TOWNSHIP OF UXBRIDGE

DESIGN CRITERIA

AND

STANDARD DETAIL DRAWINGS

FOR

SUBDIVISION DEVELOPMENTS

AND

SITE PLANS

Released 2016
Revised August 2022

SECTION A - GENERAL INFORMATION

A 1.00 GENERAL

A 1.01 FAMILIARIZATION

Prior to commencement of the Engineering design the consultant shall obtain copies of the Township of Uxbridge "Design Criteria" and "Standard Detail Drawings" to familiarize himself with the requirements of subdivision design in the Township of Uxbridge.

A 1.02 REGIONAL MUNICIPALITY OF DURHAM

The Regional Municipality of Durham is responsible for all sanitary sewers and watermains that are to be installed on all road allowances and registered blocks and easements within the Region of Durham.

The Regional Municipality of Durham is responsible for all Regional Roads.

The Consulting Engineer shall contact the Region of Durham Engineering Department to obtain copies of the Regional Design Standards for sanitary sewers and watermains.

A 1.03 ENGINEERING REQUIREMENTS FOR DRAFT PLAN APPROVAL

A Preliminary Engineering Report must be submitted by the Developer's Consulting Engineer to the Township Engineer in accordance with the Official Plan. This report must be presented in a readable, comprehensive and professional manner. The Report must be signed and sealed by a Professional Engineer.

This Preliminary Report shall contain the following and be submitted in duplicate:

(a) The Draft Plan

The Draft Plan must be in a form acceptable to the Planning Departments of the Regional Municipality of Durham and the Township of Uxbridge.

(b) Contour Plan

This plan must be at a scale of no larger than 1:1000 giving contour lines at sufficient intervals to permit assessment of existing surface drainage patterns. Contour intervals shall not be greater than 1.5 metres. This plan is to extend to the limits of the drainage area to be served by proposed sanitary and storm sewer systems, including lands beyond the boundaries of the sub division. For large external drainage areas, separate Contour Plans at a larger scale may be provided. All elevations are to refer to Geodetic Datum.

(c) General Plan of Services

This will be a plan based on the Draft Plan and must schematically show the proposed storm sewer systems and their connection to existing systems. Direction of flow must be indicated on all sewers. This plan is to be accompanied by preliminary engineering calculations indicating the quantity of storm water flow at the connection to existing systems and/or at proposed outfalls. Consideration must be given to the whole catchment area to ultimately be developed. Blocks and easements for storm drainage systems shall also be shown.

Preliminary road profiles must also be identified in the Preliminary Report. Blocks of land for community mail centres must be identified on the Draft Plan and the General Plan of Services.

(d) Drainage Plan

When a natural drainage channel passes through and is affected by the construction of the subdivision, drawings must be submitted to indicate the location and typical cross-sections of the existing channel and of any proposed changes. In general, creek diversions will not be permitted, unless these are in the nature of improvements to the existing watercourse. An erosion/sediment control plan will be required. A preliminary stormwater management plan and report will be required by the Township of Uxbridge in accordance with Section C 2.05 of this document. The Consulting Engineer must submit an outline of the erosion/sediment control plan in accordance with Section C 3.04.

Any proposed modifications to an existing channel and/or floodplain will require Conservation Authority review and approval. The Consulting Engineer must meet with Conservation Authority staff and confirm their requirements, prior to proceeding with the preliminary Engineering Report.

(e) Soils Report

A preliminary soils investigation and report from an independent Soils Consultant will be required by the Township Engineer.

(f) Hydrogeologic Report

The proponents of a draft plan application shall provide a detailed Soils and Hydrogeological Report (if applicable) prepared by a qualified Hydrogeologist, relating to the soil types and their ability to physically accommodate private sewage disposal systems, the availability of potability of groundwater supplies from the proposed water-supply sources, the anticipated quantitative and qualitative impacts within the development and with neighbouring water sources, and proposed mitigative measures. Preliminary on-site testing must be reviewed with the Township Engineer and must be sufficient to support the proposed residential density.

(g) Landscape Analysis

The proponents of a draft plan application shall provide a detailed Landscape Analysis of the site and adjacent properties which indicates major tree species, measures to be taken to protect environmentally sensitive areas and/or natural physical features of the site, proposed new plantings and existing topography at 1.5 metre intervals.

A 1.04 FUNCTIONAL REPORT

A functional report and plan is required prior to commencement of the final design. Prior to the commencement of the functional report, the Developer's Consulting Engineer shall meet with the Township Engineer and Road Superintendent to discuss the Township's requirements and with the Region's Engineering Department to discuss the Region's requirements. It is suggested that when possible this be a joint meeting. The functional report shall provide all details, calculations, costs, alternatives and recommendations necessary to evaluate the proposed development.

The functional report and plan shall include, but will not necessarily be limited to the following considerations:

(a) major roadway alignments, cross-sections and intersections,
(b) roadway structures,
(c) watercourse improvements and channelizations,
(d) railway crossings,
(e) parkland development,
(f) major trunk sewers,
(g) storm drainage systems,
(h) sanitary drainage systems,
(i) water distribution systems,
(j) lot grading design, and
(k) pumping station locations.

In cases where the subdivision development under consideration forms part of a larger area set aside for future development, the functional report shall confirm that the servicing design does not limit the future development. The functional report shall be a definite requirement, when a subdivision is being phased and the engineering design is being undertaken for each phase separately.

Concrete curb and gutter conforming to the Township of Uxbridge Standard Detail Drawings shall be used on all new subdivision roadways, subject to provisions in Section B 6.01.

The functional report shall be signed and sealed by a Professional Engineer.

A 1.05 CONSULTING ENGINEER

"Consulting Engineer" means a competent professional engineer or firm of engineers employed by the Developer and skilled and experienced in municipal work and land development projects and registered with the Association of Professional Engineers of the Province of Ontario, possessing a current certificate of authorization to practice professional engineering as required by the Professional Engineers Act.

A 2.00 SUBMISSIONS

Engineering drawings shall be submitted simultaneously to the Region of Durham and to the Township of Uxbridge. The Consulting Engineer is advised to review the Region of Durham's design criteria to determine the requirements for submission of engineering drawings to the Region's Engineering Department.

A 2.01 FIRST SUBMISSION TO THE TOWNSHIP OF UXBRIDGE

The initial submission of engineering drawings to the Township of Uxbridge shall contain the following information:

(a) one copy of the approved Draft Plan,
(b) two copies of the proposed plan for registration showing all lot and block numbering and dimensioning,
(c) a declaration from the Consulting Engineer indicating that he has been retained to design and supervise the construction of the work in the subdivision according to the terms of the Subdivision Agreement,
(d) three copies of the General Plan of Services,
(e) three copies of the Lot Grading Plan,
(f) three copies of the Area Rough Grading Plan,
(g) three copies of the Storm Drainage Plan,
(h) three copies of the storm sewer design sheets, and computer printouts, and detail calculations for pipe strength and bedding.
(i) three copies of all plan and profile drawings,
(j) three copies of the Park Grading Plan,
(k) three copies of all detail drawings other than the Township of Uxbridge Standard Detail Drawings,
(l) three copies of all drawings pertinent to the design,

(m) three copies of all other calculations necessary to check the design, and
(n) three copies of a soils report for confirmation of the pavement design, prepared by a qualified Soils Consulting Engineer.

The above information will be reviewed by the Township of Uxbridge and one set of drawings and calculations will be returned to the Consulting Engineer with the required revisions noted.

A 2.02 SUBSEQUENT SUBMISSIONS

Subsequent submissions of items (d) through (m) inclusive shall be made until the engineering drawings and design is acceptable to the Township of Uxbridge Engineer. The design of the underground electrical distribution system shall be completed by Ontario Hydro. This design shall be submitted to the Township Engineer and shall be approved prior to the final approval of the engineering drawings. The design of the Bell telephone system, Cable TV system and gas mains shall follow the same format as the Ontario Hydro requirements.

A 2.03 MINISTRY OF THE ENVIRONMENT APPLICATIONS

After the engineering design and drawings are in a state acceptable to the Township of Uxbridge, three copies of the Ministry of the Environment application forms for storm sewers and one complete set of engineering drawings shall be submitted to the Township Engineer. All copies of these applications shall be signed by the Township Engineer and Clerk of the Township of Uxbridge and shall be returned to the Consulting Engineer. The Consulting Engineer shall make application to the Region for the approval of the Ministry of the Environment, under the Ontario Water Resources Act. The Developer must submit completed MOE forms, declaring compliance with the Environmental Assessment Act.

A 2.04 OTHER APPROVALS

The Consulting Engineer shall be required to make all submissions and representations necessary to obtain approval from all other authorities affected (Ministry of Natural Resources, Ministry of Transportation of Ontario, Conservation Authorities, Canada Post Corporation, Medical Officer of Health, Transport Canada, etc.). The Township of Uxbridge shall be kept informed of the progress of these submissions by copies of all correspondence.

A 2.05 ORIGINAL TRACINGS

After all approvals have been received from all parties affected the original tracings shall be submitted to the Township Engineer. These tracings shall be signed and dated by the Township Engineer and returned to the Consulting Engineer. Changes or revisions to the drawings, after the signature of the Township Engineer has been affixed, must be formally submitted to the Township Engineer for approval.

If after one year from the date of the signing of the engineering drawings by the Township Engineer, the Developer fails to enter into a Subdivision Agreement with the Township of Uxbridge, the Township Engineer reserves the right to revoke any/or all approvals related to the engineering drawings.

A 2.06 PREPARATION OF SUBDIVISION AGREEMENT

The draft of the Subdivision Agreement will be prepared by the Township Engineer and forwarded to the Township Clerk. The final Subdivision Agreement will be prepared under the direction of the Township Clerk who will obtain Council's approval for the execution of the Agreement.

The engineering drawings must be signed by the Township Engineer prior to the preparation of the draft Subdivision Agreement Schedules.

The Township Clerk must be in a position to clear ALL Conditions of Draft Plan Approval (especially those conditions of the Ministries of Natural Resources and Environment) prior to the preparation of the draft Subdivision Agreement Schedules.

NOTE: Prior to commencement of preparation of the Subdivision Agreement the Developer's Consulting Engineer shall provide the Township Engineer with the following:

(a) Ministry of Environment certificates of approval for Township services to be constructed for the proposed subdivision.

(b) The name of the person and/or company and Mortgagees with whom the Subdivision Agreement will be executed. The Developer's address and telephone number shall be provided.

(c) The name, address and telephone number of the Developer's lawyer.

(d) A breakdown of the number of units proposed within the subdivision:

ie. - Single family units
- Semi detached units
- Townhouse units
- Apartment units - Bachelor Dwelling Unit
  - One Bedroom Dwelling Unit
  - Two Bedroom Dwelling Unit
  - Three or More Bedroom Dwelling Unit

(e) 4 copies of the Reference Plan for the subdivision.

(f) 4 copies of the LEGAL DESCRIPTION of the subdivision, based on the Reference Plan.

(g) 8 copies of the proposed final plan for registration (M-Plan) complete with the street names, lot numbers, surveyor's certificate, Owner's certificate and all other pertinent information required by the registry office.

(h) 8 copies of the reference (40R-) plans for any easements to be granted to the Township.

(i) 8 copies of the approved engineering drawings.

(j) 8 copies of the "M" and "R" Plans reduced to legal size.

(k) An OLS Certificate in tabular form identifying all lot numbers and corresponding frontages, depths and areas, in compliance with the appropriate Zoning By-law.

(l) A detailed cost estimate of Township Services to be constructed for the subdivision. The cost estimate shall be signed and sealed by a Professional Engineer.

The estimated cost of Services shall be detailed to show individual items of construction. The total estimated cost of Services shall include the following:

(i) detailed cost of services,

(ii) the actual estimated cost of the Hydro underground distribution system and street lighting,

(iii) any other miscellaneous expenditures required by the Subdivision Agreement as the Developer's obligation; such as park equipment, park landscaping, development of open space, etc.

(iv) allowances for contingencies engineering and legal in accordance with the following:

Estimated Cost Of Services (Items (i), (ii) and (iii))	Contingencies	Engineering and Legal
1. First $500,000.00	15%	15%
2. Next $500,000.00	10%	10%
3. Residual Amount Over $1,000,000.00	8%	8%

This estimate will be used as a basis for calculation of the security to be posted for the development.

(m) The Developer shall provide the Township of Uxbridge with written confirmation from the following utility authorities that satisfactory arrangements have been made for the installation of underground services in the proposed Subdivision:

- Ontario Hydro and/or Uxbridge Public Utilities
- Bell Canada
- Enbridge Gas
- Appropriate Cable Vision Company
- Any other Authority where required

In addition to the above, Location Approvals shall also be submitted by the appropriate utility authorities.

(n) Proposed timetable for construction of services.

(o) Proposed landscaping plan where necessary or required.

(p) Proposed staging Plans.

A 2.07 REQUIREMENTS PRIOR TO COMMENCEMENT OF CONSTRUCTION

Prior to commencement of construction, the Developer's Consulting Engineer shall submit the following information to the Township Engineer for approval (Allow at least 2 weeks for approval).

(a) 3 sets of all construction specifications.

(b) The proposed Contractor and subcontractors.

(c) The Contractor's list of suppliers.

(d) One copy of the signed Contract Documents complete with unit prices.

(e) All other information specified in the Subdivision Agreement as a requirement prior to commencement of construction or other information required by the Township Engineer.

(f) Conservation Authority Permits for erosion and sediment control measures proposed.

A 2.08 LAPSING OF ENGINEERING APPROVALS

If the development has not started construction two years after engineering approvals have been granted by the Township, the Developer will have to resubmit the engineering package for reapproval by the Township.

A 3.00 ENGINEERING DRAWING REQUIREMENTS

A 3.01 All engineering drawings shall be prepared in metric and in a neat and legible fashion. The design information presented on these drawings shall be completed in ink to meet with Regional requirements for microfilming.

A 3.02 All engineering drawings shall be prepared on 3 mil drafting film (mylar) with a matte surface on the working side.

A 3.03 The standard Township of Uxbridge title block as shown in the detail drawings shall be used on all engineering drawings. A title sheet is required for the engineering drawings.

A 3.04 All General Plans, Lot Grading Plans, Area Rough Grading Plans, Plan and Profile drawings and Detail Drawings shall be prepared on standard A1 sheets. Storm Sewer Drainage Area Plans may be completed on larger sized drawings in order that the entire drainage system being designed may be presented on one sheet.

A 3.05 The lot numbering and block identification on all engineering drawings shall be the same as shown on the Registered Plan for the area.

A 3.06 All elevations shown on the engineering drawings are to be of geodetic origin. Aerial photo interpretation methods for securing existing contours and elevations will not be accepted by the Township for base plan information on engineering drawings.

A 3.07 All plan and profile drawings are to be prepared so that each street can be filed separately. The street names shall be identified on the Plan portion of the Drawings.

A 3.08 When streets are of a length that requires more than one drawing, match lines are to be used with no overlapping of information.

A 3.09 The reference drawing numbers for all intersecting streets and match lines shall be shown on all plan and profile drawings.

A 3.10 A north arrow shall be referenced on all drawings.

A 3.11 All engineering drawings shall be stamped by a Professional Engineer. The Engineer's stamp must be signed and dated, prior to the issuance of drawings for tendering and signing by the Township Engineer.

A 4.00 GENERAL PLAN OF SERVICES

A 4.01 A "General Plan of Services" drawing shall be prepared for all developments at a maximum scale of 1:1,000.

A 4.02 When more than one "General Plan of Services" drawing is required for any development then the division of drawings shall reflect the limits of the Registered Plans as closely as possible. Where more than one plan is prepared, a supplementary "General Plan of Services" at a smaller scale shall be prepared to show the entire plan of subdivision on one drawing.

A 4.03 The reference Geodetic Benchmark and the Site Benchmarks to be used for construction shall be identified on the General Plan of Services.

A 4.04 A Key Plan at a scale of 1:10,000 shall be shown on all "General Plan of Services" drawings and the area covered by the drawing shall be clearly identified.

A 4.05 A drawing index shall be shown on all "General Plans of Services" to identify the Plan and Profile Drawing number for each street or easement shown.

A 4.06 All road allowances, lots, blocks, easements and reserves are to be shown and are to be identified in the same manner as shown on the Registered Plan.

A 4.07 All existing services, utilities and abutting properties are to be shown in dotted lines.

A 4.08 All services to be constructed are to be shown on the "General Plan of Services" in solid lines.

A 4.09 All storm and sanitary sewers are to be shown. It is not necessary to show the length, grade and the sewer material on the "General Plan of Services" however the sizing, direction of flow and type of the sewer must be shown.

A 4.10 All manholes will be shown and are to be numbered in accordance with the design drawings.

A 4.11 All catchbasins are to be shown.

A 4.12 All watermains, valves and hydrants are to be shown. Watermains to be identified only by sizing and usage.

A 4.13 All curbs and sidewalks are to be shown.

A 4.14 All fencing is to be indicated by height and type.

A 4.15 Dimensioning of utilities and roadways is not required on the "General Plan of Services".

A 4.16 All sites for parks, schools, churches, commercial and industrial development must be shown.

A 4.17 If a subdivision encroaches on an existing floodplain, the approved fill line restrictions must be shown, as specified by the local conservation authority.

A 4.18 Proposed locations of Community Mail Boxes and the associated number of units shall be shown on the "General Plan of Services".

A 5.00 PLAN AND PROFILE DRAWINGS

A 5.01 All plan and profile drawings shall be prepared at a scale of 1:500 horizontally and 1:50 vertically. A complete legend shall be provided on all Plan and Profile Drawings.

A 5.02 Plan and Profile drawings are required for all roadways, blocks and easements where services are proposed within the development, for all outfalls beyond the development to the permanent outlet, for all boundary roadways abutting the development and for other areas where utilities are being installed below grade.

A 5.03 All existing or future services, utilities and abutting properties are to be shown in dotted or dashed lines.

A 5.04 All services to be constructed are to be shown in solid lines.

A 5.05 The profile portion of the drawing shall be a vertical projection of the plan portion whenever possible.

A 5.06 All road allowances, lots, blocks, easements and reserves are to be shown and are to be identified in the same manner as the Registered Plan. Lot and block frontages are to be shown.

A 5.07 All curb and gutter and sidewalks shall be shown and dimensioned on the plan portion of the drawing.

A 5.08 All storm sewers shall be shown and dimensioned on the plan and shall also be plotted on the profile of the drawings. The sewers shall be described only by size, direction of flow and type in the plan portion, but shall have a complete description on the profile portion of the drawing including length, grade, material, class of pipe, usage and bedding requirements. The size of the pipe shall be plotted to full scale on the profile. The resulting hydraulic grade line for the 1:100 storm event shall also be plotted on the profile portion of the drawing.

A 5.09 All manholes shall be shown on the plan and on the profile portion of the drawing. The manholes shall be identified by, chainage, number on the plan and on the profile and shall also be referred to the applicable Township of Uxbridge Standard Detail Drawing or to a special detail on the profile portion of the drawing. All invert elevations shall be shown on the profile with each having reference to the north arrow.

A 5.10 All catchbasins and catchbasin connections shall be shown. Catchbasins are to be numbered for easy reference.

A 5.11 All storm sewer manholes which have safety platforms are to be noted.

A 5.12 All drop connections are to be noted and referred to the Township of Uxbridge Standard Detail Drawing.

A 5.13 All rim and invert elevations for rear lot catchbasins are to be shown.

A 5.14 Manhole benching details are to be shown at a scale of 1:25 whenever the Township of Uxbridge Standard Detail Drawings are not applicable.

A 5.15 All watermains, hydrants, valves, etc. shall be shown, described and dimensioned on the plan portion of the drawing. In addition, the watermain shall be plotted to true scale size on the profile portion of the drawing and shall be described.

