SITE PLAN APPROVAL POLICY GUIDELINES AND STANDARDS

THE CORPORATION OF THE CITY OF SARNIA

Date of Last Revision: June, 2025

INDEX

THE CORPORATION OF THE CITY OF SARNIA
SITE PLAN REVIEW POLICY GUIDELINES AND STANDARDS

1. INTRODUCTION

Under the Planning Act (Section 41) the City of Sarnia has passed a By-law (By-law 45 of 2023) which designates all of the land in the City of Sarnia as a "Site Plan Control Area". This by-law prescribes that most types of development within the City are subject to site plan review and approval by the municipality. Renovations and/or additions to existing buildings may also be subject to site plan review.

Low density residential (two or fewer units) and farm-related classes of development are exempt from this process. A brief discussion with the appropriate Planning and Building staff would determine the necessity for, and details of, an application.

The Site Plan Review Committee is a staff Technical Committee empowered by Council to review and provide recommendations to the Director of Planning and Building on site plans to ensure that development is attractive, compatible with surrounding land uses and meets certain minimum standards. The Committee consists of representatives from the Planning and Building, Engineering and Fire Departments.

Depending upon the scale, complexity and information requirements of an application, the approval process may be completed in 2 to 8 weeks. Applications that involve complex issues may take 3 to 4 months. Ministry approvals such as Ministry of Transportation access permits or Ministry of the Environment and Energy servicing approvals will require 8 to 10 weeks from the time of submission.

2. SITE PLAN REVIEW PROCESS

The Planning and Building Department is responsible for administration of the site plan approval process, including the co-ordination of requirements by other municipal departments and outside agencies, the preparation of site plan control agreements and the granting of approval.

A. Pre-Application

Applicants are encouraged to present preliminary site layout plans to the Planning and Building Department for review and discussion prior to submitting an application.

B. The Application

(a) An application form is completed by the owner or agent for the owner.
(b) Plans are prepared by the owner.
(c) The application form, required plans and proper fee are submitted to the Planning and Building Department and discussed with an appropriate staff person.

(d) A date, time and location for a meeting between the owner and the Site Plan Review Committee is established at the time the application is submitted.

(e) Sites Abutting County Roads

i) Six sets of plans (see Section 3, Submission) are submitted to the Secretary/Chairman of the City's Site Plan Review Committee by 5:00 p.m. atleast two (2) weeks prior to the scheduled meeting date.

ii) One of the six sets may then be submitted to the County of Lambton by the Secretary/Chairman.

iii) County approval must be obtained prior to final City of Sarnia site plan approval.

(f) Sites Not Abutting County Roads

Five sets of plans (see Section 3, Submission) are submitted to the Secretary/Chairman of the City's Site Plan Review Committee by 5:00 p.m. at least two (2) weeks prior to the scheduled meeting date.

C. Site Plan Review Committee

(a) Plans are circulated to staff members of the Site Plan Review Committee for individual comments.

(b) Meetings are held at City Hall. The setting is informal and open dialogue with the applicant/agent is encouraged.

(c) The Committee may recommend one of the following:
- approval of the plans as submitted
- approval of the plans subject to conditions, or
- refusal of the plans with a request for revised plans to be resubmitted for review.

(d) Following the meeting the minutes are prepared and made available to the applicant.

(e) If the plans have been recommended for approval subject to conditions, the plans are required to be modified to incorporate the conditions. Revised plans are to be resubmitted to the Secretary/Chairman of the Site Plan Review Committee, who ensures conditions have been addressed.

D. The Site Plan Control Agreement

Five [5] sets of approved plans are required for inclusion into the agreement.

(a) Five executed Site Plan Agreements, if required (see Section 4A - City of Sarnia requirements) must be returned to the Planning and Building Department.

(b) The agreements are then forwarded to the Director of Planning and Building for review in conjunction with the recommendations of the Site Plan Review Committee. The signature of the Director on the agreements indicates final approval. In the absence or incapacity of the Director, the Secretary/Chairman of the Site Plan Review Committee may sign the agreement

(c) Upon final approval, one signed copy of the registered Agreement is returned to the applicant.

(d) Where an applicant is not satisfied with any condition or requested modification of a staff reviewed site plan, the applicant may request, in writing, referral of the site plan to Council. Staff, in turn, will prepare a report for Council.If the applicant remains unsatisfied with Council's direction, he/she has the right to appeal to the Ontario Municipal Board.

3. THE SUBMISSION

To initiate the process for site plan approval the applicant must submit five (5) sets (six if abutting a County Road) of site, building elevation, grading, drainage, site servicing and landscape plans, as required, for the initial review. Generally, site development drawings should be completed to working drawing standards (preferably 20" x 24" - 500mm x 600mm sheets) showing all information necessary for the proper execution of construction work and for reviewing purposes.

Applicants should refer to the booklet entitled "Sarnia Engineering Standards and Specifications", which is available from the City's Engineering Department, to determine the latest engineering standards for the City.

Applicants should also refer to the appropriate Official Plan and Zoning By-law to ensure the proposed development complies with these documents.

A. Site Plan Review Checklist

A site plan should include:

(a) Key map
(b) Municipal street address
(c) North arrow
(d) Drawing scale (metric preferred)
(e) All driveways, sidewalks, curbing and ground cover to be labeled (e.g. sod, asphalt, paving stones)
(f) All proposed building setbacks and sidewalk, parking space and driveway width dimensions
(g) Existing site features including trees, rocks, watercourses, utilities, buildings
(h) Existing and proposed walls, fences and berms with details

(i) The location and screening of outdoor garbage and recycling facilities or utility facilities (e.g. air conditioning unit, hydro vaults, etc.)
(j) Proposed use of all buildings on site
(k) Uses of adjacent lands and buildings
(l) Parking layout including parking for the handicapped
(m) Location of access ramps for the handicapped
(n) Retaining walls, fences and screens with details
(o) Patios and recreational facilities
(p) All trees on municipal property (boulevards) abutting site
(q) Location of exterior lighting fixtures and standards (shown to be directed onto the site and not onto adjacent properties or streets)
(r) Existing vegetation with instructions for removal, preservation or treatment
(s) Proposed locations of trees, shrubs and ground cover clearly labeled and cross-references to a plant schedule
(t) Applicable planting details and schedules
(u) Sub-surface drainage methods for tree pits and planting areas in impermeable soil
(v) A site data chart which includes:
    i) total site area
    ii) building coverage as a percentage of site area
    iii) gross building floor area
    iv) number of floors in building
    v) total number of units (if a multiple family development)
    vi) building height
    vii) total landscaped area as a percentage of site area
    viii) required parking calculations
    ix) parking provided
    x) any other figures to show compliance with the Zoning By-law
(w) Property dimensions
(x) Benchmark location(s) and elevation
(y) Adjoining street(s) labeled
(z) All site details including service connections to City mains, curb and road cuts and restorations
(aa) Existing grades including those on adjoining properties and streets
(aa) Proposed grades in the form of spot elevations and drainage patterns at critical locations (cc) Key elevations of all site features (i.e. top or bottom of retaining walls, etc.)
(dd) Building dimensions including grade elevations at all corners
(ee) First floor elevations of all buildings on site
(ff) Location of hydro and utility poles and hydrants on or adjacent to the site
(gg) Existing and proposed roads, driveways and parking areas with dimensions and details. All proposed curb cuts or road cuts including details for restoration
(hh) Existing and proposed curbs, sidewalks and walkways with dimensions and details
(ii) Dedicated road widening or servicing easement

(jj) All culverts and swales showing direction of flow and percent slopes

(kk) Existing and proposed underground services and connections showing pipe sizes, invert elevations, materials and grades. All parking lot catchbasins (1 per each 5,000 S.F. - 465m^2) including flow restrictor details and calculations, where applicable. Stormwater management, including quality and quantity control, is required. Calculations should be based on Appendix "E," Design Guidelines for Stormwater Management.

(ll) Locations, details and sections of wells, pumping stations, septic system, garbage storage/pick-up enclosures, oil interceptors, etc.

(mm) Engineer's, Architect's or Landscape Architect's stamp and signature certifying the plan

(nn) All buffer strips required by the Zoning By-law

(oo) Location and size of any free-standing signs

(pp) Type of building construction (e.g. combustible, non-combustible, sprinklered)

(qq) Appropriate general notes

(rr) Site impact study for traffic and detail drawings showing intersection improvements, turning lanes, widenings, etc. as may be required
Note: A site impact study for traffic may be required for developments, at the discretion of the City Engineer.

(ss) acknowledgment of any survey information relied upon

(tt) a double backflow preventer is required on all sprinkler systems and a backflow preventer is required on domestic water systems

Bird Friendly Glass
The City encourages the use of Bird Friendly glass.

