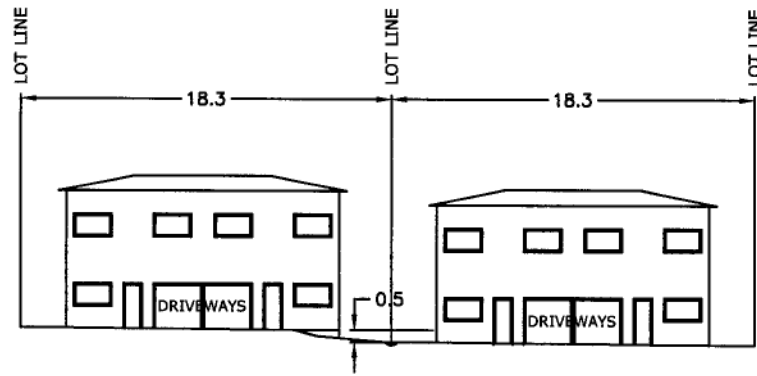
1. DIFFERENCE BETWEEN BUILDING LINE ELEVATION AND SIDE YARD SWALE ELEVATION IS TO BE MIN. 0.15m AND MAX 0.30m ACCORDING TO SIDE YARD WIDTH.
2. ALL SWALES TO BE MIN 1.0% WITH MIN. 100mm Ø PERFORATED SUBDRAIN (OPSS 405).
3. A MIN 0.60m APRON IS TO BE MAINTAINED AGAINST ALL DWELLING UNITS TO ALLOW ACCESS FROM SIDE ENTRANCES TO THE FRONT AND REAR YARDS, 0.60m ACCESS TO BE ON GARAGE SIDE IF NO SIDE DOOR.
4. SLOPES WITHIN LOTS ARE TO HAVE A MAX GRADE OF 3:1. STRUCTURAL RETAINING WALL REQUIRED WHERE MAX. SLOPE EXCEEDED.
5. DIFFERENCE BETWEEN SIDE DOOR SILL AND GROUND ELEVATION TO BE MAX. 0.40m.
6. DIFFERENCE BETWEEN TOP OF FOUNDATION WALL AND BUILDING LINE ELEVATION TO BE MIN 0.15m.
7. MIN. 75% OF REAR YARD AREA TO BE GRADED BETWEEN 2% AND 5%.
8. TYPE "A" AND TYPE "C" LOTS WITH THROUGH DRAINAGE FROM OTHER TYPE LOTS ABUTTING THE REAR LOT LINE ARE TO BE A MIN. OF 12m IN WIDTH.
9. DRIVEWAY GRADES:
FROM CURB TO STREET LINE: MIN. 2.0%, MAX. 6.0%
FROM STREET LINE TO GARAGE: MIN. 1.5%, MAX. 8.0%

URBAN LOT GRADING
TYPE 'A' - BACK TO FRONT DRAINAGE

City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	17



GENERAL NOTES
(FOR ALL GRADING TYPES)

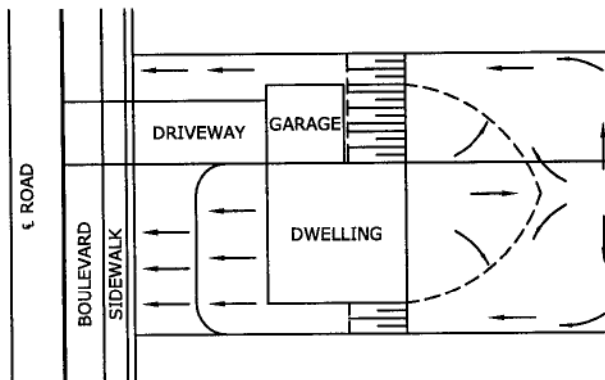
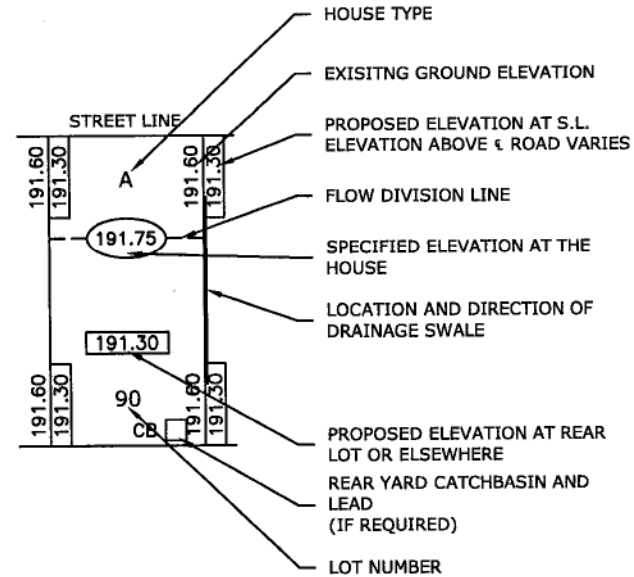
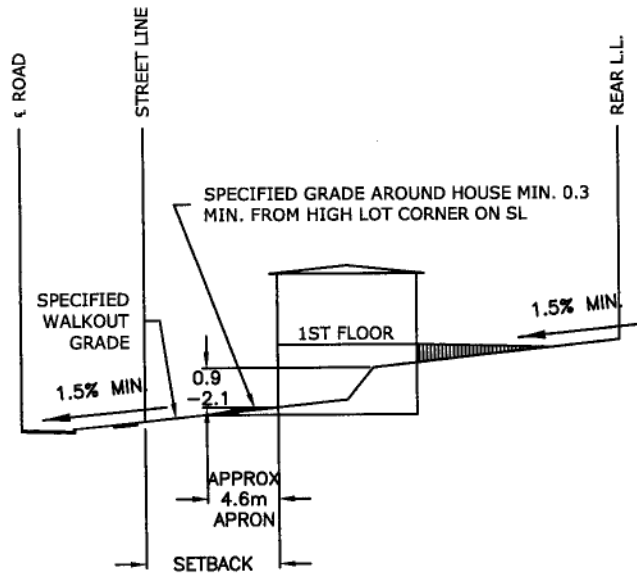
1. DIFFERENCE BETWEEN BUILDING LINE ELEVATION AND SIDE YARD SWALE ELEVATION IS TO BE MIN. 0.15m AND MAX 0.30m ACCORDING TO SIDE YARD WIDTH.
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4. SLOPES WITHIN LOTS ARE TO HAVE A MAX GRADE OF 3:1. STRUCTURAL RETAINING WALL REQUIRED WHERE MAX. SLOPE EXCEEDED.
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9. DRIVEWAY GRADES:
FROM CURB TO STREET LINE: MIN. 2.0%, MAX. 6.0%
FROM STREET LINE TO GARAGE: MIN. 1.5%, MAX. 8.0%

**URBAN LOT GRADING
SEMI-DETACHED ON TERRACES**

City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	



GENERAL NOTES
(FOR ALL GRADING TYPES)

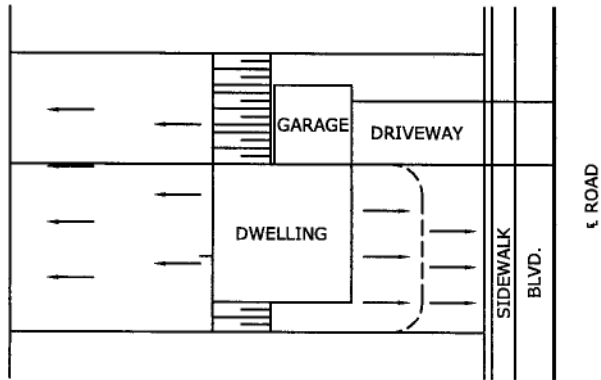
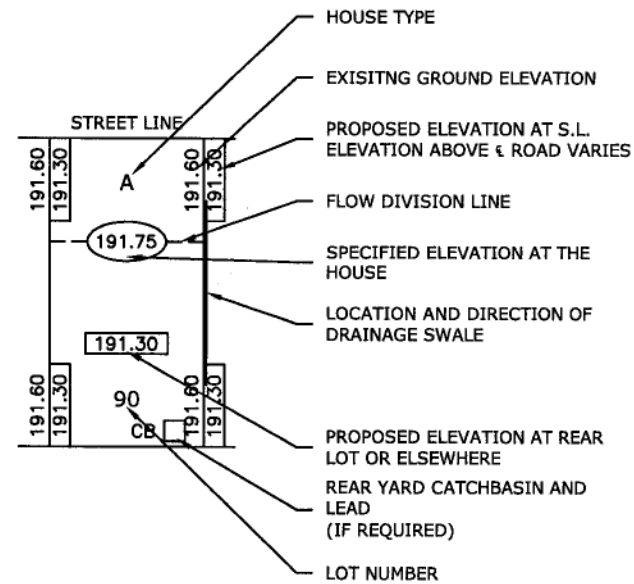
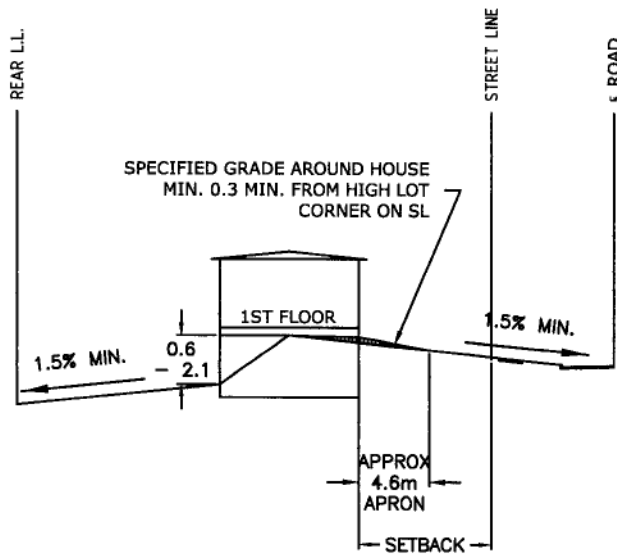
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6. DIFFERENCE BETWEEN TOP OF FOUNDATION WALL AND BUILDING LINE ELEVATION TO BE MIN 0.15m.
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9. DRIVEWAY GRADES:
FROM CURB TO STREET LINE: MIN. 2.0%, MAX. 6.0%
FROM STREET LINE TO GARAGE: MIN. 1.5%, MAX. 8.0%

URBAN LOT GRADING
TYPE 'C' - BACK TO FRONT DRAINAGE WITH WALKOUT

City of Welland
Infrastructure Services



Scale:	Scale:
Rev. Date:	Rev. Date:
Std. No.:	19



GENERAL NOTES
(FOR ALL GRADING TYPES)

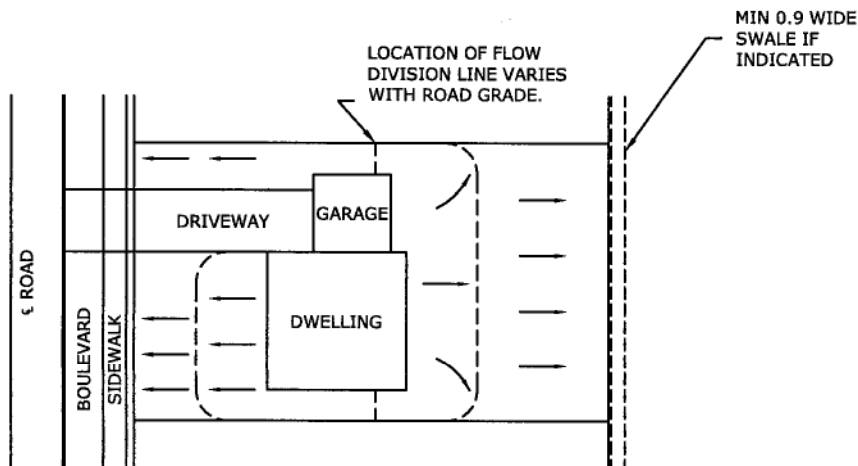
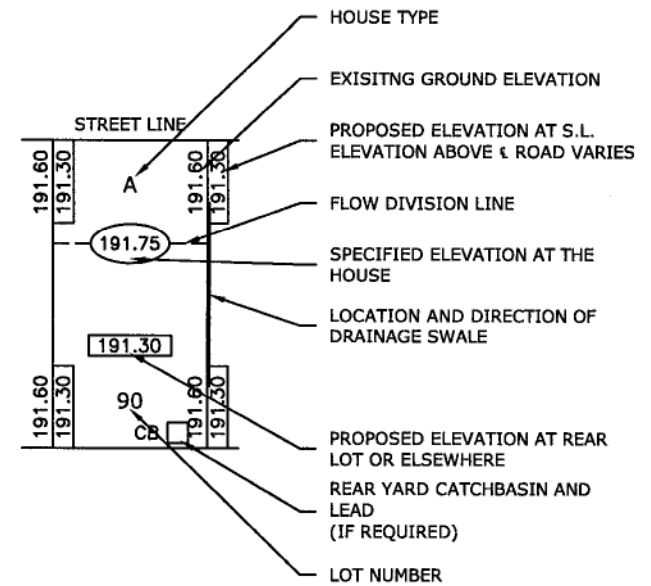
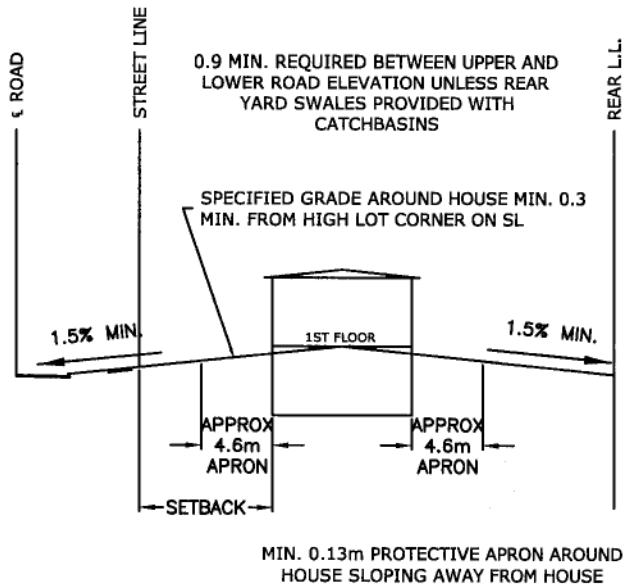
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8. TYPE "A" AND TYPE "C" LOTS WITH THROUGH DRAINAGE FROM OTHER TYPE LOTS ABUTTING THE REAR LOT LINE ARE TO BE A MIN. OF 12m IN WIDTH.
9. DRIVEWAY GRADES:
FROM CURB TO STREET LINE: MIN. 2.0%, MAX. 6.0%
FROM STREET LINE TO GARAGE: MIN. 1.5%, MAX. 8.0%

URBAN LOT GRADING
TYPE 'B' - SPLIT DRAINAGE WITH WALKOUT

City of Welland
Infrastructure Services



Scale: N.T.S.
Rev. Date: 2007.04
Std. No.:



GENERAL NOTES
(FOR ALL GRADING TYPES)

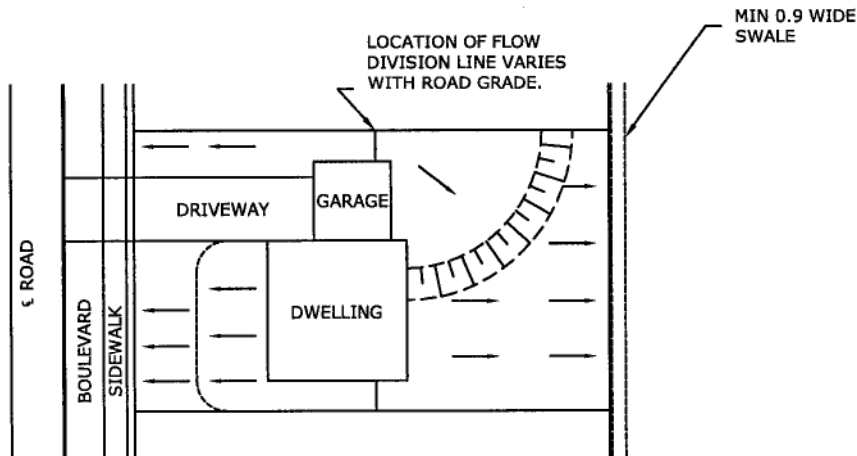
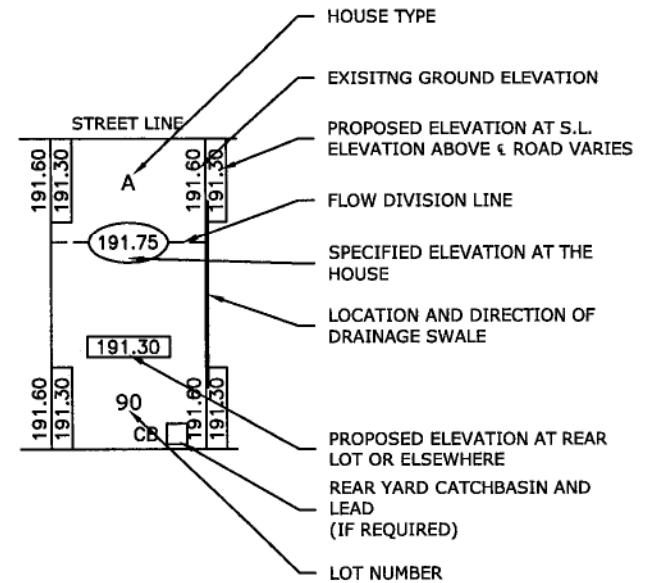
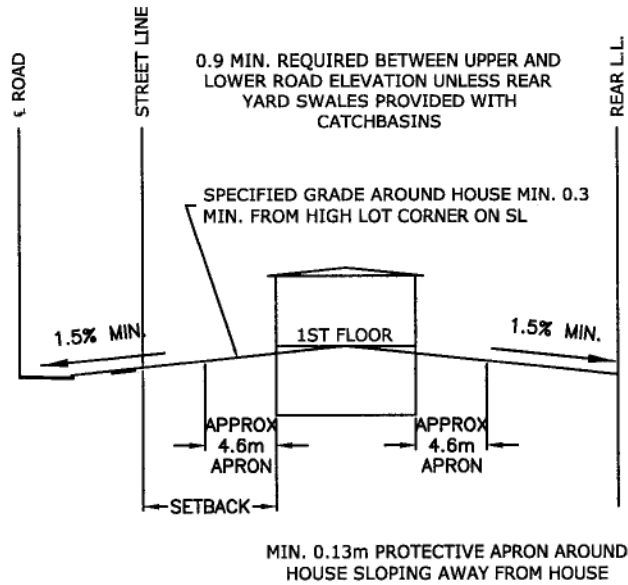
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2. ALL SWALES TO BE MIN 1.0% WITH MIN. 100mm Ø PERFORATED SUBDRAIN (OPSS 405).
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5. DIFFERENCE BETWEEN SIDE DOOR SILL AND GROUND ELEVATION TO BE MAX. 0.40m.
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9. DRIVEWAY GRADES:
FROM CURB TO STREET LINE: MIN. 2.0%, MAX. 6.0%
FROM STREET LINE TO GARAGE: MIN. 1.5%, MAX. 8.0%

URBAN LOT GRADING
TYPE 'D' - SPLIT DRAINAGE

City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	



GENERAL NOTES
(FOR ALL GRADING TYPES)