A 5.16 The location of all storm, water and sanitary service connections shall be shown on both the plan and profile portion of the drawing using different symbols for each service. These services need only be dimensioned when the location differs from the standard location as shown on the Township of Uxbridge Standard Detail Drawings. The connections to all blocks in the development shall be fully described and dimensioned (size, length, grade, invert elevations, materials, class of pipe, bedding, etc.).

A 5.17 The centreline of construction with the 20 metre stations noted by a small cross shall be shown on the plan portion of the drawing.

A 5.18 The original ground at centreline and the proposed centreline road grade shall be plotted on the profile. The proposed centreline road grade shall be fully described (length, grade, P.I. elevations, vertical curve data, high point chainages, low point chainages, etc.).

A 5.19 Details of the gutter grades around all 90 degree crescents, intersections and culs-de-sac shall be provided on the plan portion of the drawing as a separate detail at a scale of 1:100.

A 5.20 Special notes necessary to detail construction procedures or requirements are to be shown.

A 5.21 Chainage for the centreline of construction are to be shown on the profile portion of the drawing. The P.I., B.H.C., E.H.C., B.V.C. and E.V.C. chainages are to be noted.

A 5.22 The proposed pavement structure design shall be noted on the plan portion of the drawing.

A 5.23 The basement elevation of all existing dwellings on streets where sewers are to be constructed shall be noted on the profile. The resulting hydraulic grade line for the 1:100 storm event shall also be plotted.

A 5.24 All existing services, utilities and features are to be shown on the plan portion of the drawing. Those services and utilities below grade that are critical to the new construction shall also be shown in the profile. Test holes may be required to determine actual elevation of these services and utilities.

A 5.25 The curb radii at all intersections shall be shown on the Plan portion of the Drawing.

A 5.26 Profiles of roadways shall be produced sufficiently beyond the limits of the proposed roads, to confirm the feasibility of possible future extensions.

A 5.27 The location of all luminaire poles shall be clearly shown on the Plan portion of the drawings.

A 5.28 The proposed location and type of all street name and traffic control signs shall be shown on the Plan portion of the drawings.

A 6.00 OTHER DRAWINGS

A 6.01 LOT GRADING PLANS AND AREA ROUGH GRADING PLANS

All lot grading plans and area rough grading plans shall be prepared in accordance with the criteria given in Section E of this document.

A 6.02 STORM DRAINAGE PLANS

All drainage plans for storm sewer design shall be prepared in accordance with the criteria given in Section C of this document.

A 6.03 DETAIL DRAWINGS

The Township of Uxbridge Standard Detail Drawings shall be utilized whenever applicable. The use of the latest revision of the Ontario Provincial Standard Drawings may be utilized when approved by the Township Engineer. These drawings shall be reproduced as part of the engineering drawings for the development and must be referred to by number on the affected plan and profile drawings. The Consulting Engineer shall be responsible to check the suitability of the details provided on these standard drawings for the application proposed. Individual details shall be provided by the Consulting Engineer for all special features not covered by the Township of Uxbridge Standard Drawings. These special details shall be drawn on standard sized sheets and shall be included as part of the engineering drawings. The minimum scale to be used for any special manhole or sewer detail shall be 1:25.

A 7.00 CERTIFICATE OF COMPLETION AND FINAL ACCEPTANCE

The term "Certificate of Completion" shall be used to describe the date when the services are complete and acceptable to the Township of Uxbridge subject to the maintenance requirements pursuant to the Subdivision Agreement. "Final Acceptance" shall be the terminology used to describe the date when the Developer's maintenance requirements have been fulfilled and the Services are acceptable to the Township of Uxbridge. "Formal Acceptance" of the

subdivision shall be the date on which the Council of the Township of Uxbridge agrees by By-law that all the conditions of the Subdivision Agreement have been fulfilled and all maintenance requirements have been completed.

The "Certificate of Completion" and "Final Acceptance" must be requested in writing by the Developer. The dates for "Certificate of Completion" and "Final Acceptance" of the Services in the development shall be established by the Township of Uxbridge.

When the Services are completed and cleaned to the satisfaction of the Consulting Engineer, he shall advise the Township Engineer in writing that the work is completed and shall request an inspection by the Township of Uxbridge. The Township of Uxbridge shall carry out their inspections and shall advise the Consulting Engineer of any items of work requiring further rectifications. When all deficiencies have been corrected to the satisfaction of the Township Engineer, a report shall be forwarded to the Council ("Certificate of Completion") recommending a date for the commencement of the maintenance period.

Near the end of the maintenance period the Services shall be reinspected by the Consulting Engineer and all deficiencies found shall be corrected. When the Consulting Engineer is satisfied that the work is complete and acceptable, he shall so advise the Township and shall request a final inspection by the Township Engineer. When all work is completed to the satisfaction of the Township Engineer, a report shall be forwarded to the Council recommending "Final Acceptance" of the works.

A 8.00 "AS-CONSTRUCTED" DRAWINGS

A 8.01 GENERAL

The "As-Constructed" drawings constitute the original engineering drawings which have been amended to incorporate the construction changes and variances in order to provide accurate information on the works as installed in the development.

The Registered Plan Number for the subdivision must be clearly shown on all "As-Constructed" "General Plan of Services".

A 8.02 "AS-CONSTRUCTED" FIELD SURVEY

The "As-Constructed" revisions shall be based upon a final survey of all the subdivision services and the Consulting Engineer's construction records. The final survey of the subdivision services shall include a field check of the following items:

(a) Location and invert elevations of all sewer manholes.

(b) Distances between all sewer manholes.

(c) Location of all roadway catchbasins.

(d) Location, rim and invert elevations for all rear yard and lot catchbasins.

(e) Location of all sidewalks and curbs.

(f) Location and ties to all valve boxes and valve chambers.

(g) Location of all hydrants.

(h) Location and ties to all special watermain appurtenances.

(i) Road centreline elevations.

(j) Site Benchmarks.

(k) Location of all service connections to all lots and blocks and location of connection from nearest downstream manhole (ie. 0 + 023).

(l) Sewer pipe sizes.

(m) Location of all fencing constructed as part of the subdivision services.

(n) volume of all stormwater management ponds (stage-storage discharge curve must be checked to ensure it conforms with design requirements).

(o) "As-Constructed" Tree Planting.

A 8.03 DRAWING REVISIONS

The original tracings shall be revised to incorporate all changes and variances found during the field survey and to provide the ties and additional information to readily locate all underground services. One set of prints of the approved engineering drawings shall be submitted, which show the approved figures with the changed figures in coloured pencil.

All sewer and road grades are to be recalculated to two decimal places.

All street line invert elevations of storm and sanitary house connections to each block shall be noted on the drawing.

All pencil notations on the drawings shall be removed and shall be replaced in ink.

All screening shall be removed.

All street names, lot numbering and block identification shall be checked against the Registered Plan and corrected if required.

The Contractor, the date of commencement of construction and the date of completion shall be noted on the "General Plan of Services" drawings only.

The "As-Constructed" revision note shall be placed on all drawings in the revision block. The title sheet of the Engineering Drawings shall be clearly marked with; "As-Constructed", using dry transfer lettering (48 pt. Grotesque 216).

The Contract Number (Regional or Municipal only) shall be added to the drawings.

A 8.04 TOLERANCES

A maximum vertical plotting tolerance of 0.2 metres on the 1:50 vertical profile portion of the drawings and a maximum horizontal plotting tolerance of 1 metre on the 1:500 scale drawing shall be considered acceptable without replotting.

All sewer lengths are to be shown to the nearest 0.15 metres.

The information shown on the "As-Constructed" drawings may be checked by the Township of Uxbridge at any time up to two years after final acceptance of the subdivision and if discrepancies are found between the information shown on the drawings and the field conditions, then the drawings will be returned to the Consultant for rechecking and further revision.

The consultant shall be required to explain in writing any major difference between the design and the "As-Constructed" data and to provide verification that alteration does not adversely affect the design of the subdivision services.

A 8.05 SUBMISSIONS

Upon completion of all construction work and the "As-Constructed" revisions, the original tracings shall be submitted to the Region of Durham for microfilming and then to the Township of Uxbridge for their permanent records.

The submission of the "As-Constructed" drawings to the Township of Uxbridge must be completed before "Final Acceptance" of the subdivision will be given. In addition, a digital copy of the “As-Constructed” drawings on CD media in a portable document format (PDF).

The Consulting Engineer shall provide a written declaration to the Township of Uxbridge stating that all Subdivision works have been constructed in accordance with the terms of the Subdivision Agreement, approved Engineering Drawings and the Township's Design Criteria, prior to "Final Acceptance".

A 9.00 PRIVATE SERVICING OF RESIDENTIAL LOTS

A 9.01 GENERAL

Where a development is privately serviced, all wells shall be constructed in conformance with the Ontario Water Resources Act, R.S.O., 1980, and Ontario Regulation 612/84 and all private waste-disposal systems shall be constructed in accordance with the Environmental Protection Act, R.S.O., 1980, and Ontario Regulation 546/85 and with the requirements of the Durham Regional Health Unit.

A 9.02 WATER SUPPLY SYSTEMS

(a) Each water supply well must be drilled to the depth of the aquifer proposed for development in the supporting hydrogeologic report, prior to issuance of the building permit.

(b) The well shall comprise new steel casing, having an inside diameter at least 125mm and a wall thickness at least 4.7mm, and a commercial, wirewound, stainless steel screen at least 0.3 metres in length if completed in the overburden. The annular space shall be grouted from a depth of 3 metres to surface in accordance with the Ontario Well Regulation.

(c) Each well shall be capable of delivering at least 5 litres/minute of essentially sand-free water for a continuous six-hour period or two four-hour periods during any given 24-hour period, as determined by a controlled-discharge pumping test.

(d) The distribution system shall be capable of delivering at least 680 litres within one hour during the peak-demand morning and evening periods from combined storage and direct-well withdrawals.

(e) The system shall be equipped with suitable water treatment equipment to provide water supplies meeting the Ontario Ministry of the Environment Drinking Water Objectives for nitrate, iron, manganese, methane, hydrogen sulphide and the Ontario Ministry of Health standards for bacteriological quality.

A 9.03 WASTE DISPOSAL SYSTEMS

(a) Each system shall be constructed with materials meeting the standards specified in the Ontario Regulation 546/95.

(b) The tile-bed area of a private waste-disposal system shall be sized on the basis of Class 4 system requirements, whether inground or raised as

determined by the specific soil and watertable conditions on the lot. All private waste-disposal systems shall be sized to accommodate all flows from the backwash system of all water softener units.

(c) A reserve tile-bed area shall be provided, equal in size to the prime tile-bed area, on which no building or structure may be constructed.

A 9.04 SUMP PUMP OUTLET LOCATION

All sump pumps, if required, shall discharge to storm sewers or at a rear corner of the dwelling onto a concrete splash pad before flowing into the adjacent side yard swale or ditch. The discharge line shall, in all cases, be routed through the floor joists of the first level of the dwelling before passing through the basement wall. The backwash systems of water softeners, purification systems, etc. shall not be connected to the foundation weepers or sump pumps.

A 9.05 CERTIFICATION

The Developer shall retain a qualified Consultant approved by the Township Engineer who specializes in the design of Private Well and Sewage Systems. This Consultant will be responsible to both the Developer's Consulting Engineer and the Developer to complete the design, supervise and provide on-site inspection for the installation of private systems on the lots and certify that the private systems have been installed in accordance with all approved drawings and to the satisfaction of the Township, the Region of Durham Health Unit and the Ministry of the Environment.

A 10.00 RESIDENTIAL TOILET FIXTURE PERFORMANCE

Notwithstanding the requirements of the Ontario Building Code, all residential toilet fixtures shall comply with the recommendations of the Maximum Performance (MaP) Testing Project. Third Edition, November, 2004, as adopted by the Regional Municipality of Durham. In particular, all toilet models shall be certified to remove a minimum 250 grams of solids per flush.

SECTION B - ROADWAYS

B 1.00 CLASSIFICATIONS

B 1.01 STREET CLASSIFICATION

All roadways in new developments shall be classified according to the traffic volume expected and to the intended use of the roadway. For predominantly residential areas three classifications shall be noted as follows: Local, Minor Collector or Major Collector. For industrial areas the streets shall be classified Local or Collector dependent upon length of street, traffic volume expected and expected amount of truck traffic. Arterial roadways shall be classified as divided or undivided. The proposed classification of all streets in the development shall be confirmed with the Township of Uxbridge prior to the commencement of the design.

The following table is presented as a guide to the determination of the street classification.

CRITERIA	LOCAL	COLLECTOR	ARTERIAL
Source Provided	Land Access	Land Access Traffic Movement Transit Routes	Traffic Movement Transit Routes
Length of Trip	Short	Medium	Long
Flow	Interrupted	Interrupted	Through
Interconnections	Local Collector	Local Collector Arterial	Collector Arterial Freeway
Estimated AADT	0-1,000	1,000-3,000	over 3,000

B 2.00 GEOMETRIC DESIGN ELEMENTS

B 2.01 RESIDENTIAL STREETS

GEOMETRIC DETAIL	ESTATE RESIDEN-TIAL	LOCAL	MINOR COLLEC-TOR	MAJOR COLLEC-TOR
Minimum Right-of-way Width (metres)	20	20	20	26.5
Design Speed (km. per hour)	50	50	50	60
Minimum Safe Stopping Sight Distance (metres)	65	65	65	85
Minimum Visibility Curves in Sag (K values)	8	8	12	18
Minimum Visibility Curves on Crests (K values)	8	8	10	15
Minimum Horizontal Radius(Radius in Metres)	80	80	110	160
Pavement Width (face to face of curbs in metres)	8.5	8.5	10	12.8
Pavement Crossfall (per cent)	2.0	2.0	2.0	2.0

GEOMETRIC DETAIL	ESTATE RESIDEN-TIAL	LOCAL	MINOR COLLEC-TOR	MAJOR COLLEC-TOR
Minimum Grade (percent)	0.5	0.5	0.5	0.5
Maximum Grade (percent)	5	5	5	5
Maximum Grade for Through Roads at Intersections (percent)	3.5	3.5	3.0	3.0
Maximum Grade for Stop Roads at Intersections (percent)	2.0	2.0	1.5	1.5
Intersection Angle (degrees)	70-90	70-90	80-90	85-90
Minimum tangent length of Intersections (metres)taken from limit of daylighting triangles	30	30	50	60
Minimum tangent length between reverse curves (metres)	30	30	50	60

B 2.02 INDUSTRIAL STREETS

GEOMETRIC DETAIL	LOCAL	COLLECTOR
Minimum Right-of-way Width (metres)	23.0	26.5
Design Speed (km. per hour)	50	60
Minimum Safe Stopping Sight Distance (metres)	65	85
Minimum Visibility Curves in Sags K values)	8	18
Minimum Visibility Curves on Crests (K values)	8	15
Minimum Horizontal Radius (Radius in Metres)	80	160
Pavement Width (face to face of curbs in metres)	10	12.8
Pavement Crossfall (percent)	2.0	2.0
Minimum Grade (percent)	0.5	0.5
Maximum Grade (percent)	5	5
Maximum Grade for Through Roads at Intersections (percent)	3.5	3.0
Maximum Grade for Stop Roads at Intersections (percent)	2.0	1.5
Intersection angle (degrees)	70-90	80-90
Minimum tangent length at Intersections (metres) taken from limit of daylighting triangles	30	60
Minimum tangent length between reverse curves (metres)	30	60

B 2.03 ARTERIAL STREETS

Geometric Detail	Undivided	Divided
Minimum Right-of-Way Width	29.5	37
Design Speed (km. per hour)	60	80
Minimum Safe Stopping Sight Distance (metres)	85	135
Minimum Visibility Curves in Sags (K values)	18	30
Minimum Visibility Curves in Crests (K values)	15	35
Minimum Horizontal Radius (Radius in Metres)	300	350
Pavement Width (face of curb to face of curb in metres)	14	2 @ 8
Median Width (metres)	n/a	5.5
Pavement Crossfall (percent)	2	2
Minimum Grade (percent)	0.5	0.5
Maximum Grade (percent)	5	5
Maximum Grade for Through Roads at Intersections (percent)	2.0	2.0
Maximum Grade for Stop Roads at Intersections (percent)	1.0	1.0
Intersection Angle (degrees)	85-90	85-90
Minimum tangent length at Intersections (metres) taken from limit of daylighting triangles	75	75
Minimum tangent length between reverse curves (metres)	130	130

B 3.00 DESIGN ELEMENTS

B 3.01 HORIZONTAL CURVES

Horizontal alignment is to conform to the requirements as outlined in Section B 2.01. In general, "right angle bends" will not be permitted on local streets except in the case of "Courts" or "Crescents" serving no more than 50 residential lots. Where permitted, these bends (Standard Drawing No. US-224) must not have a deflection angle greater than 110 degrees.

B 3.02 VERTICAL CURVES

All points of grade change in excess of 1% shall be designed with vertical curves as outlined in the current Ministry of Transportation of Ontario publications. The minimum visibility curves to be used are outlined in the geometric details for each roadway classification. The minimum tangent length of any road grade shall be 9 metres.

B 3.03 BACKFALL AT INTERSECTING STREETS

At all street intersections the normal crossfall of the major street shall not be interrupted by the crown line of the minor street. A 1 to 2 per cent backfall shall be provided on the minor street at all street intersections. This backfall shall continue to the end of the curb return radii to facilitate proper drainage of the intersection. Overland flow routing of storm drainage through the intersection must be maintained.

B 3.04 CURB RETURN RADII AT INTERSECTIONS

The curb return radii at street intersections shall conform to the following dimensions:

PAVEMENT WIDTH STREET A	PAVEMENT WIDTH STREET B	CURB RETURN RADII
8.5 m.	8.5 m.	10.0 m.
8.5 m.	10.0 m.	10.0 m.
8.5 m.	12.8 m.	10.0 m.
8.5 m.	14.0 m.	10.0 m.
10.0 m.	10.0 m.	12.0 m.
10.0 m.	12.8 m.	12.0 m.
10.0 m.	14.0 m.	15.0 m.
12.8 m.	12.8 m.	12.0 m.
12.8 m.	14.0 m.	15.0 m.
14.0 m.	14.0 m.	15.0 m.

B 3.05 DAYLIGHTING REQUIREMENTS AT INTERSECTIONS

Daylighting at all intersection quadrants shall be included in the road allowances to provide for uniform boulevard widths. Such daylighting shall be included on the proposed plan for Registration (M-Plan) and on all engineering drawings.

B 3.06 CULS-DE-SAC AND BULBS

Permanent culs-de-sac shall be constructed in accordance with the details provided in the standard drawings. Minimum gutter grades of 1% shall be maintained along the flow line of all gutters around the culs-de-sac. The design road grade on the cul-de-sac shall be such that the drainage is directed away from the end of the cul-de-sac and towards the beginning of the bulb area where catchbasins are to be located. All culs-de-sac, bulbs and intersections shall be detailed at a scale larger than the road plan. The details shall show gutter, crown and other grades sufficient to determine that the road will properly drain and shall be used as a basis for layout. In general, park entrances shall be provided from a cul-de-sac. Dead end barricades shall be provided at the end of the cul-de-sac as required by the Township.

Permanent culs-de-sac on rural open ditch cross-sections shall be constructed with paved shoulders.

B 3.07 TEMPORARY TURNING CIRCLES

Temporary turning circles will be considered whenever a road is to be continued in the future in a phased Plan of Subdivision and the distance from the temporary dead end to the centreline of the nearest intersecting street is greater than 90 metres. Details for the requirements of temporary turning circles are provided in the Township of Uxbridge Standard Detail Drawings. Dead end barricades shall be provided at the end of the temporary turning circles as required by the Township.