B. Building Elevations

These drawings, if required by the Committee, should illustrate the elevations and cross-section views for each building to be erected, except this requirement does not apply to a building to be used for residential purposes containing fewer than 25 dwelling units. These drawings should be sufficient to display:

i) the massing and conceptual design of the proposed building;

ii) the relationship of the proposed building to adjacent buildings, streets and exterior areas to which members of the public have access; and

iii) the provision of interior walkways, stairs, elevators and escalators to which members of the public have access from streets, open spaces and interior walkways in adjacent buildings

C. Landscape Plan

The landscape plan should illustrate the following details if applicable: (see Appendix "B" for landscaping guidelines)

(a) The use of native species is encouraged over non-native species wherever possible
(b) location of all existing and proposed planting beds, trees, play areas, etc.
(c) extent of proposed sod or other ground cover
(d) plant material chart with plant size, quantity, spacing and species name (common and botanical names) for proposed plant materials

D. Site Servicing Plans

These plans shall be submitted in accordance with the requirements outlined in Appendix "A" and shall show all servicing works to be done on the site and adjacent public streets.

4. PRIOR TO APPLICATION AND/OR ISSUANCE OF A BUILDING PERMIT

The following is a list of approvals and requirements that must be fulfilled (if applicable) prior to the issuance of a building permit. It is the applicant's responsibility to determine through discussions with City staff what approvals are actually required.

A. City of Sarnia Requirements

(a) Site, landscape, site servicing, grading and drainage plans, if deemed necessary, must be reviewed by the Site Plan Review Committee and receive final approval by the Director of Planning and Building.

(b) Deeds/documents for road widenings or servicing easements must be prepared and conveyed.

(c) The registered owner of the land and all Encumbrancers will be required to enter into a Registered Site Plan Agreement with the City, agreeing to build in accordance with the approved plans.

(d) Prior to the execution of the Site Plan Agreement the owner must deposit with the City certain deposits and fees, which may include:

i) A deposit to be retained until "as-constructed" drawings and an Engineer's or Architect's certification letter are received by the City
ii) A deposit equal to 100% of the value of the work to be done on City property
iii) A cheque for meeting and inspection fees by City forces as determined by the Director
iv) A cheque for each required fire hydrant flow test as determined by the Director.

See Appendix "A" - Item (e) for more information regarding these deposits.

(e) Any work performed on a City right-of-way shall be done by a contractor approved by the City and all work shall be done in accordance with City engineering specifications and related by- laws.

(f) A copy of the Engineer's Certificate of Liability Insurance in the amount of one million dollars

(g) As a condition of the development or re-development of land for residential purposes, and prior to the issuance of any building permit, land in an amount of 5% of the land proposed for development or re-development shall be conveyed to the City for parkland purposes. Cash- in-lieu of the whole or part of a required land dedication will be accepted if City Council determines such payment would be appropriate. In the event that cash-in-lieu of parkland is to be paid, the owner shall be required to enter into an agreement with the City fixing the amount of the cash payment and for the payment of such monies at the time of execution of the agreement.

B. County of Lambton Requirements

Applicants whose property abuts a County Road must ascertain if the following (or other conditions) are required by the County through discussions with the Site Plan Committee and the County which will provide advice and direction to the applicant:

(a) Entrance permit to County Roads from the County of Lambton
(b) Grading and drainage plan approval
(c) Deeds/documents for road widenings or servicing easements
(d) Site Plan approval

County conditions must be fulfilled prior to execution of a Site Plan Agreement and issuance of a building permit.

C. Other Requirements

Requirements of other agencies may have to be addressed prior to Site Plan Approval and/or issuance of a building permit as follows:

(a) St. Clair Region Conservation Authority approval for fill, construction or alteration to a waterway

(b) Ministry of Transportation of Ontario (MTO) approval of building location, signs, drainage or entrances for sites within 400 metres (1300') to a Highway intersection or sites within 45 metres (150') to a Highway right-of-way. They may also require approval for major developments within 800 metres (½mile) of MTO property. It is best to consult with them to determine their requirements.

(c) Ministry of Environment and Energy (MOEE) approval of site servicing plans may be required The Committee will provide advice and direction to the applicant regarding these and other agencies involvement in the process.

NOTE: For additional information or clarification of any of the above, please contact the City of Sarnia Planning and Building Department at (519) 332-0330.

APPENDICES

APPENDIX "A"

SITE SERVICING AND PARKING REQUIREMENTS

For all Site Developments the following shall apply:

(a) The owner shall provide for the construction of sewers, watermains, roads, site grading and service connections as designed, certified and shown on the drawings prepared by a professional engineer, architect or landscape architect, and in accordance with the City of Sarnia Engineering Standards for Design and Construction (copies of this manual are available upon request).

The drawings required shall include, but not be limited to:

- a lot grading plan showing proposed and existing grades; and

- a servicing plan showing all existing and proposed services and utilities.

(b) The owner's plans as reviewed and accepted by the City Engineering Department shall form part of the Site Plan Agreement.

(c) The owner's consultant shall provide inspections for the installation of the site services in accordance with the approved plans and specifications. A final certified inspection report is required to be filed with the City.

All work on City property shall be co-ordinated with the Engineering Department and will require full-time inspection by the owner's consultant. All watermains shall be inspected and tested up to and including the curb stops or the on-site fire hydrants, in accordance with the City of Sarnia Engineering Standards for Design and Construction.

(d) (1) All work to be performed upon an existing City R.O.W. and on City streets shall comply with City By-laws, and the Owners shall obtain the necessary permits to cut the street surface and perform the required connections to the City mains.

(2) At least five (5) working days notice shall be given to the Director of Engineering prior to the construction of any sewers, watermains, roads, grading or other service work on the City right-of- ways.

(e) The Owner shall deposit the following with the City prior to the execution of the Agreement:

(1) A deposit, in the form of a certified cheque, the sum of _____ **thousand dollars** to be retained until such time as two sets of "as constructed" drawings and one computer disk containing the drawings in a digital AutoCad format (.dwg) or an equivalent .dxf format have been submitted to the Director and until an architect, professional engineer or landscape architect has given to the Director a letter addressed to the

Director and signed by the engineer, architect or landscape architect certifying that all services on or in the said lands, required for this development or redevelopment, and not contained within a building, have been installed and completed in a manner satisfactory to the engineer, architect or landscape architect. Upon receipt of such drawings and letter, the said deposit shall be returned to the Owner without interest.

(2) A security shall be provided, in the form of a certified cheque or Letter of Credit (as per Schedule`B'), equal to 100% of the value (including G.S.T.) of the work to be done on City or County property. The Owner's consultant shall provide an estimate for the work to be approved by the Director. Upon substantial completion, as certified by the City and the Owner, the City will return 80% of the security without interest, 10% of the security will be held for 45 days until the construction lien period expires, in accordance with the construction Lien Act, S.O. 1983 and 10% will be retained by the City for future maintenance.

OR

A security shall be provided in the form of a certified cheque or Letter of Credit (as per Schedule
`B') equal to 100% of the value (including G.S.T.) of the work to be done on City or County property. The Owner's consultant shall provide an estimate for the work to be approved by the Director. Upon substantial completion, as certified by the City and the Owner, the City will return 65% of the security without interest, 10% of the security will be held for 45 days until the construction lien period expires, in accordance with the Construction Lien Act, S.O., 1983 and 25% will be retained by the City for a two (2) year maintenance period. All securities returned to the Owner shall be without interest. The Owner guarantees the performance of the completed work provided for in this Agreement for a period of two (2) years from the date of substantial completion.

Prior to the expiry of the maintenance period the Owner shall:

(i) give the City Engineer documentation of any internal television inspection required by the City Engineer

(ii) flush and clean all sewers and catchbasins

(iii) correct and repair any deficiencies or difficulties which may have occurred or arisen during the maintenance period, all to the satisfaction of the City Engineer; and

(iv) provide a report to the City Engineer confirming that all deficiencies or difficulties have been corrected, which report will act as a notice for a request to the City Engineer for the maintenance clearance inspection.

Upon receipt of the report of the Owner, the City Engineer will undertake a maintenance

clearance inspection of the work and, subject to the completion of any additional required work, will confirm that the work is satisfactory and complete.

Upon expiry of the maintenance period, and the completion of a maintenance clearance inspection to the satisfaction of the City Engineer, the Director may release to the Owner the final 25% of the security which the City has to which the Owner is entitled under this Agreement.

The City Engineer may require the Owner to provide internal television inspections of the sewer mains provided for in this Agreement to be made prior to the expiration of the maintenance period, and the costs of any such inspection shall be paid by the Owner.

(3) A cheque shall be provided for an amount to be determined by the Engineering Department for inspection and administration fees for the Engineering Department.

(f) If the Owner wishes to use an existing sewer connection, the Owner shall expose each existing sewer connection and arrange to have a television inspection of it done all at his own expense. If the inspection reveals that the connection is unsuitable for use, the Owner shall be responsible for all costs associated with either repairing it or installing a new one, all to the satisfaction of the City Engineer, acting reasonably.