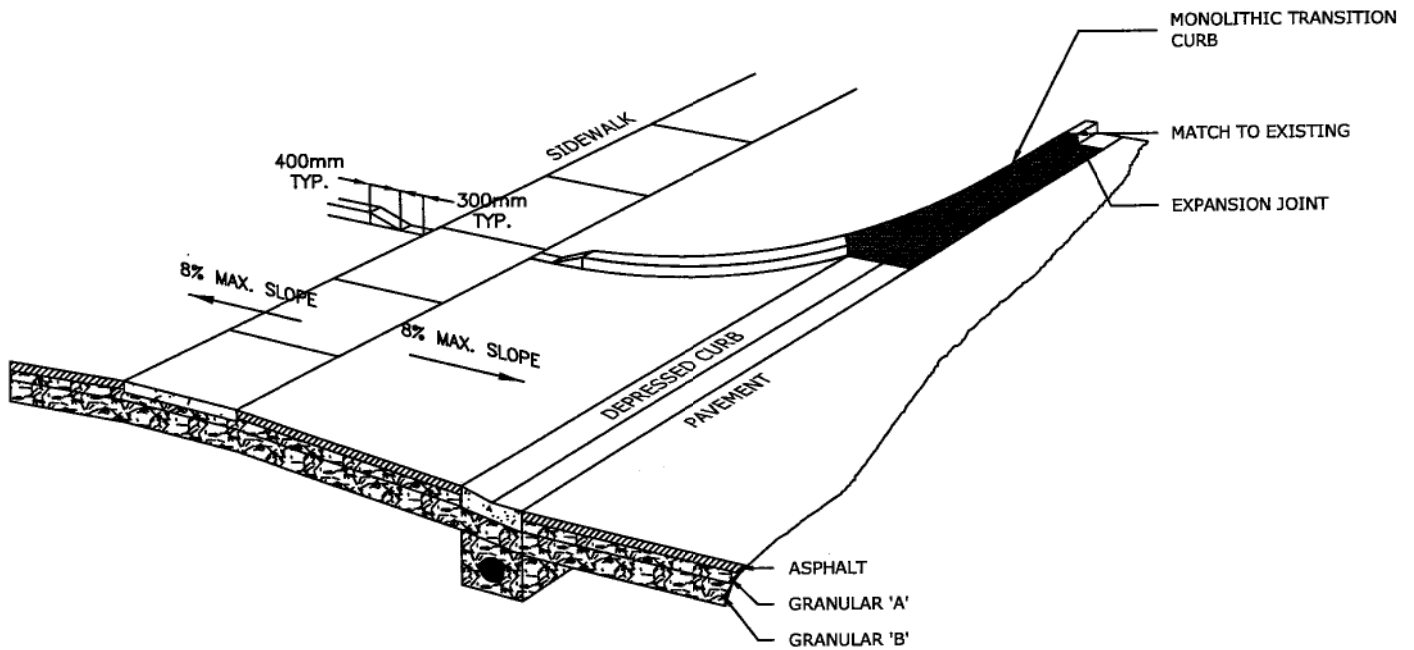
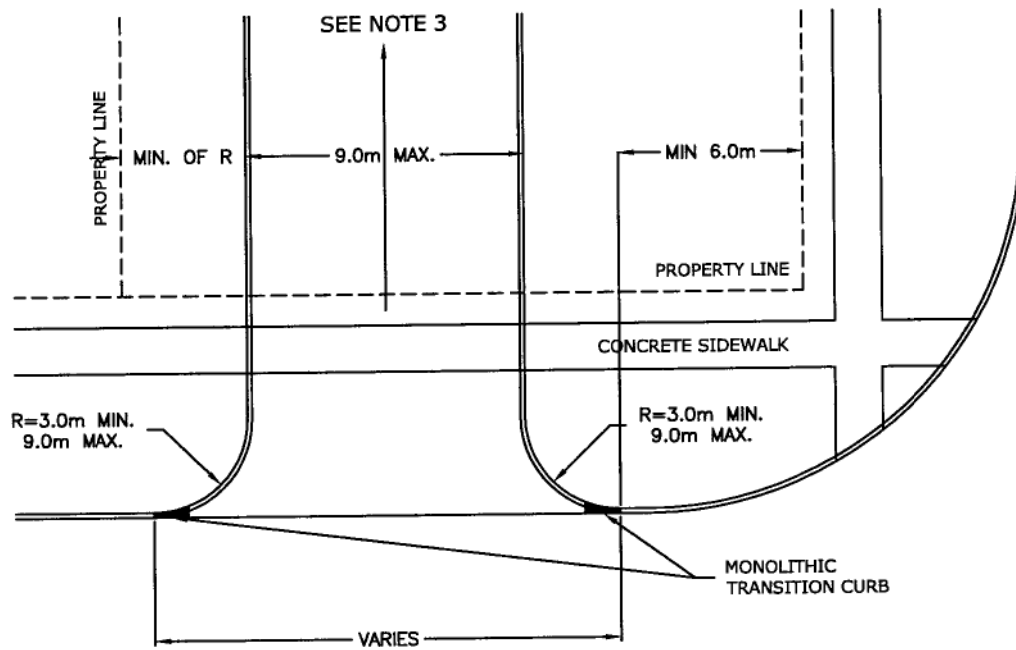
1. DIFFERENCE BETWEEN BUILDING LINE ELEVATION AND SIDE YARD SWALE ELEVATION IS TO BE MIN. 0.15m AND MAX 0.30m ACCORDING TO SIDE YARD WIDTH.
2. ALL SWALES TO BE MIN 1.0% WITH MIN. 100mm ϕ PERFORATED SUBDRAIN (OPSS 405).
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9. DRIVEWAY GRADES:
FROM CURB TO STREET LINE: MIN. 2.0%, MAX. 6.0%
FROM STREET LINE TO GARAGE: MIN. 1.5%, MAX. 8.0%

URBAN LOT GRADING
TYPE 'E' - SPLIT DRAINAGE

City of Welland
Infrastructure Services



Scale: N.T.S.
Rev. Date: 2007.04
Std. No.: 21



MINIMUM DRIVEWAY PAVEMENT DESIGN

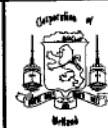
	LIGHT INDUSTRIAL COMMERCIAL	HEAVY INDUSTRIAL COMMERCIAL
SURFACE COURSE ASPHALT HL3 (OPSS 1150)	40mm	40mm
BASE COURSE ASPHALT HL8 (OPSS 1150)	50mm	75mm
GRANULAR 'A' (OPSS 1010)	150mm	150mm
GRANULAR 'B' (OPSS 1010)	225mm	300mm

NOTES:

1. THE DRIVEWAY SHALL INTERSECT THE ROADWAY WITH AN ANGLE OF NOT LESS THAN 60°.
2. RADIUS TO BE APPROVED BY THE ENGINEERING DEPARTMENT.
3. DRAINAGE TO BE CONTAINED ON SITE.
4. REFER TO THE CITY OF WELLAND STD. NO. FOR SIDEWALK DETAIL.
5. NOWHERE ON THE DRIVEWAY SHALL THE GRADE DIFFERENTIAL EXCEED 8%.

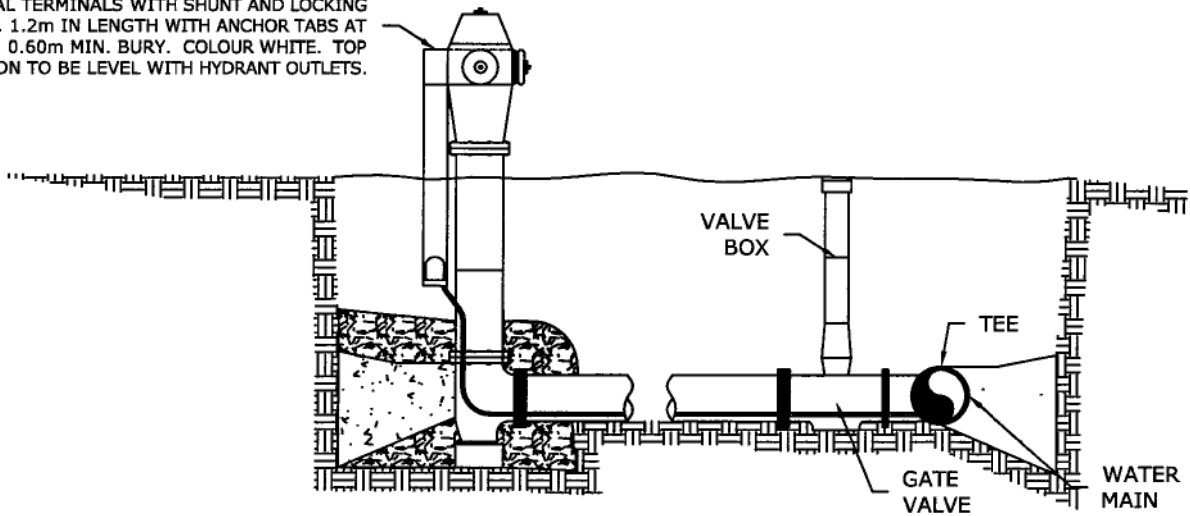
INDUSTRIAL AND COMMERCIAL ENTRANCE DETAIL

City of Welland
Infrastructure Services

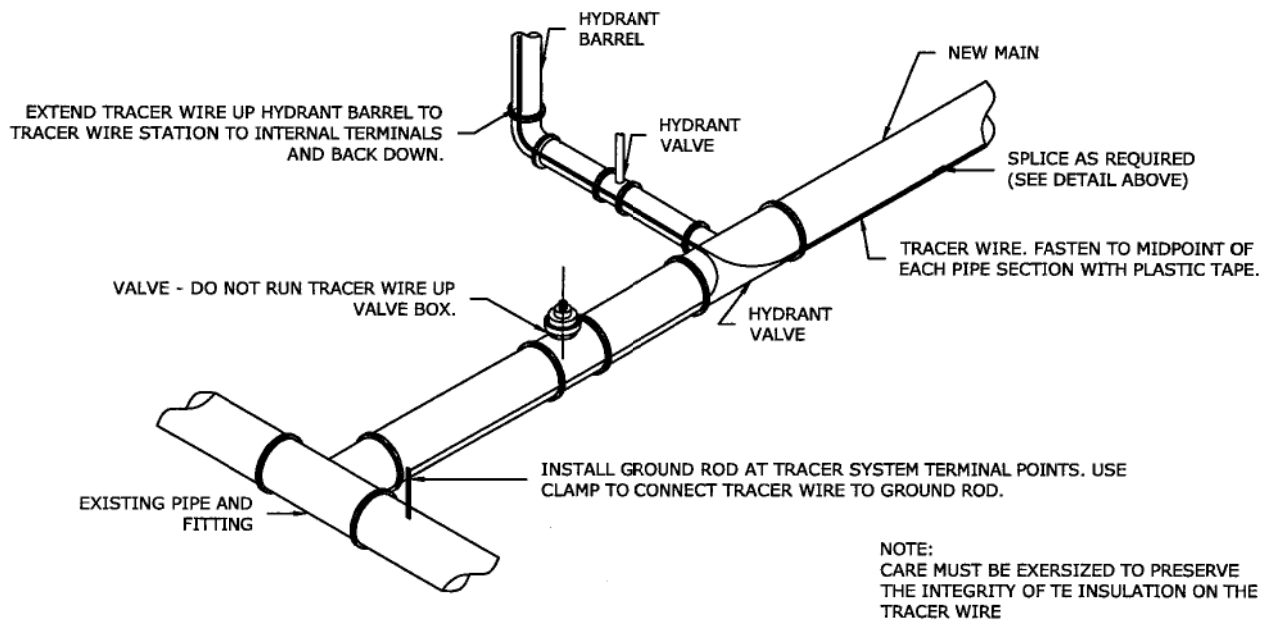


Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	09

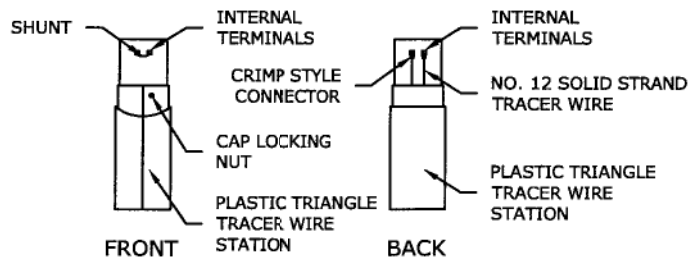
PLASTIC TRIANGLE TRACER WIRE STATION WITH 2 INTERNAL TERMINALS WITH SHUNT AND LOCKING CAP. 1.2m IN LENGTH WITH ANCHOR TABS AT BOTTOM. 0.60m MIN. BURY. COLOUR WHITE. TOP OF STATION TO BE LEVEL WITH HYDRANT OUTLETS.



TRACER WIRE STATION AT HYDRANT



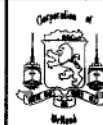
TRACER WIRE DETAIL



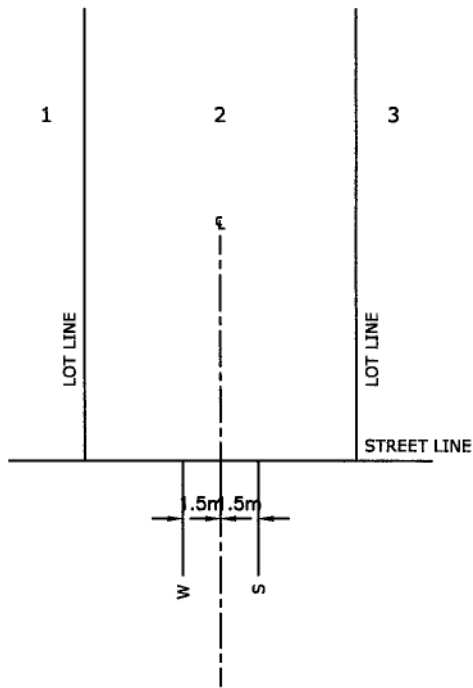
TRACER WIRE RECEPTACLE DETAIL

TRACER WIRE DETAIL

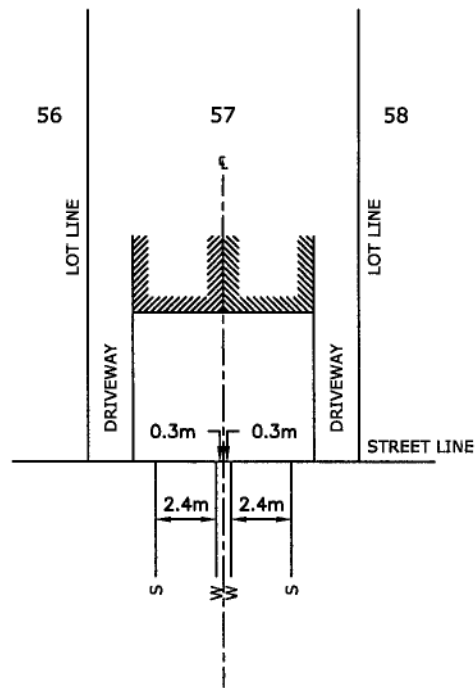
City of
Welland
Infrastructure
Services



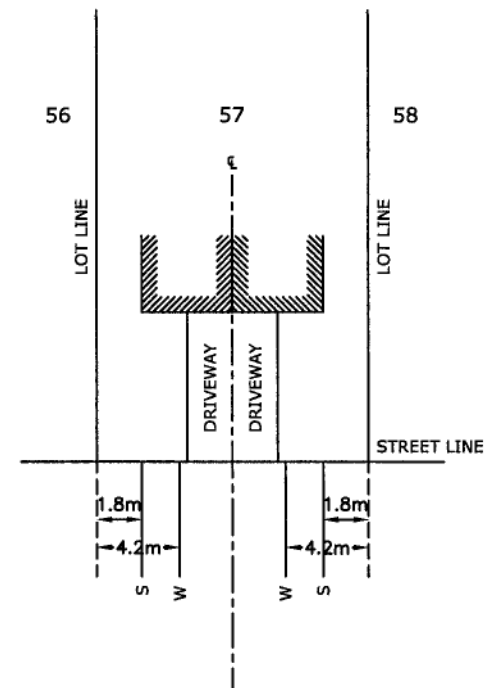
Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	03



SINGLE FAMILY LOT



SEMI-DETACHED LOT
NON-CENTRED DRIVEWAYS



SEMI-DETACHED LOT
CENTRED DRIVEWAYS

LEGEND

- W 25mm Ø WATER SERVICE
- S 125mm Ø SANITARY LATERAL

NOTE: FOR MULTIPLE ATTACHED DWELLING UNITS (EG. TOWNHOUSES) THE MINIMUM SEPARATION BETWEEN THE WATER SERVICE AND SANITARY SEWER LATERAL SHALL BE 2.4m AS PER M.O.E. GUIDELINES.

STANDARD LATERAL LOCATIONS

City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	0

STREET:	BUILDING NUMBER:
SUBDIVISION:	LOT NUMBER:
SERVICED OFF SAME STREET <input type="checkbox"/>	SERVICED OFF OTHER STREET <input type="checkbox"/> (SPECIFY)

INSTALLED BY:	
INSPECTED BY:	DATE:

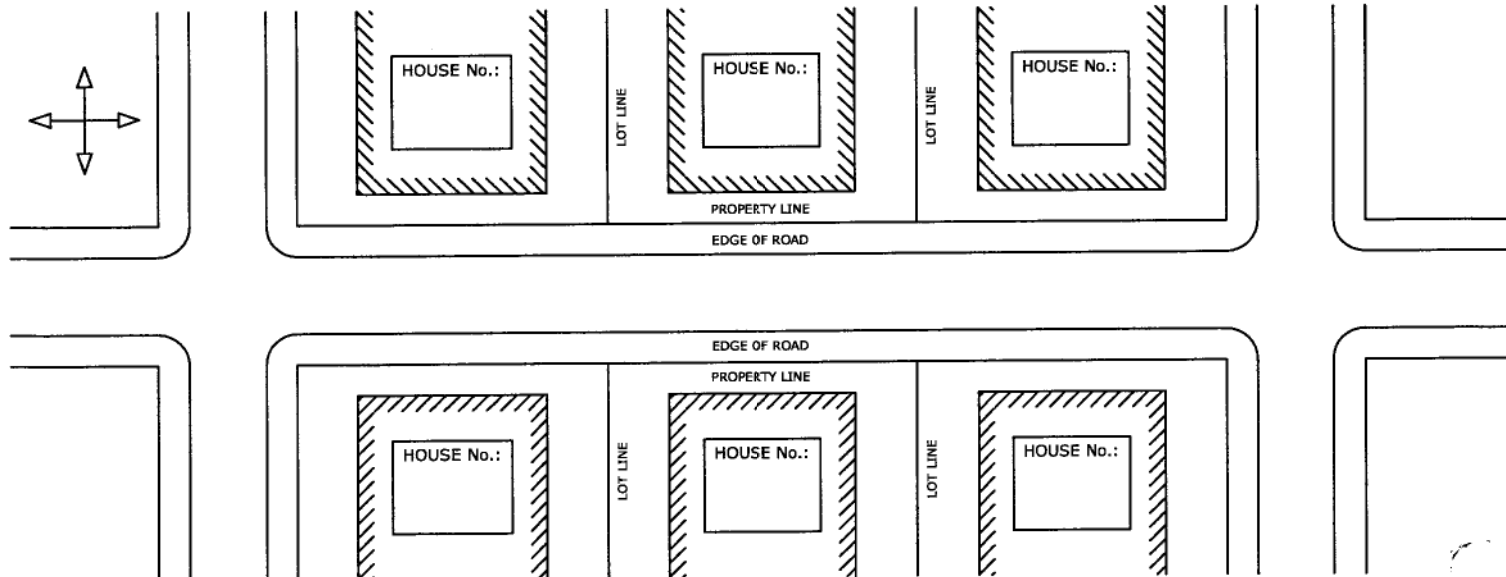
MAINLINE		
DIAMETER:	MATERIAL:	COVER:
(mm)		(m)

TEE	
DISTANCE FROM NEAREST MAINTENANCE HOLE:	DIRECTION:
(m)	
LOCATION/DESCRIPTION OF NEAREST MAINTENANCE HOLE:	

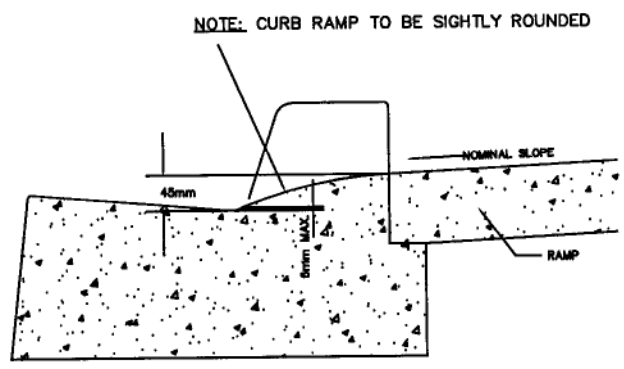
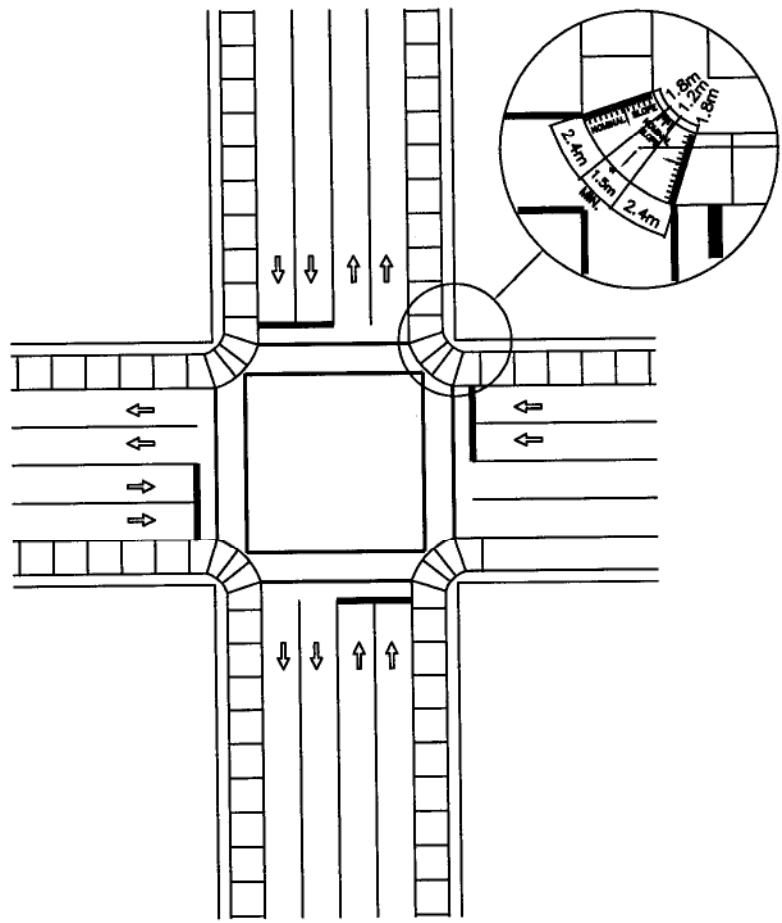
LATERAL AT STREET LINE					
CITY SERVICE PIPE			PRIVATE (HOMEOWNER'S) SERVICE PIPE		
MATERIAL LENGTH (m)	SIZE (mm)	MATERIAL	MATERIAL LENGTH (m)	SIZE (mm)	MATERIAL