B 3.08 LOCATION OF UTILITIES

The location of utilities within the road allowance shall be as detailed on the Township of Uxbridge Standard Drawings. Utility drawings shall be submitted to the Township Engineer for approval of utility locations.

All utility wiring is to be housed underground or direct buried. Hydro transformers are to be housed in suitable enclosures and mounted on transformer pads installed at the final surface of ground. Hydro transformer pads must be placed in locations detailed on the Township of Uxbridge

Standard Drawings. Bell telephone and Cable TV junction boxes are to be mounted at the surface in approved standard enclosures, provided by the appropriate Authority. Hydro transformer pads and Bell Telephone and Cable TV junction boxes are in general to be located adjacent to common lot lines.

B 3.09 COMMUNITY MAIL BOX REQUIREMENTS

In general, community mail centres and/or site individual super mail boxes shall be placed in locations approved by the Township of Uxbridge. Community mail centres shall be constructed in mini-parks, centrally and suitably located in the plan of subdivision on consultation with Canada Post Corporation. The design of the community mail centre must incorporate such criteria as pedestrian safety, traffic flow and aesthetics. The Township of Uxbridge may require the Developer to furnish the following amenities within the community mail centre:

- park benches
- fencing
- garbage containers
- landscaping
- pedestrian lighting
- concrete pad or interlocking stone finished surface
- architectural controlled kiosks
- architectural controlled canopies over groups of super mail boxes
- adjacent car bays parallel to the travelled portion of the roadway

All details associated with community mail centres shall be identified on the Engineering Drawings and will be subject to the approval of the Township Engineer. The Developer shall be responsible for constructing community mail centres within residential subdivisions, prior to the issuance of the first Building Permit.

In areas where site individual super mail boxes are proposed within a residential subdivision, the locations will be subject to the approval of the Township Engineer. In general, individual super mail boxes shall be located near the rear lot line of flankage lots on concrete pads. The location of super mail boxes shall in no way restrict site lines at intersecting roads. When establishing the spacing of street lighting within a residential subdivision, consideration must be given for the placement of a street light within 10 metres of the location of super mail boxes. Parallel car bays shall also be located adjacent to super mail boxes to ensure a continuous traffic flow. The length of bays will be governed in general by the number of super mail boxes. Architectural controlled canopies shall also be constructed at the Developer's expense over super mail boxes, as per Standard Detail Drawing US-350, as directed by the Township.

All amenities associated with site individual super mail boxes shall be constructed at the Developer's expense. All associated details must be shown on the Engineering Drawings and will be subject to the approval of the Township Engineer.

The approval of Canada Post Corporation with respect to location of community mail centres and/or site individual super mail boxes will be required prior to the approval of the Engineering Drawings by the Township Engineer.

B 4.00 STRUCTURAL REQUIREMENTS

B 4.01 ROAD PAVEMENT DESIGN REPORT

A road pavement design report prepared by a soils consultant is required for all the roads, including results from soil testing of the existing subgrade and recommended pavement design in accordance with the Canadian Good Roads Association publication “A Guide to the Structural Design of Flexible and Rigid Pavements in Canada”. The design shall include consideration of the effect of proposed underground services. Base course asphalt must be in place a

minimum of two winters or as approved and directed by the Township before the top lift asphalt is applied. Perforated sub-drains connected to the storm sewage system shall be installed full length under all curbs unless otherwise directed in writing by the Township.

In no case shall the road structural requirements be less than those set out in Sub-sections 4.02 and 4.03.

B 4.02 Minimum Depth Requirements for Roads (in order from top to bottom)

(i) Local and Rural Residential Roads

Asphalt
- 45mm compacted depth of HL-3 asphalt
- 50mm compacted depth of HL-8 asphalt

Base and Subbase
- 150mm compacted depth of Ontario Provincial Standard Specification (OPSS) Granular "A" or OPSS 20 mm diameter crusher-run limestone.
- 350mm compacted depth of OPSS Granular "B"
  or
- 225mm compacted depth of OPSS 50mm diameter crusher-run limestone

(ii) Industrial, Collector and Arterial Roads

Asphalt
- 45mm compacted depth of HL-3 asphalt
- 90mm compacted depth of HL-8 asphalt

Base and Subbase
- 150mm compacted depth of OPSS Granular "A" or 20mm diameter crusher-run limestone
- 600mm compacted depth of OPSS Granular "B"
  or
- 400mm compacted depth of OPSS 50mm diameter crusher-run limestone

B 4.03 Minimum Depth Requirements for Driveways (in order from top to bottom)

(i) Residential

Asphalt
- 60mm compacted depth of HL-3A asphalt (top course)

Base
- 200mm compacted depth of OPSS Granular "A" or OPSS 20mm diameter crusher-run limestone.

The driveway surface is to be paved from curb to the sidewalk or where there is no sidewalk pavement must extend to the property line. Other hard driveway surfaces may be installed as approved by the Township.

(ii) Industrial

Asphalt
- 45mm compacted depth of HL-3 asphalt (top course)
- 75mm compacted depth of HL-8 asphalt (base course)

Base and Subbase
- 150mm compacted depth of OPSS Granular "A" or OPSS 20mm diameter crusher-run limestone.
- 450mm compacted depth of OPSS Granular "B"
  or
- 300mm compacted depth of OPSS 50mm diameter crusher-run limestone

The above standard shall apply to the portion of industrial driveway between the curb and the street line.

Note: The maximum asphalt cement content by mass in an asphalt mixture for driveways is 7.0%

B 4.04 SPECIFICATIONS OF MATERIALS

(i) Granular Materials (Base/Subbase)

- The pit-run materials Granulars "A" and "B" should meet their respective OPSS (Form 1010) requirements.

- The 20mm diameter crusher-run limestone shall meet the OPSS Granular "A" gradation requirements.

- The 50mm diameter crusher-run limestone shall meet the OPSS Granular "B" (Type II) gradation requirements.

(ii) Asphalt

All asphalt shall be homogenous, free of impurities, and shall comply with the specification requirements for the properties and use of various grades of Performance Graded Asphalt Cement (PGAC) given in the Ministry of Transportation of Ontario (MTO) Non-standard Special Provision Amendment to OPSS 1101. The grade of PGAC is determined by the recycled asphalt pavement (RAP) content of the mix and design temperature required. Grade changes are not required if up to a maximum of 20% RAP is used in the mix.

(iii) Concrete

All concrete curbs and gutters, sidewalks and walkways shall be mixed from Portland Cement A5 conforming to the Canadian Standards Association (CSA) Specifications. Coarse and fine aggregates shall conform to the Township's specifications. Concrete is to achieve a compressive strength of 30 MPa at 28 days, maximum water/cement ratio of 0.5 by weight of 7% ± 1.5% air entrainment. Curing by means of burlap and water, moisture barrier, or membrane shall be according to the Township's specifications.

B 4.05 SUBGRADE PREPARATION AND COMPACTION

(i) Subgrade

On-site excavated "clean" mineral soil can be reused as compacted backfill, provided the moisture content (m/c) is strictly controlled within ± 2% of its optimum m/c.

Alternatively, imported material may be reused as compacted fill, provided it meets the Ministry of Environment (MOE) Decommissioning Clean-up Guidelines (PHYTO), revised February 1997.

Where unstable or organic soil is found to exist below the sub-base, such soil will be removed to a depth of 1.2m below finished grade and the void will be filled and compacted with pit-run gravel or approved earth.

(ii) Compaction

All material within the roadway shall be compacted to the satisfaction of the Township's geotechnical engineer. All material shall be spread upon the road in loose layers not exceeding 150mm in thickness.

Minimum allowable compaction requirements are as follows:

i) Sewer Trench Backfill - 95% standard Proctor maximum dry density (SPMDD).
ii) Top 600mm of subgrade - 98% SPMDD (fill areas and over sewer trenches).
iii) Top 300mm of subgrade - 98% SPMDD (cut areas within road allowance).
iv) Granular bases - 100% SPMDD

The compaction of the above materials should be carried out under conditions of optimum moisture content.

v) Asphalt (base and top course) - 97% its Marshall field density.

B 4.06 TESTING

The Director of Public Works may require core tests to determine the actual thickness and for outlining areas of deficient thickness of roadways and sidewalks. Cores shall be taken at locations determined by the Director of Public Works or by the Township's geotechnical engineer. All costs for such testing shall be borne by the Developer.

B 5.00 CONSTRUCTION REQUIREMENTS

B 5.01 CLEARING AND GRUBBING AND AREA ROUGH GRADING

The road allowance shall be cleared of all trees and shrubs which are not included in final landscaping, and of all other obstructions for such widths as are required for the proper installation of roads, ser- vices, and other works. Rough grading shall be done to bring the travelled portion of the road to the necessary grade and in conformity with the cross-section shown on the drawings. Rough grading of all lots and easements must be performed prior to the road construction. The sub-grade for all roads shall be properly shaped and compacted to 95% Standard Proctor Density, prior to any application of granular base course materials. In all cases, topsoil shall be stripped for the complete width of the road allowance and stockpiled at locations approved by the Township Engineer.

For any excess fill removed to a disposal site classified as "swamp, ravine, floodplain or lake", the Developer must receive prior written permission from the local Conservation Authority.

B 5.02 ROAD SUB-DRAINS

In general, 100 mm dia. perforated, filter cloth wrapped plastic corrugated subdrains will be required to run continuous along both sides of all roads with curb and gutter. It will be the responsibility of the Developer to justify deviation from this standard by submitting a "Soil Drainage Report" from a recognized independent Geotechnical Consultant. Sub-drains may be omitted if it can be shown that the sub-grade is sufficiently permeable to ensure adequate drainage of the road base.

B 5.03 SNOW CLEARING

Snow clearing operations prior to "Final Acceptance" may be carried out by the Township if so requested in writing by the Developer and the associated costs will be charged back to the Developer.

B 5.04 PLACING OF FINAL SURFACE COURSE ASPHALT

The placement of surface course asphalt shall not commence in any area until all of the following conditions are met:

(1) a minimum period of one year has expired from the completion date for the placement of the base course asphalt;

(2) 85% of the dwellings have received final Occupancy Permits.

(3) all undeveloped lots are rough graded in accordance with the approved lot grading plans;

(4) all service connections for multiple-family, commercial, institutional or other blocks are installed; and

(5) the approval of the Township Engineer is obtained in writing.

B 5.05 IN DEPTH CONSTRUCTION SEAL/MAINTENANCE SEAL

All roadways shall have an in-depth construction seal/maintenance seal applied to the surface within one month of placement of top course asphalt. The specification for the in-depth construction seal/maintenance seal are included in Section B 5.05.01.

B 5.05.01 SPECIFICATIONS FOR INDEPTH CONSTRUCTION, SEAL/MAINTENANCE SEAL ASPHALT REJUVENATING AGENT (FURNISHED AND APPLIED) FEBRUARY 1, 2002

B5.05.01.01 SCOPE

This work shall consist of furnishing all labour, equipment and material needed to perform all operations necessary for the rejuvenation and in-depth sealing of a "hot mix" asphalt surface course by spray application of a cationic rejuvenating agent composed of petroleum oils and resins emulsified with water. Products which result in coating the insitu asphalt with asphalt emulsion or coal tar, etc. are not acceptable for this project.

This proposed improvement would be constructed at the existing profile and grade.

Whenever the term Director of Public Works are used in specifications for this work, they shall apply equally to the duly authorized representatives of each.

B5.05.01.02 MATERIALS

The asphalt rejuvenating agent shall be composed of a petroleum resin maltene oil base uniformly emulsified with water. The rejuvenating agent shall have a record of at least ten (10) years of satisfactory service as an asphalt rejuvenating agent and in-depth sealer on municipal roadways. Each submission shall include a certified statement from the asphalt rejuvenator manufacturer showing that the asphalt rejuvenating emulsion conforms to the following physical and chemical requirements.

B5.05.01.03 SPECIFICATIONS

	Test Method		Requirements	
Tests	**ASTM**	**AASHTO**	**Minimum**	**Maximum**
Tests on Emulsion:				
Viscosity @ 25 C., SFS	D244	T-59	15	40
Residue, % W (1)	D244(Mod)	T-50(Mod)	60	65
Miscibility Test (2)	D244(Mod)	T-59(Mod)	No coagulation	
Sieve Test, % W(3)	D244(Mod)	T-59(Mod)	--	0.1
Particle Charge Test	D244	T-59	Positive	
Percent Light Transmittance	GB	GB	--	30
Tests on Residue from Distillation:				
Flash Point, COC C	D-92	T-48	196	--

Viscosity @ 60 C., Cst	D-445	--	100	200
Asphaltenes, % W	D-2006-70	--	--	1.00
Maltene Dist. Ratio	D-2006-70	--	0.3	0.6
PC+A(first) (4)	D-2006-70	--	0.5	--
S+A(second) (4)				
Saturated Hydrocarbons				
S (4)	D-2006-70	--	21	28

(1) ASTM D-244 Modified Evaporation Test for percent of residue is made by heating 50 gram sample to 149EC (300EF) until foaming ceases, then cool immediately and calculate results.

(2) Test procedure identical with ASTM D-244 60 except that .02 Normal Calcium Chloride solution shall be used in place of distilled water.

(3) Test procedure identical with ASTM D-244 except that distilled water shall be used in place of two percent sodium oleate solution.

(4) Chemical composition by ASTM Method D-2006 - 70:
PC + Polar Compounds A(first) = First Acidaffins
A(second) = Second Acidaffins S = Saturated Hydrocarbons

The product Reclamite is acceptable for these requirements. Alternative products will be required to meet all specifications and a 5-liter container of product must be provided to the municipality for testing and approval. All testing costs will be born by the supplier.

B5.05.01.04 APPLICATION TEMPERATURE

The temperature of the emulsion at the time of application shall be as recommended by the manufacturer.

B5.05.01.05 HANDLING OF ASPHALT REJUVENATING AGENT

Contents in tank cars or storage tanks shall be circulated at least ten minutes before withdrawing any material for application. When loading the distributor, the asphalt rejuvenating agent concentrate shall be loaded first and then the required amount of water shall be added. The water shall be introduced into the distributor with enough force to cause agitation and thorough mixing of the two materials. To prevent foaming, the discharge end of the water hose or pipe shall be kept below the surface of the material in the distributor which shall be used as a spreader. The distributor tank will be cleaned of all of its asphalt materials, and washed out to the extent that no colouration of the emulsion may be perceptible. Cleanliness of the spreading equipment shall be subject to the approval and satisfaction of the Director of Public Works or his/her designee.

The distributor for spreading the emulsion shall be self-propelled, and shall have pneumatic tires. The distributor shall be designed and computer equipped/radar speed regulated to distribute the emulsion uniformly on variable widths of surface at readily determined and controlled rates from 0.18 to 0.45 liters per square meter of surface and with an allowable variation from any specified rate not to exceed 5 percent.

Distributor equipment shall include full spray bars, pump, on-board computer assisted application rate and monitoring devices utilizing accurate radar technology, volume measuring device and a hand hose attachment suitable for application of the emulsion manually to cover areas or patches inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the emulsion within the tank.

A check of distributor rate and uniformity of distribution shall be made when directed by the Director of Public Works or his/her designee.

B5.05.01.06 WEATHER LIMITATIONS

The emulsion shall be applied only when the existing surface to be treated is thoroughly dry and when the weather is clear and is not threatening to rain. The emulsion shall not be applied when the atmospheric temperature is below 4 degrees Celsius.

B5.05.01.07 PRIOR TO APPLICATION

Roads shall be mechanically blown free of debris prior to application. Catch basin grates will be covered with absorbent pads. Suitable traffic control will be established. Typical lane closures range from 15 min. - 1 hour.

B5.05.01.08 APPLICATION

The asphalt rejuvenating agent shall be applied by distributor at the temperature recommended by the manufacturer and at the pressure required for the proper distribution of the material. The emulsion shall be so applied that uniform distribution is obtained at all points of the areas to be treated. Distribution shall be commenced with a running start to ensure full rate of spread over the entire area to be treated. Areas inadvertently missed shall receive additional treatment as may be required by hand sprayer applications.

Application of asphalt rejuvenating agent shall be one-half width of the pavement at a time.

When the second half of the surface is sealed, the distributor nozzle nearest the center of the road shall overlap the previous application by at least one-half width of the nozzle spray. In any event, the centerline construction joint of the pavement shall be treated in both application passes of the distributor truck.

Before traffic is permitted to travel on a treated lane a light coating of gray 30A Blast Furnace Slag Sand shall be applied to the surface in sufficient amounts to protect the traveling public. The type and gradation of sand is critical to providing excellent skid numbers. This sand will be picked up by mechanical sweeper within 48 hours of application.

Before spreading, the asphalt rejuvenating agent shall be blended with water at the rate of two (2) parts rejuvenating agent to one (1) part water, or one (1) part rejuvenating agent to one (1) part water by volume as determined by the on-site contractor’s technical advisor or as specified by the manufacturer. The asphalt rejuvenating agent (not including the water component) shall be spread at the rate of 0.14 to 0.18 liters per square meter. The contractor’s technical advisor will calculate application rates of mixed rejuvenator so that the appropriate amount of concentrate is applied utilizing approved application determination methods. The Director of Public Works or his/her designee may attend the application determination test.

The rejuvenating agent shall be applied by an applicator approved by the product manufacturer.

B 5.06 OTHER REQUIREMENTS

Whenever it is necessary to cut through an existing Township road, the Developer's Contractor will be responsible for properly compacting the backfill material and restoring the surface pavement to its original conditions immediately upon completion of backfilling operations.

Before making detours, permission is required from the Township Public Works Department. Where the road is not part of the Township Road system, approval from the appropriate road authority will also be necessary. In all cases the Fire, Police Departments, School Bus Companies and Ambulance Service must be notified by the Developer or his Contractor.

All work will be done in accordance with ordinances and By-laws of the Township of Uxbridge.

B 6.00 CONCRETE CURB AND GUTTER

Concrete curb and gutter conforming to the Township of Uxbridge Standard Detail Drawings shall be used on all new subdivision road ways, subject to provisions in Section B 6.01.

Reinforcing steel shall be placed continuously throughout all curb and gutter as detailed on the standard drawings.

Driveway depressions shall be formed in the curb according to the details and locations as shown on the standard detail drawings. If the driveway depression should be improperly located, then that section of depressed curb which is improperly located shall be broken out and shall be replaced with a normal curb and gutter section. The concrete capping of a depressed curb shall not be permitted. The new driveway depression at this location can be formed by cutting the back of the curb with a curb cutting machine providing the existing section is free from cracks and other defects and that the entrance is to a single-family residence. For multiple-family, commercial, industrial, apartment and other entrances the existing curb and gutter shall be completely removed and replaced with a steel reinforced depressed curb section in accordance with the detail on the standard drawing.

B 6.01 OPEN DITCH ROAD SECTION - FEASIBILITY

The requirements of this section only need be addressed if an open ditch roadway is under consideration to service the proposed rural development. In such cases, the preliminary engineering report shall assess whether the development site is suitable for the incorporation of an open ditch drainage system. Generally, in completing the evaluation, the site shall be assessed for compliance with the following criteria:

CRITERIA	**CONDITIONS FOR OPEN DITCH ROAD SECTION**
1.0 Lot Frontages	Average lot frontage > 30.0 m
2.0 Land Use	Low density development
3.0 Soils 3.1 Frost Susceptibility 3.2 Percolation Times	(to be completed by a Geotechnical Engineer) Non-frost susceptible soils T≤ 12 min/cm
4.0 Groundwater Table	High water table must be below the foundation drain collectors (evaluation to be completed by a Geotechnical Engineer)
5.0 Topography 5.1 Ditch grades 5.2 Contributing Drainage Areas to Ditches	Maximum grade = 3.5% Minimum grade = 1.0% No external contributing areas to discharge to the road side ditches. Road side ditches shall only receive run-off resulting from precipitation falling on the lots serviced by the roadway.
6.0 Utilities	23.0 m right-of-way width required.