(g) Any work performed on a City right-of-way shall be done by a contractor approved by the City and all work shall be done in accordance with City engineering specifications and related by-laws.

(h) The Owner shall erect and maintain all required temporary traffic directional signs on the City or County right-of-way during the time they are needed for construction on the right-of-way to the satisfaction of the Director. If the Owner is unable or unwilling to provide satisfactory signs, the Owner hereby authorizes the City to erect and maintain the signs and the Owner agrees to pay the City all costs associated with the erection and maintenance of signs by the City.

(i) Any exterior lighting of a building, open space or signs shall have its intensity controlled and shall be directed away from the adjacent properties or streets.

(j) All parking areas shall be surfaced with concrete or asphalt pavement or paving stone and bounded by continuous concrete curbs and all parking spaces shall be clearly marked.

(k) All loading spaces shall be constructed and maintained with a stable surface which shall have a cement or asphalt binder.

(l) Any one loading space shall have a minimum width of 3.5 metres, a minimum length of 9 metres with a minimum vertical clearance of 4.5 metres and shall include such additional area as is necessary for the maneuvering of a vehicle into or out of the loading space.

(m) Two-way traffic movement between rows of parking will only be permitted where 90 degree angle parking is provided.

(n) Any parking space which is bounded on one or both sides by a wall or column shall have a minimum unobstructed width of 2.75 metres.

(o) All driveways shall be constructed to the following standards:
- (i) OPSD 350.01 for Urban Industrial, Commercial and Apartment Entrances;
- (ii) OPSD 351.01 for Urban Residential Entrances.

(p) All parking spaces for the handicapped shall be a minimum of 4.26 metres wide and 5.5 metres long.

(q) The minimum width of an entrance driveway at any point to carry two-way traffic shall be 7.2 metres, and for an entrance driveway to carry one-way traffic shall be 3.6 metres.

(r) All parking areas shall conform to the minimum design standards in the table, which follows on the next page of this document.

ACCESSIBLE PARKING SPACE GUIDELINES

Accessible parking requirements apply to new parking facilities and the redevelopment of existing parking facilities. For the purposes of this requirement, re-painting of existing lines to mark parking spaces and other periodic maintenance or restorative activities do not trigger redevelopment requirements.

1) Size of Accessible Parking Spaces
   1. Off-street parking facilities must provide the following two types of parking spaces for the use of persons with disabilities
      - Type A, a wider parking space which has a minimum width of 3.4m and signage that identifies the space as “van accessible”; and
      - Type B, a standard parking space which has a minimum width of 3.0m and length of 5.5m.

2) Access Aisles
   1. Access aisles, that is the space between parking spaces that allows persons with disabilities to get in and out of their vehicles, must be provided for all parking spaces for the use of persons with disabilities in off-street parking facilities.
   2. Access aisles may be shared by two parking spaces for the use of persons with disabilities in an off- street parking facility and must meet the following requirements:
      - They must have a minimum width of 1.5m.
      - They must extend the full length of the parking space.
      - They must be marked with high tonal contrast diagonal lines, which discourages parking in them, where the surface is asphalt, concrete or some other hard surface.
   3. Access aisles adjacent to Type A parking spaces should be located adjacent to the passenger side of the vehicle if parked front first.
   4. Access aisles adjacent to Type B parking spaces should be located adjacent to the driver side of the vehicle if parked front first.

3) Location of Accessible Parking Spaces

1. In determining the location of parking spaces for the use of persons with disabilities that must be provided where there is more than one off-street parking facility at a site, an development proponents may distribute them among the off-street parking facilities in a manner that provides substantially equivalent or greater accessibility in terms of distance from an accessible entrance or user convenience.
2. For subsection 3(a), the following factors may be considered in determining user convenience:
    - Protection from the weather.
    - Security.
    - Lighting.
    - Comparative maintenance.

4) Accessible Parking Space Signage Requirements

1. Development proponents shall ensure that parking spaces for the use of persons with disabilities are distinctly indicated by erecting an accessible permit parking sign under section 11 of Regulation 581 of the Revised Regulations of Ontario, 1990 (Accessible Parking for Persons with Disabilities) made under the Highway Traffic Act.

SITE SERVICING AND PARKING REQUIREMENTS

PARKING TABLE

Dimensions of Parking Spaces

A parking space required hereby shall have the following minimum rectangular dimensions:

Parking Angle A	Stall Width B	Stall to Curb C	Aisle Width D	Curb Length per Car E	Curb to Curb Width F	Centre to Centre Width G
90'a	2.75	5.5	7.3	2.75	18.3	18.3
90'b	3	5.5	6.0	3	17.0	17.0
60'	2.75	6.1	5.0	3.1	17.2	15.7
45'	2.75	5.8	4.5	4	16.1	14.2
30'	2.75	5.1	4.0	5.3	14.2	11.9

Diagram 1

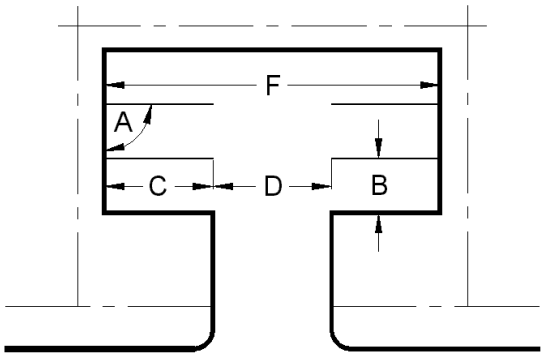
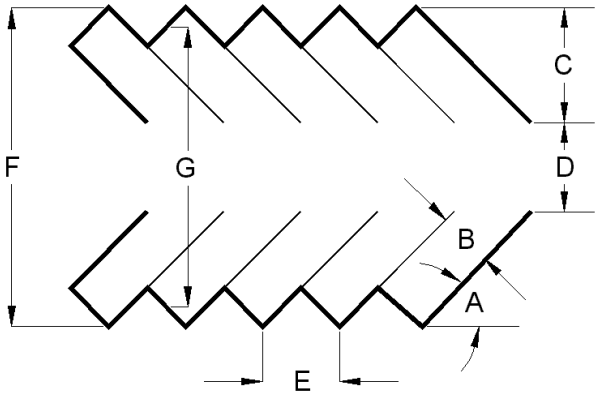
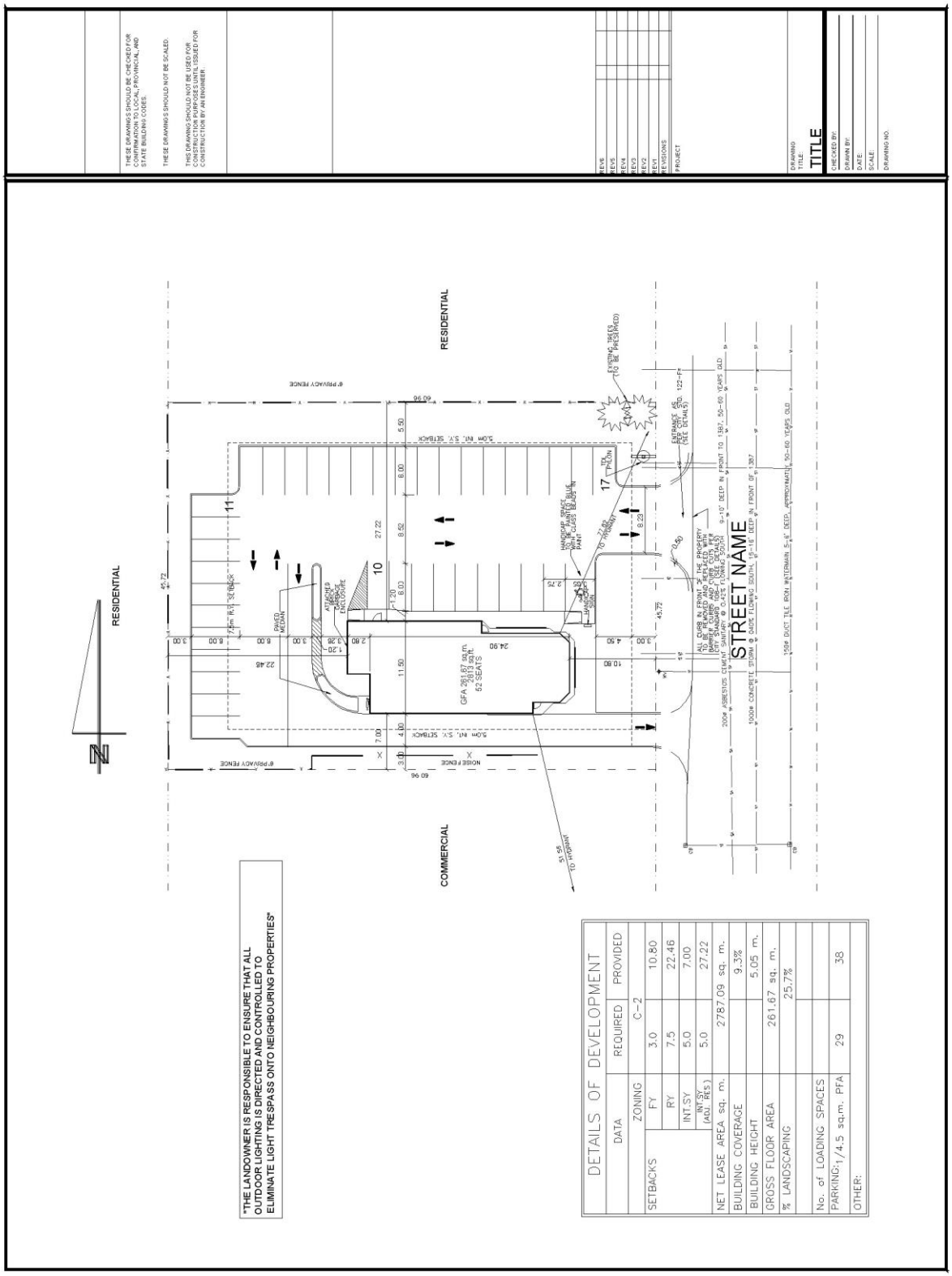