LOCATION AT PROPERTY	
LATERAL:	DIRECTION:
CLEANOUT:	

REMARKS:



SANITARY SEWER SERVICE LATERAL RECORD	City of Welland Infrastructure Services		Scale:	N.T.S.
			Rev. Date:	2007.04
			Std. No.:	05

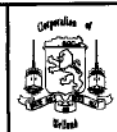


NOTES:

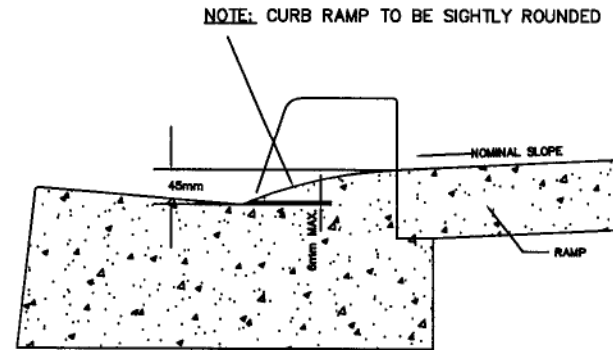
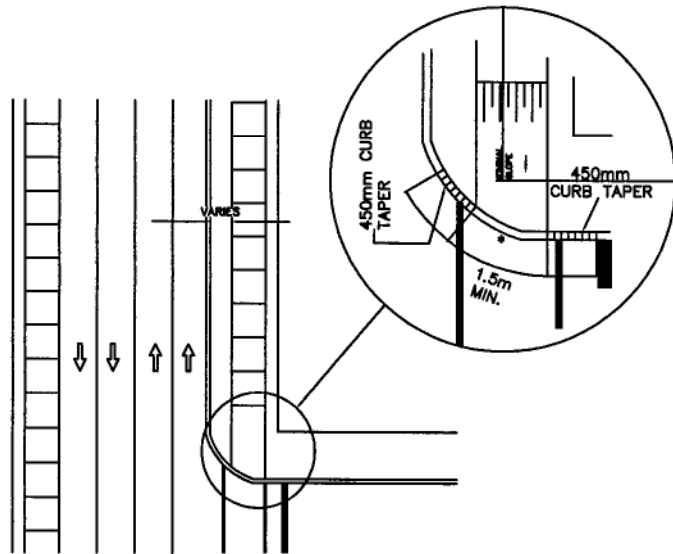
1. RAMP BASE IS TO BE WIDENED AS REQUIRED TO PERMIT WHEEL CHAIR USERS TO SAFELY ENTER/EXIT CROSSWALK.
 2. RAMP SURFACE IS TO BE PROPERLY TEXTURED FOR ADEQUATE FRICTION REQUIRED BY WHEELCHAIRS.
 3. RAMP IS TO BE CONSTRUCTED TO AN ABSOLUTE MINIMUM ATTAINABLE SLOPE.
 4. NOMINAL SLOPE = 4% (25mm TO 50mm)
- *DENOTES FULL DEPRESSION REQUIRED FOR CURB

**SIDEWALK RAMP
4-WAY INTERSECTION, MID-RADIUS RAMP**

City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	11



NOTES:

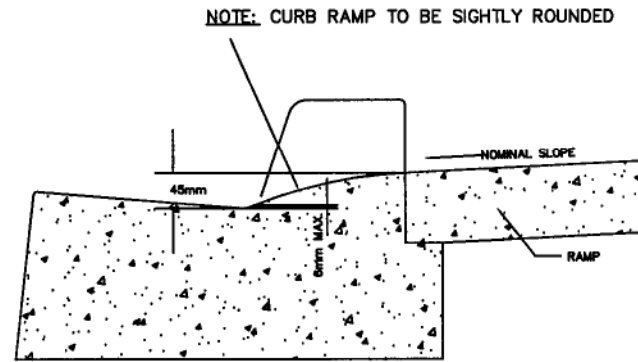
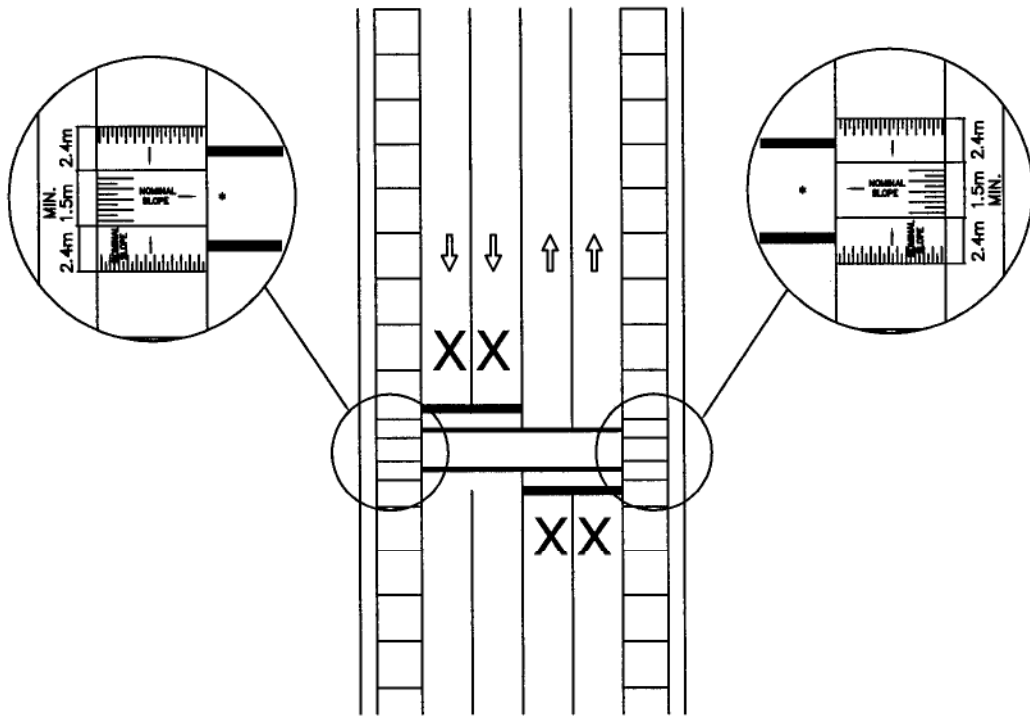
1. RAMP BASE IS TO BE WIDENED AS REQUIRED TO PERMIT WHEEL CHAIR USERS TO SAFELY ENTER/EXIT CROSSWALK.
 2. RAMP SURFACE IS TO BE PROPERLY TEXTURED FOR ADEQUATE FRICTION REQUIRED BY WHEELCHAIRS.
 3. RAMP IS TO BE CONSTRUCTED TO AN ABSOLUTE MINIMUM ATTAINABLE SLOPE.
 4. NOMINAL SLOPE = 4% (25mm TO 50mm)
- *DENOTES FULL DEPRESSION REQUIRED FOR CURB

**SIDEWALK RAMP WITH BOULEVARD
'T' INTERSECTION**

City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	1



NOTES:

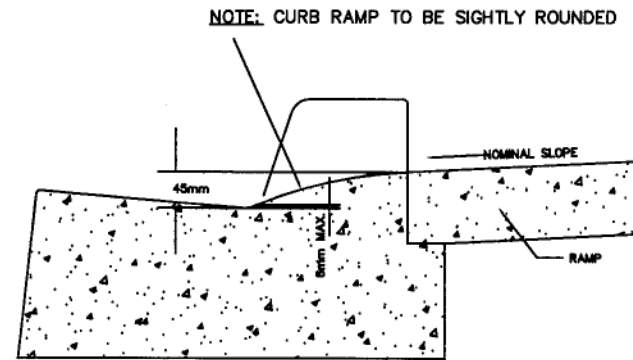
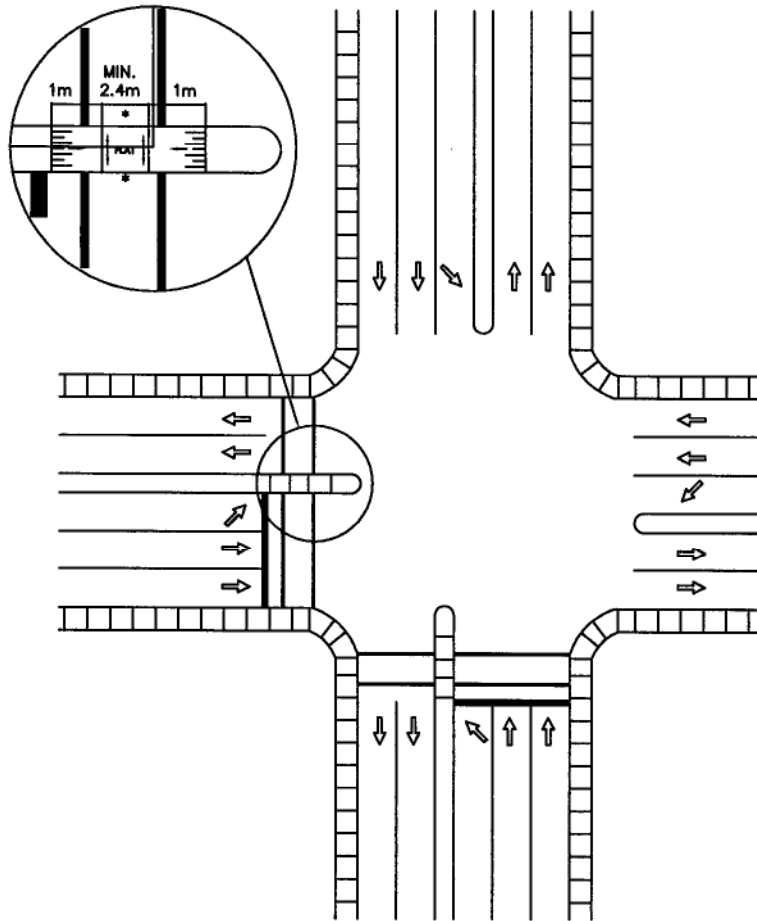
1. RAMP BASE IS TO BE WIDENED AS REQUIRED TO PERMIT WHEEL CHAIR USERS TO SAFELY ENTER/EXIT CROSSWALK.
 2. RAMP SURFACE IS TO BE PROPERLY TEXTURED FOR ADEQUATE FRICTION REQUIRED BY WHEELCHAIRS.
 3. RAMP IS TO BE CONSTRUCTED TO AN ABSOLUTE MINIMUM ATTAINABLE SLOPE.
 4. NOMINAL SLOPE = 4% (25mm TO 50mm)
- *DENOTES FULL DEPRESSION REQUIRED FOR CURB

**SIDEWALK RAMP
PEDESTRIAN CROSS, OVER RAMP AT MID BLOCK**

City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	13



NOTES:

1. RAMP BASE IS TO BE WIDENED AS REQUIRED TO PERMIT WHEEL CHAIR USERS TO SAFELY ENTER/EXIT CROSSWALK.
2. RAMP SURFACE IS TO BE PROPERLY TEXTURED FOR ADEQUATE FRICTION REQUIRED BY WHEELCHAIRS.
3. RAMP IS TO BE CONSTRUCTED TO AN ABSOLUTE MINIMUM ATTAINABLE SLOPE.
4. NOMINAL SLOPE = 4% (25mm TO 50mm)

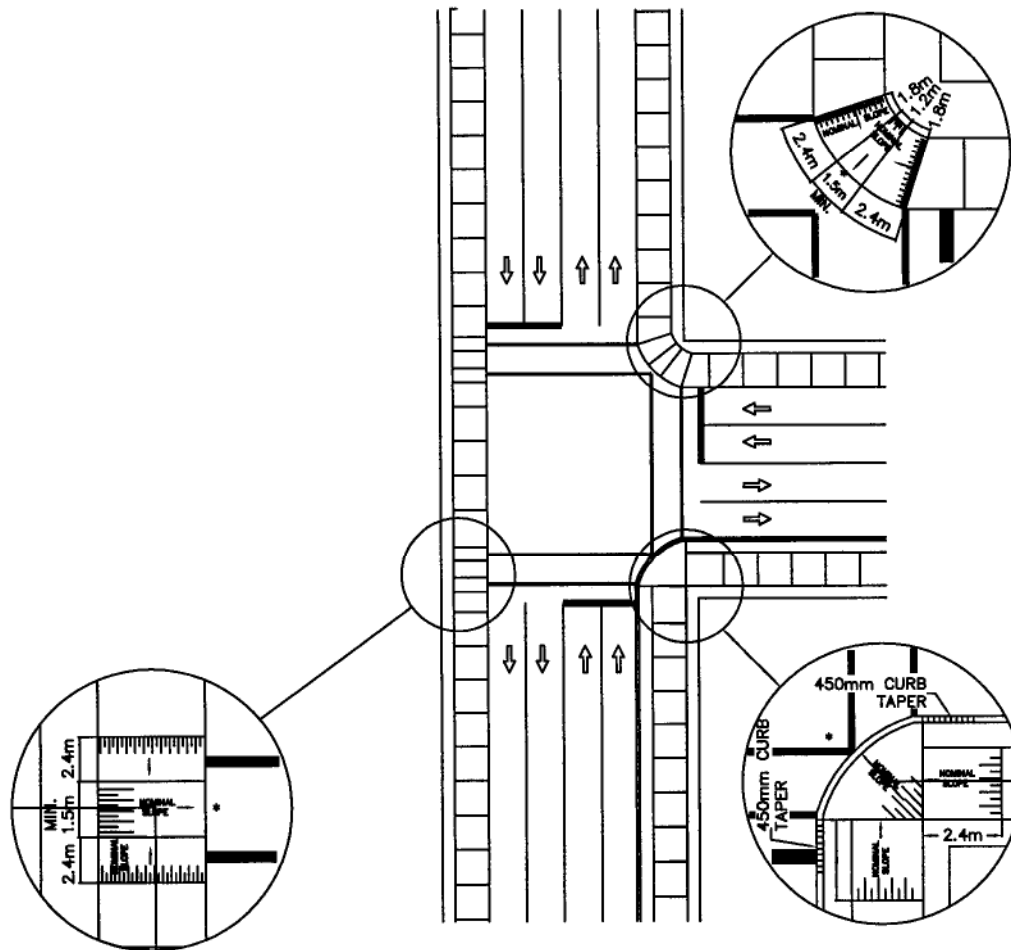
*DENOTES FULL DEPRESSION REQUIRED FOR CURB

**SIDEWALK RAMP IN MEDIUM
4 QUAD INTERSECTION**

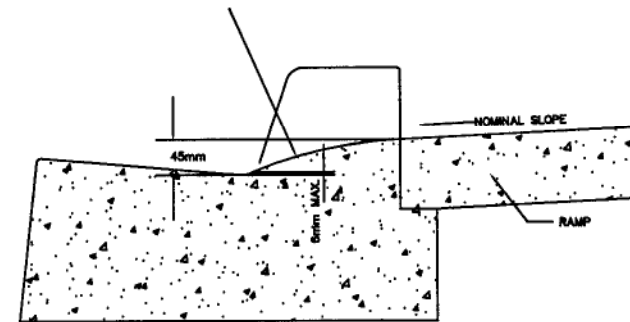
City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	



NOTE: CURB RAMP TO BE SLIGHTLY ROUNDED



NOTES:

1. RAMP BASE IS TO BE WIDENED AS REQUIRED TO PERMIT WHEEL CHAIR USERS TO SAFELY ENTER/EXIT CROSSWALK.
2. RAMP SURFACE IS TO BE PROPERLY TEXTURED FOR ADEQUATE FRICTION REQUIRED BY WHEELCHAIRS.
3. RAMP IS TO BE CONSTRUCTED TO AN ABSOLUTE MINIMUM ATTAINABLE SLOPE.
4. NOMINAL SLOPE = 4% (25mm TO 50mm)

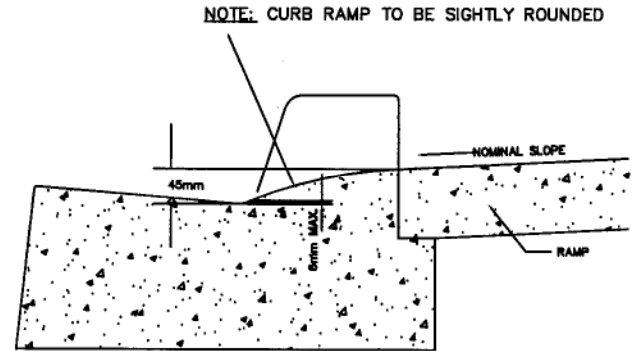
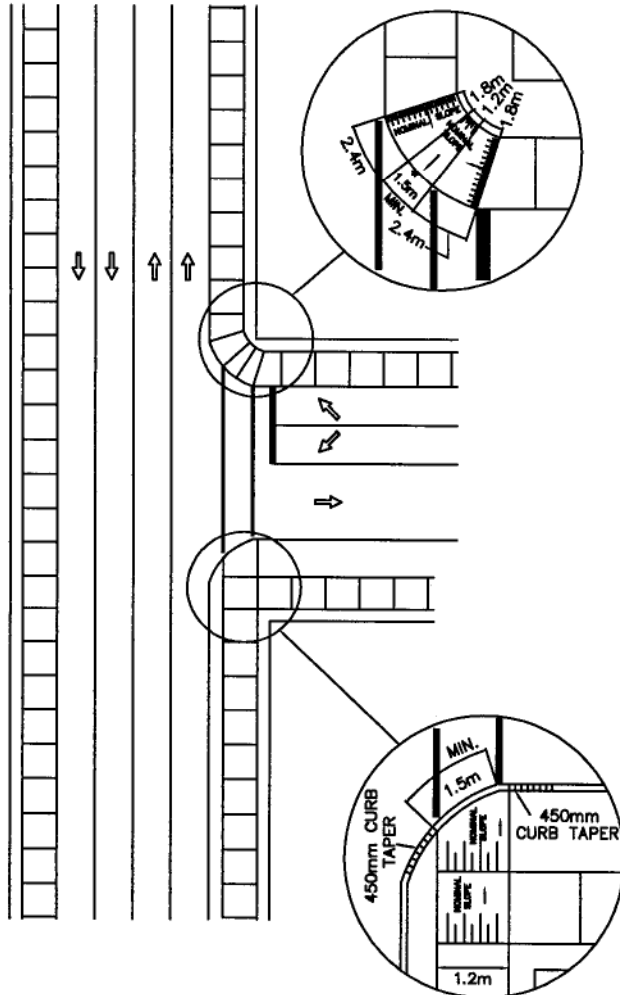
*DENOTES FULL DEPRESSION REQUIRED FOR CURB

**SIDEWALK RAMP
FULLY CONTROLLED 'T' INTERSECTION**

City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	14



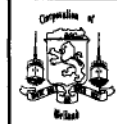
NOTES:

1. RAMP BASE IS TO BE WIDENED AS REQUIRED TO PERMIT WHEEL CHAIR USERS TO SAFELY ENTER/EXIT CROSSWALK.
2. RAMP SURFACE IS TO BE PROPERLY TEXTURED FOR ADEQUATE FRICTION REQUIRED BY WHEELCHAIRS.
3. RAMP IS TO BE CONSTRUCTED TO AN ABSOLUTE MINIMUM ATTAINABLE SLOPE.
4. NOMINAL SLOPE = 4% (25mm TO 50mm)

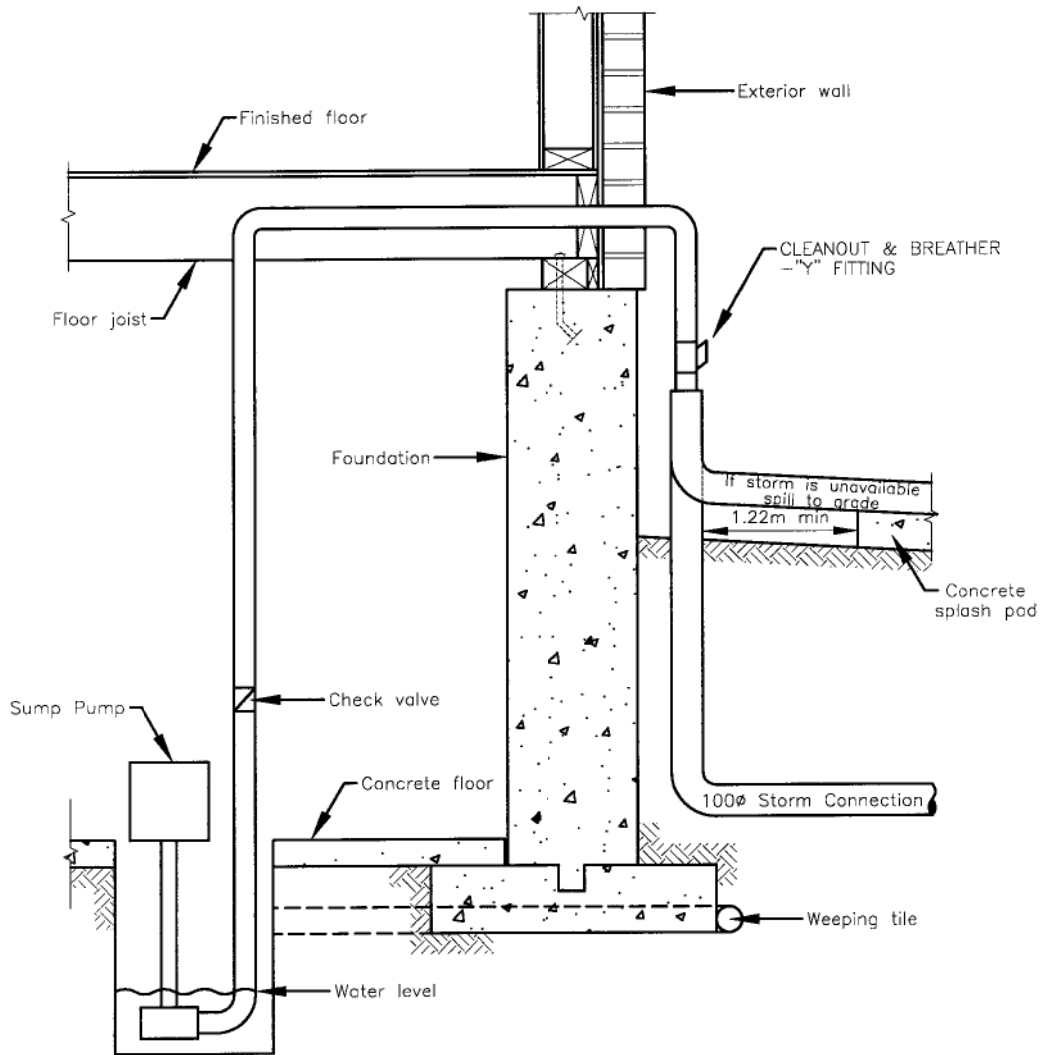
*DENOTES FULL DEPRESSION REQUIRED FOR CURB

**SIDEWALK RAMPS
'T' INTERSECTION**

City of Welland
Infrastructure Services



Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	1



NOTES

1. For storm sewer lateral location at property line see servicing drawings.
2. Other variations may be approved by the Building Department.
3. Sump pump and piping installation to be inspected by Building Dep't.