In addition to the above, it may be necessary to take into consideration additional factors including:

- stormwater management requirements

- long term maintenance demands
- traffic control
- pedestrian movements
- safety
- economics

It is suggested that prior to preparation of the report, the Developer's Consulting Engineer meet with Township representatives and the Township Engineer to review site characteristics and determine the scope of investigation necessary and specific to the development proposal. With an open ditch cross-section, the minimum maintenance period will be increased from 2 to 5 years. As a general guide, the crown of the open ditch road section must be lower than the proposed front lot corner elevations by a minimum of 150 mm and a maximum of 300 mm.

Where open ditch road sections are constructed, the Developer shall provide a cash contribution based on $5.21 per metre of total roadway length, per annum, over a time period of 20 years.

B 7.00 SIDEWALKS

The location requirements for sidewalks in new subdivisions shall be confirmed with the Township Engineer prior to commencing the detailed design. In general, sidewalks are required on both sides of all arterial and collector roadways and at least one side of all local streets. For local roadways, the locations of schools, parks, churches, commercial establishments etc., the length of street, traffic volume expected and the number of dwelling units serviced will be used as criteria in determining whether sidewalks are required on one or two sides of the street.

The sidewalk shall conform in details and dimensions to the current Township of Uxbridge Standard Detail Drawings and shall be installed at locations as shown on the typical road cross sections. The width of sidewalks for streets is 1.50 metres.

The sidewalks shall be increased in thickness at all driveway locations as shown on the standard drawings. In cases where the sidewalk has been constructed prior to the establishment of an entrance to other than a single-family residence then the existing sidewalk shall be removed and shall be replaced with a thickened sidewalk section with wire mesh reinforcing in accordance with the standard drawing.

At street intersections the curb and the sidewalk shall be depressed to meet the roadway elevation as shown on the standard drawings.

When a sidewalk is constructed adjacent to a curb and gutter a keyway shall be provided along the back of the curb to support the sidewalk, all in accordance with the details shown on the Township of Uxbridge Standard Detail Drawing.

The Township of Uxbridge requires that <u>all</u> concrete sidewalks be constructed as indicated on the approved Engineering Drawings, prior to the release of the first conditional or unconditional Occupancy Certificate in accordance with the Township's Subdivision Agreement.

B 8.00 DRIVEWAY APPROACHES

The Developer is responsible for the grading, gravelling and the paving of all driveways from the curb to the sidewalk or from the curb to the street limit if no sidewalk exists.

B 8.01 MINIMUM DRIVEWAY DESIGN

The minimum consolidated depth requirements for the granular base and asphalt in driveways shall conform with Section B 4.03.

B 8.02 DRIVEWAY GRADES

The maximum permissible design grade for any driveway on private lands shall be 6.0%. The maximum "As-Constructed" grade for any driveway on private lands shall be 7.0%. These maximum grades are not recommended and should be employed only in exceptional cases where physical conditions prohibit the use of lesser grades. The minimum driveway grade shall be 1.0%. The use of negative grade driveways is actively discouraged. Negative sloping driveways will only be considered in estate residential developments under special circumstances. Where negative sloping driveways are used, a positive slope of at least 2.5 percent must be maintained from the garage over a minimum distance of 10.0 metres.

B 8.03 DRIVEWAY DEPRESSIONS

The width and location of the depressions in the curb and gutter for single-family residential driveways shall be as detailed on the Township of Uxbridge Standard Detail Drawing with particular attention being placed on the location of the garage and the direction of traffic flow.

The width and location of the driveway depressions for apartment, commercial, and industrial driveways shall be detailed on the engineering drawings. These driveways shall be designed to accommodate the anticipated vehicular traffic without causing undue interference with the traffic flow on the street. The maximum width of any driveway depression for commercial, apartment or industrial driveways shall be 12 metres. All apartment, commercial and industrial driveways shall be provided with barrier curbs constructed to blend into the roadway curb and gutter.

B 9.00 BOULEVARDS

All boulevard areas are to be graded according to the details shown on the Township of Uxbridge Standard Detail Drawings and to the satisfaction of the Township Engineer. In order to minimize construction problems for the utility companies, the grade of the boulevard shall be constant from the back of the curb to the street limit. Terracing or embankments within the road allowance on new subdivision streets shall not be permitted. The final grade of sod placed within the boulevard areas shall match and not exceed the finished grade of top of concrete sidewalk and curb.

All debris and construction materials shall be removed from the boulevard area upon completion of the basecourse asphalt construction and the boulevards shall be maintained in a clean state until the roadway section is completed.

Clean weed-free topsoil shall be placed on all boulevard areas that are to be sodded. The minimum depth of topsoil required shall be 150 mm.

No. 1 nursery sod shall be used for all boulevard areas that are to be sodded.

B 10.00 EASEMENT REQUIREMENTS

B 10.01 GENERAL

Where underground services are placed outside road allowances and on blocks of land under the ownership of the Township of Uxbridge, permanent easements are required.

Easements must be located on one side of the common lot line between adjacent lots. Pipes shall be centred on the easement. The easements will not be permitted to straddle common lot lines. Building extensions or roof

overhangs will not be permitted to encroach over the limits of the Township's easements.

Where two pipes are to be located on one easement, the minimum width of easement shall be the width of easement required for the larger of the two pipes plus 2 the width of easement for the smaller pipe, rounded to the next 1.0m increment. Additional easement width may be required to ensure adequate separation between the two pipes and a minimum separation of 3.0 metres between the easement limit and the nearest pipe.

B 10.02 STORM SEWER MAINS

The minimum width of easements for storm sewers shall be in accordance with the following:

Size of Pipe	Depth of Invert	Minimum Width of Easement
Up to 675 mm	3.5 m maximum	6.0 m
750 mm to 1500 mm	3.5 m maximum	8.0 m
1650 mm and up	4.0 m maximum	4.0 m plus 3 times O D. of Pipe, rounded to next 1.0 m increment.

B 10.03 STORM CONNECTIONS FOR REAR YARD CATCHBASINS

Easements are not required for rear lot catchbasins where the catchbasin and lead are on one lot. The responsibility for maintenance and repair of all lots where there are rear lot catchbasins with no easements shall be the responsibility of the homeowner. Warning clauses advising the homeowners that they are responsible for the maintenance and repair of all rear lot catchbasins where there are no easements must be placed on all agreements of purchase and sale.

Permanent easements are required where leads for rear lot catchbasins cross two properties. The minimum width of permanent easements, if required for leads to rear yard catchbasins shall be 5.0 metres for pipe sizes ranging from 250 mm to 450 mm in diameter. For pipe sizes greater than 450 mm, criteria under Section 10.02 shall apply. The lead shall be centred on the easement.

B 11.00 BLOCKS OF LAND REQUIREMENTS

Stormwater management facilities, overland flow routes for the major storms and open channels shall be contained in blocks of land, conveyed to the Township of Uxbridge. Natural Watercourses and their associated floodplains shall also be contained in blocks of land under ownership of the Township or Local Conservation Authority and zoned as Hazard Lands. Precise limits of the Hazard Lands and corresponding blocks will be subject to the approval of the Local Conservation Authority and the Township of Uxbridge.

The minimum width of blocks of land for open channels shall be the width of top of open channel plus 7.5 metres for maintenance requirements.

Valley lands (crest of slope to crest of slope) shall be contained within blocks of land to be conveyed to the Township of Uxbridge or Local Conservation Authority, as a condition of development (subject to provisions of Section C 2.01).

SECTION C - STORM DRAINAGE AND STORM WATER MANAGEMENT

C 1.00 DRAINAGE POLICIES

C 1.01 DRAINAGE OBJECTIVES

To assist in the attainment of proper drainage, the Township has set the following objectives for drainage management within its boundaries:

- prevent loss of life and minimize property damage and health hazards;
- minimize inconvenience from surface ponding and flooding;
- minimize adverse impact on the local groundwater systems and baseflows in receiving watercourses;
- minimize downstream flooding and erosion;
- minimize pollution discharges to watercourses;
- minimize soil losses and sediments to sewer systems and waterbodies from construction activity;
- minimize impairment of aquatic life and habitat; and
- promote orderly development in a cost-effective manner.

C 2.00 ATTAINMENT OF DRAINAGE OBJECTIVES

C 2.01 PLANNING

The Township of Uxbridge has a policy that the valleys of existing watercourses should be maintained and preserved in their natural state insofar as this is feasible. Where an area is to be developed, the Township will require, as a condition of development, that:

- Valleys or watercourses shall be dedicated to the Township in blocks of land.

- A conservation buffer strip 10.0 m wide from the stable top of valley bank be respected. The Township may ask that this strip be dedicated to the Municipality and that it not be considered part of the park dedication requirements set out in the Planning Act. Where the buffer strip remains in private ownership, the Township will ask that it be protected by zoning and/or agreement.

- Hazard lands and stormwater management facilities are not acceptable as part of the park land dedication requirements.

The Township discourages watercourse diversions, alterations, pipings and channelization except where these are needed for flood and/or erosion control. Permits for such work shall be obtained under existing legislation from the Township of Uxbridge, the appropriate conservation authority and the Ministry of Natural Resources.

Conservation Authorities endeavour to restrict the construction of all buildings and structures from within prescribed limits as described in accordance with their 'Fill, Construction and Alteration to Waterways' regulations.

C 2.02 MAJOR AND MINOR SYSTEMS

In general, the Township of Uxbridge supports the concept of urban drainage having two separate and distinct components - the minor drainage system and the major drainage system. The minor drainage system comprises swales, street gutters, catchbasins and storm sewers. The major drainage system comprises the natural streams and valleys and the man-made channels and ponds.

C 2.03 RUN-OFF QUANTITY CONTROL

Since development almost invariably increases run-off from any storm due to the increase in impervious surfaces, it will usually be necessary to compensate by exercising control on the quantity of urban run-off. The only exception will be when it can be proven that the increased run-off will not do any harm. Some of the methods of quantity control are temporary storage of water on parking lots, discharging rainwater leaders onto the ground and grassed areas, and downstream stormwater retention or detention ponds. The Township of Uxbridge takes a flexible approach to encourage ingenuity and the development of superior communities. At the same time, the Township endorses the "Blue-Green Concept" whereby the open spaces provided by Hazard Lands, major systems, valleys and parks are integrated into a continuous green belt for the beneficial use of both the public and water transport.

C 2.04 RUN-OFF QUALITY CONTROL

The Township requires developers, contractors and builders to plan and execute their operations so as to minimize sediment and debris pick-up and transport to water bodies. The degree of control and methods used must meet regulations and guidelines of the M.O.E., M.N.R., M.T.O. and the conservation authorities.

C 2.05 PHOSPHOROUS REMOVAL OBJECTIVES

The Township requires the Developer, Contractor, and Builders to plan and execute their objectives so as to minimize phosphorous from entering water bodies. All new developments must be developed in accordance with the Uxbridge Urban Area Stormwater Management Study completed by TSH, Donald G. Weatherbee Associates Inc., and James Li dated July 2000 and as amended. A copy of this report is included with this Design Criteria. This study provides a goal for 90% phosphorous removal from all new developments among other requirements.

C 2.06 MASTER DRAINAGE PLANS

The Township requires a Master Drainage Plan for all proposed urban developments at the Secondary Plan stage of land use planning. The primary purpose of the Master Drainage Plan is to define the effects of urban development and to determine the solution that is compatible with the objectives for the watershed, meets the constraints and does so at the highest benefit:cost ratio. In some cases, a Master Drainage Plan may not have been prepared along with a Secondary Plan. The Township will then require the proponent of a Draft Plan of Subdivision to prepare a Preliminary Stormwater Management Plan using the following methodology:

<u>Inventory Site and Watershed</u>

- topography, soils, land use (present and proposed), vegetative cover
- details on channels, watercourse crossings, culverts, bridges, etc.
- Preliminary Hydrology and Hydraulics
- select most appropriate models
- select design storms
- simulate pre- and post-development hydrographs
- define floodlines
- Define Constraints

- flooding; history of past floods and storms, flood damage centres, present and future floodlines (with no stormwater management) on watersheds greater than 135 ha.

- erosion; mapping of erosion and valley bank instability on site and downstream, assessment of sensitivity to flow changes, assessment of remedial measures.

- environmental; water quality assessment, environmentally sensitive areas, groundwater recharge or discharge areas

- institutional; policies and objectives of M.O.E., M.N.R., conservation authority, regional and local municipalities

- economic; the aim is to achieve the development at least present value cost or at highest benefit:cost ratio while doing no significant harm to anyone or anything else

Formulate Alternative Solutions

- if the hydrologic and hydraulic changes can be handled by the existing system, there is no need to formulate alternative solutions

- if there are problems or binding constraints, the solutions may include any appropriate set of structural or non-structural measures

- structural measures include pipe and ditch configurations, dams and weirs, various types of storages, diversion channels, channelizations, diking, dry and wet floodproofing

- non-structural measures include change of land use, prohibition of floodplain occupancy, use of two zone concept of floodplain management, setbacks from valley banks, recreational or low density designation on key parts of groundwater recharge or discharge areas

- hydrologic and hydraulic analyses to locate and size storage facilities, channels, pipes and overland flows

Evaluate Alternatives

- a blend of technical, aesthetic and economic feasibility

- quantify, in present value dollar terms, all benefits and costs that can be quantified

- describe qualitatively all other benefits and costs

- combine into a benefit cost matrix for comparison of alternatives

Report Presentation

- concise and clear, to aid decision makers and reviewing agencies

- flood plain maps, computer listings and output, supportive figures

For additional information on the requirements of Master Drainage Plans, the Consulting Engineer should procure the Provincial Document entitled, 'Urban Drainage Design Guidelines'.

C 3.00 MAJOR SYSTEM

C 3.01 HAZARD LANDS AND FLOODLINES

The Conservation Authorities of Ontario administer fill, construction and alteration to Waterways Regulations made under the Conservation Authorities Act, R.S.O., 1980. These regulations restrict the following:

- the placement of fill in a regulated area;
- the building or renovation of structures within a floodplain; and
- the alteration of a watercourse.

Conservation Authority staff can advise if the property is regulated and what types of projects require approval.

The Township of Uxbridge requires that Hazard Lands be clearly defined on all watersheds and that no development other than necessary access or services be located therein. The Township also requires that the floodplains that would result from the 1:100 year and Regional Storms be defined for pre-development and post-development conditions. This applies not only to the area to be developed, but also to the watercourses affected downstream and upstream of the development. In general, Conservation Authorities require that there be no adverse impacts either downstream or upstream of the development.

Where a natural watercourse or a man-made channel is used as a component of the major drainage system, irrespective of the drainage area, the Township of Uxbridge requires that all land that would be inundated by the greater of the Regional Storm over 1:100 year storm floods be classified as Hazard Lands. In urban areas, where deemed appropriate by the Township, no part of any lot for development may intrude upon such Hazard Land. In cases where lots extend into Hazard Lands, it will normally be required that the minimum standards for area, depth and width required under the appropriate development zoning are maintained on the table land portion of the lot, and the Hazard Lands portion of the lot will be zoned in a Hazard Land category. In rural areas, Hazard Lands may be left in private ownership, but a by-law will impose a restriction on alteration of any land or building thereon within the Hazard Land limits, consistent with conservation authority regulations.

C 3.02 ACCEPTABLE LEVELS OF FLOOD RISK

The Township of Uxbridge requires that no new building should be damaged by the floodwater levels generated by the Regional Storm or the 1:100 year storm, whichever is the more stringent. This applies not only to the major drainage system, but also to the minor drainage system. This therefore requires proper care in the design of streets, gutters and catchbasins, grading of lots and road allowances, setting the elevations of openings into buildings and weeping tile connections.

C 3.03 METHODS AND DEGREE OF QUANTITY CONTROL

In general, urbanization of land leads to increased run-off, primarily due to the increased use of impervious surfaces and faster transport of the water in storm sewers and on streets. Some of this increase can be obviated by discharging rainwater leaders onto grassed areas, by temporarily storing water on parking lots and by using grassed swales rather than pipes. It is also possible to use a restricted pipe outlet and store water underground in tanks or superpipes. Other control methods that have been used successfully include:

-diverting all overland flow into detention ponds located in passive parks and highway interchanges, with discharge limited to some predetermined rate;

-constructing detention storage facilities on the major system watercourse with discharge rates being controlled.

The Township of Uxbridge endorses use of any or all of these methods of controlling the rate of run-off from a proposed new development or for re-development within an existing urbanized area. The Consulting Engineer is

required to analyze the constraints and opportunities and to develop a drainage system that maximizes the benefits to costs.

If a detention (dry) pond is to be located on a watercourse, this should, if at all practicable, be incorporated into a road crossing of the watercourse valley. Care must be taken to define the environmental concerns at the site and to design the facility to minimize adverse effects. If a detention pond is to be located off-stream (eg. in a passive park) care must be taken to ensure the safety of the residents and the safe passage of all flows without causing undue erosion and maintenance.

The Township of Uxbridge prohibits the construction of detention ponds over intensive use recreational playing fields (ie. ball diamonds, soccer pitches, etc.).

Under no circumstances should the contours of the land in such detention ponds be altered after construction without notifying the Township of Uxbridge and the appropriate conservation authority and without obtaining their agreement that such modification will have no detrimental effect on stormwater management.

As a guideline to be used until Master Drainage Plans are prepared for each watershed, the degree of control on the quantity of run-off from a proposed development shall be:

The post-development peak flow shall not be greater than the corresponding pre-development peak flow for the 1:5 year, 1:10 year, 1:25 year and 1:100 year storms. Other regulatory agencies may require other storm flows to be analyzed (ie. 2 year and/or Regional flows). The 3 hour, 4 hour, 6 hour and 24 hour storm duration shall be analyzed for the 1:100 year storm event. See Section C 5.03.01 for additional information on storm events.

C 3.04 METHODS OF QUALITY AND EROSION AND SEDIMENT CONTROL

The Township of Uxbridge requires the Consulting Engineer to submit an outline of his proposed erosion-sediment control plan along with the draft plan of subdivision submission. This may contain any or all of the following measures:

- sediment traps or temporary retention ponds;
- seeding of topsoil stock piles;
- isolated stripping of development lands;
- vegetation screens.

The Township of Uxbridge requires the Consulting Engineer to submit details of his erosion-sediment control plan along with the detailed engineering design drawings.

Stormwater quality control measures shall be designed as per the requirements of the MOE and the Conservation Authority.

C 3.05 OUTLET STRUCTURES FROM PONDS

Where a detention or retention pond is proposed for quantity control on a major system watercourse, the outlet structures must be designed as much for ease of operation as for hydraulic efficiency. All operational outlet structures shall be of the free-flow non-grated type; under no circumstances will gate or valve or stoplog structures be acceptable except that a valve will be permitted in the emergency drain for a retention pond. The inlets and outlets must be protected to prevent child and major debris access. The area at the downstream end must be protected against erosion by channel lining and/or an energy dissipater.

While such ponds will normally be designed not to be overtopped, the dam creating the pond must be designed to pass safely the flows resulting from the Regional Storm.