Diagram 2



SITE SERVICING AND PARKING REQUIREMENTS - TYPICAL SITE PLAN



DETAILS OF DEVELOPMENT

DATA		REQUIRED	PROVIDED
ZONING		C-2	
SETBACKS	FY	3.0	10.80
	RY	7.5	22.46
	INT.SY	5.0	7.00
	INT.SY (ADJ. RES.)	5.0	27.22
NET LEASE AREA sq. m.		2787.09 sq. m.	
BUILDING COVERAGE		9.3%	
BUILDING HEIGHT		5.05 m.	
GROSS FLOOR AREA		261.67 sq. m.	
% LANDSCAPING		25.7%	
No. of LOADING SPACES			
PARKING: 1/4.5 sq.m. PFA		29	38
OTHER:			

APPENDIX "B"

LANDSCAPING GUIDELINES FOR DEVELOPMENT

The following information is provided for anyone preparing a landscaping plan for submission to, and approval by, the City. The guidelines are intended to ensure that any plans submitted will contain sufficient information and will be drawn clearly enough to permit a thorough and rapid review of them. These guidelines do not constitute an exhaustive or final listing and do not preclude any alternate method of meeting them provided the alternate is acceptable to the City. The attached samples of a plant list and a landscaping plan are provided as examples of a format which would be acceptable to the City.

1. Landscape Plans

   a) The plant species to be employed for landscaping shall be listed on the Landscape Plan by its botanical name and common name and the height or caliper, location and quantity of each type shall be shown.

   b) Spot elevations shall be shown on the Landscape Plan to show final grading and, if berms or slopes are to be employed, elevations and slope ratios shall be indicated.

   c) The mature crown of plant materials shall be graphically illustrated on the plan.

2. Plant Materials

   a) Only those plant materials which are hardy in the Sarnia area are to be used. Soil condition, climatic factors and resistance to insects and disease are considerations in this regard.

   b) All landscaping shall be designed for minimum maintenance.

   c) Those plant materials which not only produce a pleasant effect but also may mature without significant thinning out of other plant material should be used. Spacing of materials is important in this regard.

3. Landscape Design

   a) All of the property in the front yard of the site that is to be planted with grass shall be sodded and not seeded.

   b) Evergreen plant materials shall be used wherever possible to provide year round effect.

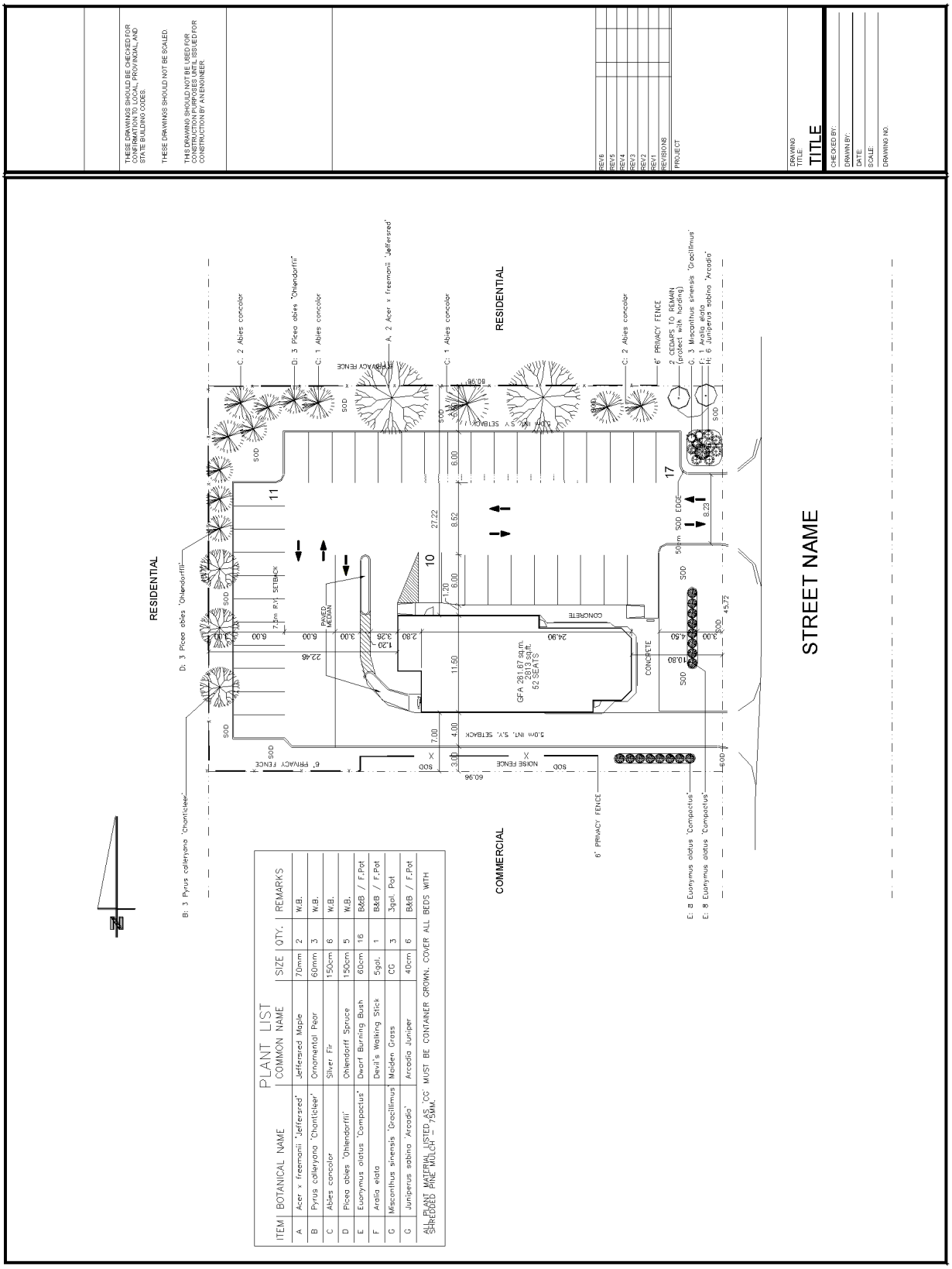
   c) The parts of the property that are reserved for expansion or are otherwise unused shall be maintained as lawn.

   d) The landscape treatment shall not interfere with sight line requirements for vehicular circulation.

e) The function of a proposed development, the types and scale of the structures upon the site and the relationship of these to abutting properties and roads must be considered in preparing the landscape design. The developers should consider the use of other design elements in addition to plant materials such as berms, walkways, planters, pools, fountains, sculptures, decorative stone, fences, light fixtures, etc.

f) To reduce the potential for vandalism and to maintain public safety, secluded areas should be avoided in the landscape design.

LANDSCAPING GUIDELINES FOR DEVELOPMENT - TYPICAL LANDSCAPING PLAN



APPENDIX "C"

FIRE DEPARTMENT GUIDELINES

SITE PLANNING STANDARDS FOR THE PROVISION OF LIFE SAFETY SERVICES, FIREFIGHTING, EMERGENCY SERVICES, ETC.

FIRE DEPARTMENT GUIDELINES

DEFINITIONS

The Building Code means: The current edition of The Ontario Building Code in effect on the day of design.

The Fire Code means: The current edition of The Ontario Fire Code in effect on the day of design.