SUMP PUMP/STORM LATERAL INSTALLATION

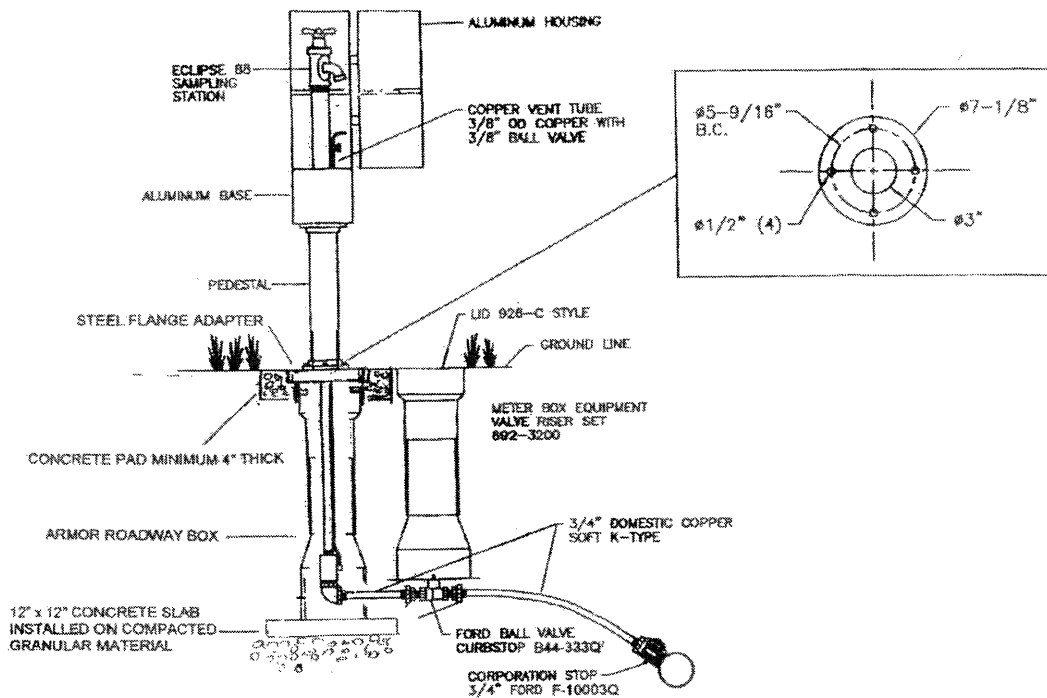
NTS



City of Welland
Infrastructure Services

DATE: Oct 27, 2008	SCALE: N.T.S.
DRAWN BY: J.C.	CHECKED BY: S.R.

SUMP PUMP/STORM LATERAL INSTALLATION



Sampling Stations shall be 1.7m bury, with a 3/4" FIP inlet, and a (3/4" hose or unthreaded) nozzle.

All stations shall be enclosed in a lockable, nonremovable, aluminum-cast housing.

When opened, the station shall require no key for operation, and the water will flow in an all brass waterway.

All working parts will also be of brass and be removable from above ground with no digging. Exterior piping shall be galvanized steel (brass pipe also available).

A copper vent tube will enable each station to be pumped free of standing water to prevent freezing and to minimize bacteria growth.

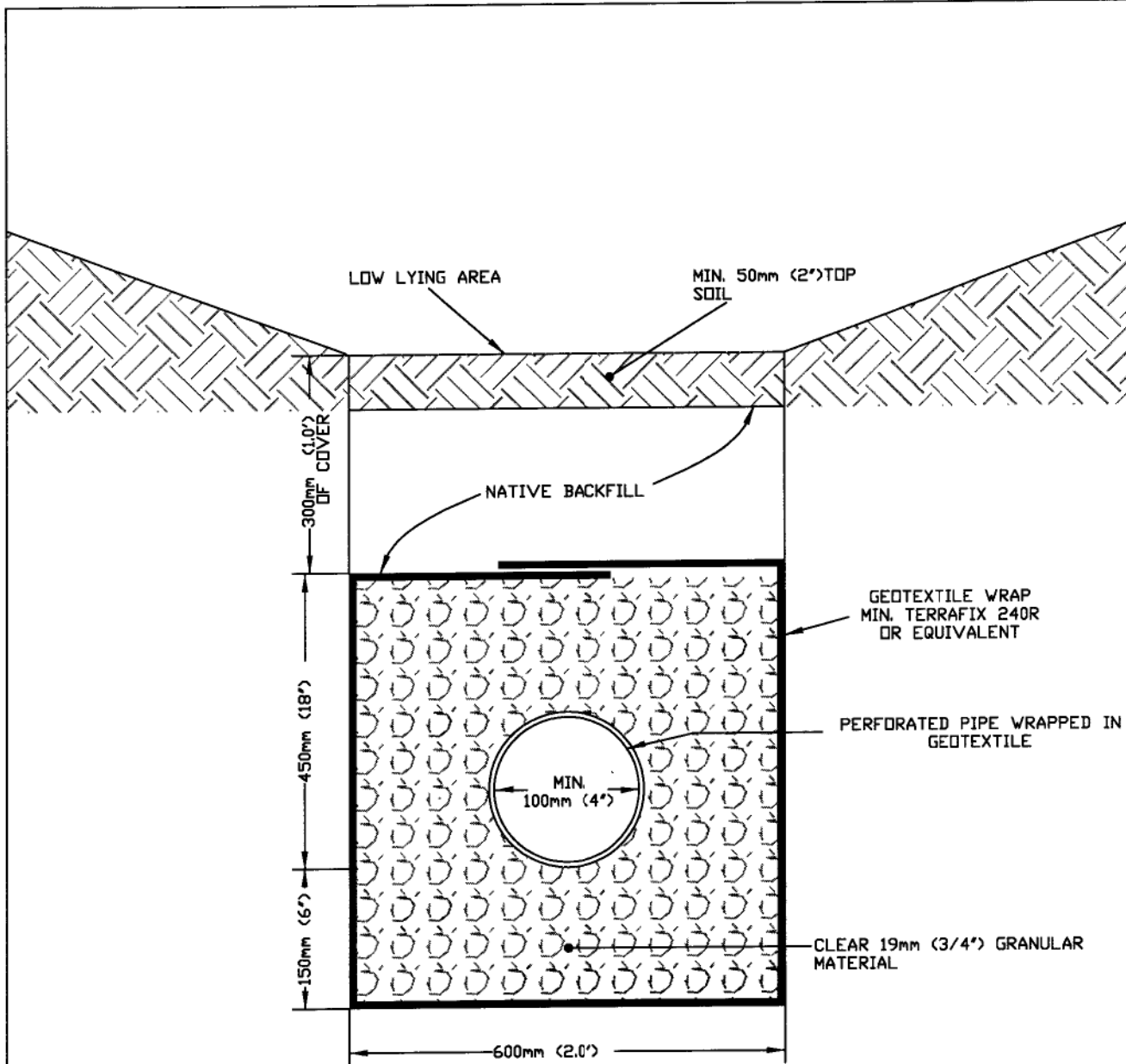


City of Welland
Infrastructure Services

DATE: MARCH 2009 SCALE: N.T.S.

DRAWN BY: JC CHECKED BY: SR

WELLAND SAMPLING STATION WITH FROST PROTECTION



NOTE:

- PIPE MAY BE CONNECTED TO CATCH BASIN, OR OUTLET TO OPEN DRAINAGE CHANNEL, i.e. DITCH AND SWALE, AS APPLICABLE.
- CATCH BASIN AND CURB LINE CONNECTIONS MUST BE PRE-APPROVED BY CITY PUBLIC WORKS DEPT.
- IMPERIAL MEASUREMENTS IN BRACKETS

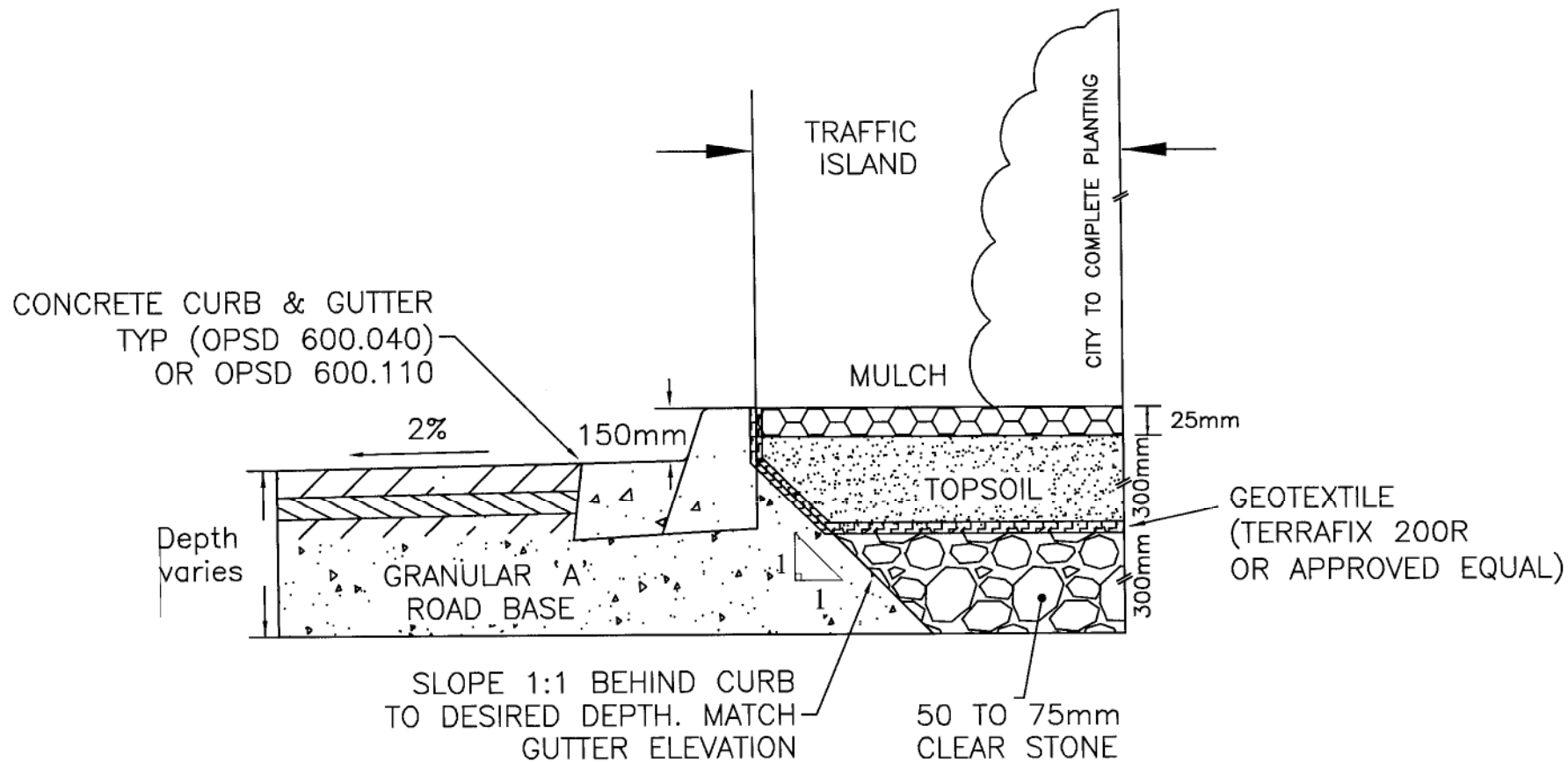
F:\DwgProj\Welland Standard Dwg\French Drain.dwg



**City of Welland
Infrastructure Services**

**RECOMMENDED
DETAILS ON FRENCH DRAINAGE
SYSTEM
FOR RESIDENTIAL USAGE**

DRWG. No. 1 OF 1	DATE: DECEMBER 5, 2002	SCALE: N.T.S.
FILE No.	DRAWN BY: N.V.T.	APPROVED BY: D. TSANG



City of Welland
Infrastructure Services

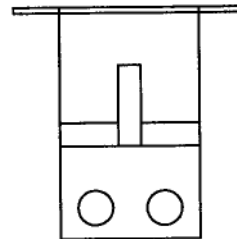
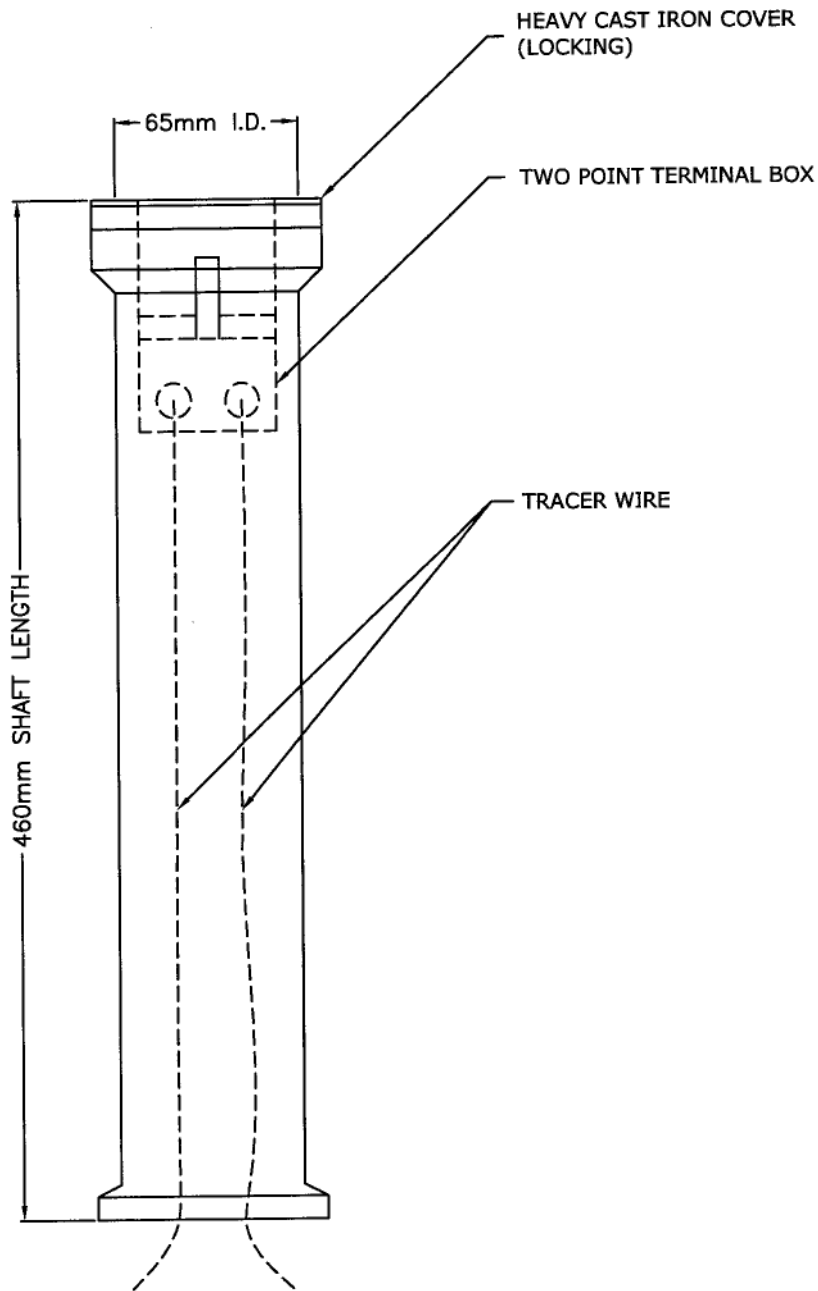
DATE: OCT. 5, 2010

SCALE: N.T.S.

DRAWN BY: J.C.

CHECKED BY: D.T.

STANDARD LANDSCAPED ISLAND DETAIL



LID ELEVATION
N.T.S.

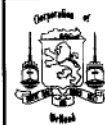


LID PLAN
N.T.S.

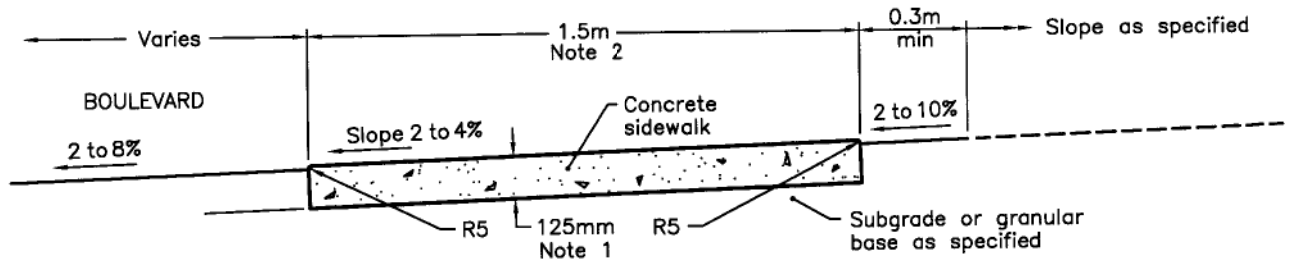
NOTE:
LOCATE TEST STATIONS BEHIND ALL FIRE HYDRANTS ON THE POTABLE DISTRIBUTION SYSTEM. TEST STATIONS SHALL NOT BE UTILIZED ON THE IRRIGATION SYSTEM.

TRACER WIRE TEST STATION

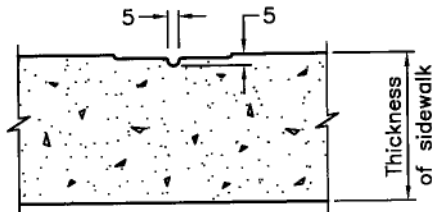
City of
Welland
Infrastructure
Services



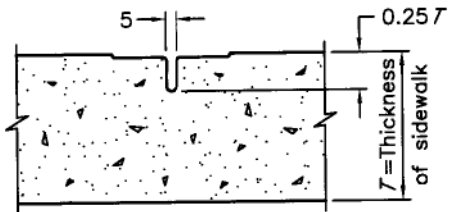
Scale:	N.T.S.
Rev. Date:	2007.04
Std. No.:	04



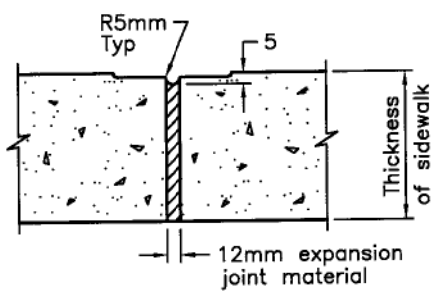
TYPICAL SECTION



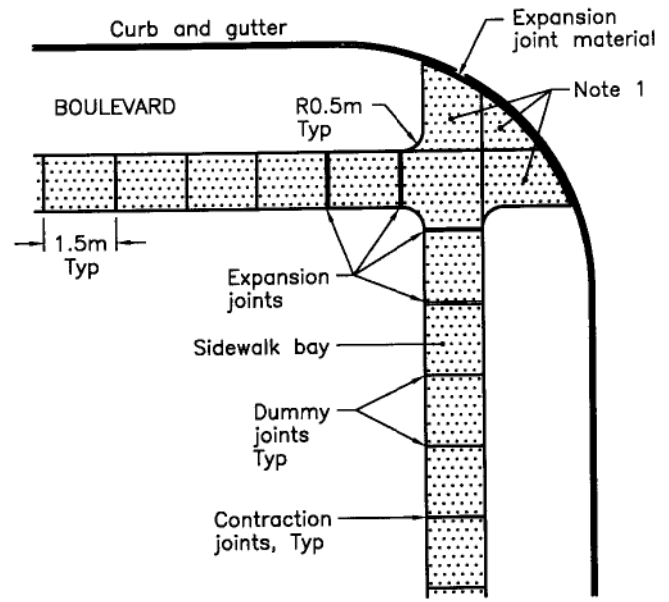
DUMMY JOINT



CONTRACTION JOINT



EXPANSION JOINT



JOINT LAYOUT

NOTES:

- 1 Sidewalk thickness at residential driveways and adjacent to curb shall be 150mm. At commercial and industrial driveways, the thickness shall be 200mm.
- 2 Sidewalk width shall be increased to 2.4m at schools, bus stops, and other high pedestrian areas.