C 3.06 STORMWATER MANAGEMENT POND DESIGN

Stormwater management ponds shall be designed in accordance with the Ministry of the Environment Stormwater Management Planning and Design Manual, March 2003 or latest amendment. The following items shall be incorporated in the design of the SWM pond:

1. Gravity flow of water throughout the facility. Pumps and potential pump failure are avoided. The hydraulic grade line is examined to ensure an adequate downward slope from the storm sewer outlet to the point of discharge from the pond.
2. All Stormwater Management Ponds shall be designed with a Vortech Unit for pre-treatment of stormwater runoff
3. Avoid using loose rip-rap or concrete formed depressions that encourage standing water. Rip-rap is often used at the outlet of storm sewers to help dissipate the energy in the water. Encasing the rip-rap or concrete chute blocks within a sloped bed of concrete will diminish the risk of standing water.
4. Avoid using barriers or diversions that hold standing water.
5. Seal the flow control structures from stagnant water (held longer than three days) to prevent the entry of adult mosquitoes. Adult female mosquitoes can enter an opening as small as 1.5 mm (1/16"). Allowances must be made to permit easy access for dewatering if the need arises.
6. Dry detention facilities must completely drain all standing water within 72 hours.
7. Small diameter flow control orifices can become clogged and blockage will delay the drawdown time. Consider an emergency flow release.
8. An all-weather access road is recommended along at least one side of the pond that is less than 7 m wide and as close to the shoreline as possible. If space permits, ponds with a shoreline-to-shoreline distance greater than 7 m generally require access on both sides.
9. A stormwater management pond maintenance manual shall be prepared by the Developer's Engineer during design of the pond.

C 3.07 FOUNTAINS/AERATION DEVICES

Where a permanent pool stormwater management pond is proposed for any development the pond must be designed to accept a fountain/aeration device, subject to the approval of the Township and the Conservation Authority. Aeration can be used as an effective measure at controlling mosquito populations. Power must be provided by the Developer to the location of the fountain. The Township will supply and install the fountain/aeration device and charge the Developer for all costs.

C 3.08 STORMWATER MANAGEMENT POND MONITORING

The Developer shall undertake a monitoring program for all SWM Ponds until Assumption of the Subdivision to the satisfaction of the Township. The program shall include the following components:

a.Installation of a water samplers upstream and downstream of the pond;

b.Installation of a rain gauge near the flow logger;

c.The water shall be sampled 4 times annually and shall be tested for the following parameters:

- E.coli;
- PH, conductivity, alkalinity;
- turbidity

- dissolved, suspended and total solids;
- TKN, total phosphorus;
- dissolved phosphorus;

An annual report shall be submitted to the Town and shall include a statistical analysis (average) of the results, as well as a comparison of the analysis. The provincial water quality objectives and the Uxbridge Urban Area Stormwater Management Study dated July 2002 by TSH Associates, Donald G. Weatherbe Associates Inc. and James Li.

A stormwater management pond performance report shall be prepared and recommendations on revisions to the pond maintenance manual shall be identified.

C 3.09 CULVERT AND BRIDGE HYDRAULIC CAPACITY

	Design Flood Frequency	
Road Classification	Culverts (Up to 3 m Span)	Bridges, (Over 3 m Span)
Arterial	1:50 years	1:100 years to Regional
Collector	1:25 years	1:50 years
Urban Local	1:25 years	1:50 years
Temp. Detour	1:5 years	1:5 years

Given the Township of Uxbridge's endorsement of the Blue-Green Concept and the need to protect weepers from undesirable back- water effects, it is considered that only arterials and collectors should, if feasible, be permitted to cross the major system watercourses. It is also recommended that designers consider the need to design culverts and bridges on such arterials and collectors for at least the 1:100 year storm flow, if not for the Regional Storm flow. If smaller culverts or bridges are provided, the backwater effects for the 1:100 year and Regional Storm flows must be determined. Concrete box culverts shall be designed and placed for all watercourse crossings subject to the approval of the Township Engineer. Conservation Authority approval under their Regulations may be required for watercourse/ valley crossings.

C 3.10 WATERCOURSE EROSION AND BANK INSTABILITY

Where erosion or bank instability is already evident in an area to be developed or re-developed, the Township of Uxbridge requires that the situation be stabilized by appropriate remedial measures. Where an upstream development will cause significantly increased downstream erosion, the Township also requires the Developer to obviate further damage by appropriate remedial measures. In those cases where access to do the work cannot be given by the Township, a cash contribution may be requested from the Developer. Where more than one Developer is involved, the respective shares will be based on the areas of impervious surfaces as calculated for the imperviousness ratio.

When designing remedial erosion or bank instability works, preservation of the natural valley aesthetics must be secondary only to achieving a sound technical solution. A normal low water channel has a capacity of about the 1:2 year flood. Protection to this level will be adequate provided care is taken to prevent undermining by higher floods and provided that the channel bank is not coincident with a higher valley bank. In this latter case, it may be necessary to protect the bank to a level as high as the 1:100 year flood or even the flood resulting from the Regional Storm.

Conservation Authorities endeavour to restrict the construction of all buildings and structures from within prescribed limits as described in accordance with their 'Fill, construction and alteration to water- ways', regulations.

C 4.00 MINOR SYSTEM

C 4.01 WATERSHED AREA

The watershed area shall be determined from contour plans and shall include all areas that naturally drain into the system and any fringe areas not accommodated in adjacent storm drainage systems, as well as other areas which may become tributary by reason of regrading. This information shall be confirmed with the Township Engineer prior to the start of the design of the internal servicing of the site.

C 4.02 STORM DRAINAGE PLANS

EXTERNAL AREAS

A plan shall be prepared to a scale of 1:1,000 or 1:2,000 dependent upon the size of the watershed area, to show the nature of the drainage of the lands surrounding the development site and to show all external drainage areas that are contributory to the drainage system for the development. The external drainage areas shall be divided into smaller tributary areas and the area and the location to which the tributary area is considered in the design shall be clearly shown. The Plan shall clearly show all existing contours used to justify the limits of the external drainage areas.

In lieu of precise information on development on the whole or any part of a watershed area, the latest zoning by-law and official plans issued by the Planning Department shall be used to determine the correct values of the run-off parameters to be used for all external areas in the design and to determine the specific areas to which these values apply.

This external drainage area plan shall be prepared and shall be submitted to the Township Engineer at the functional report stage and prior to the commencement of the detailed storm sewer design.

INTERNAL DRAINAGE PLAN

All internal storm drainage plans shall be prepared to a scale of 1:1,000 and shall include all streets, lots, blocks, easements and other lands within the development. The proposed storm sewer system shall be shown on this plan with all manholes numbered consecutively from the outlet. These manholes shall be the tributary points in the design and the area contributing to each manhole shall be clearly outlined on this plan. The area, in hectares, of each contributing area (to the nearest hundredth) and the run-off parameter used shall be shown in a circle located within the contributing area. In cases where areas of different run-off parameters may be tributary to the same manhole, the areas and the parameters shall be separately indicated on the plan.

In determining the tributary area to each manhole, the proposed grading of the lots must be considered to maintain consistency in the design.

In the case of large areas under single ownership or blocks requiring future site plan agreements, the design shall be prepared on the basis of the whole area being contributory to one manhole in the abutting storm sewer unless more than one private storm connection is necessary to serve the property in which case the appropriate area tributary to each connection shall be clearly shown and taken into account in the storm sewer design.

The length, size and grade of each section of storm sewer shall also be shown on the storm drainage plan.

C 4.03 RAINWATER LEADERS

Rainwater leaders on all single family and semi-detached residential units shall be discharged onto grassed or garden areas and away from wells or tile-bed areas.

The rainwater leaders draining the rear halves of all townhouses shall be discharged onto grassed or garden areas. The rainwater leaders draining the front halves of all townhouses shall be connected to the storm sewer system and the roof area must be included in the calculated imperviousness ratio.

The rainwater leaders from all commercial, industrial, institutional and high density residential buildings should be discharged onto grassed or garden areas, if possible and if acceptable to the Township. Precast concrete splash pads shall be placed at each rainwater leader downspout, all in accordance with the Standard Detail Drawing.

Alternatively rainwater leaders may be directed to on-site detention facilities to achieve an equivalent controlled discharge rate of 42 litres per second per hectare of roof area.

C 4.04 HYDRAULIC DESIGN LEVELS

The system of street gutters, catchbasins and storm sewers shall be designed for the 1:5 year storm with the following exception:

Consideration will be given to using a 1:10 year storm for high value commercial development and for downtown business areas. In such cases, the Township of Uxbridge may require some internal control in the form of temporary ponding on parking areas furthest away from the building or underground storage. The Township may require the Developer to provide a manhole located at the street line to control discharges into the storm sewer system.

Where parking lot detention is used in industrial, commercial, institutional and high density residential developments, the controlled discharge rate from parking lots shall not be greater than 250 litres per second per hectare of asphalt and shall not be less than 195 litres per second per hectare of asphalt.

It is vital that the interception capacity of the system of catchbasins be completely compatible with the design capacity of the storm sewers. While the storm sewers will be designed for free-flow conditions for the storm noted above, the actual flows captured by the catchbasins during the 1:100 year design storm shall be determined. The hydraulic grade lines produced by the captured 1:100 year design storm flows shall be determined and plotted on the detailed design drawings. The spacing of catchbasins may be varied and approved orifice inserts fitted into the catchbasins to control the amount of water entering the storm sewers during less frequent storms.

C 4.05 CONNECTION OF FOUNDATION WEEPERS

It is the Township of Uxbridge's policy to connect foundation weepers by gravity to the storm sewer system provided that the elevation of the basement floor is at least 0.60 m above the elevation of the storm sewer obvert at the building envelope. (In some cases, this may require shallow basements). All basements shall be constructed a minimum of 0.6 m above the 1:100 year storm hydraulic gradeline at the site. For buildings located close to the point where the storm sewer discharges into the major system, there is the additional requirement that the basement floor elevation must be 0.60m above the regulatory flood elevation at the point of discharge.

C 4.06 STREETS AND GUTTERS

The depths of flooding permitted on streets while acting as part of the minor drainage system, generally designed for the 1:5 year storm, are as follows:

(a) There shall be no curb overtopping.

(b) On local roads, the flow may spread to the crown.

(c) On collector roads, the flow spread must leave one lane free of water.

(d) On arterial roads, the flow spread must leave one lane in each direction free of water.

The depths of flooding permitted on streets and at intersections during the 1:100 year storm are as follows:

(a) No building shall be inundated at the ground line, unless the building has been floodproofed.

(b) For all classes of roads, the product of depth of water (m) at the gutter times the velocity of flow (m/s) shall not exceed 0.65 ^{m2}/s.

(c) For arterial roads, the depth of water at the crown shall not exceed 0.15 m.

Flow across road intersections shall not be permitted for minor storms (generally 1:5 year). To meet the criteria for major storm run-off, low points in roads cannot be permitted unless adequate provision is made for the safe overland flow at the low points.

C 5.00 HYDROLOGIC CRITERIA

C 5.01 GENERAL

A stormwater management (SWM) study should be conducted in two main stages, namely, preliminary planning and detailed design.

Stage 1

Preliminary planning on a watershed or community basis to define clearly potential drainage constraints, to examine and assess different SWM alternatives and to recommend for approval a SWM scheme which is economically and environmentally justifiable (now called Master Drainage Plan).

Stage 2

Detailed design of the proposed and approved SWM scheme, i.e. sizing, grading, location, operation and cost estimates of various stormwater drainage facilities of the major and minor systems, the schedule of their implementation and hydraulic grade lines (now called Stormwater Management Plan).

The system should be designed to meet the requirements of the Township of Uxbridge, the conservation authorities and the Ministries of the Environment (M.O.E.) and Natural Resources (M.N.R.).

C 5.02 MODELS

Different hydrologic computations or models of various levels of sophistication have been used to estimate stormwater run-off volume and peak flow. The selection of an appropriate model should be based on appreciation of its underlying assumptions and limitations with respect to the problems under consideration. Three categories of commonly used hydrologic models, namely Rational Method, Unit Hydrograph and physical process simulation models, may be considered for the SWM study. Their underlying assumptions and limitations must be clearly stated.

For additional information relative to hydrologic modelling, the Consulting Engineer should procure the Provincial Document entitled, 'Urban Drainage Design Guidelines'.

C 5.02.01 Rational Method

The Rational Method, while simple and popular, has its major limitations in the crude representation of physical run-off parameters and its inability to simulate the actual run-off distribution in time. However, it can be used for the preliminary sizing of the minor sewer system in the final design stage (Stage 2), providing the total drainage area is not greater than 25 ha.

The Rational Method does not take into account the actual storm pattern and thus fails to reflect the run-off distribution in both time and space. This shortcoming makes the Rational Method unsuitable for the design of detention storage, pumping and interceptor facilities.

In recent years, computer programs have been developed for the Rational Method, which dynamically simulate the run-off distribution in both time and space. Such computer programs may be used for the final design of storm sewers and storm water management facilities, subject to the approval of the Township Engineer.

C 5.02.02 Unit Hydrograph Models

Unit Hydrograph Models are of the "black box" type and their validity is strongly dependent on proper calibration of the various parameters. Frequently used models in this category are HYMO, TR20, and HEC1.

The OTTHYMO model gives results compatible with actual measurements and with SWMM and is therefore recommended for all Master Drainage Plan level studies.

C 5.02.03 Physical Process Simulation Models

These models reproduce overland flow and routing in street gutters by simplified assumptions. The most frequently used ones are ILLUDAS and SWMM, which were originally designed as urban SWM tools and thus should be used in the detailed flow analysis for the design of new urban sewers or the evaluation of the existing system (Stage 2). In general, for small to medium size urban development, the use of SWMM is more desirable, since it adopts more rigorous hydraulic computations for both overland and pipe flows and also has a comprehensive water quality modelling capability. The OTTSWMM model incorporates the capability of analyzing dual drainage flows (pipe and street) simultaneously. It can be used to calculate the flow captured by the catchbasins during infrequent storms, route this flow through the pipe system and determine hydraulic grade lines.

Other physical process simulation models may be employed in the detailed design of the SWM scheme (Stage 2), subject to the approval of the Township Engineer.

C 5.02.04 Validation

Whenever possible, a model should be properly calibrated under local conditions before its actual application. It is advisable to validate the results from the preliminary analysis by using different models, e.g. the post-development peak flows estimated through HYMO should be checked against those obtained through SWMM. Comparison by two models is recommended wherever possible; however, OTTHYMO and OTTSWMM do not require validation.

C 5.03 BASIC DATA

C 5.03.01 Meteorology

All models derive flows from storms of a given frequency. The frequency of the flow is, in general, not identical to the frequency of the storm. The Rational Method uses rainfall intensity-duration- frequency curves. All other models use design storms or, in special cases, real storm distributions.

Standard Drawing No. US-600 gives the rainfall intensity-duration- frequency (IDF) curves that should be used for all frequencies from 1:2 years to 1:100 years. To take into consideration climate change impact in the design of drainage infrastructure, the following intensities are to be used for design year 2097m which is 75-year horizon from present.

Table 5.03.01. Rainfall Intensity (mm/hr) 2097 design year

Rainfall Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	111.55	81.75	65.47	42.68	26.51	11.81	7.01	4.19	2.46
5-yr	153.60	112.17	89.89	58.19	36.08	15.99	9.57	5.61	3.28
10-yr	179.93	131.42	105.16	68.13	42.12	18.64	11.02	6.52	3.81
25-yr	225.73	160.23	126.41	80.32	49.19	21.59	12.83	7.51	4.48
100-yr	285.84	206.48	163.97	104.68	63.79	27.52	15.98	9.27	5.33

Due to timing required for the engineering approvals, it is recommended that if the development has not started construction two years after engineering approvals have been granted by the Township, the Developer must resubmit the engineering package for re-approval by the Township. This may require updates to the intensity calculations presented in Table 5.03.01. Township staff needs to be consulted to confirm the need for updates that may be required on approved design packages.

Based on the revised intensities/IDF curves, two sets of design storms have been developed for use in studies. These are the SCS Type II and Chicago Distribution Design Storms.

In general, the SCS design storms should be used for determining the hydrographs for rural watersheds and for checking detention storages required for quantity control. The Chicago design storms should be used for determining hydrographs in urban areas and also for checking detention storages. It is prudent to run both sets of design storms to make sure that the more stringent is used for each individual element of the drainage system (pipe flow, street flow, stream or river flow, detention storage).

Current regulations require that the floodlines on streams be deter mined for the greater of the Regional Storm or a 1:100 year design storm. It is imperative that all on-stream detention and retention ponds be designed to handle the Regional Storm flows without suffering unacceptable damage and without causing unacceptable flooding.

Since the intensity-duration-frequency curves were originally derived from discrete rainfall data with a minimum time duration of 5 minutes, it can be assumed that 10 minutes represents the minimum reasonable time step for discretization purposes. The time step for discretization of the design storm can vary according to the size of the watershed, but must not exceed the estimated time of concentration. The maximum rainfall intensity should be compatible with that of real storms on record.

In the detailed design of storage structures, it is recommended that operation be checked for Spring flood due to combined snow-melt and rain. Wet ponds should be checked for evaporative losses in very dry years. Temperature data should be collected when snowmelt and evaporation are to be estimated.

Operation of storage facilities should also be checked in order to verify that a sequence of storms may not be more critical than a design storm.

C 5.03.02 Physical Data

Watershed/community/subdivision should be discretized into subcatchments according to land-use and topographic characteristics from detailed soil and topographic maps along with a well defined development plan. The finer the discretization is, the more precisely one can derive the physiographic parameters such as slope, hydraulic length, and imperviousness, etc. A minimum area of 25 ha. should provide reasonably accurate estimates. In the preliminary planning stage, coarser discretization is acceptable.

Field measurements are required for all major watercourses and items such as channel section, length, slope, the storage-elevation relationship of any ponds, and dimensions of existing culverts.

C 5.03.03 Hydrologic Considerations

In the OTTHYMO model, the soil complex numbers govern the availability of excess rainfall to become run-off. They should be determined according to the soil type/land-use and antecedent moisture conditions.

Time of concentration is required in both HYMO and ILLUDAS as well as Rational Method. Although there is a built-in empirical formula in the HYMO model, it is advisable to compare the estimate with those obtained from other proven empirical formulas or hydraulic approximations.

Initial and final infiltration rates are required in both ILLUDAS and SWMM. Without field measurements of infiltration, model default values may have to be adopted unless otherwise justified. This also applies to other hydrologic parameters such as depression and detention storage, etc.

If the Rational Method is to be used for the preliminary sizing of sewers, the run-off coefficients should be properly determined as a function of imperviousness and rainfall frequency.

C 5.04 COMPUTATIONAL REQUIREMENTS

C 5.04.01 <u>Stage 1 - Preliminary Planning</u>

Define clearly potential drainage constraints affecting the development, such as flood control and erosion control criteria, inadequate capacity of downstream system and other constraints imposed by natural environment or government regulations.

Examine different SWM alternatives such as on-line or off-line detention storage, roof disconnection, etc., by appropriate hydrologic computations. Unit Hydrograph Methods or less sophisticated physical process simulation models may be used for the preliminary planning hydrologic and stormwater management analysis. Segmentation of the watershed should be based on land use and drainage patterns. A minimum of ten sub-watersheds is desirable. A coarser segmentation or lumping should be justified by comparison with more detailed discretizations. Assess each alternative on the basis of economics, i.e. benefit/cost analysis, environmental impacts, i.e. water quality and aesthetic aspects, and compatibility with the general development plan, etc. No-control and over-control options should also be included for comparison.

C 5.04.02 <u>Stage 2 - Detailed Design</u>

Based on the preliminary findings from the planning study, a well conceived SWM scheme which defines the drainage pattern for the watershed shall be

designed, tested and presented in detail. Preliminary sizing of sewers can be carried out using the rational method in accordance with the design guidelines.

The hydraulic grade lines in the storm sewer system must be determined for the 1:5 year storm and for the actual captured flows from the 1:100 year storm.