FIRE DEPARTMENT GUIDELINES

DESIGN STANDARDS FOR FIRE DEPARTMENT ACCESS TO BUILDINGS

When access to a building is required, the design and construction of such access routes shall be in accordance with The Building Code and reviewed by the Sarnia Fire Rescue Service and shall:

1. Have a centerline turning radius of no less than 12.4 meters

2. Fire Route Signs may be required where designated by The Sarnia Fire Rescue Service and be installed at the owner's expense. Signs are to be purchased from the city Engineering Department.

3. The building or individual unit Municipal Address must be prominently displayed

WATER SUPPLY

1. An adequate supply of water meeting the requirements of The Building Code shall be supplied.

2. Dead end Water Mains are not allowed.

Notwithstanding the above The Sarnia Fire Rescue Service reserves the right to accept or reject any proposal.

HYDRANTS

1. Only Fire Hydrants meeting the City of Sarnia Standard shall be installed.

2. Fire Hydrants shall be located in accordance with The Building Code.

3. Notwithstanding the above the Sarnia Fire Rescue Service reserves the right to request fire hydrants as deemed necessary.

4. When public hydrant(s) are located on the opposite side of a multi-lane (4 or more) highway, a private hydrant will be required

FIRE DEPARTMENT CONNECTIONS

1. The location of the Fire Department connection requires Fire Department approval.

2. Fire Department connections and shall be located in conformance with The Building Code.

TOWNHOUSE DEVELOPMENTS

1. Where units of a townhouse block front on amenity spaces, vehicular access shall be provided with hydrant spaces at not less than ninety (90) meter intervals.

2. (a) Access to blocks of townhouses should be from a street. A block of townhouses shall not exceed a distance of forty-five (45) meters without an access to the rear of a townhouse block.

   (b) Access to rear yards shall be provided by means of a three (3) meter break.

   (c) Visitor parking shall not block the aforementioned three (3) meter breaks given to rear of buildings for fire fighting purposes.

PROVINCIAL STANDARDS AND REGULATIONS

ALL RELAVENT CODES AND STANDARDS FOR THE PROVINCE OF ONTARIO AND MUNICIPAL BY-LAWS SHALL APPLY.

APPENDIX "D"

THE FOLLOWING TYPICAL NOTES ARE REQUIRED ON PLANS SUBMITTED FOR SITE PLAN APPROVAL

(Use only the notes which are appropriate for the project)

1. The General Contractor or appropriate sub-trade shall be responsible for notifying the following people at least 96 hours prior to commencement of construction:

    a) the City of Sarnia Engineering Department Inspector Contact:
    - Mr. Rob Williams at 332-0330 Ext.283 or
    - Mr. Mike Berkvens at 332-0330 Ext.355

    b) the Engineering Consultant

    c) the Plumbing Inspector for the County of Lambton at 845-0801

    No Work Shall Commence Until Such Notification Has Been Done

2. All work on City property shall be co-ordinated with the City's Engineering Department and will require full time inspection by the consultant on all underground servicing and part time on other work.

3. All work on City property shall only be done by a contractor that is approved by the City of Sarnia.

4. The road must be restored immediately after installation of services. If it is not possible then the contractor must immediately provide a temporary asphalt surface 50mm thick until permanent restoration can take place.

5. Pavement Structural Requirements (select applicable standard):

    a) For Construction in Sand Areas:

        i) Industrial, Arterial or Designated Bus Routes
        - 40mm H.L.3,
        - 65mm H.L.4,
        - 200mm Granular "A" compacted

        ii) Collector or Local Roads
        - 40mm H.L.3,
        - 40mm H.L.4,
        - 100mm Granular "A" compacted

        iii) Commercial Driveways and Parking Lots
        - 50mm H.L.3,
        - 150mm Granular "A" compacted

TYPICAL NOTES

b) For Construction in Clay Areas:

i) Industrial, Arterial or Designated Bus Routes
- 40mm H.L.3,
- 65mm H.L.4,
- 200mm Granular "A" compacted,
- 410mm Granular "B-1" compacted or;
- 275mm Granular "B-11" compacted

ii) Collector or Local Roads
- 40mm H.L.3,
- 40mm H.L.4,
- 100mm Granular "A" compacted
- 300mm Granular "B-1" compacted or;
- 200mm Granular "B-11" compacted

iii) Commercial Driveways and Parking Lots
- 50mm H.L.3,
- 150mm Granular "A" compacted

6. Replace sidewalk to first joint on each side of the driveway entrance with:

a) 50mm Granular "A" sub-base at driveway only
b) 50mm Granular "A" base under entire new sidewalk
c) 185mm of 25MPa concrete

7. Storm and sanitary sewers shall be rigid P.V.C., Tyton joint, constructed to A.S.T.M. Standard D3034, SDR28.

8. Safeguard all existing structures, services, utilities and plant materials which will be affected by the work of this contract

9. Each parking space that is designated for use by the handicapped shall have:
a) the surface painted blue with glass beads in the paint and
b) the handicapped parking symbol painted in the space and
c) a sign designating the space mounted on a post or wall at the end of it

10. All raised curbs are to stop 0.6 metres inside the property line. No raised curbs are permitted on City property.

APPENDIX "E"

Corporation of the City of Sarnia
Design Guidelines for Stormwater Management

Introduction

Stormwater management guidelines and criteria documents provide specific objectives and targets for stormwater management design and are themselves a subset of the complete suite of design objectives to address a full range of development considerations. As such these guidelines should be considered as a first step in the design process.

These guidelines replace previously issued guidelines. Due to the limitations of existing municipal storm conveyance infrastructure to meet potential increases in both frequency and duration of storm events attributable to Climate Change, these guidelines encourage both new development and redevelopment to incorporate into their storm water design low impact development (LID) as a strategy that seeks to mitigate the impacts of increased runoff and stormwater pollution by managing runoff as close to its source as possible.

LID comprises a set of site design strategies that minimize runoff and provide distributed, small scale structural practices that mimic natural or predevelopment hydrology through the processes of infiltration, evapotranspiration, harvesting, filtration and detention of stormwater.

These practices can effectively remove nutrients, pathogens and metals from runoff, and reduce the volume and intensity of stormwater flows.

A more complete discussion on the use of these design practises is included in Appendix B of this document and should be referenced by those designers unfamiliar with these concepts.

Guidelines for the design of stormwater management facilities

1. The Official plan shall be used to determine the forecast land use for tributary areas for storm sewer design for new developments.

2. Use of the Rational Method is acceptable for designing the storm sewers for minor storms using the following formula: $Q = 0.0028 \times C \times I \times A$ m^3/sec.

   where C is the runoff coefficient; I is the rainfall intensity (mm / hour) and A is the catchment area in hectares.

3. Current City standards require collector sewers to be sized for the 5 year return frequency for new developments. Surcharging of the existing storm sewer infrastructure is expected during larger storm events and major storm overland flow routes must be established to accommodate these flows.

4. For residential areas the determination of post development runoff shall be based on a two (2) year return period storm events with a maximum time of concentration of ten (10) minutes and with a demonstrated ability to manage events up to and including the one hundred (100) year return period storm event through a combination of at source, LID and end of pipe controls.

5. For Commercial and Industrial developments these storm water guidelines will apply for stormwater management for both quantity and quality control.

6. The City of Sarnia IDF curves as modified for Climate Change (refer to Appendix A) should be used for all rainfall runoff analysis.

7. The post development peak discharge from a development site is to be controlled to the equivalent 2 year predevelopment level for storms up to the 100 year return frequency.

8. Individual infill developments may have more stringent requirements for allowable runoff (e.g. mitigation of peak discharges to the 1 year predevelopment level for areas south of the highway 402 corridor, north of Campbell Street and west of East Street).

9. Re-development or extension to the existing development will be considered as an opportunity for a retro-fit to the above criteria. Such control may be achieved by adopting the policies outlined above using MOE recommended stormwater best management practices (BMPs) for lot level and conveyance controls.

10. As a minimum, all infill developments or additions to existing development must provide quantity and quality controls for the increased runoff from the site. For the purpose of establishing the increase in the runoff, all proposed changes will be considered changes based on the pre-development pervious surfaces. Existing soil conditions vary across Sarnia but typically the areas north of London Road are comprised of silty sands (use C=0.25) becoming more permeable as they approach Lake Huron, and soils to the south of London Road comprise silty clays (use C=0.35) becoming more impermeable to the south.

11. For infill development of sites up to 2 hectares (5 acres) and for parking lot storage design, use of the rational method (see example in Appendix) is encouraged.

12. In the absence of a detailed analysis of a proposed site based on the specific site parameters such as sub-soils, area, topography and material coverage, the following range of runoff coefficients, C shall be utilized in the Rational Method:

- Parks and Playgrounds 0.25 to 0.35
- Residential
  - suburban 0.35
  - single family housing 0.45
  - townhouses 0.60
  - high density apartments 0.70
- Neighbourhood Commercial 0.65 to 0.75
- Commercial and Industrial 0.70 to 0.85
- High Value Commercial 0.85
- Gravel parking area 0.65
- Paved (non porous) parking 0.90 to 0.95

13. The developer's consulting engineer shall evaluate the effect of all applicable storms based on the IDF curves provided for the City of Sarnia and shall recommend the most appropriate design solution on a case-by-case basis.