- A This OPSD to be read in conjunction with OPSD-310.030.
- B All dimensions are in millimetres unless otherwise shown.

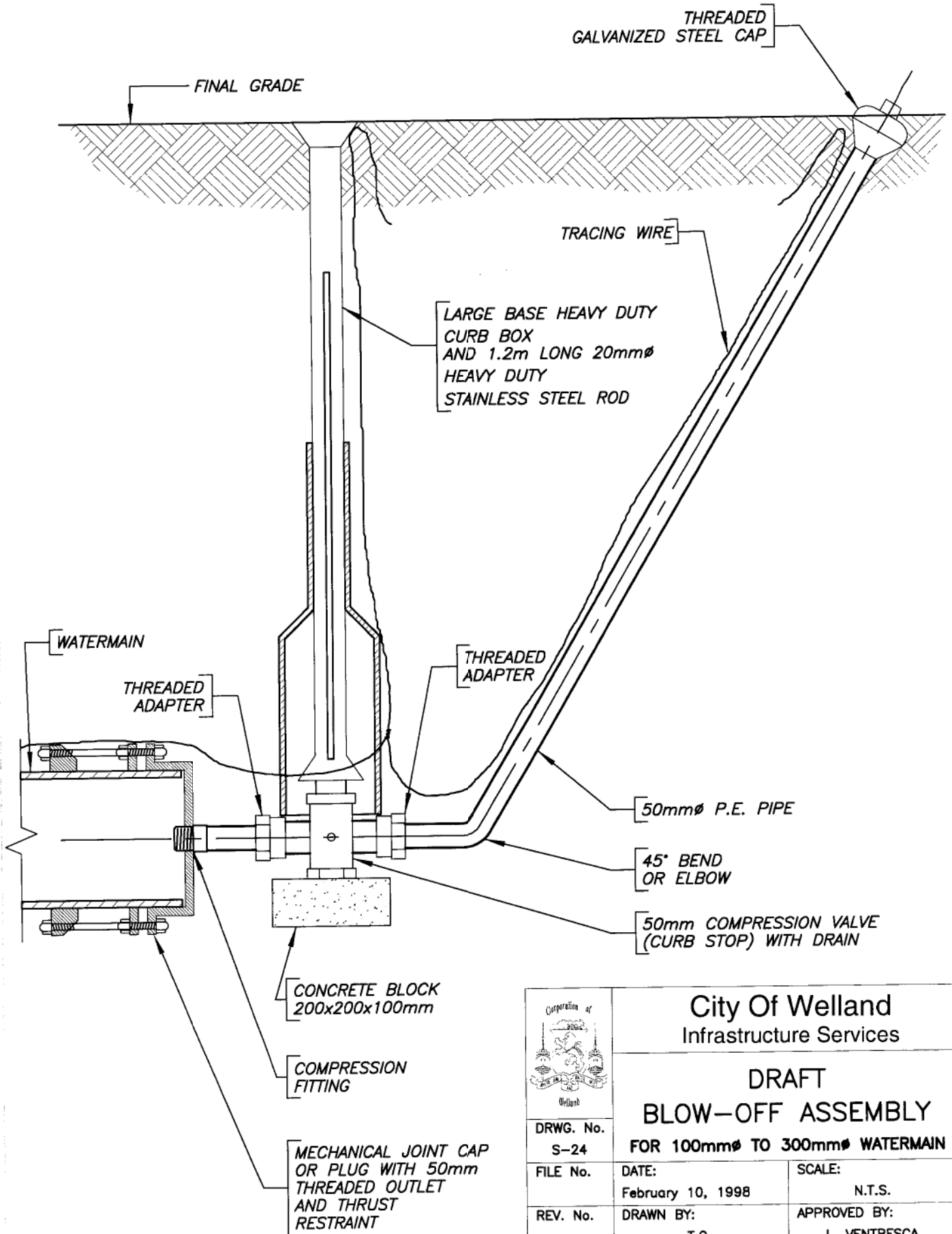
ONTARIO PROVINCIAL STANDARD DRAWING


Nov 2005 Rev 1

CONCRETE SIDEWALK

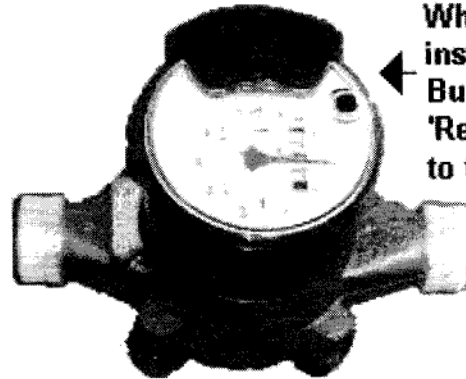


OPSD - 310.010

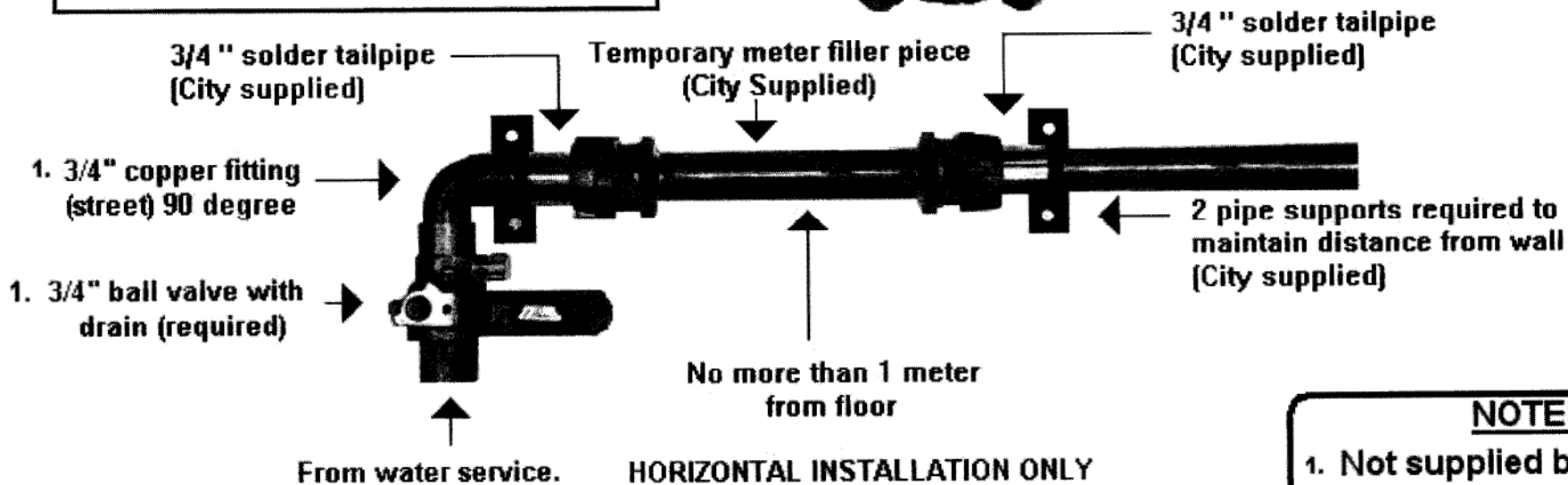


	City Of Welland Infrastructure Services	
	DRAFT BLOW-OFF ASSEMBLY FOR 100mm\varnothing TO 300mm\varnothing WATERMAIN	
DRWG. No. S-24	DATE: February 10, 1998	SCALE: N.T.S.
REV. No.	DRAWN BY: T.G.	APPROVED BY: L. VENTRESCA

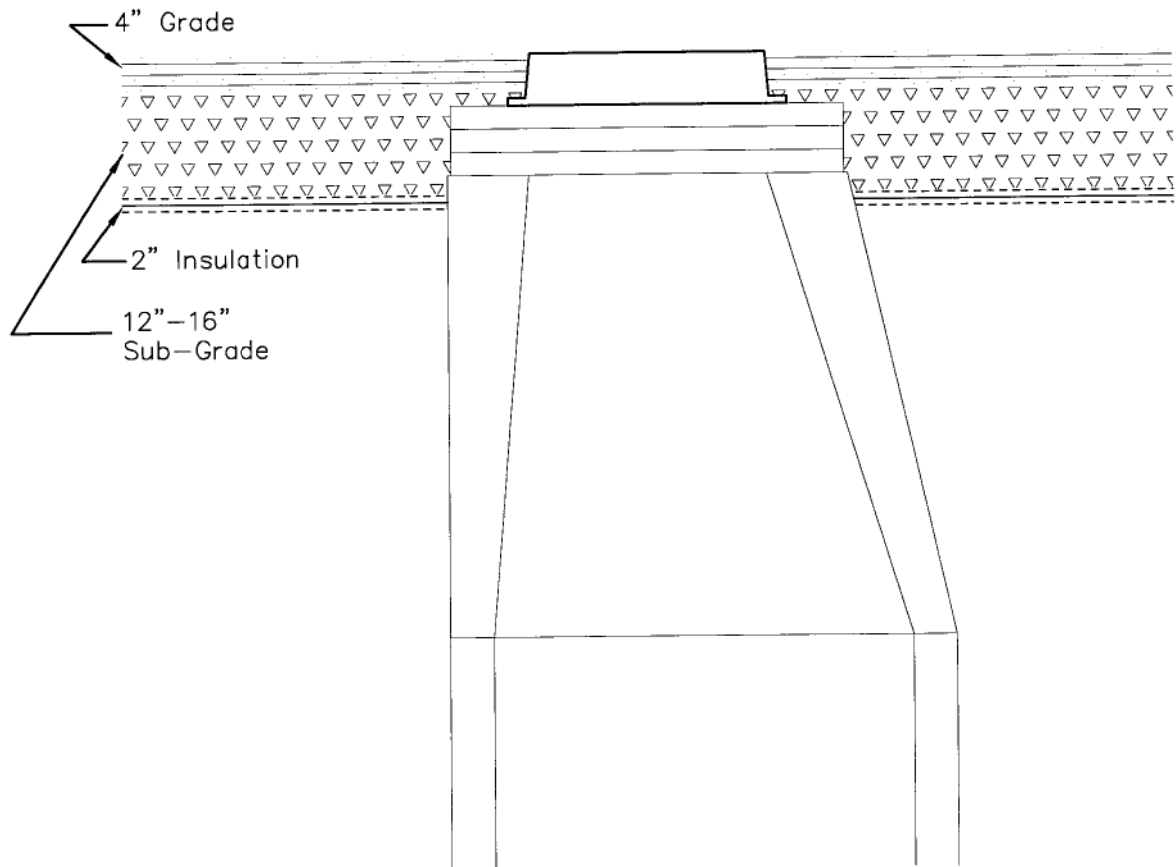
**CITY OF WELLAND
STANDARD WATER
METER INSTALLATION /
ROUGH-IN
FOR HOUSES ²**




When rough-in is complete, meter is to be installed by the City.
Builder must complete and fax the 'Request for Water Meter Installation' form to the City of Welland at 905-735-6446.
Two weeks notice is required.

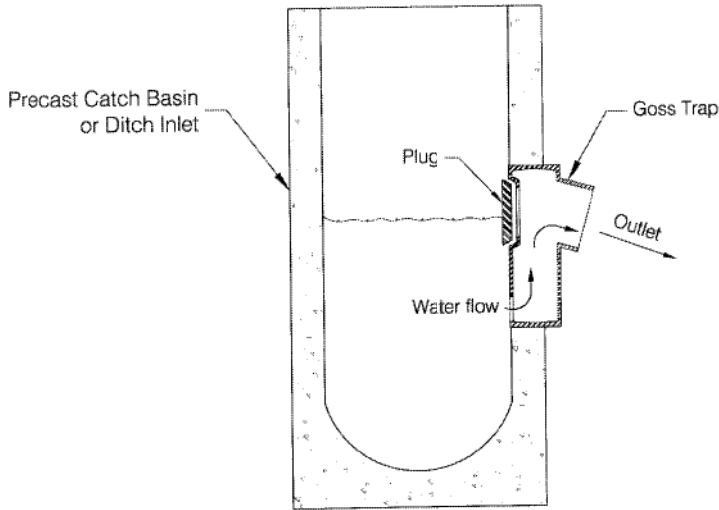
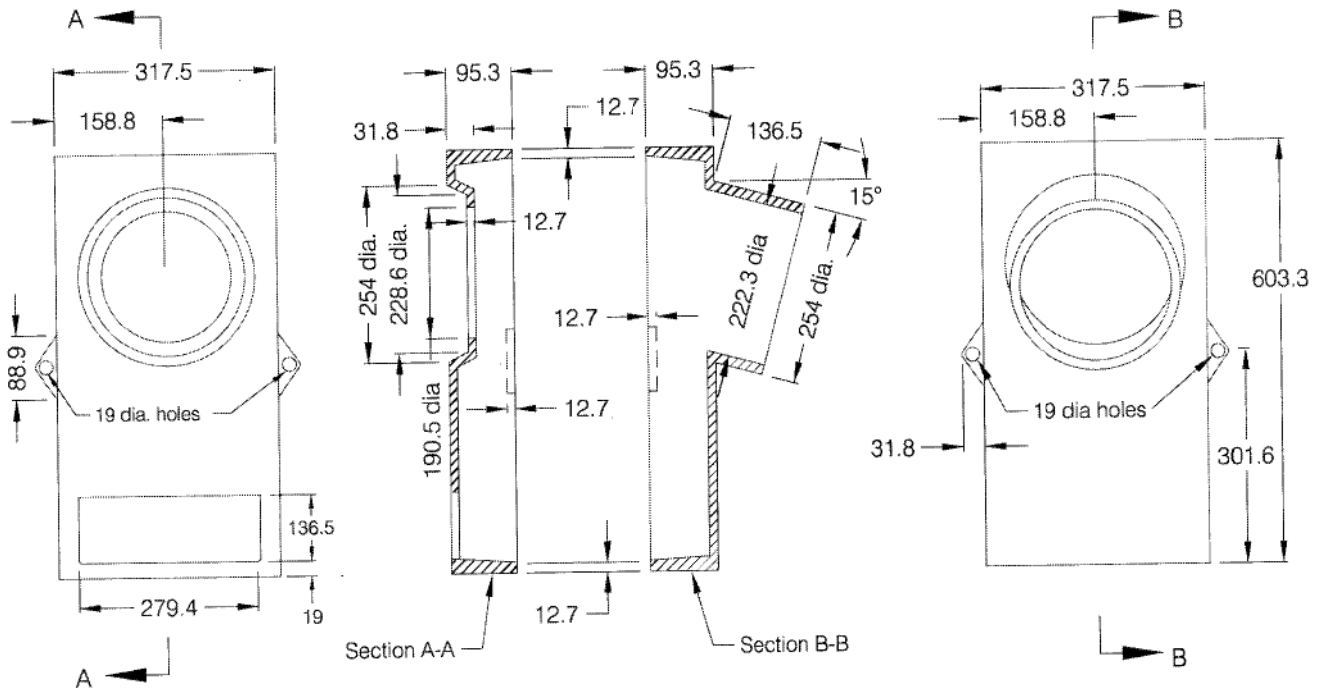


- NOTES**
1. Not supplied by City
 2. A house includes a single detached dwelling, semi-detached dwelling and a (street) townhouse
 3. **Occupancy/Use is not permitted until meter is installed**



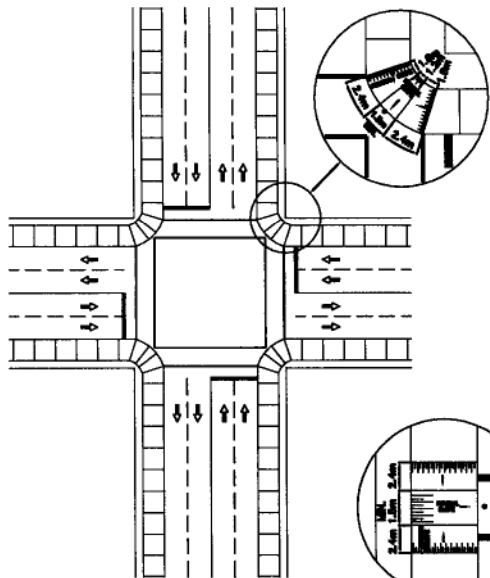
THE INSULATION MATERIAL SHALL BE STYROFORM HI 40 AS MANUFACTURED BY DOW CHEMICAL COMPANY OR APPROVED EQUAL.

	City Of Welland Infrastructure Services	
	MAINTENANCE HOLE INSULATION DETAIL	
DRWG. No.		
FILE No.	DATE: February 8th, 2001	SCALE: HOR: N.T.S.
REV. No.	DRAWN BY: M.J.P.	APPROVED BY: L. VENTRESCA

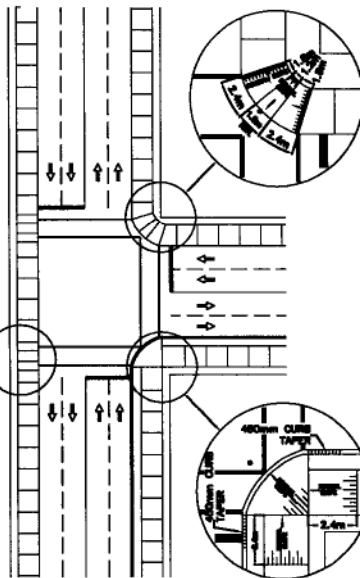


NOTES:

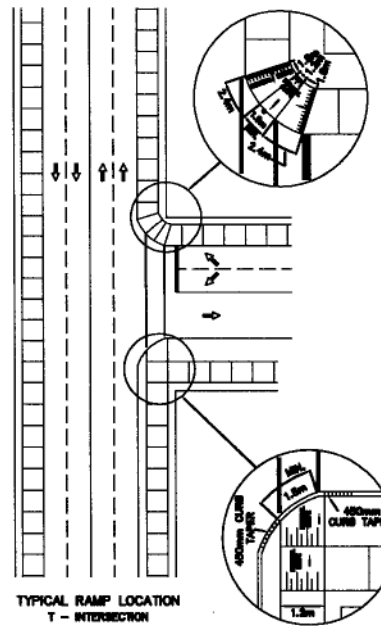
1. As illustrated in the diagram above, the goss trap helps prevent substances floating on the surface (i.e. gas, oil, leaves, branches, etc.) from entering the pipe.
2. Cast iron Goss Trap Plugs are available.
3. For other applications contact our Engineering Department.
4. All dimensions in millimetres, unless otherwise shown.