Storage design, whether on-line or off-line, above ground or underground, also requires analysis of such factors as critical sequence of storm events competing for limited storage, snowmelt run-off with large volume and longer duration, and simultaneous operation of a series of storage units resulting in adverse downstream effect due to uncoordinated timing of peaks. The outflow control from the storage facilities should be properly designed to optimize storage utilization.

C 5.04.03 Water Quality Computations

In environmentally sensitive watersheds, the effect of pollution of run-off can be assessed by comparing pre-development and post- development pollutant loadings by means of the STORM model. The model must be applied for an average year and parameters such as suspended solids, biochemical oxygen demand and phosphorus and nitrogen will be compared in terms of annual loading and the "worst event". This event is usually given by a combination of a large number of dry days and a storm of average intensity. If the change in total pollutant loading upstream from the critical creek section is significant, the effect of changes in dissolved oxygen has to be further indicated. Methods to reduce the pollutant loading including temporary detention, and changes in density must be investigated and the results approved by MOE.

In addition, evaporation losses and sediment loading are important for wet ponds, in order to evaluate maintenance problems, the need for additional water supply, etc.

C 5.04.04 Presentation of Hydrologic Studies

Hydrologic studies should describe the model parameters and criteria for their selection as well as input and output data. The Consulting Engineer has the responsibility for the computations, and the Township shall check the main assumptions and the input data. All information required for this verification should be submitted with the hydrologic computations. To facilitate review, the following documentation should be submitted.

(a) Plan showing the model subcatchments that enclose the drainage modification project.

(b) Summary tables that provide the following data on the portion of the drainage project:

- (i) total drainage area;
- (ii) pre- and post-development impervious area and run-off coefficients;
- (iii) pre- and post-development area devoted to each ground cover element (rooftop, street, grass, etc.);
- (iv) total drainage area devoted to each hydrologic soil group;
- (v) storage volumes associated with pre- and post- development run-off control measures.

(c) Site plan maps showing:

- (i) boundaries of drainage modification project;
- (ii) pre- and post-development topography;
- (iii) points along the drainage modification project boundaries that receive run-off from offsite drainage areas;

(iv) pre- and post-development structures, paved areas, and vegetative cover;

(v) pre- and post-development drainage network (sewers, culverts, inlets, manholes, swales, open channels, etc.) and drainage divides for land area tributary to each sewer or culvert inlet, as well as the following information:
- length, cross-sectional dimensions, gradient, and roughness factor of each conduit;
- invert and ground elevations for all junctions and connecting conduits;
- for on site drainage area, the total area of each ground cover element tributary to a storm sewer or culvert inlet;
- for off site areas tributary to a storm sewer or culvert inlet, total acreage by land use classification.

(vi) pre- and post-development run-off control measures.

(d) The hydraulic grade lines produced by the actual captured flows from the 1:100 year storm shall be plotted on the detailed design drawings.

C 6.00 STORM SEWER DESIGN

C 6.01 RUN-OFF OR IMPERVIOUSNESS COEFFICIENTS

Run-off coefficients to be used in storm sewer design with the Rational Method shall be as follows:

Parks over 4 hectares	0.20
Parks 4 hectares and under	0.25
Single-family Residential (Urban)	0.45
Single-family Residential (Estate Residential)	0.40
Semi-detached Residential	0.60
Townhouses, Maisonettes, Row Houses, etc.	0.75
Apartments	0.75
Schools and Churches	0.75
Industrial	0.75
Commercial	0.90
Heavily Developed Areas	0.90
Paved Areas	0.95

A 10 minute inlet entry time at the head of the system must be utilized unless large external drainage areas exist.

C 6.02 PIPE CAPACITIES

Manning's formula shall be used in determining the capacity of all storm sewers. The capacity of the sewer shall be determined on the basis of the pipe flowing full. The Design of all storm sewer systems shall be such that the actual flows/capacity of the storm sewer does not exceed 0.75.

The value of the roughness coefficient 'n' used in the Manning's formula shall be as follows:

(a) Concrete Pipe all sizes	0.013
(b) Concrete box culverts	0.013

C 6.03 FLOW VELOCITIES

Minimum acceptable velocity = 0.75 m./sec.
Maximum acceptable velocity = 4.5 m./sec.

C 6.04 MINIMUM SIZES

The minimum size for a storm sewer main shall be 300 mm. for concrete pipe.

C 6.05 MINIMUM GRADES

Regardless of flow velocities obtained, the minimum design grades for pipe storm sewers shall be as follows:

Sewer Size	Concrete Pipe
up to 375 mm.	0.40%
450 mm. to 525 mm.	0.30%
600 mm. to 1,200 mm.	0.20%
1,200 mm. and over	0.15%

C 6.06 MINIMUM COVER

The depth of a deep storm sewer shall be sufficient to provide a suit- able outlet for the building foundation weeping tiles. The minimum cover to the top outside pipe barrel of a deep storm sewer shall be 2.5 to 3.0 metres depending on the storm service connection requirements. The minimum cover to the top outside pipe barrel of a shallow storm sewer system shall in no case be less than 1.3 metres from the centre line of the roadway.

C 6.07 LOCATION

The storm sewers shall be located as shown on the standard Township of Uxbridge road cross section drawings. This standard location shall be generally 1.5 metres south or west of the centreline of the road allowance. In the case of crescents, looped and curvilinear streets, this standard location may be varied to the extent that the storm sewer remains on the same side of the centreline of the street (i.e., left or right) to avoid crossing the sanitary sewer trenches at the changes in direction of the street.

C 6.08 CURVED SEWERS

Radial pipe shall be allowed for all storm sewers 1000 mm. in diameter and larger providing that a manhole is located at the beginning or at the end of the radial section. The minimum centreline radius allowable shall be 15 x the pipe diameter.

C 6.09 LIMITS

All sewers shall be terminated at the subdivision limits when external drainage areas are considered in the design with suitable provision in the design of the terminal manholes to allow for the future extension of the sewer.

When external areas are not included in the sewer design, the sewer shall extend at least half way across the frontage and/or flankage of any lot or block in the subdivision.

C 6.10 SEWER ALIGNMENT

All storm sewers shall be laid in a straight line between manholes unless radial pipe has been designed.

C 6.11 PIPE CROSSINGS

A minimum clearance of 0.20 metres shall be provided between the outside of all pipe barrels at all points of crossing. In cases where the storm sewer crosses a recent utility trench at an elevation higher than the elevation of the utility, a support system shall be designed to prevent settlements of the storm sewer, or alternatively the original trench will be re-excavated to the top of the utility and shall be backfilled with compacted crushed stone or concrete to adequately support the storm sewer. When the storm sewer passes under an existing

utility, adequate support shall be provided for the utility during and after construction to prevent damage to that utility.

C 6.12 CHANGES IN PIPE SIZE

No decrease of pipe size from a larger upstream to a smaller size downstream will be allowed regardless of the increase in grade.

C 7.00 SEWER PIPE

C 7.01 MATERIALS

The type and classification of all storm sewer pipe and the sewer bedding type shall be clearly indicated on all profile drawings for each sewer length.

Concrete pipe shall conform to the requirements of C.S.A. Specification A257-M1982 for the particular classes as shown below:

a) Non-Reinforced Concrete Pipe,
CSA Standard A257.1-M1982, Class 1, 2 and 3.

b) Reinforced Concrete Pipe,
CSA Standard A257.2-M1982, Strength Classification 50-D, 65-D, 100-D and 140-D.

Polyvinyl Chloride (PVC) Pipe Products shall conform to the requirements of CSA B 182.2, B 182.3, B 182.4, ASTM D 3034, F 679, F 794 and UNI-B-5, B-6 and B-9. The pipe must be manufactured with factory assembled spigot gasket and integral bell joints.

Fabrication of PVC pipe products shall conform to the requirements of CSA Standard B 182.2, B 182.3 and B 182.4.

PVC pipe for storm sewers shall be white in colour.

All storm sewer mains in size up to and including 600mm shall be constructed of reinforced concrete pipe or polyvinyl chloride (PVC) pipe.

All storm sewer mains 675mm or larger shall be constructed of reinforced concrete pipe. Storm sewer leads from catchbasins shall be constructed with non-reinforced concrete pipe or PVC pipe.

C 7.02 PIPE BEDDING

The class of pipe and the type of bedding shall be selected to suit loading and proposed construction conditions. Details of the types of bedding are illustrated in the Township of Uxbridge Standard Drawings.
In general, the Type "2" bedding (20 mm. crusher run limestone) shall be used for storm sewers in new developments, and the class of pipe will be selected to suit this bedding detail. Alternate granular materials for pipe bedding may be specified, subject to the approval of the Township Engineer, however clear stone bedding will not be permitted. The width of trench at the top of the pipe must be care- fully controlled to ensure that the maximum trench width is not exceeded unless additional bedding or higher strength pipe is used.

C 7.03 VIDEO RECORD

All newly constructed storm sewers shall be T.V. inspected upon satisfactory completion of all other testing, prior to the Township's issuance of "Certificate of Completion".

A permanent record in video taped form shall be supplied, illustrating a continuous record of the sewer installations, service connections, manholes,

etc. A report identifying any unusual or sub-standard conditions shall also be submitted.

The video tape record and the inspection report shall be prepared by a firm experienced and qualified in this field.

All video cassettes, reports and data provided from inspections are to become the property of the Township of Uxbridge.

At the discretion of the Township Engineer, additional video inspections and records may be required prior to "Final Acceptance".

C 8.00 MANHOLES

C 8.01 LOCATION

Manholes shall be located at each change in alignment, grade or pipe material, at all pipe junctions, at the beginning or end of all radius pipe sections and at intervals along the pipe to permit entry for maintenance to the sewer.

C 8.02 MAXIMUM SPACING

The maximum spacing between manholes shall be as follows:

Pipe Size	Maximum Manhole Spacing
300 mm	95 metres
375 mm. to 750 mm	100 metres
825 mm. to 1,200 mm	125 metres
1,200 mm. and over	150 metres

C 8.03 MANHOLE TYPES

Manholes may be constructed of precast or poured concrete. The Township of Uxbridge standard manhole details shall be used for manhole design where applicable. Although these standard drawings provide details for manholes up to certain maximum depths and sizes, the Consulting Engineer shall analyze, individually, each application of the standards related to soil conditions, loading and other pertinent factors to determine structural suitability. In all cases where the standard drawings are not applicable, the manholes shall be individually designed and detailed.

A reference shall be made on all profile drawings to the type and size of all storm manholes. In the case of the standard 1,200 mm. precast manhole, the size of the manhole may be omitted and reference need only be made to the standard drawing number.

Precast manholes shall conform to ASTM specifications C-478 M latest revision.

C 8.04 MANHOLE DESIGN

(a) All manhole chamber openings shall be located on the side of the manhole parallel to the flow for straight run manholes, or on the upstream side of the manhole at all junctions.

(b) The direction of flow in any manhole shall not be permitted at acute interior angles.

(c) Safety gratings shall be provided in all manholes when the depth of the manhole exceeds 5 m. The maximum spacing between safety gratings shall not exceed 4.5 m.

(d) The obverts on the upstream side of manholes shall not be lower than the obvert of the outlet pipe.

(e) The maximum change in direction of flow in manholes, for sewer sizes 900 mm. diameter and over, shall be 45°.

(f) Where the difference in elevation between the obvert of the inlet and outlet pipes exceed 0.9 m., a drop structure shall be placed on the inlet pipe.

(g) All storm sewer manholes shall be benched to the obvert of the outlet pipe on a vertical projection from the spring line of the sewer.

(h) The minimum width of benching in all manholes shall be 230 mm.

(i) Manholes in boulevards shall be located, wherever possible, a minimum of 1.5 m. distant from the face of curb or other service.

(j) Minimum size of any manhole stack shall be 685 mm. square.

C 8.05 GRADES FOR MANHOLE FRAMES AND COVERS

All manholes, located within the travelled portion of a roadway, shall have the rim elevation set flush with the surface of the basecourse asphalt. The concreting and setting of the frame and cover shall be completed in accordance with the details provided in the standard drawing. A maximum of 300mm of modular rings shall be permitted on manholes in new subdivisions. No concrete shall extend over the edge of the manhole.

Prior to the placement of the final lift of asphalt, steel adjustment rings (McCoy Foundry or equal) shall be added to the manhole frame to provide the necessary adjustments for the surface asphalt.

C. 8.06 HEAD LOSSES

Suitable drops shall be provided across all manholes to compensate for the loss in energy due to the change in flow velocity and for the difference in the depth of flow in the sewers.

In order to reduce the amount of drop required, the designer shall, wherever possible, restrict the change in velocity between the inlet and outlet pipes to 0.6 metres/sec.

Hydraulic calculations shall be submitted for all junction and transition manholes on sewers where the outlet is 1,050 mm. or greater. In addition, hydraulic calculations may be required for manholes where the outlet pipe is less than 1,050 mm dia. if, in the opinion of the Township Engineer, there is insufficient invert drop provided across any manhole.

Regardless of the invert drop across a manhole as required by calculations, the obvert of the outlet pipe shall not be higher than the obvert of the inlet pipe at any manhole location.

The minimum drops across manholes shall be as follows:

Change of Direction	Minimum Drop (mm)
0	20
1° to 45°	50
46° to 90°	80

C 9.00 CATCHBASINS

C 9.01 LOCATION AND SPACING

Catchbasins shall be selected, located and spaced in accordance with the conditions of design. The design of the catchbasin location and type shall take into consideration the lot areas, the lot grades, pavement widths, road grades and intersection locations.

All catchbasins and their leads shall be of the single, double or backyard type as set out in the standard drawings. The hydraulic capture capacity of the catchbasins is given in the Township of Uxbridge Standard Detail Drawings. To ensure that the capture or inlet capacity matches that of the storm sewer, the spacing of catch- basins on streets may be varied.

If detailed analysis of the major-minor system and SWMM analysis of the pipe system indicate the need for inlet controls, additional constrictions should be implemented. Since reduction in the size of the standard catchbasin covers is not desirable, an orifice plate or hooded inlet can be located in the catchbasin.

Catchbasins shall be generally located upstream of sidewalk crossings at intersections and upstream of all pedestrian crossings. Catchbasins shall not be located in driveway curb depressions.

Double catchbasins shall be normally required when the catchbasin intercepts flow from more than one direction. Single catchbasins may be used in the case where the total length of drainage to the catchbasin, from both directions, is less than 95 m, subject to the analysis of the major-minor system.

Rear lot catchbasins and connections shall be located as outlined in the lot grading criteria. In general, the catchbasin and the catch- basin connections shall be located entirely on one lot.

C 9.02 CATCHBASIN TYPES

Catchbasins must be of the precast type as shown on the Standard Drawings.

Typical details for the single, double and rear lot type catchbasins are shown in the standard drawings.

Special catchbasins and inlet structures shall be fully designed and detailed by the Consulting Engineer.

C 9.03 CATCHBASIN CONNECTIONS

For single catchbasins, the minimum size of connection shall be 250 mm. and the minimum grade shall be 1.0%.

For double catchbasins, the minimum size of connection shall be 300 mm. and the minimum grade shall be 1.0%.

For rear lot catchbasins, the minimum size of the connection shall be 250 mm. and the minimum grade shall be 1.0%.

In general, catchbasins located in close proximity to a manhole shall have their leads connected to the manhole. Long catch basin connections (in excess of 20 m.) shall be connected to a manhole or, alternatively, the lead can be connected to the sewer and a 1,200 mm. manhole catchbasin used in lieu of the normal 600 mm. square catchbasin.

C 9.04 GRATINGS

The frame and cover for catchbasins shall be as detailed in the Township of Uxbridge Standard Drawings. In general, the "bike-proof" catchbasin grate shall

be required for all catchbasins located in roadway or walkway areas, and the pyramidal type shall be used for rear lot and ditch located catchbasins.

C 9.05 CATCHBASINS AT INTERSECTIONS

All catchbasins at street intersections shall be located on the tangent section of the curb at a minimum of 0.6 metres distant from the beginning or the end of the radial portion of the curb.

C 9.06 GRADES FOR CATCHBASIN FRAMES AND COVERS

All catchbasins located within the travelled portion of a roadway, shall have the frame elevation set flush with the surface of the base course asphalt. The adjusting and setting of the frame and cover shall be completed in accordance with the details provided in the standard drawing, upon placement of surface course asphalt.

Temporary asphalt curbing shall be placed behind all catchbasins within the travelled portion of the roadway at the stage of base course asphalt. Asphalt curbing shall be placed in accordance with OPSD 601.01 - Type "D", between the two adjacent expansion joints as shown on the Standard Drawing.

Prior to placing surface course asphalt, temporary asphalt curbs shall be removed and replaced by concrete curb in accordance with OPSD 600.040.

C 10.00 INLETS, OUTFALLS AND SPECIAL STRUCTURES

C 10.01 GENERAL

Inlet and outlet structures shall be fully designed on the engineering drawings. The details provided shall include the existing topography, proposed grading and the work necessary to protect against erosion.

C 10.02 INLETS

For other than minor swales, where catchbasins with pyramidal tops are used, inlet structures shall be fully designed by the Consulting Engineer. Inlet grates shall generally consist of inclined parallel bars or rods set in a plane at approximately 18° with the top away from the direction of flow. Gabions, rip-rap or concrete shall be provided at all inlets to protect against erosion and to channel the flow to the inlet structure.

Hydraulic design calculations for inlet structures must be performed in accordance with guidelines established by the Ministry of Transportation, Ontario, Drainage Manual.

The design of any culvert on a new or reconstructed watercourse where an inlet grating is required must provide a measure of safety and minimize the risk of entanglement or entrapment of a person.

C 10.03 OUTLETS

The Township of Uxbridge standard headwall shall be used for all storm sewers up to 1,800 mm. For sewers over 1,800 mm. in diameter, the headwalls shall be individually designed. All headwalls shall be equipped with a grating over the outlet end of the pipe and a railing across the top of the headwall for the protection of the public.

All outlets shall blend in the direction of flow of the watercourse with the directional change being taken up in the sewer rather than the channel.
Storm sewer outfalls shall not be connected to existing or proposed road crossing culverts. Storm sewer outfalls must be terminated at separate headwall structures, adjacent to the outlet side of road crossing culverts.

Gabions, rip-rap, concrete or other erosion protection shall be provided at all outlets to prevent erosion of the watercourse and to the area adjacent to the headwall. The extent of the erosion protection shall be indicated on the engineering drawings and shall be dependent upon the velocity of the flow in the storm sewer outlet, the soil conditions, the flow in the existing watercourse and site conditions.

C 10.04 OPEN CHANNELS

The proposed criteria for an open channel design shall be submitted to the Township Engineer for his approval, by the Consulting Engineer, prior to the actual design being undertaken. The Consulting Engineer shall also be responsible for obtaining the approval of the design from the Ministry of Natural Resources, the Ministry of the Environment and the local Conservation Authority, if the open channel concept is favourably considered.

The minimum side slopes of channels shall be three in the horizontal plane to one in the vertical plane. The designer shall provide for dry weather flow in the design of open channels. The maximum velocity for sod lined channels shall be 1.25 m/s and for concrete lined channels shall be 2.5 m/s, for the 100 year or Regional Storm flow.

Open channels shall only be considered at the discretion of the Township Engineer when the design flow exceeds 14.0 C.M.S.

C 11.00 GABION BASKETS AND FILTER FABRIC

C 11.01 GABION BASKETS

Gabion material shall be constructed in accordance with current OPSD standards.

C 11.02 FILTER FABRIC

Where specified, "Terrafix-Type 270R" or "Textual 7612" or approved equal filter material shall be placed on the back side of the gabions strictly in conformance with the lines and dimensions shown on the engineering drawings.

The fabric shall be laid against the gabion baskets, fully extended but without tension and shall be held against the gabion baskets so that no displacement will occur during backfilling. Care must be taken during installation to prevent puncture or tearing of the fabric. The successive filter fabric mats shall have an overlap of 200 mm minimum.