14. For each problem (i.e. analysis of flood control, quality control, erosion control), a "critical" storm and return period should be selected for design purposes.

15. For stormwater quality control a 25mm design storm should be used.

    Where the development involves:-

    - Gas stations or significant parking areas;
    - Parking for more than 100 vehicles or >3000 m2 allocated to parking;
    - Loading/unloading zones for Commercial and/or Industrial areas;
    - The potential for oil spills.

    Oil/grit interceptors must be designed to treat the peak flow from the site.

16. For suspended solids removal, the normal protection criteria with at least 70% removal rate shall be used for sizing of the BMP facility discharging to municipal storm sewers.

17. A higher level (up to 80%removal) may be required by the City where storms sewer discharges are located close to aquatically sensitive water courses, sensitive aquifers or wet lands habitat or where the proposed use of the development is considered a greater risk to the environment.

18. Stormwater designs may also be required to be reviewed by the St Clair Region Conservation Authority (SCRCA) where stormwater from the proposed site outlets to a water course which falls under their control or jurisdiction.

19. Stormwater design will also require review by the Ontario Ministry of Transportation (MTO) for projects abutting to or discharging to MTO lands in accordance with their Corridor Control regulations.

20. Design of stormwater management facilities such as dry/wet ponds should be carried out based on appropriate flow routing methods. Use of industry standard software/models is encouraged for rainfall runoff analyses and flow routing. However, the accuracy of the results must be independently verified by the developer's engineer.

21. MOE approval will be required for Stormwater Management designs for projects located on Industrial lands (typically required on sites zoned Industrial or Light Industrial) which are not exempted by their proposed use under Ontario Regulation 525/98. Refer to the definition of *Industrial Lands* within the legislation to determine whether a Commercial or Institutional project is exempt from Section 53 MOE Approval for a non-industrial use on zoned Industrial lands.

22. Stormwater management BMPs should also provide for measures for winter runoff control and frozen ground conditions. Maintenance requirements for the recommended BMPs must be discussed in the report and responsible parties identified.

23. Stormwater Management Planning and Design Manual (MOE, 2003) should be referred to in order to address all other issues, including quality control and ongoing maintenance requirements not covered by these guidelines.

Additional information to be included in a Stormwater Management Report

A storm water management report shall include where applicable the following:

1. Project location, description, and physical features including existing and proposed development;
2. Adjacent land use and proposed project land use;
3. Watershed contribution and potential impacts to water bodies and existing stormwater outlets either upstream or downstream of the proposed project;
4. Beneficial uses of surface waters and ground water surrounding the project;
5. Characterization of project runoff both pre-project and post-project, conditions of concern, locations of storm water outfall(s), tributary drainage area to outfall(s), changes in downstream erosion potential, and site hydrology;
6. Water quality pollutants of concern, treatment volume based on water quality design storm, site plans and adjacent land use, and soil characteristics;
7. Summary of low impact design (LID) measures proposed for use on the project;
8. Specified orifice controls (minimum size to be 70mm), maximum ponding depths (300mm maximum in paved areas) and bypass routes for overland flows;
9. Mitigation measures to protect water quality, pollution prevention BMPs, site design BMPs, source control BMPs, natural BMPs, and structural treatment BMPs;
10. Mitigation measures to prevent any increase in downstream erosion;
11. Specify agreements, easements, and any licenses relating to the redevelopment and construction of the stormwater management measures proposed, including their location, access for maintenance and any changes in drainage characteristics;
12. Provide a project map identifying relevant watersheds and surface water bodies within the project area;
13. Information relating to threats to water quality including (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; and (6) non-storm water discharges.

Above items may be shown on other application documents such as the tentative map, preliminary grading plan, or preliminary drainage study. If this is done, the SWMP report must identify where each of these component pieces can be found.

As the contents of the SWMP Report are of engineering nature, the report must be signed and sealed by an Ontario licensed professional engineer.

APPENDIX A

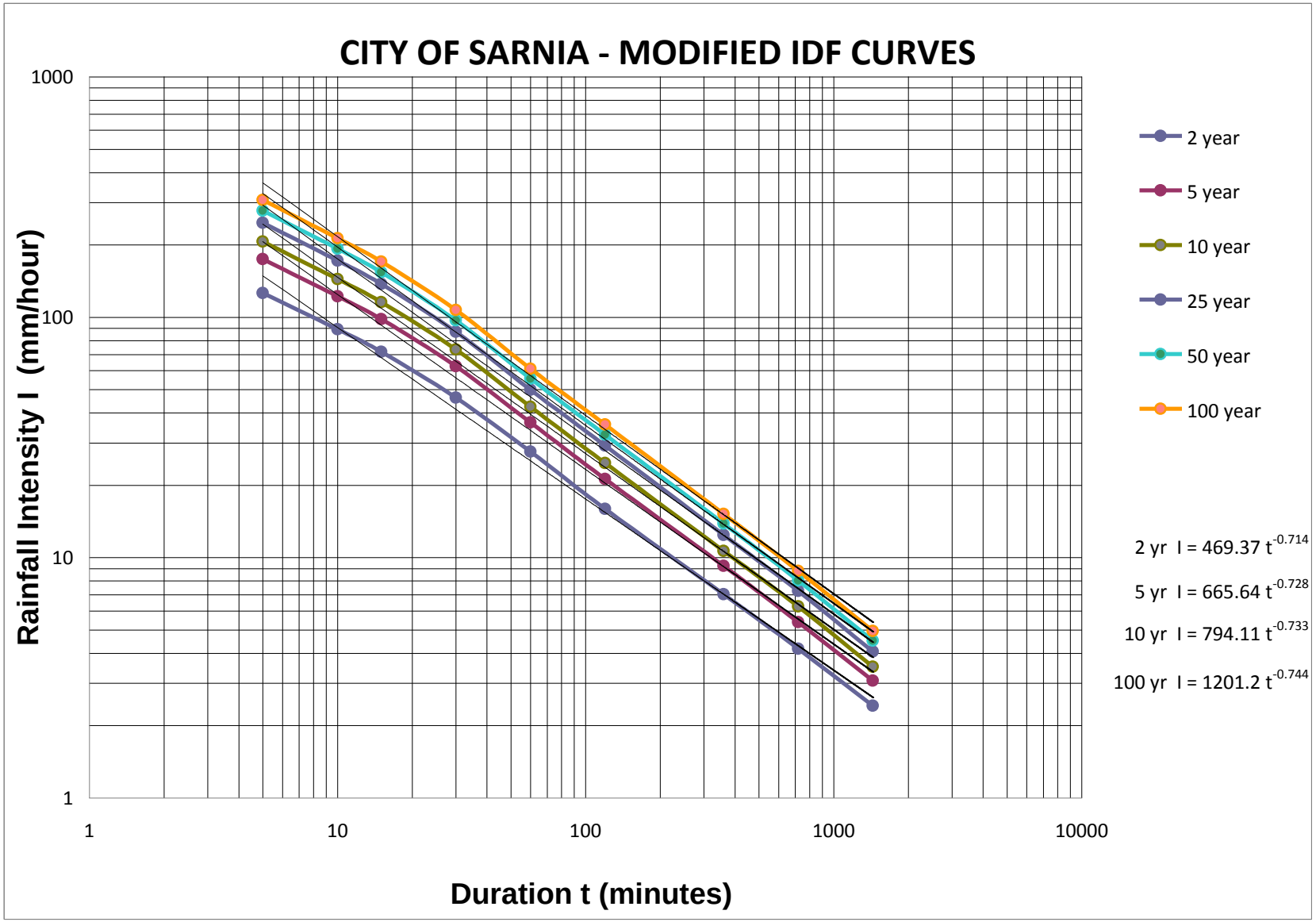
Modified Rainfall Data for the City of Sarnia (based on records from 1964 - 2006)

Modified Return Period Rainfall Amounts (mm) (For use from 2012 to 2042)