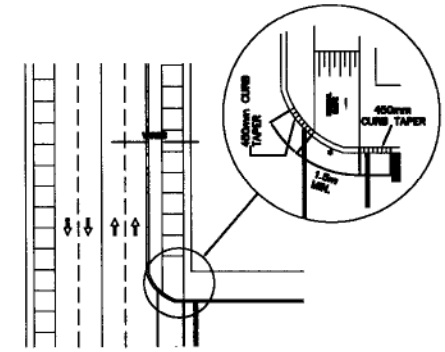
MID - RADIUS RAMP
4 - WAY INTERSECTION



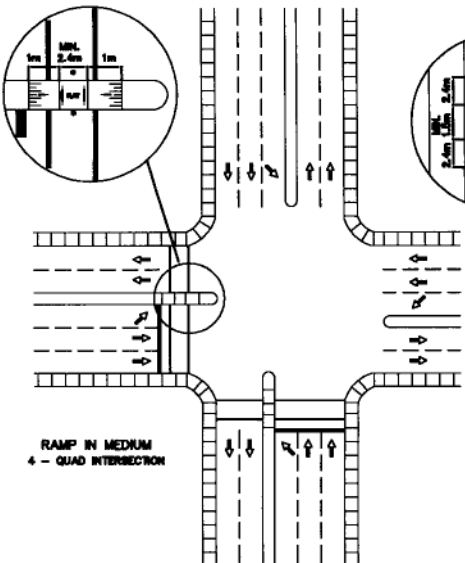
FULLY CONTROLLED
SIDEWALK RAMP
T - INTERSECTION



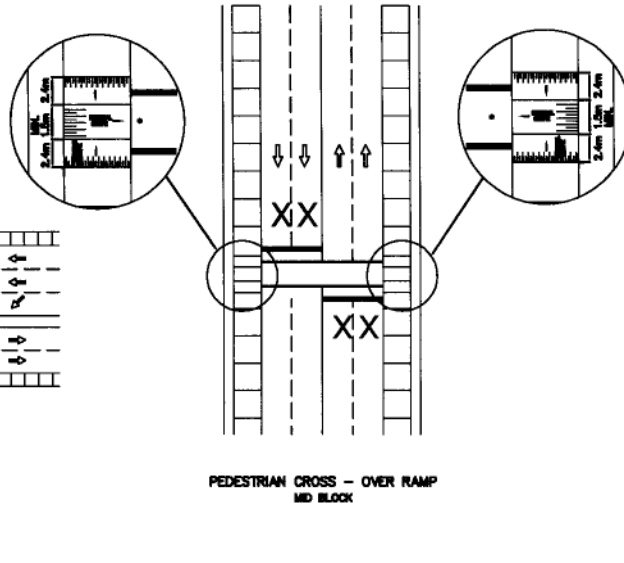
TYPICAL RAMP LOCATION
T - INTERSECTION



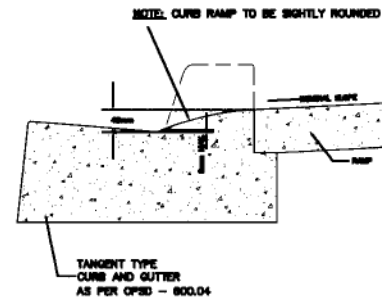
SIDEWALK RAMP WITH BLVD.
T - INTERSECTION



RAMP IN MEDIUM
4 - QUAD INTERSECTION




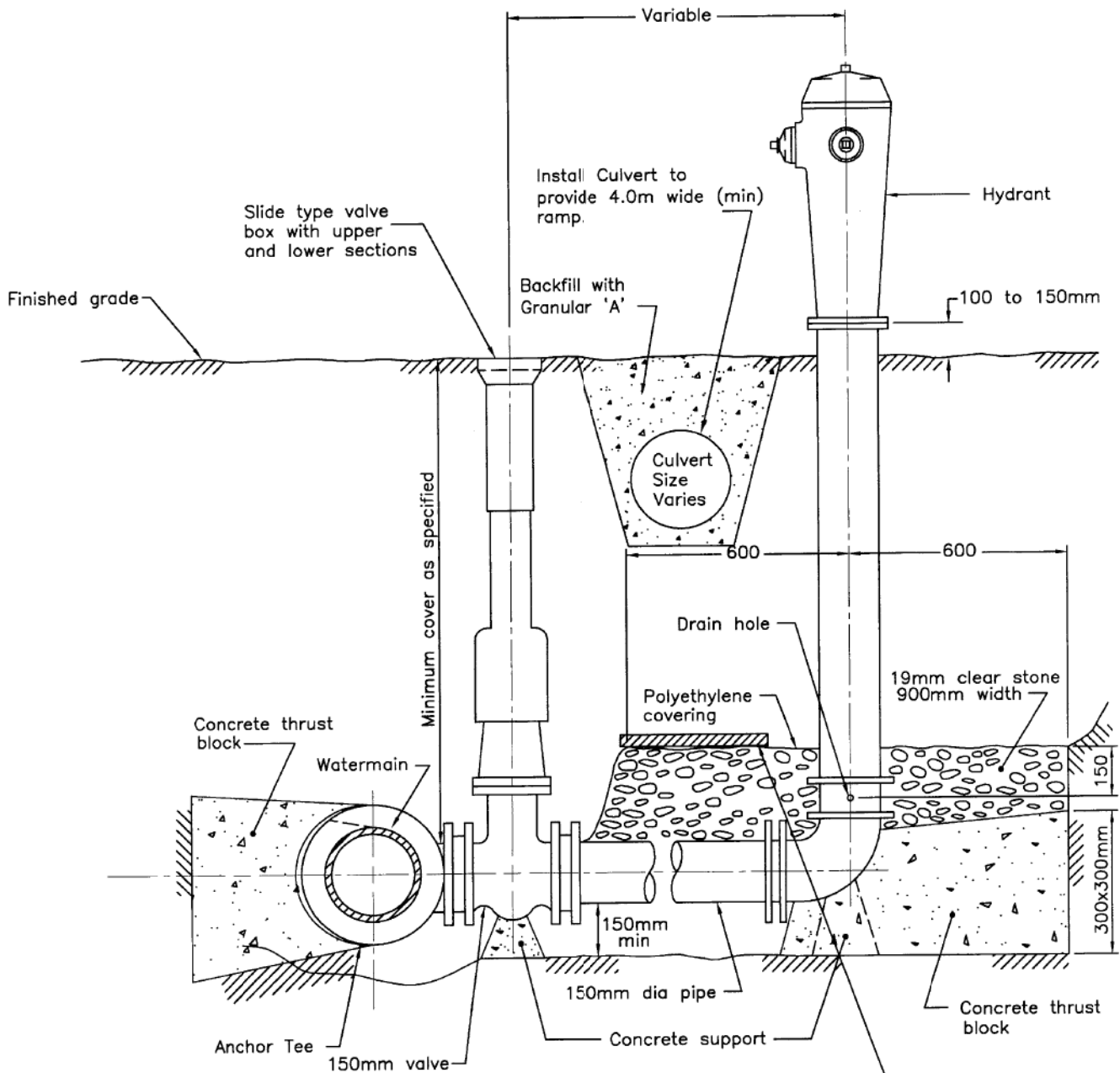
PEDESTRIAN CROSS - OVER RAMP
MID BLOCK



THRESHOLD DETAIL
FOR ALL RAMP

- GENERAL NOTES AND LEGEND**
- RAMP BASE IS TO BE FORMED AS REQUIRED TO PREVENT WATER CURB USERS TO SAFELY DISPERSE/DRY CONDITIONS.
 - RAMP SURFACE IS TO BE PROPERLY SLOPED FOR APPROPRIATE FRICTION REQUIRED BY WHEELCHAIR.
 - RAMP IS TO BE CONSTRUCTED TO AN ABSOLUTE MINIMUM ATTAINABLE SLOPE.
 - NOMINAL SLOPE = 4% (1" TO 2").
 - DENOTES FULL DEPRESSION REQUIRED FOR CURB

	CITY OF WELLAND	
	VARIOUS SIDEWALK RAMP	
REV. No. 001	DATE: April 2004, 2004	SCALE: N/A
REV. No.	DATE: 04/2004	APPROVED BY: D. Young

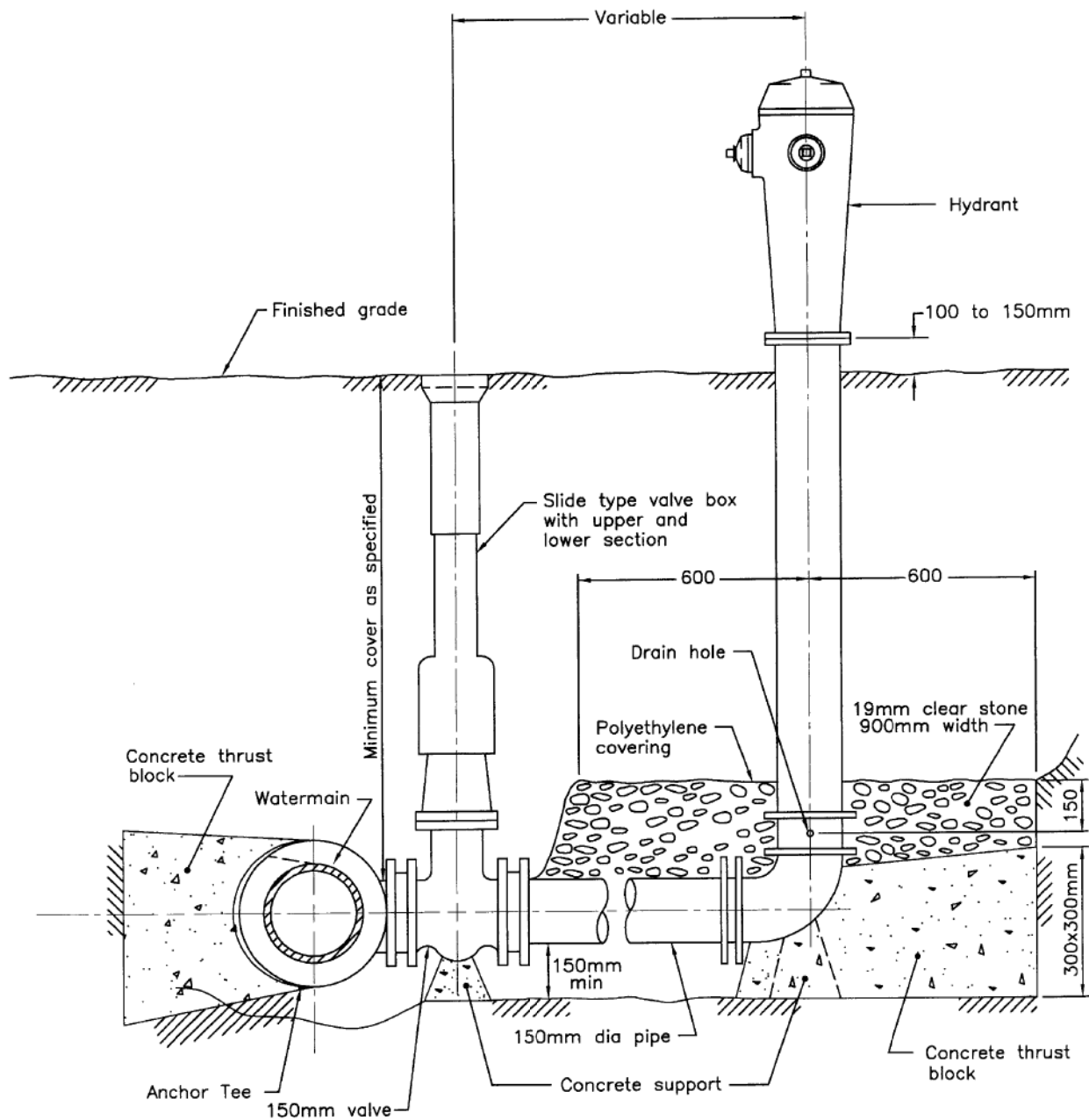


NOTES:

- A All concrete thrust blocks to be poured against undisturbed ground.
- B Bond breaker to be used between the concrete and the fittings and apputenances.
- C Bolts and nute for buried flange to flange connections are to be stainless steel.
- D Flange of standpipe extensions not to be in frost zone
- E All dimensions are in millimetres unless otherwise shown.


100mm Thickness,
1.5m wide insulation
over 150mmØ hydrant
lead. Protect both sides
with 6mm plywood.

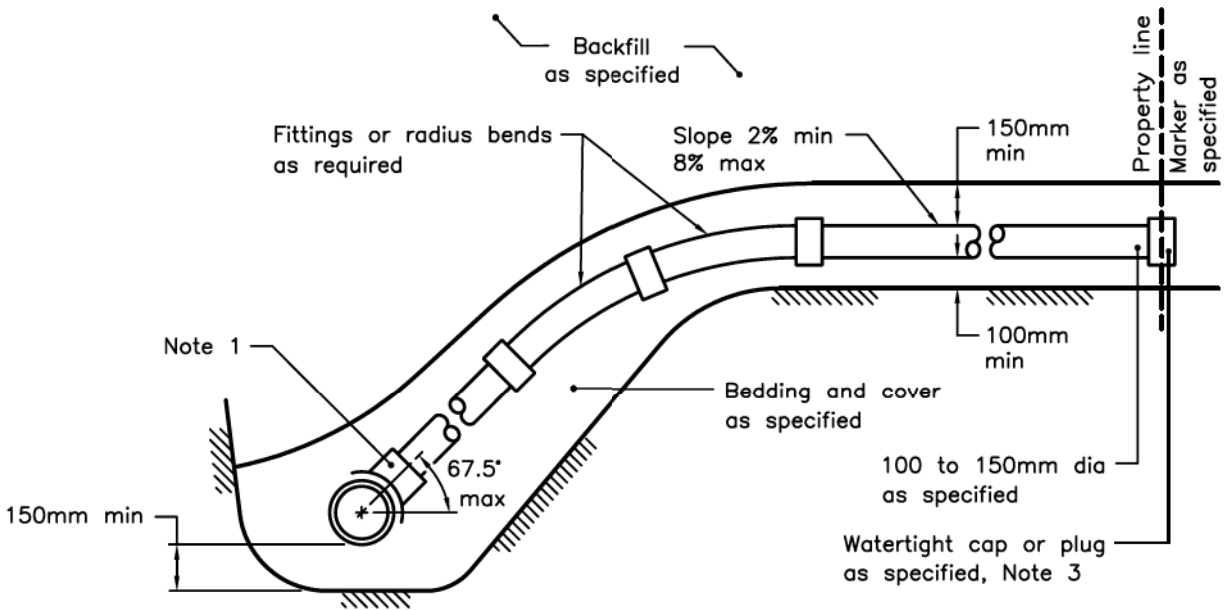
	CITY OF WELLAND		
	RURAL STREET HYDRANT INSTALLATION WITH ANCHOR TEE		
Scale: NTS	Sept 2009	Rev	



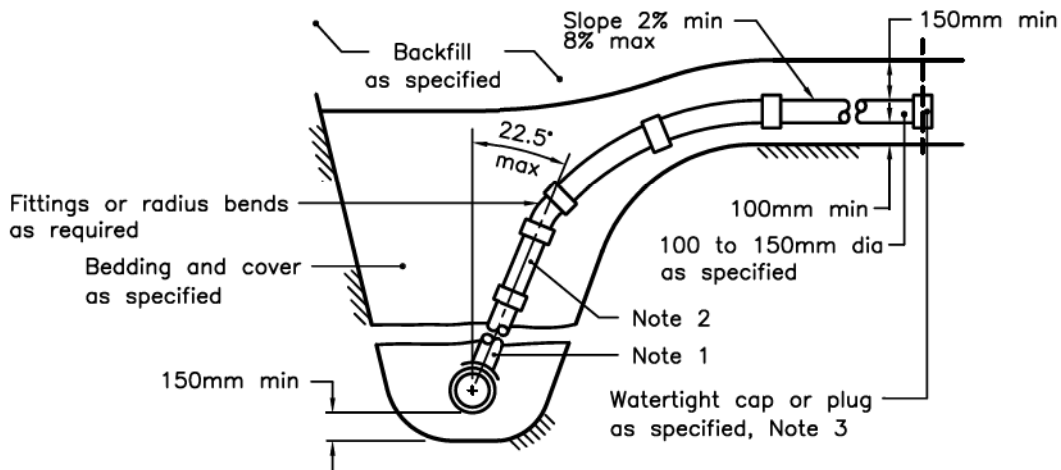
NOTES:

- A All concrete thrust blocks to be poured against undisturbed ground.
- B Bond breaker to be used between the concrete and the fittings and appurtenances.
- C Bolts and nuts for buried flange to flange connections are to be stainless steel.
- D Flange of standpipe extensions not to be in frost zone.
- E All dimensions are in millimetres unless otherwise shown.

	CITY OF WELLAND		
	HYDRANT INSTALLATION WITH ANCHOR TEE		
Scale: NTS	Nov 2003	Rev	



CONNECTION WITHOUT VERTICAL RISER



CONNECTION WITH VERTICAL RISER

NOTES:

- 1 Service connections to the main pipe sewer shall be made using factory made tees, strap-on-saddles, or other approved saddles.
Factory made tees shall be used for all service connections where the diameter of the main pipe sewer is:
 - a) less than 450mm; or
 - b) less than twice the diameter of the service connection.
- 2 Vertical risers shall be as specified.
- 3 Cap or plug at property line shall be adequately braced to withstand testing pressures.
- A Maintenance holes shall be used at the main sewer to connect service connections greater than or equal to 200mm.
- B For new construction, saddles must be installed on the main pipe before that pipe is laid.
- C Approved cut-in tool must be used for field made connections.
- D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2005

Rev 1

**SEWER SERVICE CONNECTIONS
FOR RIGID MAIN PIPE SEWER**



OPSD - 1006.010

**APPENDIX 'D' - CITY OF WELLAND STANDARD OPERATING PROCEDURES FOR ALL
WATERMAIN DISTRIBUTION REPAIR, INSTALLATION AND MATERIAL SPECIFICATIONS**

For the most up to date version of these documents please refer to;

[Procedures](#)

[Materials](#)

APPENDIX 'E' -

**TERMS OF REFERENCE FOR STORMWATER MANAGEMENT
STUDIES**

TERMS OF REFERENCE
FOR
STORMWATER MANAGEMENT PLANS

HIERARCHY:

The City of Welland does not currently have a Watershed Plan or Subwatershed Plans produced for the drainage areas within the Municipality. A Watershed Plan prescribes general policies related to watershed functions, as well as specific goals and targets for its various subwatersheds. Subwatershed Plans provide specifics on topics related to stormwater and environmental management, including: flooding, erosion, water quality, terrestrial features, aquatic habitat, groundwater and valley slopes.

Preliminary Stormwater Management Plans are required for proposed developments in order to demonstrate that stormwater will not adversely affect the environment. Preliminary Stormwater Management Plans translate specific objectives and targets from Subwatershed Plans into stormwater conveyance and control techniques for specific developments.

Preliminary Stormwater Management Plans for subdivisions are submitted to the City and Niagara Peninsula Conservation Authority prior to issuance of Draft Plan conditions. These describe the approach to managing stormwater, and include calculation of post-development flows and preliminary design and sizing of stormwater management facilities.

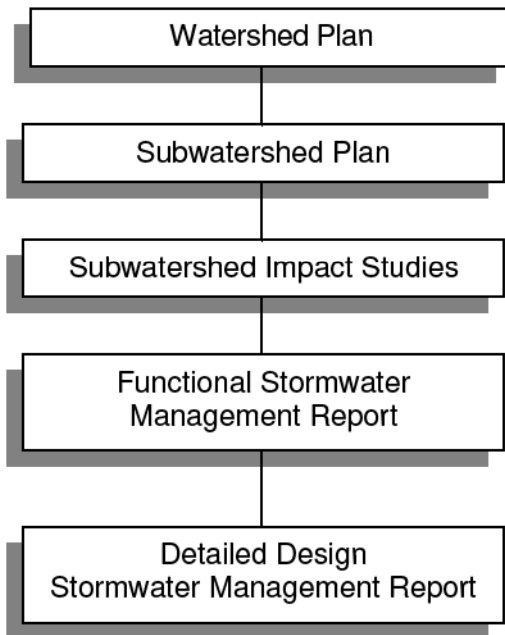
When a Draft Plan of Subdivision is being prepared for a portion of a community, the water resources engineer will be required to prepare the Functional Stormwater Management Plan. Based on the proposed street and lot layouts, the engineer will be able to define the extent and directions of the major and minor system flows and how the facilities will meet the constraints and requirements of the Subwatershed Plan. The requirements for erosion and sediment control should be conceptually investigated.

Detailed Design Stormwater Management Reports are more detailed documents that are submitted to the City and Conservation Authority before site registration and pre-servicing. They contain detailed design for flow conveyance and stormwater facilities, drainage systems, sediment controls and revegetation.

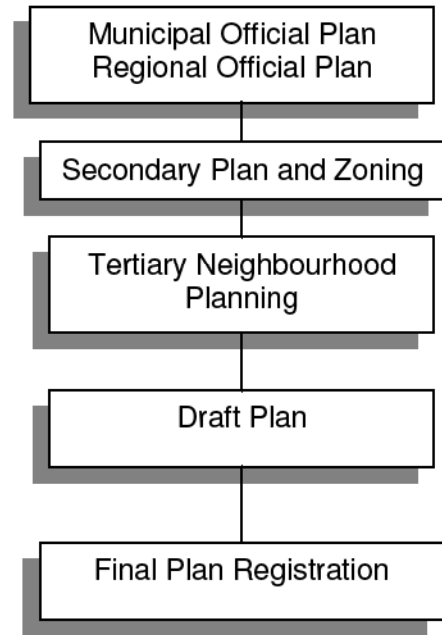
Only when detailed design drawings (with lot grades, street grades and preliminary storm sewer and catchbasin design) become available, is it possible to prepare the Final Stormwater Management Plan Report termed the Stormwater Management Implementation Report. The details from this are then incorporated into the detailed design drawings. The Stormwater Management Implementation Report should document how the works will meet or exceed the applicable requirements of the Subwatershed Plan and Watershed Plan and should detail the erosion and sediment control measures.