The filter fabric must meet the requirements of Class II, OPSS 1860.07.02.

C 12.00 CONSTRUCTION

Construction of all storm sewers and appurtenances shall be in accordance with the specifications and Standard Detail Drawings of the Township of Uxbridge at the time of approval of the design drawings by the Township Engineer.

SECTION D - STORM DRAIN CONNECTIONS

D 1.00 SINGLE FAMILY AND SEMI-DETACHED LOTS

D 1.01 GENERAL

The installation of a sewer service connection to serve more than one building (ie. double service) will not be permitted. Semi-detached units will require separate sewer laterals for each side. Storm drain connections must be provided on all estate subdivisions which have storm sewer systems.

D 1.02 CONNECTION SIZE AND GRADE

The minimum size for storm drain connections shall be 150 mm installed at a minimum grade of 2% from the storm sewer to the building envelope.

D 1.03 DEPTH OF CONNECTION

The storm drain connection shall be installed to a sufficient depth to provide for the drainage of the weeping tile around the foundation of the house in accordance with the standard detail drawings.

Concrete or PVC risers shall be used on all drain connections when the depth to invert of the storm sewer exceeds 4.5 m. The riser shall be constructed as shown on the Township of Uxbridge Standard Drawings.

D 1.04 CONNECTION TO THE STORM SEWER

The connection of the storm drain to the storm sewer shall be made by means of a manufactured tee on the storm sewer line for storm sewer sizes up to and including 450 mm. and by means of a saddle for storm sewer sizes in excess of 450 mm. As an alternate ,"Kor-N-Tee" connectors may be used for 150 mm. and 200 mm. diameter storm drain connections.

D 1.05 STORM DRAIN MATERIALS

Storm drain connections shall be constructed of non-reinforced concrete pipe or polyvinyl chloride (SDR 28) pipe. PVC pipe to be white in colour.

D 1.06 LOCATION

Storm drain connections shall be installed to the location as shown on the Township of Uxbridge Standard Drawings.

After construction, the end of the connection shall be marked by a suitable length of 50 mm. x 100 mm. lumber extending from the obvert of the connection to a point 0.9 m. above grade. The top of this marker shall be painted green.

Storm drain connections shall be installed to the end of the connection and shall be fitted with a manufactured watertight plug.

D 2.00 LANDS DEVELOPED UNDER SITE PLAN CONTROL

D 2.01 GENERAL

All blocks of land within the plan of subdivision, shall have a storm drain installed from the storm sewer to the street limit.

D 2.02 CONNECTION SIZE

The storm drain connection to all multi-family and other blocks shall be sized individually according to the intended use of the lands and in accordance with the requirements of Section C.

D 2.03 DEPTH OF CONNECTION

The depth of the storm drain connection shall be governed by the grading of lands and the extent of the area to be served. The depth of the connection shall be sufficient to provide for drainage of all lands within the block, but in no case shall the depth to the top of the pipe be less than 1.5 metres.

D 2.04 CONNECTION TO MAIN SEWER

The connection of the storm drain to the storm sewer may be made at a manhole or directly to the storm sewer if the size of the connection is less than half of the size of the storm sewer. If the connection size is greater than one half the size of the main sewer, the connection must be made to a manhole on the storm sewer. If the connection is made directly to the storm sewer pipe, then a manhole must be installed on the private lands within 1.5 m. of the street limit.

D 2.05 STORM DRAIN MATERIALS

Concrete pipe shall be used for a storm drain connection to all blocks in the class as required by design. Class of pipe to conform to OPSS Section 1820.07.01.

D 2.06 LOCATION AND TIMING OF CONSTRUCTION

Since the ultimate development of the block may be unknown at the time of the construction of the underground services, it may be desirable to delay the installation of the storm drain connections to the blocks in the plan of subdivision until further information is available.

If the block is developed prior to the placement of the surface course asphalt, then the service connection can be installed to the location required to suit the development. If no development proposals are received for the block at the time of the placement of the surface course asphalt, then the storm drain connections shall be installed to the locations shown on the approved engineering drawings prior to the placing of the surface course asphalt.

In either case, all trenches crossing the travelled portion of the roadway shall be backfilled with granular material thoroughly compacted and the road base shall be restored.

D 3.00 BEDDING FOR STORM DRAIN CONNECTIONS

All storm drain connections shall be installed using Type "2" bedding as shown on the Township of Uxbridge Standard Drawings.

D 4.00 CONSTRUCTION

All storm drain connections shall be constructed in accordance with the standards and specifications of the Township of Uxbridge, current at the time of approval of the engineering drawings by the Township Engineer.

SECTION E - LOT GRADING

E 1.00 GENERAL

The grading of all lots and blocks in new development must be carefully monitored by the Consulting Engineer in order to provide sites that are suitable for the erection of buildings and to provide satisfactory drainage from all lands within the development. In this regard, the design of the grading for all developments will be of primary concern to the municipality and the following criteria shall be used in the preparation of all lot grading plans for new developments in the Township of Uxbridge.

E 2.00 LOT GRADING PLAN

E 2.01 Drawing Size: (594 x 841 mm.) AI

E 2.02 Scale: 1:500 for single-family or semi-detached areas and 1:200 for multi-family areas.

E 2.03 All lots and blocks within the subdivision are to be shown and are to be numbered in accordance with the plan proposed for registration.

E 2.04 Existing contours are to be shown at maximum 0.5 m. intervals within the subdivision limits and 15 metres beyond the subdivision limits.

E 2.05 Proposed centreline road elevations are to be shown at 20 m. stations along all roads within and abutting the subdivision. Elevations are to be shown for the 20 m. stations in accordance with the chainage on the profile drawings. In addition, centreline road elevations shall be shown opposite all lot corners.

E 2.06 Proposed elevations are to be shown for all lot corners and intermediate points of grade change. On large blocks, a proposed elevation is to be shown at 15 m. intervals along the frontage of the block and at reasonable intervals along the sides and rear of the block to clearly illustrate the grading of the block in relation to the surrounding lands and house types.

E 2.07 The specified lot grade shall be shown at a location 7.62 m. from the street line. For "split" type drainage patterns, the specified rear of house grade shall be shown. The specified minimum basement floor elevation for each lot shall also be shown.

E 2.08 The direction of the surface water run-off from the rear of all the lots shall be indicated by means of an arrow pointing in the direction of the run-off.

E 2.09 All swales, other than the normal side yard swales, are to be shown along with the invert elevation of the swale at regular intervals (ie. centreline of each lot for rear yard swales).

E 2.10 All rear yard catchbasins shall be shown along with the rim elevation of the catchbasin and the invert elevation of the outlet pipe.

E 2.11 All terracing required shall be shown with the intermediate grades specified.

E 2.12 All lot surfaces shall be constructed to a maximum lot grade of 12% (calculated from the difference in lot elevations between the rear wall of the house and property line - embankments included).

E 2.13 Existing elevations are to be shown on adjacent lands approximately 15 metres, or greater if required, from the subdivision limit to enable assessment of the grading between the subdivision and the adjacent areas. The interval of those elevations shall be dependent upon the degree of development of the adjoining lands with the developed areas requiring the most information. The Lot

Grading Plan must provide for drainage problems on adjacent property which can only be solved by permitting drainage through the subdivision.

E 2.14 The lot grading plan shall make note of the Township of Uxbridge Standard Drawings that are applicable to the grading of the development. The Township reserves the right to refuse any house type which is incompatible with the lot grading design specified for a lot.

E 2.15 The lot grading plan shall note all existing slopes that are to be left in an undisturbed state. Temporary fencing shall be required along the top of these slopes to prevent disturbance to the existing vegetation.

E 2.16 A 0.6 metre strip shall be left undisturbed along the boundary of the subdivision next to adjacent properties unless grading is required to eliminate drainage problems on adjacent properties. Such grading must be stipulated on the approved Lot Grading Plan.

E 2.17 Lot drainage is to be self-contained within the subdivision limits, where possible.

E 2.18 The lot grading plan shall show proposed locations for building envelopes and envelopes for private sewage disposal systems.

E 2.19 The lot grading plan shall show all proposed easements for registration.

E 3.00 LOT GRADING DESIGN

E 3.01 The specified lot grade shall be calculated in accordance with the Lot Grading Detail Sections included in the Township of Uxbridge Standard Drawings.

E 3.02 The front yards of all lots shall be graded to drain towards the street.

E 3.03 All boulevard areas shall be graded with a constant slope from the curb to the street limit (minimum slope to be 2%, maximum slope to be 5%) and all water boxes, manhole covers, valve boxes, etc. shall be set flush with the finished sod surface.

E 3.04 Driveways shall not be used as outlets for any swales.

E 3.05 All rear yard drainage shall be directed away from the houses in defined swales which outlet at the curb, sidewalk or a catchbasin. Overland flow routes must be provided for all rear yard catchbasins.

E 3.06 The drainage from all the lands within the subdivision limit is to be provided for internally with drainage over abutting lands being permitted only in exceptional cases at the discretion of the Township Engineer.

E 3.07 The grading along the limit of the subdivision shall be carefully controlled to avoid disturbance to the adjoining areas. In general, lot drainage should be directed away from top of banks or valley slopes.

E 3.08 The lot grading design shall provide for drainage problems on adjacent property that can be best resolved by permitting drainage through the subdivision.

E 3.09 All lot surfaces shall be constructed to a minimum grade of 2.0%.

E 3.10 All lot surfaces shall be constructed to a maximum lot grade of 12% (calculated from the difference in lot elevations between the rear wall of the house and property line - embankments included).

E 3.11 Maximum slope between all terraces and embankments shall be 3:1 when the vertical difference does not exceed 1 metre and 4:1 when the vertical differences

exceeds 1 metre. Between successive terraces, an intermediate level area of at least 1.50 metres in width must be provided.

E 3.12 The lot grading design shall provide for the temporary drainage of all blocks of land within the subdivision that are intended for future development under site plan agreements.

E 3.13 The maximum flow allowable to any side yard swale shall be that from 0.5 hectares.

E 3.14 The maximum area contributing to a rear yard swale that may be discharged directly onto a road allowance shall be that of 0.50 hectares.

E 3.15 The maximum length of a rear yard swale between outlets shall be 60 metres.

E 3.16 Swales providing internal drainage from each lot shall have a minimum slope of 2.0%.

E 3.17 Minimum depth of any swale to be 250 mm.

E 3.18 Maximum depth for a rear yard swale to be 750 mm.

E 3.19 Maximum depth for a side yard swale to be 450 mm.

E 3.20 Maximum side slope on any swale shall be 3:1.

E 3.21 All drainage swales shall be located on the high side of the common lot line (low side of lot) between adjacent lots and not along the lot line.

E 3.22 Rear yard catchbasins and outlet pipes shall be located such that the outlet and the catchbasin are located entirely on the same lot. The catchbasin leads shall be concrete encased within the limits of the adjacent building envelopes. The foundation walls of the adjacent buildings must be set to allow for the future replacement of the catchbasin leads.

E 3.23 Rear lot catchbasins shall only be utilized where an overland route for the catchbasin exist prior to water encroaching on any building envelope.

E 3.24 Driveway grades on private property shall be designed and constructed in accordance with Section B 8.02. Driveway locations shall not extend beyond lot line projections within the right-of-way.

E 3.25 Wherever possible, the use of retaining walls is discouraged in new developments. Where retaining walls are required as a result of no other viable alternatives, no retaining wall shall exceed 1.0m in height where it is located within a front or exterior side yard or adjacent to public lands or roadways. Retaining walls must be constructed of textured concrete utilizing earth tone colours or natural limestone or granite blocks, subject to the Township's approval. No retaining wall shall be constructed using wood. A retaining wall may be stepped such that no face of the wall exceeds 1.0m in height provided that there is a 1.0m planting strip between any section of a retaining wall and these lands are used exclusively for landscaping materials that will visually buffer the wall. Prior to construction of retaining walls, the Owner shall prepare and submit six (6) sets of shop drawings, stamped by a professional engineer, to the Township of Uxbridge for review.

E 4.00 TOPSOIL AND SOD PLACEMENT

E 4.01 All disturbed areas of an estate residential lot shall be rough graded, and fine graded. All lots shall have 150mm topsoil and nursery sod placed on the front yard and side yard to the extent of 25m behind each dwelling. At corner lots there shall be 150mm topsoil and nursery sod placed on the sideyard adjacent to the flankage street for the full length of the flankage, from the street line to

the projection of the side wall of the dwelling structure. All remaining disturbed areas shall receive 200mm topsoil and seed. If existing groundcover is to remain on any portion of the lot, the proposed area must be identified on the approved grading plans. Biodegradable erosion control matting shall be placed on all swales and slopes on seeded areas.

E 4.02 All areas of an urban residential lot shall be rough graded, and fine graded and covered with 150mm topsoil and nursery sod.

E 4.03 Testing of the topsoil by a certified laboratory for organic matter and fertilizer recommendations shall be completed for all imported topsoil prior to placement of the topsoil. The recommendations of the testing shall be followed.

E 5.00 CERTIFICATION

E 5.01 Prior to application for a building permit, individual lot grading plans for each lot shall be prepared and shall be submitted to the Developer's Consulting Engineer for approval. These lot grading plans shall include the following:

1. Lot description including Registered Plan Number.
2. Dimensioned property limits and house location.
3. House type; normal, side split, back split, etc.
4. Finished first floor elevation.
5. Finished garage floor elevation.
6. Finished and original grades over septic tile beds.
7. Finished basement floor elevation.
8. Elevation of underside and top of footings.
9. Top of foundation wall (all locations).
10. Existing and proposed lot elevations.
11. Existing trees to be maintained.
12. Driveway locations, widths and proposed grades.
13. Location of house entrances.
14. Location of rainwater downspouts.
15. Location of walkways.
16. Arrows indicating the direction of all surface drainage and swales.
17. Location and elevation of swales.
18. Location of patios, decks and/or porches.
19. Location of terraces, retaining walls and tree wells.
20. Location and dimensions of all easements.
21. All yard catchbasins with rim elevations.
22. Curb cut locations and dimensions.
23. Hydrants, luminaire poles, bell and cable TV pedestals, hydro transformers and point of supply for Hydro service.
24. Location and type of any private sewage disposal system and reserve areas and private wells.
25. Durham Region Health Unit Certificate of Approval placed on individual plans for private sewage disposal systems.
26. Location of all road features along frontage and flankage of lots (curb lines, catchbasins, sidewalks, etc.).
27. Lot grading certificate by Developer's Engineer in accordance with the Subdivision Agreement requirements.

After approval and certification by the Developer's Consulting Engineer, the lot grading plans shall be forwarded to the Township Engineer.

E 5.02 Prior to the release of any lot from the conditions of the Subdivision Agreement, the Developer's Consulting Engineer shall provide certification to the Township of Uxbridge that the grading and drainage of the lot is in accordance with the approved lot grading and drainage plans. The Developer's Consulting Engineer shall also submit lot grading certificates to the Township of Uxbridge.

If the grading differs from the approved lot grading plan, the Consulting Engineer shall provide details of the variance from the approved plans and shall include his recommendations for rectification of the area if required.

'As-Built' Lot Grading Plans for each lot shall be submitted to the Township Engineer by the Developer's Consulting Engineer, prior to issuance of a 'Final Occupancy Certificate'. 'As-Built' Lot Grading Plans shall include all requirements identified under Section E 4.01.

E 6.00 AREA ROUGH GRADING PLAN

E 6.01 GENERAL

Where earth cuts and fills in excess of 400mm is required within the lots and blocks of the new development, area rough grading must be performed prior to road construction.

E 6.02 DRAWING REQUIREMENTS

Drawing Size: (594 x 841 mm.) Al

Scale: 1:1,000 for single-family (Rural)
1:500 for single-family (Urban)
1:200 for multi-family areas.

All lots and blocks within the subdivision are to be shown and are to be numbered in accordance with the plan proposed for registration.

Existing contours are to be shown at maximum 0.5 m. intervals.

The area rough grading plan must identify all areas where the depth of fill sections and cut sections are in excess of 400 mm. Self adhesive films shall be permitted on the plan to identify these areas.

E 6.03 CONSTRUCTION REQUIREMENTS

As rough grading proceeds, the Developer must immediately enforce an erosion control program by applying a seed and mulch mixture to the area of concern, to the satisfaction of the Township Engineer.

The Developer and his Engineer shall control the placement of imported fill material on registered lots where private sewage disposal systems are required. Imported fill material placed on Registered lots must meet or exceed the original ground's capability to support a private sewage disposal system as required by the appropriate Health Unit.

SECTION F - SIGNS

F 1.00 PLAN

The proposed location and type of all street name and traffic control signs shall be shown on Plan and Profile Drawings.

F 2.00 STREET NAME SIGNS

F 2.01 LOCATION

Street name signs shall be placed at each intersection and shall identify each street at the intersection. The location of the street name signs are shown in the Township of Uxbridge Standard Drawing.

F 2.02 TYPE

The street name signs shall display the same Message on each side of the sign. Sign Messages shall be white lettering on a green background; both lettering and background to be fabricated from Scotchlite reflective sheeting, High Intensity Grade as manufactured by 3M Canada Limited and have a durability rating of 10 years. Lettering shall be fabricated from 2270 Silver Sheeting; PRA Series C. Lettering for names of streets shall be upper case, 100 mm in height. Lettering for; street, boulevard, crescent, trail, avenue, land, etc., shall be upper case, 50 mm in height. The street name sign blades shall be extruded aluminum manufactured from 50S T6C aluminum alloy. The blades shall have a width of 2.3 mm. and a length of 610 to 915 mm. Correct spacing must be adhered to in order that the message will appear aesthetically correct. Street name signs shall be fitted on top of a 100 mm. by 100 mm. pressure treated post with the "stop sign" as shown on the Standard Detail Drawing.

F 2.03 ERECTION

Street name signs must be erected by the Developer at the completion of the base course asphalt road construction and prior to issuance of building permits. Signs must be maintained by the Developer until "Final Acceptance" by the Township of Uxbridge.

F 3.00 TRAFFIC CONTROL AND ADVISORY SIGNS

F 3.01 LOCATION

Traffic control and advisory signs shall be located as shown on the Township of Uxbridge Standard Drawings. In cases where the positioning of the signs is not covered by the standard drawings, the location must be in conformance with the Manual of Uniform Traffic Control Devices for Ontario or the Highway Traffic Act Regulations for Ontario.

All signs shall be mounted approximately at right angles to the direction of and facing the traffic that they are intended to serve. On curved alignments the angle of placement should be determined by the course of the approaching traffic rather than by the roadway edge at the point where the sign is located. Signs for different purposes should not be placed closer together than 30 m.

F 3.02 TYPE

All traffic control and advisory signs shall conform to the current revised standards of the Manual of Uniform Traffic Control Devices for Ontario.

Dead end street barricades shall be constructed in accordance with Township of Uxbridge Standard Drawing US-240.

F 3.03 ERECTION

Regulatory signs shall be mounted on hot dipped galvanized steel cold rolled "U" channel (80,000 P.S.I.) posts 3.65 m. in length. Channel posts shall have a minimum thickness of 5 mm and a minimum width of 62 mm. The posts shall be pre-punched with a minimum of 24 holes at 50 mm centres compatible with standard bolt hole arrangements for regulatory signs. Stop signs shall be placed on a 100 mm. by 100 mm. pressure treated post with street name signs as shown on the Standard Detail Drawing.

Traffic control signs must be erected by the Developer at the completion of the base course asphalt road construction and prior to issuance of Building Permits. Signs must be maintained by the Developer until "Final Acceptance" by the Township of Uxbridge.