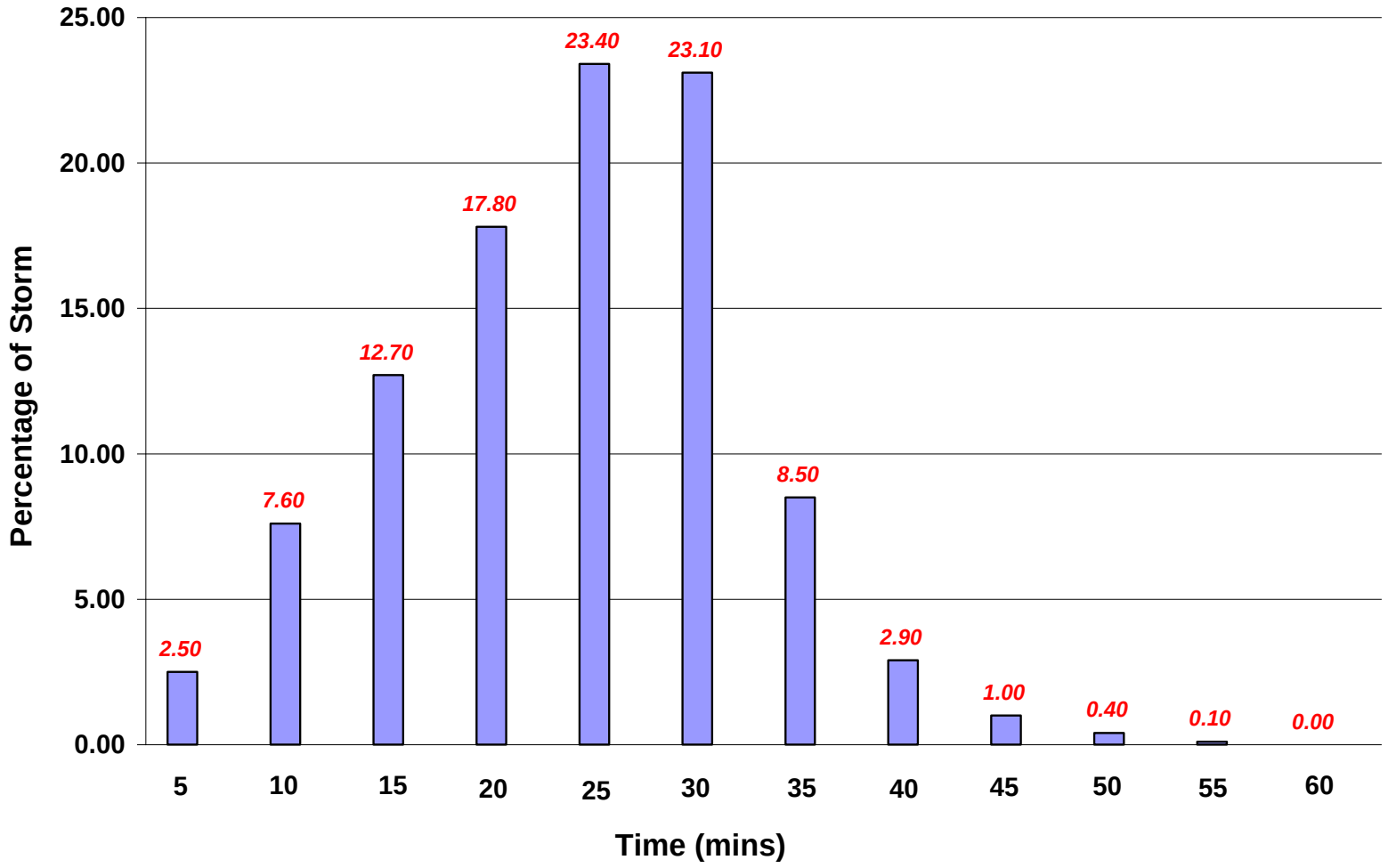
	Return Period (years)					
Duration	2	5	10	25	50	100
5 min	10.56	14.52	17.27	20.57	23.1	25.63
10 min	14.85	20.35	24.09	28.71	32.12	35.53
15 min	17.93	24.53	28.93	34.43	38.5	42.57
30 min	23.1	31.24	36.63	43.45	48.51	53.57
1 h	27.61	36.52	42.46	49.94	55.55	61.05
2 h	32.01	42.57	49.61	58.41	65.01	71.5
6 h	42.13	55.22	63.91	74.91	83.05	91.08
12 h	50.05	65.12	75.02	87.56	96.8	106.04
24 h	57.64	74.03	84.81	98.56	108.79	118.8

Modified Return Period Rainfall Rates (mm/h) - 95% Confidence limits

	Return Period (years)					
Duration	2	5	10	25	50	100
5 min	126.2	174.7	206.7	247.3	277.4	307.2
10 min	89.1	122.3	144.3	172.2	192.8	213.3
15 min	71.8	98.2	115.6	137.7	154.0	170.3
30 min	46.3	62.6	73.4	87.0	97.0	107.1
1 h	27.6	36.5	42.5	49.9	55.6	61.1
2 h	16.0	21.2	24.8	29.3	32.5	35.8
6 h	7.0	9.2	10.7	12.4	13.9	15.2
12 h	4.2	5.4	6.3	7.3	8.0	8.8
24 h	2.4	3.1	3.5	4.1	4.5	5.0


CITY OF SARNIA - MODIFIED IDF CURVES
Rainfall Intensity I (mm/hour)
1000
100
10
1
1
10
100
1000
10000
Duration t (minutes)
2 year
5 year
10 year
25 year
50 year
100 year
2 yr I = 469.37 t^-0.714
5 yr I = 665.64 t^-0.728
10 yr I = 794.11 t^-0.733
100 yr I = 1201.2 t^-0.744

1- Hour AES Storm Distribution for Sarnia



APPENDIX B

Ancillary Design Guidelines for Low Impact Development (LID)

1 Introduction:

Low Impact Development (LID) comprises a set of site design strategies that minimize runoff and provide distributed, small scale structural practices that mimic natural or predevelopment hydrology through the processes of infiltration, evapotranspiration, harvesting, filtration and detention of stormwater. These practices can effectively remove nutrients, pathogens and metals from runoff, and reduce the volume and intensity of stormwater flows.

The proponents Engineer retained to prepare the Stormwater Management Report accompanying a Site Plan Application (SPA) for either a new "Greenfield" or an existing "Brownfield" site should be familiar with the latest version of the publication entitled
Low Impact Development (LID) Stormwater Management Planning and Design Guide
2010. This has been developed as a joint initiative of the Toronto and Region and Credit Valley Conservation Authorities and in consultation with representatives from the Ministry of the Environment, Fisheries and Oceans Canada, GTA municipalities and the development industry.

The *LID SWM Guide* focuses on a number of lot level and conveyance stormwater management practices that have been used extensively in Europe, the United States, British Columbia and at demonstration sites in Ontario. These low impact development practices include green roofs, bioretention, permeable pavement, soakaways, perforated pipe systems, enhanced grass swales, dry swales and rainwater harvesting.

The *LID SWM Guide* recommends and supports the use of the treatment train approach for stormwater management. Accordingly Engineers should also refer to the Stormwater Management and Design Manual (MOE, March 2003), as a guide for incorporating more traditional practices such as wet ponds and wetlands into the overall stormwater management planning and design process.

This set of guidelines is not intended to limit innovation or restrict the use of creative solutions for stormwater management. Indeed the municipality encourages the development of innovative designs and technologies.

Acknowledging that it will not always be possible to maintain the predevelopment water budget of a site, predicted increases in runoff from land development that cannot be mitigated through stormwater infiltration practices should be minimized through practices that either evapotranspire (*e.g.,* green roofs, bioretention), or harvest runoff for non-potable uses (*i.e.*, rainwater harvesting). In areas where development has already taken place, LID can be used as a retrofit practice to reduce runoff volumes, pollutant loadings, and the overall impacts of existing developments on receiving waters.

LID practices can include:

- conservation site design strategies (i.e., non-structural LID practices);
- infiltration practices;
- rainwater harvesting;
- runoff storage and evapotranspiration;
- runoff conveyance;
- filtration practices; and
- landscaping.

Studies show that implementing LID practices can have multiple positive environmental effects including:

- protection of downstream resources;
- abatement of pollution;
- recharge of groundwater;
- improvement of water quality;
- improvement of habitat;
- reduced downstream flooding and erosion;
- conservation of water and energy; and
- improved aesthetics in streams and rivers.

These combined benefits help to mitigate potential negative impacts of climate change on groundwater levels, risk of flooding and stream channel erosion.

Treatment train stormwater management strategies that integrate a full range of facility types have the potential to achieve a broader range of benefits including:

- maintaining and enhancing shallow groundwater levels and interflow patterns;
- maintaining predevelopment drainage divides and catchment discharge points;
- moderating run off velocities and discharge rates;
- improving water quality;
- enhancing evapotranspiration;
- maintaining soil moisture regimes to support the viability of vegetation communities;
- maintaining surface and groundwater supplies to support existing wetland, riparian and aquatic habitats.

It is important that stormwater management plans be developed with consideration of the different types of runoff source areas that will be present, and recognition of source areas with low to moderate contamination potential that represent opportunities for rainwater harvesting, permeable pavement and other stormwater infiltration practices.

Furthermore, it is vital to ensure that relatively clean runoff is not mixed with lesser quality runoff from surfaces that are subject to higher levels of contamination, rendering it less suitable for infiltration or harvesting.