Integrated Management Hierarchy

Environmental and Stormwater Management



Land Use Planning



STORMWATER MANAGEMENT PLANS

The information for both the Functional and Detailed Design should be organized as a report including text, plans, tables, figures and appendices. Minimum requirements associated with the reports include the following:

1. TEXT

a) *Introduction*

- Description of site location and plan purpose

b) *Criteria, Policy and Guidelines*

- Outlines of specific and applicable criteria, policy and guidelines for the management of flooding, erosion, baseflow, watercourses, stormwater quality, terrestrial and aquatic features related to Subwatershed and Watershed Plan
- Any other unique requirements resulting from City and/or Agency consultation

c) *Hydrology*

- Details on the methodology adopted to generate design flows for the estimation of post-development impacts associated with site development, including flooding, erosion and, where appropriate, base flow

d) *Hydraulics*

- Depending on the proposed means of flow conveyance within the site development, the methodology of calculating both minor (2 year) and major (100 year or Regional) flows through the site to a safe and satisfactory outlet should be detailed

e) *Stormwater Management*

- This section to outline various alternatives for the management of both the quality and quantity of runoff
- An evaluation of alternatives including impacts on Municipal operations and maintenance should be included
- The performance of the recommended or preferred stormwater management practices is to be summarized

f) *Erosion and Sediment Control*

- Details on the principles and general practices proposed for managing erosion and sediment during construction should be presented

g) *Conclusions/Recommendations*

- Clear and concise summary of study findings and recommendations

2. SITE PLANS

- a) Copy of applicable sections from Official or Secondary Plan including site;
- b) Lot and road layout;
- c) Minor drainage system (sewers, swales and appurtenances);
- d) Major drainage system including overland flow routes for 1:100 year design storm (or Regulatory flood if greater);
- e) Regulatory floodlines on-site (if applicable);
- f) Details of stormwater management practices, including landscaping where appropriate;
- g) Erosion and sediment control plan.

3. TABLES

- a) Catchment parameterization;
- b) Pre- and post-development flows at critical locations;
- c) Hydraulic grade line calculations for 1:100 year design event, if foundation drains are connected to the storm sewer;
- d) Inflow/outflow from Stormwater Management facilities for range of storms, related to pre-development flows for the same storm frequencies;
- e) Overland flows, depths and velocities at key points on roads and at outfalls to major system for 1:100 year design storm;
- f) Hydraulic information, flood levels for regulated on-site watercourses (if applicable).

4. FIGURES

- a) Schematics of computer model;
- b) Pre- and post-development drainage areas and hydrographs at outfalls and at outlets from Stormwater Management facilities;
- c) Details of erosion and sediment control measures;
- d) Details of control structures and facilities.

5. APPENDICES

- a) Hydrologic Modeling Input/Output (also on disk)
- b) Hydraulic Modeling Input/Output (also on disk)
- c) Records of Agency and City Consultation
- d) Geotechnical records (where applicable)

Terms of Reference for Subwatershed Impact Studies

In some cases, an additional phase, involving both engineering and environmental study, is required in order to “bridge-the-gap” between the Subwatershed Planning phase and the site specific Stormwater Management Plans. It would be the objective of this intermediate study, termed a *Subwatershed Impact Study* to define the following for logical or contiguous subdrainage units:

- (i) *Detailed assessment/treatment of open watercourse systems*
- (ii) *Detailed assessment/treatment of vegetation communities; i.e. identify preliminary environmental protection plan with respect to tree saving and vegetation retention*
- (iii) *Conceptual design of stormwater management facilities integrated into a Tertiary Land use plan, consistent with a Secondary Plan*
- (iv) *Potential for centralized water quality facilities*
- (v) *Potential for centralized erosion control facilities*
- (vi) *Detailed gradients for trunk major and minor systems (vertical control)*
- (vii) *Ownership of, easements on, and maintenance of stormwater facilities (quantity, quality, conveyance) is to be addressed*
- (viii) *Construction timing and financing*

Subdrainage units should be determined on the basis of commonality of land use (future), environmental characteristics and hydrologic function.

1. Report Content

- (a) Overview of important Baseline Environmental Conditions for local area as documented in Subwatershed Plan.
- (b) Documentation of Water Quality/Quantity control requirements for flood and erosion control and stormwater quality management in accordance with Provincial habitat protection requirements and Subwatershed Plan recommendation.
- (c) Screening and evaluation of various stormwater and environmental management approaches consistent with Subwatershed Plan.
- (d) Preferred Stormwater and Environmental Management approach.
- (e) Location for proposed stormwater management infrastructure.
- (f) Cost sharing and phasing approach.
- (g) O & M requirements.
- (h) Monitoring requirements.

2. Site plans showing:

- (a) Watershed and development in relation to it;
- (b) Topography, watercourse, wooded areas, etc.;
- (c) Present land use;
- (d) Tertiary land use plan defining roadways and lot layout;
- (e) Proposed major drainage system, including external drainage areas;
- (f) Regulatory floodlines, where appropriate;
- (g) Elevations, existing and proposed, of key points;
- (h) Land Ownership Plan.

3. Tables Showing:

- (a) assumed subwatershed characteristics, pre- and post-development;
- (b) details of existing and proposed watercourse crossings (culverts, bridges, roads);
- (c) details on watercourse and valley reaches;
- (d) simulated flood flows at key points, pre- and post-development;
- (e) calculated flood elevations at all sections, pre- and post-development;
- (f) alternative solutions, elevation criteria; and
- (g) sizes of SWM facilities proposed for alternative solutions.

4. Figures showing:

- (a) pre- and post-development flows, uncontrolled and proposed controlled at key points; and
- (b) water quality, erosion and flood control works dictated by constraints and forming alternative solutions.

APPENDIX 'F' -

TERMS OF REFERENCE FOR TRANSPORTATION IMPACT STUDIES

1. INTRODUCTION

1.1. Transportation Impact Assessments – General

A transportation impact study (TIS) provides valuable information and analysis for governing agencies and others reviewing development proposals. The City of Welland Transportation Impact Study Guidelines has been compiled to outline the process and structure required to produce a comprehensive transportation impact assessment for a proposed development. A transportation impact study includes all modes of transportation including automobiles, trucks, transit vehicles, cyclists and pedestrians.

1.2. Why a Transportation Impact Study?

The goal of a traffic impact study is to assess the potential effects of traffic caused by a proposed development on Regional and local roadways and to identify the total roadway improvements needed to ensure that the roadway system will operate at an accepted level upon completion of the proposed development.

The main purpose is to demonstrate that the transportation impacts of a proposed development will be manageable and that the transportation aspects of the proposal are consistent with the objectives of Council as expressed in the Official Plan.

The Official Plan outlines a number of criteria, which generally must be met in order to obtain Council approval for a proposed development. Through the study, the proponent must demonstrate that the proposal meets these criteria, as summarized below:

- Travel demand generated by the proposed development must be manageable after taking into account transportation system improvements and travel demand management initiatives which will be secured in conjunction with the proposal;
- The proposal must incorporate a suitable travel demand management strategy which includes all reasonable measures to facilitate and promote cycling and walking for trips to and from the site; and
- The number of vehicular parking spaces provided in conjunction with the applicable Zoning by-law in consideration of:
 - The proximity and level of public transit service;
 - On street/off street parking lots;
 - Existing and anticipated future capacity constraints on the City of Welland and Regional Roads;
 - Demonstrated requirements for short term and long term parking; and
 - The provision of on-site parking to replace existing on-street parking.

Furthermore, in planning parking facilities, the proponent must, as appropriate:

- Provide for preferential treatment of vehicles operated by or for those with personal mobility constraints; and

TRANSPORTATION IMPACT STUDY (TIS) GUIDELINE FOR LAND DEVELOPMENT APPLICATIONS

- Provide suitable and convenient off street parking facilities for commercial vehicle loading and unloading and for courier and other deliveries.
- The proponent must agree to provide or to contribute to the provision of transportation system or service improvements of travel demand management initiatives in accordance with the need for these improvements created by the proposal;
- The proponent must agree to make all reasonable provisions to protect for future transportation system improvements either identified in the Welland Official Plan, Development Charges by-law and Niagara Urban Structure Review;
- The development must be successfully integrated with the Welland road and transit systems with respect to vehicular and pedestrian access and connections to the transit system. In some cases, provision may have to be made for on-site transit stations and related facilities and services; and
- The development must be phased, if necessary, in conjunction with the implementation of transportation system and service improvements and travel demand management initiatives, to ensure that travel demand and transportation supply are kept in balance over time.

1.3. Applicability

It is important to recognize that the policies, objectives, standards, guidelines, requirements etc. outlined herein are relevant at the time of printing. The guidelines will be reviewed/updated, as necessary to reflect current policy, practice and accepted standards. The applicant/consultant should contact the City to identify any major modifications to this document since its completion date.

For additional information or for clarification of any of the material contained in this document, please contact the City.

The following document outlines general guidelines for the preparation of transportation impact studies for submission to the City of Welland. The City recognizes that in many cases the following guidelines and assumptions may not be applicable to specific locations and/or projects. The purpose of this document is to provide a framework for the preparation of transportation impact studies and should not be submitted for good transportation engineering judgment.

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Acknowledgement of Authorship/Ownership

When the scale of the development/redevelopment warrants a Transportation Impact Study, it is the proponent's responsibility to retain an experienced transportation consultant. Alternatively, the City may retain a consultant at the proponent's expense.

The City of Welland requires that a transportation impact study be prepared by a qualified firm/individual. The consultant shall be a member of the Institute of Transportation Engineers and registered as a Professional Engineer in the Province of Ontario. The report must be stamped, dated and signed accordingly.

In stamping, dating and signing the report the Engineer is verifying that appropriate assumptions and methodologies have been utilized in the completion of the transportation impact study and is indicating the individual(s) whom are taking corporate/professional responsibility for the work. This information will also assist City Staff in contacting the appropriate individual if clarification of any part of the transportation impact assessment is required.

2. OBJECTIVES AND SCOPE OF THE GUIDELINE

The guidelines provide a general overview of TIS objectives, scope of analysis, issues to be addressed, study approach and presentation format. More detailed information on key topics is provided in the following appendices:

- Appendix A – Trip Generation, Distribution and Assignment;
- Appendix B – Background Traffic Growth;
- Appendix C – Site Access and Circulation;
- Appendix D – Capacity Analysis

2.1. When is a Transportation Impact Study Required

There are a number of criteria under which a traffic impact study may be required. In general a traffic impact study should be conducted when one or more of the following are anticipated or present:

- The proposed development/redevelopment will add more than 150 peak-hour vehicle trips to the transportation system;
- The development/redevelopment is located in an area of high roadway congestion and/or a high expected rate of population or employment growth;
- The development, its access or type of operation is not envisaged by local land-use or transportation plans;
- The development or redevelopment requires an amendment or an exception of the applicable City planning or by-law policy, strategy or plan;
- If, in the opinion of the City or the Region, the development/redevelopment has the potential to create unacceptable adverse operational and safety impacts on the area road network.

The study will be required as a condition of approval and that the proponent/consultant confer with Welland and Regional staff to determine if a study is required and to establish an appropriate scope and level of detail.

2.2. TIS Scope/Detail

The level of detail and the required components of the study will be a function of the location, size and operation of the proposed development. In some cases the proposal may be located in an area for which a transportation strategy or plan has been undertaken or prepared. Under this scenario, the City shall determine if certain elements of the study can be omitted.

The guidelines that follow outline the general requirements for a comprehensive study.

The onus will be on the proponent/consultant to demonstrate that a study is not required of that certain aspects of the general requirements can be omitted at the City's discretion.

2.3. Functional Life of TIS

Generally, the transportation impact study will have a "functional life" of ten (10) years. Major changes within the study area may reduce the applicability of the document if they were not previously considered in the impact assessment.

2.4. Other Jurisdictional Requirements

In addition to the City of Welland requirements for the preparation and submission of a transportation impact study, the Regional Municipality of Niagara and the Province may require additional information or analysis to satisfy their requirements for a proposed development. The proponent should contact Regional and Provincial staff directly to determine these needs.

Every effort should be made to meet with all affected jurisdictions simultaneously to expedite the process and ensure consistency for the TIS scope/approach.

3. DESCRIPTION OF THE DEVELOPMENT PROPOSAL AND STUDY AREA

A description of the proposed development, its location and the proposed traffic impact study area is required to permit City Staff to identify the site location, its anticipated operation and area of potential impact. In addition, this information allows timely review of key study assumptions ranging from the study area limits and horizon years to the trip assignment assumptions.

3.1. Description of the Development Proposal

The traffic impact study should provide a full description of the proposed development. This may include the following elements, as applicable:

- Existing land uses or permitted use provisions in an Official Plan, Official Plan Amendments, Zoning By-laws, etc.;
- Municipal Address;
- Proposed land uses and relevant planning regulations to be used in the study;
- Total building size(s) and location(s);
- Floor space including a summary of each type of use;
- Number of parking spaces along with location and access arrangements;
- Number and type of loading areas along with location and access arrangements;
- Anticipated Date of Occupancy;
- Approximate hours of Operations;
- Planned phasing of the development;
- Near-by intersections and accesses to adjacent developments including type of control;
- Proposed access points and type of access (full turns, right-in-right-out, turning movement restrictions, etc.); and
- Nearby transit facilities/stops.

It is a requirement to provide a preliminary site plan, of a suitable scale, for consideration in the review of the transportation impact study. If the proposed development/redevelopment is to be constructed in phases, describe each phase and the proposed timing of implementation.

3.2. Study Area

Definition of the Study Area

Generally, the size of the study area will be a function of the size and nature of the proposed development and the existing and future operations of the surrounding road network.

The study area should encompass all municipal, regional and provincial roadways, intersections, interchange ramp terminals and transit facilities which will be noticeably affected by the travel generated by the proposed development. Typically, this will include an area that may be impacted as follows:

- The development will increase traffic volumes or transit usage by 5% or more;

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- The development's impact on volume/capacity (V/C) ratios for overall intersection operations, through movements, or shared through/turning movements increases to 0.85 or above; or
- The development's impact on V/C ratios for exclusive movements increases to 0.95 or above.

It is important, since the definition of a study area cannot be based on hard and fast rules, that the proponent/consultant discuss the potential project impacts with City Staff, prior to the transportation impact study preparation, so that a mutually acceptable study area may be established.

Description of Existing Study Area

A description of the existing transportation system within the study area, using a combination of maps and other documentation should identify relevant information, such as, but not be limited to, the following:

- All adjacent and nearby roads indicating the number of lanes, jurisdiction and posted speed limit;
- Road hierarchy including classifications as dictated by the City and Region Official (Secondary) Plans and/or Transportation Master Plans;
- Signalized/unsignalized intersections and interchange ramps terminals indicating, as relevant:
 - Lane configurations;
 - Available permitted movements;
 - Type of Control;
 - Lane widths;
 - Turning restrictions, by time of day/day of week, as applicable;
 - Channelization; and
 - Bus bay locations.
- Planned roadway, transit and pedestrian improvements which will have a noticeable impact on the transportation operations within the study area, should be obtained from the City, Region and/or Province;
- Other developments in the study area which are under construction, approved of for which an application has been submitted. Briefly describe the size and nature of these developments in general terms;
- Location of sidewalks, multi-use trails, bicycle lanes, pedestrian cross-overs, intersection pedestrian signals (IPS) and school crossing guard locations;
- Location of on-street parking, parking/stopping restrictions in the vicinity of the proposed development or those which would affect the operation of the study roadways and intersections. The periods for which the restrictions are in effect, shall be provided;
- Transit facilities/routes; and

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- Truck routes/heavy vehicle restrictions, by time of day/day of week, as applicable.

Less detailed information than that identified above would be appropriate for transportation facilities and services that will not be noticeably affected by the travel generated by the proposed development.

4. ANALYSIS PERIODS

4.1. Horizon Year(s)

It would be beneficial to consult with City of Welland Staff in determining the appropriate horizon year(s) for the transportation impact study. In general, the horizon year will be taken as ten (10) years from the submission of the study. Other considerations to be taken into account are as follows:

- Other area proposed developments;
- Future infrastructure initiatives;
- Historical growth on the area roadways; and
- Date of occupancy.

Horizon years should also be identified for any interim phases of development and additional horizon years, ranging from a minimum of ten (10) years after the study date to a maximum of full build-out of the defined study area, may be required depending on the magnitude of the development. Typically, this type of long-range evaluation is recommended only for larger scale projects, such as those generating 500 or more peak-hour vehicle trips. The need for a long-range horizon should be discussed with the City at the outset of the study.

4.2. Peak Periods

Identification of the time periods for analysis should take into consideration the following:

- Type of size of development;
- Potential and existing AM and PM peak traffic period trip generation;
- Hours of operation;
- Reoccurring special events; and
- Seasonal fluctuations.

Typically, the AM and PM peak traffic periods will constitute the “worst case” combination of site related and background traffic; however, in the case of retail, entertainment, religious, institutional, sports facility uses, the Saturday, Sunday or site peak may require analysis. As part of the consultation process prior to commencing the study, the consultant should determine in conjunction with City Staff the selected time periods for analysis.

5. EXISTING TRANSPORTATION CONDITIONS

5.1. Traffic Conditions

To provide a representative picture of the existing traffic conditions, the following should be included in the transportation impact study, as applicable:

- Exhibit(s) showing the existing traffic volumes and turning movement analysis for the roadways and intersections in the study area including pedestrian volumes and heavy vehicle percentages;
- Traffic volumes may be acquired from the City, Regional Municipality of Niagara or previous transportation planning, traffic operation or transportation impact studies undertaken in the vicinity of the proposed development. In general, traffic counts more than two (2) years old or counts that do not appear to reflect existing conditions, should be updated to ensure that they reflect actual traffic levels;
- Intersection analysis of the existing conditions for all peak periods. The analysis should be undertaken with the methodologies and assumptions summarized in Appendix D. Calibration of the analysis to actual conditions must be undertaken and the analysis parameters must be documented;
- Summary of level-of-service including volume to capacity (V/C) ratios for all intersections and individual turning movements for peak periods. Full documentation of the results of all level of service analyses should be provided in an appendix;
- Summary of key field observations of the existing conditions; and
- When the development finds that a Level of Service (LOS) of E has been attained, then traffic signals are required by the City at the cost of the proponent.

5.2. Transit Operations

To provide a representative picture of the existing transit conditions within the study area, the following should be included in the transportation impact study, as applicable:

- Commentary/exhibit(s) summarizing to the existing transit routes, stops and facility locations;
- Approximate walking distance to the transit services;
- Transit vehicle headways/frequency for routes that service or may be anticipated to service the proposed development; and
- Current ridership and residual capacity on each route.

Recent transit counts may be available from the City of Welland; however, where the available ridership data does not appear to reflect existing conditions, additional surveys may be necessary.

6. EVALUATION OF IMPACTS OF SITE GENERATED TRAVEL

6.1. Evaluation of Impacts of Site Generated Traffic Demand

The following are the steps that should be undertaken to evaluate the impacts of the site generated traffic on the area road network:

- Calculate the travel demand generated by the proposed development and assign it to the area road network, consistent with the approach/methods outlined in Appendix A.
- Undertake intersection analysis for all intersections/accesses within the study area. The intersection analysis should be consistent with the general assumptions outlined in Appendix D, unless the proponent/consultant is of the opinion that other methodologies/assumptions would be more applicable. It is important that these deviations be confirmed with City Staff prior to the submission of the transportation impact study.
- Provide a summary of level-of-service including volume to capacity (V/C) ratios for overall intersection operations and individual movements, for all analysis periods and time horizons. Full documentation of the results of all level of service analyses should be provided in an appendix.
- Identify signalized intersections where:
 - Volume/capacity (V/C) ratios for overall intersection operations, through movements or shared through/turning movements increased to 0.85 or above;
 - V/C ratios for exclusive movements increased to 0.95 or above; or
 - Queues for an individual movement are projected to exceed available turning lane storage.
- Identify unsignalized intersections where:
 - Level of service (LOS), based on average delay per vehicle, on individual movements exceeds LOS "E", or
 - The estimated 95th percentile queue length for an individual movement exceeds the available queue storage.
- Identify potential safety or operational issues associated with the following, as applicable:
 - Weaving;
 - Merging;
 - Corner clearances;
 - Sight distances;
 - Vehicle-pedestrian conflicts;
 - Traffic infiltration;
 - Access conflicts;
 - Cyclist movements;
 - Heavy truck movement conflicts; etc.

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- Provide supplementary analysis required to address vehicle queue lengths/queue blocking, merging, weaving, gap availability/acceptance, sight distance availability, etc., to address quantify/qualify any operational or safety issues.
- Pedestrian routing plans are required to form part of the engineering submission for a development.
- A parking plan is required to show how parking both on and off site shall be accommodated.
- Must include and requires inter-development cooperation and sharing of traffic related information.

6.2. Evaluation of Impacts of Site Generated Transit Demand

- The following are the steps that should be undertaken to evaluate the impacts of the site generated transit demands on the travel level-of-service.
- Evaluation of the site generated transit demands with comparisons to the transit service supplied in the area for all analysis periods and horizons;
- Identification of situations/locations and time periods where:
 - Transit service is not provided in the area as required;
 - The provision of transit service or facilities are desires on site;
 - Demand exceeds residual capacity of the existing transit service. Times of day, duration and days of week should be specified as applicable;
 - Transit service hours do not coincide with the times when transit demand will be required;
 - It would be beneficial to provide increase transit frequency or service requirements for special events or peak arrival/departure times.
- Identification of pedestrian connections that are required to access transit services; and
- Identification of impacts on transit operations directly associated with the site generated traffic volumes/operations.

7. IDENTIFICATION OF TRANSPORTATION SYSTEM IMPROVEMENTS REQUIRED TO MITIGATE THE IMPACTS OF THE PROPOSED DEVELOPMENT

This section outlines the process of identification of physical and operational transportation system improvements and other measures required to ensure that acceptable operation of the transportation system is maintained to the acceptability of the City.

The mitigation of traffic and transit related impacts should be considered in unison as modifications to one inherently affect operations of the other. The physical and operational remedial measures recommended in the transportation impact study must address all deficiencies identified through the completion of the tasks outlined in Section 6.0 of this document.

7.1. Identification of Required Road Network Improvements

The physical and operational road network improvement requirements identified in the transportation impact study must address and ensure that:

- Site generated traffic does not create conditions in which the capacity criteria summarized in Section 6.0 is exceeded;
- Accumulative impact assessment which includes other existing/proposed developments in the area;
- Motorist, pedestrian and cyclist needs and safety are accommodated;
- Vehicular, pedestrian and cyclist operations and safety are maintained or improved;
- Site generated traffic will not have a noticeable adverse impact on existing or proposed residential communities.

Additional analysis shall be provided to demonstrate that the proposed mitigative measures will in fact address the impacts of the site generated traffic. The City requests that functional plans be provided for all recommended road improvements.

7.2. Identification of Required Transit System Improvements

The physical and operational transit system and service improvement requirements identified in the transportation impact study must address and ensure that:

- The existing capacity of the transit service and facilities is capable of accommodating the anticipated site generated transit demand;
- Site generated traffic will not have a noticeable adverse impact on transit operations; and
- There is a provision of the following, if required:
 - Transit service to the area or to the site including potential transit routes;

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- An increase in transit frequency or hours of operation;
- Special event service;
- Transit facilities such as terminals, bays or stops.

Additional analysis shall be provided to demonstrate that the proposed mitigative measures will in fact address the impacts of the site generated traffic. The proponent should consult with the City of Welland to confirm the feasibility of the provision of new/improved transit services and facilities.

7.3. Implementation and Funding of Improvements/Strategies

The proponent must demonstrate that the development will be phased, as necessary, in conjunction with the implementation of transportation infrastructure or service improvements and/or TDM strategies, to ensure that travel supply and demand are kept in balance over time.

Approval of the development, as proposed, may be based on the demonstrated success in implementation of the TDM strategy. The approval of the development may be structured in phases such that the later phases of the development may be conditional upon demonstrated success of the strategy in conjunction with earlier phases of the development. In order to demonstrate success, the proponent/consultant may be required to implement a monitoring program in consultation with the City of Welland.

The transportation impact study must address what extent the required transportation system or service improvements will be provided or contributed to by the proponent. The proponent/consultant must identify, with justification, the degree of financial responsibility that the proponent proposes to accept with respect to each of these improvements. A cost sharing assessment for other contributing developers must be included.

8. SITE PLAN, PARKING AND ACCESS REQUIREMENTS

This section addresses site plan criteria, parking and access locations in order to develop a plan that will be harmonized with the surrounding developments and provide acceptable access and site circulation for pedestrians, cyclists, transit users, emergency access, vehicles and persons with disabilities.

When determining the location of an access consideration should be given to how the access will affect the surrounding road network, area residents and area businesses. Approval must be granted from the affected agency for access onto roadways not under the jurisdiction of the City of Welland.

Points of consideration with respect to site plan criteria, parking and access are:

- An evaluation of proposed access points with respect to possible mutual interference with other adjacent or opposed access points should be undertaken;
- An evaluation of the possibility of restricting one or more site access to right-in/right-out only;
- An evaluation of sight-lines to ensure safe conditions in accordance with accepted standards;
- An evaluation of the potential for access and circulation movements with in-site parking, drive-thru facility etc. to result in queues extending onto or vehicles backing onto public roadways;
- Demonstration that the parking policies and standards applied to the development are in accordance with City By-laws and the policies outlined in Section 1.2.
- An evaluation of delivery vehicle/courier loading/unloading facilities and access to these facilities with respect to location, size and design. Convenient access should be provided in order to avoid the possibility of pick-up/delivery occurring on municipal right-of-way;
- A description and evaluation of site access provisions for pedestrians and cyclists should be included with particular emphasis on convenient and safe access to transit services; and
- A description of the measures taken to make the proposed development, including on-site transit facilities, where appropriate, accessible to persons with personal mobility limitations.

It would be beneficial for the proponent to discuss access opportunities and constraints with City Staff prior to the preparation of site plans and establishment of building locations.

9. DOCUMENTATION AND REPORTING

It is recommended that the format of the transportation impact study follow the guidelines outlined in this document, as applicable. The following is a proposed structure for a typical study:

- Site/Development Description;
- Study Area;
- Existing Conditions;
- Analysis Periods;
- Background Travel Demand;
- Site Generate Travel;
- Future Travel Demand;
- Future Traffic Operations and Impacts;
- Future Transit Operations and Impacts;
- Improvement Alternatives Required to Mitigate Traffic and Transit Impacts;
- Financing Transportation Improvements; and
- Conclusion and Recommendations.

Five (5) copies of the final transportation impact study and three (3) copies of the technical appendices should be provided to the City of Welland for review. Similar requirements are made for addendums and subsequent work submitted in support of the original study.

The study should consist of a main document containing:

- Text;
- Key maps;
- Illustrations;
- Summary tables; and
- Detailed analysis.

A technical appendix included under another cover should be provided in the case were the analysis and other technical materials are too substantial to provide in one document. Where possible, key maps, diagrams, graphs, tables and other exhibits should be placed adjacent to the relevant text as opposed to an appendix.

Analysis summary sheets are sufficient; however, the City reserves the right to request a full printout of the analysis or digital copies of the analysis.

10. THE TRANSPORTATION IMPACT STUDY PROCESS

As indicated a number of times, it is important for the proponent to consult with City Staff throughout the process, with emphasis on early consultation prior to developing site plans and initiating a study.

The transportation impact study, when submitted to the City, is first viewed by the Public Works Department to assess consistency with the Official Plan objectives, evaluate the travel demand analysis and identify relevant transportation planning issues.

If further information is necessary or modifications to the study are required, the proponent and the City will be notified. In many cases, a letter will be sufficient to convey requirements for modifications or supplementary analysis if these are straightforward. Alternatively, a meeting or series of meetings may be convened to discuss difficult issues, multi-agency issues and/or alternative approaches to resolving issues.

Minor modifications can be submitted through a technical memorandum/addendum in support of the original study. Should modification to the original study be requested and these changes are deemed substantial by the City, then an update to the study will be requested to replace the original study.

When submitted, the revised study or addendum will once again be circulated for the preparation of final comments, including conditions to be attached to approval of the development application.

Once these final comments have been received, City staff will coordinate the preparation of a final staff position on the transportation aspects of the development application. If there are still outstanding issues, further meetings may be convened with the proponent and City Staff to try and resolve these or to identify the implications or non-resolution.

It should be recognized that the study and all associated information submitted to the City will be considered to be in public domain once approved or addressed in Committee of Council, in whole or in part.

**SUBSECTION 1
(TRANSPORTATION IMPACT STUDY GUIDELINES)**

TRIP GENERATION, DISTRIBUTION AND ASSIGNMENT

June 2007

TRIP GENERATION, DISTRIBUTION AND ASSIGNMENT

1.1. Estimation of Traffic Demand

Consultation with City Staff is recommended to ensure that appropriate and agreed upon trip generation rates are being employed in the transportation impact study. Available trip generation methods:

- Trip generation surveys from similar developments in the region, which have similar operating characteristics as the proposed development. Modifications should be made to the trip generation rates to account for differences in the surveyed and proposed development sites;
- “First principles” calculations of anticipated trips to/from the site; and
- ITE Trip Generation rates provided that differences in the site nature and size are accounted for.

Typical trip generation rates or equations are usually derived from the counts taken at driveways of various land uses. However, for many commercial land uses, not all of the trips generated at the driveway(s) represent new trips added to the adjacent street system. The number of trips generated may include pass-by trips and internal “Synergy” trips.

Where appropriate, it may be justified to change the trip generation of the proposed development to account for:

- Captive market effects/“Synergy” – Represents trips which are shared between two or more uses on the same site, i.e., a motorist visiting a retail store and a grocery store on the same site;
- Pass-by trips – trips that represent intermediate stops on a trip already on the road network, i.e. a motorist stopping into a retail store on their way home from work. It should be recognized that pass-by trips must be accounted for in the turning movements into/out of the site;
- Transit mode split – travel surveys are the most reliable sources of transit modal splits. Transportation planning projections/goals should be considered; however, should not replace good engineering judgment and actual modal split data. The number of trips estimated with this assumption should be reflected in Section A5: Site Generated Transit Demand; and
- Travel Demand Management (TDM) strategies (See Section A.2).

All trip generation assumptions and adjustments assumed in the calculation of “new” vehicle trips should be supported and documented. Sensitivity analysis should be undertaken where trip generation parameters have the potential to vary considerably and most probable values cannot be readily identified.

1.2. Travel Demand Management (TDM) Strategies

The City of Welland Official Plan includes a requirement for all proposed developments to incorporate a suitable travel demand management plan which includes all reasonable measures to facilitate reduced automobile reliance and promote cycling and walking for trips to and from the site.

The TDM plan should be included in the study and summarized as follows:

- Provide a description of the TDM initiatives and their function, including a pedestrian routing plan. The proponent should contact City Staff to establish the scope of the TDM plan and the required format for the pedestrian routing plan;
- Evaluate the impacts of the proposed TDM initiatives specifically relating to reduced trip generation associated with the site, reduced peak hour travel, increased transit usage and/or increased auto occupancy;
- Incorporate these adjustments into the traffic generation assumptions outlined in Section A.1.

1.3. Trip Distribution and Assignment

1.3.1. Trip Distribution

The trip distribution assumptions should be supported by one or more of the following, in the order of preference:

- Transportation Tomorrow Survey (TTS) data, if applicable;
- Origin-destination surveys;
- Comprehensive travel surveys;
- Existing/anticipated travel patterns;
- Output from the transportation planning models; and
- Market Studies.

Engineering judgment should be utilized to determine the most applicable of the above methodologies for each particular application.

1.3.2. Trip Assignments

Trip assignment should consider logical routings, available and projected roadway capacities and travel times. Assumptions should reflect the most “probable” travel patterns expected. Traffic assignments may be estimated using a transportation planning model or “hand assignment” based on knowledge of the proposed/future road network in the study area.

1.4. Summary of Traffic Demand Estimates

A summary of the existing and future traffic demands should be provided in the form of exhibits/illustrations that summarize the following:

- Existing traffic;
- Future background – existing plus background traffic;
- Site generated traffic – if pass-by traffic has been assumed in Section A.1, an exhibit must be provided which summarizes the reassignment of pass-by traffic; and
- Future total traffic – Future background + site generated traffic.

Summary exhibits must be provided for each peak period and analysis horizon. It is recommended that the exhibits be provided within the body of the document where they are referenced as opposed to an appendix. This layout will aid in the timely review of the study.

In some cases, interim traffic conditions may need to be assessed to reflect phasing of developments, interim site access arrangements, or planned transportation system improvements.

1.5. Site Generated Transit Demand

It is recommended that City Staff be contacted early in the impact review process to establish mutually acceptable assumptions for transit usage for the proposed development. The site generated transit demand must reflect the assumptions outlined in Section A.1. In order of preference, the following may be utilized to establish the transit demand for the subject development.

- Transit surveys/data provided by the City of Welland;
- Transit surveys/data obtained from a similar development with proper adjustments for dissimilarities between the proposed and surveyed site;
- “First principles” calculations of anticipated transit trips to/from the site; and
- ITE Trip Generation rates for transit, provided that differences in the site nature and size are accounted for.

The level of detail required by the City will be dependent on the nature of the development and its reliance on transit usage.

**SUBSECTION 2
(TRANSPORTATION IMPACT STUDY GUIDELINES)**

BACKGROUND TRAVEL GROWTH

June 2007

BACKGROUND TRAVEL GROWTH

2.1. Background Traffic

The background growth in traffic should be established with one of the following methods:

- Estimation of future volumes from a calibrated traffic forecast model;
- Traffic growth forecasts established through a previous land-use or transportation planning study;
- Regression analysis of historical traffic growth; and
- A growth rate considered acceptable to the City, the consultant and the Region, as required;

It is important that the proponent consult with City Staff to obtain agreement on the most applicable strategy for addressing background traffic growth in the study.

In some situations, alternative assumption or methods, such as the application of development absorption rates may be appropriate. In the absence of these methods, rates provided by the City should be used.

2.2. Other Area Developments

The background changes in traffic growth should take into account:

- Developments that are under construction, approved, or in the approval process;
- Occupancy levels of adjacent development, i.e., buildings which are constructed but not fully occupied; and
- Developments/land uses that are planned to be closed or activities suspended which will noticeably impact the transportation system in the study area.

2.3. Future Developments

The consultant should contact the City to establish the approved/active proposed developments within the Study Area. The consultant should include anticipated traffic growth on the area road network for developments that are expected to proceed prior to or within the study horizons.

2.4. Background Growth in Transit Demand/Planned Transit Service

An assessment of transit ridership changes resulting from development beyond the study area and the ongoing growth across the City/Region and through the study area must be incorporated into the analysis. The proponent should contact City Staff to establish suitable assumptions for background growth in transit demand.

The background growth in transit demand must recognize:

- The transit travel aspirations of the City;
- Reasonable transit model split assumptions; and
- Developments that are currently being constructed, not fully occupied or approved and are anticipated to be constructed prior to the proposed development.

**SUBSECTION 3
(TRANSPORTATION IMPACT STUDY GUIDELINES)**

SITE ACCESS AND CIRCULATION

June 2007

All works shall be in accordance with "GEOMETRIC DESIGN STANDARDS FOR CANADIAN ROADS AND STREETS", issued by the Roads and Transportation Association of Canada (RTAC)

**SUBSECTION 4
(TRANSPORTATION IMPACT STUDY GUIDELINES)**

CAPACITY ANALYSIS

June 2007

CAPACITY ANALYSIS

4.1. Accepted Analysis Methodologies and Assumptions

Provided below are a number of analysis methodologies and assumptions accepted by the City of Welland. These assumptions represent “base” values and should be utilized in the absence of suitable data or engineering studies/surveys. These assumptions should not be used in place of good engineering judgment and common sense. Each intersection and roadway should be evaluated to determine appropriate analysis assumption.

During the preparation of the transportation impact study, the consultant may identify situations where the application of the following analysis assumptions would not be appropriate/prudent for the specific operations in the study area. In this event, the consultant should explicitly document the basis for these deviations, for consideration by the City Staff.

4.2. Analysis Methodologies

The City of Welland accepts both the Highway Capacity Manual (HCM) and Canadian Capacity Guide (CCG) methodologies of intersection analysis. Specific software packages include CCG/Calc, HCS Version 2.1g or higher, Synchro 4.0, HCS 2000, HCM/Cinema or InterCap. Should the consultant wish to utilize a software package other than those listed above, prior approval from the City must be obtained. Under this circumstance, it should be recognized that the City reserves the right to request that specific intersection analysis is undertaken with one of the above noted software packages should the verification of results be required.

4.3. Saturation Flows

The saturation flow rate is a measure of the flow rate at which vehicles may enter the intersection on a green phase. Typical base saturation flow rate assumptions are included in Table D.1. It should be recognized that the Highway Capacity Manual (HCM) and Canadian Capacity Guide (CCG) methodologies vary in terms of their definition of saturation flow rates. The proponent must ensure that the factored saturation flow rates calculated by intersection analysis software package in use reasonably reflect the actual rates being obtained at the intersection.

Movement	Saturation Flow Rate (vphpl)
Advanced Left Turn	1,800
Through	1,850
Right Turn	1,550

Saturation flow rates may need to be modified to reflect downstream congestion/constraints. Field observations and surveys should be undertaken to determine appropriate assumptions under these circumstances.

4.4. Lost Time

The lost time assumptions should reflect those provided in Table D.2. Variations from these assumptions should be supported by documented engineering studies.

TABLE D.2. RECOMMENDED LOST TIME ASUMPTIONS	
Phase	Seconds of Lost Time
Advanced Green	1.0
Back-to-Back-Lefts	1.0
Main Phase	5.0

4.5. Cycle Length and Signal Timings

Cycle lengths within the City/Region typically vary from 75 to 105 seconds.

Signal timings and cycle length assumptions incorporated into the analysis of existing conditions must reflect actual timings. Analysis of future conditions may utilize modified timings in an attempt to:

- Minimize overall delay at the intersection;
- Minimize the degree of saturation for critical movements/major traffic flows;
- Implement queue management; or
- Balance the flow ratios.

Modifications to the cycle length and existing signal timings employed by the City/Region must be explicitly identified and justified. Typically, the City will accept cycle lengths in the range of 75 to 105 seconds. All revised (existing intersections) and proposed (future intersections) signal timings must be approved by City Staff.

Proposed signal timings at City intersections should not incorporate any of the following phasing schemes unless agreed upon, in advance, by the City:

- Split phasing; or
- Extended/lagging fully protected phases.

4.6. Lane Utilization

Where two or more exclusive lanes are provided on an approach for the same movement, an appropriate lane utilization assumption must be assumed. This is especially important in the case of dual left turn lanes. A number of the intersection computer simulation packages calculate a suitable lane utilization factor where required. These assumptions should not be modified unless justified.

In the case of dual left turns, a lane utilization factor must be incorporated to account for this reduced capacity compared to that of two left turn lanes, i.e., generally the capacity of a dual left turn lane is not twice the capacity of a single left turn lane. This differential becomes more pronounced with increased presence of buses and other heavy vehicles.

4.7. Green Intervals

Signal timings must satisfy driver expectation, that is, motorists expect a reasonable length of green time. The expectation varies depending on the type of movement and local operating conditions. Provided in Table D.3 are the minimum green times to be provided at City intersections. Under no circumstances are these minimum green times to be violated.

TABLE D.3. MINIMUM GREEN INTERVALS		
Signal Indication	Minimum Duration on Major Street (Seconds)	Minimum Duration on Cross Street (Seconds)
Circular Green Interval	20	10
Left or Right Turn Advance	5	7
Advance Signal (Flashing Circular Green)	5	7
Notes: Minimum pedestrian crossing times must be accommodated at intersections where it is reasonable to expect pedestrian movements.		

The minimum green times outlined above may need to be increased in areas where intersections accommodate significant volumes of multi-unit or heavily loaded commercial vehicles.

4.8. Amber and All-Red Intervals

For the analysis of existing conditions, the amber and all-red intervals incorporated into the analysis should reflect the actual signal timings. For planning purposes, the existing amber and all-red intervals should be utilized at existing intersections. In the case of future/proposed intersections, amber and all-red intervals of 4.0 and 2.0 seconds, respectively, should be assumed.

4.9. Peak Hour Factors

A number of intersection analysis methodologies and software packages assume that a suitable peak hour factor (PHF) is being utilized. The PHF accounts for volume fluctuations within the one-hour analysis period, i.e., the peak 15-minute period, and generally range between 0.85 and 0.95. Actual PHFs should be assumed for all intersection analysis. A PHF of 0.9 will be assumed for all proposed/future unsignalized and signalized intersections. Higher PHFs may be utilized if supported by defensible and documented surveys/data.

4.10. Pedestrian Walking Speeds

Generally, a pedestrian walking speed of 1.2 m/s is accepted as design criteria for pedestrian crossing times. Pedestrian walking speed assumptions should take into account such factors as school children and seniors utilizing the area intersections. Pedestrian crossing times must be accommodated in the intersection signal timing if it is reasonable to expect pedestrian movements at the intersection.

4.11. Intergreen Movements

Left turns on amber or “sneakers” vary considerably from one intersection to the next. For design purposes, a value of 0 to 0.25 left turns on amber/cycle may be assumed. In some cases, existing conditions may reflect more than 2.5 left turns on amber/cycle; however, for design purposes this assumption should be limited to 2.0 vehicles/cycle at a typical intersection and 2.5 vehicles/cycle at congested intersections.

4.12. Right Turns on Red

The number of right turn on red (RTOR) movements is generally a function of the conflicting vehicular and pedestrian volumes on the cross street and the availability of an exclusive right turn lane. RTOR volumes assumed in the existing intersection analysis should reflect those observed in the field. Intersection analysis for future scenarios should include reasonable assumptions relating to RTOR volumes.

4.13. Truck Percentages

The majority of the analysis techniques, methodologies and computer applications require the utilization of a vehicle flow expressed in a homogeneous unit, i.e., passenger car units (pcu). Commercial and other heavy vehicles generally have different operating characteristics than passenger vehicles. Due to the variability of their length, type and weight-to-power ratios, the pcu for truck range from 1.1 to 2.5. For planning purposes, an average of 2.0 pcu can be assumed for trucks, buses and recreational vehicles. In situations where a high percentage of multi-unit or heavily loaded vehicles can be reasonably expected, the use of a higher pcu may be warranted.

Actual truck percentages should be incorporated into the analysis of existing conditions. For future traffic scenarios, appropriate truck volumes must be assumed.

4.14. Critical Gaps

A critical gap represents the gap in main street traffic that a motorist on the side of a street is willing to accept to proceed across or into the main street traffic flow. Critical gap assumptions should reflect the most recent research provided in the Highway Capacity Manual published by the Transportation Research Board. Deviations from these values must be justified by engineering studies.

APPENDIX 'G' -

**PERPETUAL MAINTENANCE FEES FOR STORM WATER
MANAGEMENT FACILITIES**