These guidelines recognise that a number of sites, particularly in infill development, may not be able to incorporate all the above practises within the site limitations due to site specific constraints; however the following lists of potential mitigation measures should be addressed in any design submission made to City staff during the review process.

Potential opportunities to integrate SWMPs at the site level stage in the planning process include:

- harvesting of rainwater from rooftops for non-potable uses (*e.g.*, irrigation, toilet flushing) using rain barrels or cisterns;
- installation of green roofs;
- drainage of runoff from rooftops to pervious or depression storage areas;
- integration of soakaways (*e.g.*, infiltration trenches or chambers) below landscaped areas, parking areas, parks, sports fields, etc.;
- incorporation of bioretention areas, rain gardens, biofilters or constructed wetlands into the landscape design for the site;
- use of permeable pavement in low and medium traffic areas;
- incorporation of bioretention areas, vegetated filter strips, and swales to intercept and treat parking lot and road runoff;
- incorporation of woodland restoration in upstream areas to reduce runoff rates;
- integration of detention ponds and wetlands as large aesthetic and recreational features within the landscape.

Stormwater management opportunities that should be explored for infill and retrofit developments include:

- roof top storage;
- green roofs;
- rainwater harvesting;
- bioretention areas;
- biofilters;
- grassed swales;
- permeable pavement;
- rain gardens;
- stormwater planters and fountains;
- depression storage;
- soakaways;
- constructed wetlands; and
- enhanced urban tree canopy.

Key principles for low impact development design can be summarized as follows:

1 Use existing natural systems as the integrating framework for planning

1.1 Consider regional and watershed scale contexts, objectives and targets;
1.2 Look for stormwater management opportunities and constraints at watershed/subwatershed and neighbourhood scales;
1.3 Identify and protect environmentally sensitive resources;

2 Focus on runoff prevention

2.1 Minimize impervious cover through innovative site design strategies and application of permeable pavement;
2.2 Incorporate green roofs and rainwater harvesting systems in building designs;
2.3 Drain roofs to pervious areas with amended topsoil or stormwater infiltration practices;
2.4 Preserve existing trees and design landscaping to create urban tree canopies

3 Treat stormwater as close to the source area as possible

3.1 Utilize decentralized lot level and conveyance stormwater management practices as part of the treatment train approach;
3.2 Flatten slopes, lengthen overland flow paths, and maximize sheet flow;
3.3 Maintain natural flow paths by utilizing open drainage (*e.g.*, swales).

4 Create multifunctional landscapes

4.1 Integrate stormwater management facilities into other elements of the development to conserve developable land;
4.2 Utilize facilities that provide filtration, peak flow attenuation, infiltration and water conservation benefits;
4.3 Design landscaping to reduce runoff, urban heat island effect and enhance site aesthetics.

5 Educate and maintain

5.1 Municipality will develop legal agreements to ensure long-term operation and maintenance of private facilities.
5.2 Municipalities to develop guidelines and training for property owners and their managers on how to monitor and maintain lot level stormwater management practices on private property;
5.3 Municipalities to develop training programs for staff to monitor and maintain lot level and conveyance stormwater management practices on public property;

Table 1: Types of stormwater source areas, typical runoff characteristics and opportunities for treatment and use

Stormwater Source Area	Runoff Characteristics	Opportunities	Principles
Foundation drains, slab underdrains, road or parking lot underdrains	Relatively clean, cool water.	Suitable for infiltration or direct discharge to receiving watercourses.	Should not be directed to stormwater management facility that receives road or parking lot runoff.
Roof drains, roof terrace area drains, overflow from green roofs	Moderately clean water, contaminants may include asphalt granules, low levels of hydrocarbons and metals from decomposition of roofing materials, animal droppings, natural organic matter and fall out from airborne pollutants, potentially warm water.	- Infiltration; - Filtration; - Harvesting with rain barrels or cisterns and use for non-potable purposes (*e.g.*, irrigation, toilet flushing) after pretreatment; - Attenuation and treatment in wet pond or wetland detention facility.	Runoff should be treated with a sedimentation and/or filtration practice prior to infiltration. Where possible, runoff should not be directed to end-of-pipe facilities to capitalize on potential for infiltration or harvesting. Flow moderation (quantity control) prior to discharge to receiving watercourse is required.
Low and medium traffic roads and parking lots, driveways, pedestrian plazas, walkways	Moderately clean water, contaminants may include low levels of sediment, de-icing salt constituents, hydrocarbons, metals and natural organic matter. Typically warm water.	- Infiltration after pretreatment; - Filtration after pre-treatment; - Harvesting with cisterns or permeable pavement reservoirs and use for outdoor non-potable purposes (*e.g.*, vehicle washing, irrigation) after pretreatment; - Attenuation and treatment in wet pond or wetland detention facility.	Runoff should be treated with a sedimentation and/or filtration practice prior to infiltration. Flow moderation (quantity control) prior to discharge to receiving watercourse is required. Water quality should be tested prior to use for non-potable purposes.
High traffic roads and parking lots	Potential for high levels of contamination with sediment, de-icing salt constituents hydrocarbons and metals. Typically warm water.	- Filtration after sedimentation pre-treatment; - Attenuation and treatment in wet pond or wetland detention facility; - Infiltration after pretreatment only where groundwater uses are limited.	Runoff should be treated with a sedimentation and/or filtration pretreatment practice prior to infiltration.
Pollution hot spots* such as vehicle fueling, servicing or demolition areas, outdoor storage and handling areas for hazardous materials, some heavy industry sites	Potential for high levels of contamination with sediment, de-icing salt constituents, hydrocarbons, metals, and other toxicants.	- Attenuation and treatment in wet pond, wetland or hybrid detention facility; - Potential requirement for sedimentation pretreatment; - Infiltration and harvesting practices not recommended.	Runoff from these sources should not be infiltrated or used for irrigation. Spill containment or mitigation devices recommended contingent on size of storage facilities.

Table 2: Comparison of site constraints for a range of structural LID SWM practices

LID Stormwater Management Practice	Depth to high water table or bedrock[1] (m)	Typical Ratio of Impervious Drainage Area to Treatment Facility Area	Native Soil Infiltration Rate (mm/hr)[3]	Head[4] (m)	Space[5] %	Slope[6] %	Pollution Hot Spots[7]	Set backs[8]
Rain barrel	Not applicable	[5 to 50 m^2][2]	Not applicable	1	0	NA	Yes	None
Cistern	1	[50 to 3000 m^2][2]	Not applicable	1 to 2	0 to 1	NA	Yes	U, T
Green roof	Not applicable	1:1	Not applicable	0	0	0	Yes	None
Roof downspout disconnection	Not applicable	[5 to 100 m^2][2]	Amend if < 15 mm/hr[9]	0.5	5 to 20	1 to 5	Yes	B
Soakaway, infiltration trench or chamber	1	5:1 to 20:1	Not a constraint	1 to 2	0 to 1	< 15%	No	B, U, T, W
Bioretention	1	5:1 to 15:1	Underdrain required if < 15 mm/hr	1 to 2	5 to 10	0 to 2	No	B, U, W
Biofilter (filtration only Bioretention design)	Not applicable	5:1	Not applicable	1 to 2	2 to 5	0 to 2	Yes	B, T
Vegetated filter strip	1	5:1	Amend if < 15 mm/hr[9]	0 to 1	15 to 20	1 to 5	No	None
Permeable pavement	1	1:1 to 1.2:1	Underdrain required if < 15 mm/hr	0.5 to 1	0	1 to 5	No	U, W
Enhanced grass swale	1	5:1 to 10:1	Not applicable	1 to 3	5 to 15	0.5 to 6	No	B, U
Dry swale	1	5:1 to 15:1	Underdrain required if < 15 mm/hr	1 to 3	5 to 10	0.5 to 6	No	B, U, W
Perforated pipe system	1	5:1 to 10:1	Not a constraint	1 to 3	0	< 15%	No	B, U, T, W

Notes:

1. Minimum depth between the base of the facility and the elevation of the seasonally high water table or top of bedrock.
2. Values for rain barrels, cisterns and roof downspout disconnection represent typical ranges for impervious drainage area treated.
3. Infiltration rate estimates based on measurements of hydraulic conductivity under field saturated conditions at the proposed location and depth of the practice.
4. Vertical distance between the inlet and outlet of the LID practice.
5. Percent of open pervious land on the site that is required for the LID practice.
6. Slope at the LID practice location.
7. Suitable in pollution hot spots or runoff source areas where land uses or activities have the potential to generate highly contaminated runoff (*e.g.*, vehicle fueling, servicing or demolition areas, outdoor storage or handling areas for hazardous materials and some heavy industry sites).
8. Setback codes: B = Building foundation; U = Underground utilities; T = Trees; W = drinking water wellhead protection areas.
9. Native soils should be tilled and amended with compost to improve infiltration rate, moisture retention capacity and fertility.