Upon completion of base course asphalt, the Developer shall place signage at each point of ingress/egress to the subdivision stating the following:

THIS ROAD
UNASSUMED
BY THE
TOWNSHIP OF
UXBRIDGE
USE AT
OWN RISK

Each sign shall be 450 mm. wide by 600 mm. high with black letters on yellow background, mounted on "U" channel posts, 3.65 metres in height.

SECTION G – TREE/SHRUB PLANTING

G 1.00 RESPONSIBILITY

The Developer is responsible to plant trees along all road allowances in and abutting the development in accordance with the specifications established pursuant to the Subdivision Agreement, Site Plan, Condominium Agreement or any other applicable regulation. Proposed tree locations on Regional Roads must be confirmed with the Regional Municipality of Durham.

When considering plant species selection and planting methods, a landscape architect shall be consulted. Native species are the preferred plantings. Non-native plant species shall be permitted only with the approval of the Township. A list of acceptable shrub species and a list of acceptable tree species for street trees and site plans are included in this document. These lists are guidelines and subject to change at the discretion of the Township.

G 2.00 LOCATIONS

Trees shall be located such that development of the species' natural mature form will not conflict with public safety, visibility, essential street functions, services and utilities. Species selection shall consider the site conditions relative to expected growth and longevity of tree species.

G 2.01 STREET TREES:

Trees shall be planted within the road allowance to the satisfaction of the Township Engineer.

- At least one tree shall be planted in front of each semi-detached and single-detached dwelling unit and at 15m maximum intervals adjacent to all multiple-family lots, blocks and parklands.
- Where the lot frontage exceeds 25 metres, a second tree per lot shall be planted.
- Trees shall be placed along the flankage of all lots at the same spacing interval required for the frontages. A minimum of two trees shall be placed along the side of each corner lot.
- Along industrial roads, trees shall be planted at a maximum interval of 25m.
- Along commercial frontage, trees shall be spaced at a maximum interval of 15m.
- Spacing shall take into consideration mature canopy spread of species and trees shall not be spaced any closer than 8m.

G 2.02 BUFFER PLANTING:

Buffer planting shall be installed in order to provide screening for all lands abutting collector and arterial roads where 0.3m reserves are provided.

- The screening shall be placed on the road allowance and may include the 0.3m. reserve.

G 2.03 SPATIAL CONSIDERATIONS:

All tree and planting bed locations shall be staked out and approved by the Township Engineer prior to excavation. The location of the trees and planting areas shown on the design drawings may require adjustment due to site conditions and utilities. Trees shall not be planted directly above or below utilities or services.

- Trees shall not be planted in spaces with a surface area less than 1.5m x 3m. Spaces with this minimum soil volume should be planted with smaller stature tree species.
- Root zones may be extended under hard surfaces using techniques such as structural soil, cells, continuous planting trenches or permeable

paving. Structural soil shall not be used as the planting medium in a tree pit.

- Where possible, trees shall be planted at least 1.5m from curbs, sidewalks, driveways and other hard surfaces to buffer from road salt, plowing, vehicle overhang and compacted soils.
- Trees shall be set back a minimum of 15m from stop signs, traffic signal lights and intersections, or in accordance with site triangle requirements.

- Trees shall be set back a minimum of 5m from light poles and 1.5m from fire hydrants.

G 3.00 QUALITY AND SOURCE

All plant material shall conform to the current edition of the Canadian Nursery and Landscape Association; Canadian Standards for Nursery Stock. The Authority has the right to reject any and all plant material. Plant material shall be from a source within the same hardiness zone of the planting site and consider microclimate and soil conditions. Native species are the preferred plantings. Non-native plant species shall be permitted only with the approval of the Township.

Health: All plant material shall be free of disease, insect infestation, rodent damage, sun scald, frost cracks and other abrasions or scars to the bark. They shall be densely foliated when in leaf and have healthy, well developed root systems.
Size: The minimum acceptable tree caliper is 50mm measured at 15cm above the stem flare. Deciduous trees shall be minimum 4m in height. Coniferous trees shall be a minimum of 2m in height.
Form: Scaffold branches must be well established, a single main leader must be intact, growth over the past three years must be well developed, stem must be single unless specified to be otherwise.
Root Ball: All trees must be dug with a tree spade and have an appropriately sized rootball. Roots shall be balled and burlapped or in a wire basket. Balls with nylon rope will not be accepted unless nylon is completely removed from the tree pit. Proper planting depth must be ensured. Upper-most structural roots should be within 2.5-7.5cm of the soil surface, measured 10cm from the trunk. Ideally, the structural roots will be visible at the point where they emerge from the trunk.
Warranty: All trees must be guaranteed for a minimum of two growing seasons after acceptance.

G 4.00 TIMING

Plant trees, shrubs and perennials only during periods that are conducive to such work as determined by local weather conditions, when seasonal conditions are likely to ensure successful adaptation of plants to their new location. The ideal time to plant trees and shrubs is during the dormant season in the fall after leaf drop or early spring before bud break in unfrozen soil. Cool weather conditions allow plants to establish roots in the new location before spring rains and summer heat stimulate new top growth. When properly cared for during transport to prevent damage and with adequate maintenance and watering through establishment, trees can be planted throughout the growing season. Certain species adapt better to spring transplanting such as oak (Quercus spp.)

G 5.00 INSTALLATION

Tree Preparation: All material used for containing and transporting plants must be removed from the top 2/3 of the rootball and collar and disposed of off site. Only broken, damaged or crossing branches are to be pruned.

Planting Pit: Tree pits are to be dug as large as possible in restricted planting areas (between curb and sidewalk) and at a minimum of two times the rootball diameter in good parent soil conditions. The depth of the tree pit shall be the

same depth as the root ball with compacted or undisturbed soil beneath. In poorly drained soils, the top of the root ball shall sit 50 mm above finished grade. Trees must be planted so that their natural root flare is flush with finished grade. Shrub beds shall be excavated to a minimum of 450mm and perennial beds shall be excavated to a minimum of 300mm.

Drainage: Planting pit shall be tested for adequate drainage to prevent suffocation of roots. Drainage channels can be used to discharge water from poorly drained planting holes.

Soil and Soil Amendments: On sites with high-quality soil, the backfill does not require amending. Amendments should be considered on sites with poor quality soil to improve structure, water-holding capacity, or drainage. Discontinuity of soil properties between amended backfill and site soil may inhibit root penetration. For simple amendment, mix the parent soil with composted organic matter (20-30% by volume). A qualified soil scientist should be consulted for more complex amendment. Soil should be tested for pH and nutrient content for each project site.

Support Systems: Staking, guying and bracing are methods for mechanically supporting the trunk of a planted tree to keep it in an upright position. Stakes shall be fabricated of wood or re-useable material. Stakes must be free of sharp edges and slivers. Stakes shall not be driven through the root ball. Tree ties shall be a minimum of 25mm wide, shall remain pliable under all weather conditions and be of a material that will not damage the bark. To prevent injury to the bark, the guying should be examined at least once during the growing season. In most cases, supports should be removed after one year to avoid trunk girdling. Tree shall be stable prior to removal of support system.

Mulch: All planting areas shall be mulched with shredded bark mulch with no piece larger than 25mm in length to a minimum depth of 100mm. Mulch shall be kept 75mm away from the trunk.

Stem Protection: For species where sunscald or frost cracks are common, wraps that are light in colour and biodegradable may be used. Trunk wrap shall be applied from the bottom to the top so that layers overlap and shed water. Trunk wrap shall be applied in the late fall and removed in early spring. White plastic guards can be used for protection against damage from sun, maintenance equipment and animals. Tree guards must be removed before restricting or girdling the trunk.

Watering: All trees must be watered at the time of planting to ensure good soil to root contact and to prevent air gaps. Through warm summer months during the first two growing seasons, tree pits should be watered every week in sufficient amounts to moisten the entire root system without overwatering. Approximately 5-10 gallons of water will moisten a 25-50cm diameter root ball from a dry condition. 10-20 gallon drip bags are available to be placed at the base of the tree and release water over several hours. Moisture should be monitored to avoid overwatering or under-watering.

Fertilizer: Adding fertilizer to newly planted trees that have been subjected to transplanting and drought stress may be disadvantageous. A soil nutrient analysis should be conducted before planting to determine specific soil deficiencies and fertilizer recommendations. If transplanted trees are fertilized, only slow-release fertilizer with ≥50 % water-insoluble nitrogen should be used.

Establishment Maintenance: Trees are to be maintained throughout the 2 growing season warranty period. This includes the tree, mulch, and staking. All replacements shall be as originally specified and be guaranteed for an additional growing season. The Township Engineer may extend the guarantee for an additional year if at the end of the warranty period the tree in question is not in acceptable condition.

G 6.00 STORMWATER MANAGEMENT POND PLANTING

All tree/shrub planting shall be in accordance with Appendix E of the MOE Stormwater Management Planning and Design Manual, dated March 2003 or latest edition.

G 7.00 TREE SPECIES

The species of trees to be planted shall be selected from trees hardy to the Uxbridge area and tolerant of individual site conditions. Species susceptible to disease or are marginal for the Township's hardiness zone should be spaced with alternate varieties.

The species of trees and the percentages of each species to be used in each development shall be submitted and approved in writing by the Township Engineer prior to the commencement of the planting program. Species diversity is required to provide a built-in resistance to insect and disease problems. Refer to acceptable species list (Appendix A). The Township of Uxbridge reserves the right to alter the list at any time.

SECTION H - DEVELOPMENT OF OPEN SPACE

H 1.00 GENERAL REQUIREMENTS

This section is intended to cover the requirements of the Township of Uxbridge for the development of dedicated open space, which may include parks, trails, bicycle paths, walkways or other recreational lands dedicated or otherwise deeded to the Township by the Developer.

The Developer shall retain a Landscape Architect or Designer who is a member in good standing of any or all of the following organizations:

Ontario Association of Landscape Architects
Canadian Society of Landscape Architects
American Society of Landscape Architects

The architect will be engaged to design and prepare all plans and drawings required to enable the proper development of open space lands.

Where public open space is located adjacent to one or more school sites, the Landscape Architect, at the Developer's expense, shall meet with representatives of the Township and officials of the appropriate Board(s) of Education to develop a comprehensive site landscape plan acceptable to all parties concerned.

The Landscape Architect shall prepare the site landscape plan and all related drawings for each site and submit same for written approval of the Township before conditions can be incorporated into the Subdivision Agreement.

Such plans shall show all existing trees and features that are in conformity with the end use of the open space that are to remain. All dead trees and other features not in conformity to the end use of the open space shall be removed by the Developer.

The plans shall form part of the approved Engineering Drawings.

H 2.00 BASIC PARK DEVELOPMENT

The Developer is required to provide and carry out the following items at no cost to the Township of Uxbridge, a “basic” park development in accordance with the approved plans, drawings and specifications. A “basic” park development is defined as follows:

a) to undertake, amongst other matters, the rough grading, fine grading, topsoiling, walkways, sodding or seeding and the installation of perimeter fencing and drainage facilities in new parkland.

Parks shall be fine graded in accordance with the approved grading plan with particular care being taken to avoid damage to those trees or features that are to remain. All graded areas shall be covered with a minimum of 200mm of approved topsoil and shall be seeded and fertilized in accordance with the specifications of the Township. The seed mixture proposed shall be approved by the Township prior to placement. All park blocks less than 0.4 ha. in size shall be sodded on 200mm of topsoil. All stones and debris shall be removed and disposed of by the Developer prior to the seeding or sodding of any park.

Where required by the Township of Uxbridge, underground primary or secondary electrical cables shall be placed from the road allowance to designated locations within the open space.

Water service connection and sanitary and storm sewer lateral connections to the street line for open space, if required by the Township of Uxbridge.

Metering requirements for water service connections shall be confirmed with the Regional Municipality of Durham.

In the absence of municipal services, an acceptable water supply complete with well and all required plumbing fixtures shall be provided by the Developer.

Identification sign for each park site entrance, according to Township standards for such signs shall be shown on the plans. Head of Trail signs shall be placed at all trail entrance locations. The signs will be manufactured by the Township and the costs billed to the Developer. In general, park entrances shall be provided from a cul-de-sac.

The Developer shall show, on the basic park development plans, waste receptacles at locations approved by the Township of Uxbridge. The waste receptacles shall be specified as double-compartment Hide-A-Bag units to allow for separate storage of waste and recyclables. The waste receptacles shall be bought and installed by the Township and all costs charged to the Developer.

The Developer shall provide for paved walkways unless approved, as required by the Township of Uxbridge, within the Development and to connect to existing walkway systems.

The paved walkway shall be in accordance with the Township of Uxbridge standard drawings.

The preferred maximum grade for all walkways shall be 5.0%. Where the maximum grade for the walkway is not able to be maintained, the following maximum grades shall be permissable over short intervals.

a) 8.3% for a maximum distance of 61.0m
b) 10.0% for a maximum distance of 9.1m
c) 12.5% for a maximum distance of 3.0m.

Under certain conditions the Township may allow Limestone walkways as per the standard drawings . The maximum grade for a limestone walkway is 5.0%, anything above 5.0% must be paved.

H 3.00 FINISHED PARK DEVELOPMENT

The Township of Uxbridge shall determine the requirements in providing a “finished” park development. A “finished” park development is defined as follows:

- to undertake, amongst other matters, the installation of the following types of features:

    a) playground equipment
    b) equipment for playing fields (i.e. lighting, backstops, home run fencing, soccer goal posts);
    c) walkways, benches & landscaping; and
    d) parking areas

H 4.00 PLANS

Upon receipt of written approval from the Township on the preliminary site concept and all detail drawings, the Developer’s Consultant shall prepare final drawings and detail plans of all component requirements as stipulated in Section H 2.00 for final written approval by the Township.

The Consultant shall prepare and submit the following plans on mylar on a scale of 1:500.

- Site Design Concept.

- Grading Plan.

- Detailed drawings for water supply.

- Detailed drawings on location of underground utilities or services within the site(s).

- Detailed drawings for retaining wall structures.

- Detailed drawings for any other components required as a condition of subdivision approval.

In addition to the foregoing, the Township shall be supplied with one coloured print of the Site Design Concept, one Site Design Concept in mylar, reduced to 8 1/2" X 11" and three prints of all mylar drawings.

H 5.00 TIMING OF CONSTRUCTION

Parkland in subdivisions will be developed to the "basic" park development stage by the Developer within one (1) year of the date of the registration of the first phase of the subdivision. The timing of the development of the park may be altered by the Township of Uxbridge as necessary, depending on such site specific matters as access to the new park, split development, location of the park related to phases being registered, house occupancy levels in the subdivision, timing of registration in respect to growing season or other considerations.

The Developer shall schedule the completion of the "finished" park in subdivisions at approximately the time that ten (10) homes in the plan of subdivision are occupied.

Seeding must be carried out during the desirable months of May, August or September.

H 6.00 MAINTENANCE

The Developer shall be responsible for the maintenance, fertilizing and mowing of open space until "Final Acceptance".

In addition the Developer upon satisfactory completion of all works shall guarantee and maintain the water supply until "Final Acceptance".

Building materials or equipment shall not be stored on open space. No dumping of debris will be permitted over open space.

SECTION I - STREET LIGHTING

I 1.00 GENERAL

All street lighting systems in the Township of Uxbridge shall be 120V. All components of street lighting systems for roadways in the Township of Uxbridge shall be CSA approved and shall meet the requirements of the Ontario Electrical Code and the Electrical Safety Authority (ESA). They shall also meet the requirements of Hydro One or Supply Authority in addition to those listed below.

The Developer shall arrange with Hydro One or Supply Authority for the connection of all lighting systems. The estimated cost of the total installation must be approved by the Township Engineer. The Developer shall provide the local electrical supply authority with easements wherever they are required.

The street lighting system is to consist of two types of lighting standards. Decorative coach type luminaries will be utilized for residential local and minor collector roadways. Cobra head luminaries will be used for industrial subdivision roadways. The entire system must be energized prior to anyone occupying the subdivision.

I 2.0 0 STREET LIGHTING POLES

All street lighting poles in the Township of Uxbridge shall be direct buried class "B" concrete as per the following table 1. All poles will be buried to a minimum depth of 1.5m or as per manufacturers recommendations.

Table 1

Approved CONCRETE POLES (Direct Buried)			
Manufacturer	Type "A" 7.6m (above Grade) Octagonal (Residential Subdivisions)	Type "B" 7.6m (above Grade) Round (Industrial Subdivisions)	Type "C" 9.9m (above Grade) Round (Industrial Subdivisions)
USI	Madison MA-300-B-2-ML-60-F (1.5m Scroll Arm)	Hampton HA-300-B-1-PG-10 (2.4m Elliptical Bracket)	Hampton HA-375-B-1-PG-10 (2.4m Elliptical Bracket)
Stresscrete	Octagonal Class "B" E-300-BPO-G-S11 c/w FC (Blk) (1.5m Scroll Arm)	Round Class "B" E-300-BPR-G-MOO (2.4m Elliptical Bracket)	Round Class "B" E-375-BPR-G-MOO (2.4m Elliptical Bracket)

All communication poles for combination street lighting, Bell and cable installations shall be Stresscrete Alexander Catalogue No. KAH25-T4-G-E11. See Township of Uxbridge Standard Drawings for details.

All street lighting poles shall be supplied c/w an above grade handhole and cover, a ground lug at the handhole and two below grade wiring apertures. See Township of Uxbridge Standard Drawings for details.

I 3.00 CONTROL AND SUPPLY

Street lighting systems shall be controlled by a "Service Entrance" rated disconnect to comply with the current Electrical Safety Authority (ESA)

requirements. The disconnect shall be Square D Model CQO112M100C60 or approved equal. The branch breakers shall be 40A Square D Model QO140HID or approved equal. The enclosure shall be a Pedestal Solutions Inc. pedestal Cat. No. SLS1 (120 volts) or SLS2 (240 volts). Pedestals are to be mounted on a precast concrete foundation as manufactured by Brooklin Concrete Cat. No. BCP 20 PED. Final connection to secondary supply to be completed by local hydro authority or Hydro One at transformer or secondary supply pole.

The Developer shall be responsible for the payment of all fees, electrical consumption charges and costs to be paid to local utility for the energization and operation of the street lighting system, until Formal Acceptance of the subdivision.

In developments supplied by Hydro One, the Municipality shall upon request by the Developer, arrange for Hydro One to energize the lighting system. All ensuing charges shall be paid by the Municipality and billed back to the Developer until "Final Acceptance" of the subdivision.

I 4.00 WIRING

Low voltage single conductor cables for roadway lighting shall be stranded copper conductors with RWU90 cross linked polyethylene insulation rated for 600 volt according to CSA C22.2 No. 38. Insulation colour of "Line" conductors shall be RED and BLACK for a120/240V, 1-phase, 3-wire system and RED for 120V, 1-phase, 2-wire system. Insulation colour of Neutral conductor shall be white. Wire sizes allowed shall be #8, #6, #4 and #2 AWG and shall be sized so as to satisfy a maximum voltage drop of 5% to the branch breaker.

Splices shall be made only in the pole handholes with CSA approved Burndy compression connectors and electrical insulating tape. Electrical insulating tape shall be rates for 600 V and -10E C to 90E working temperature and shall be according to CSA C22.2 No. 197.

Riser wires in lighting poles shall be #12 AWG, stranded copper, type TW90 insulation. Riser wires shall be connected to the lighting circuit wiring in the pole handhole with an in-line fuse holder rated 600V complete with protective boot and 10A type KTK fuse.

The separate system ground wire shall be #6 stranded copper, insulation colour green RWU90 cross linked polyethylene, 600 volt according to CSA C22-2 No. 38. The system ground shall be connected to the ground lug in each pole handhole and to the main ground bus at the supply disconnect.

The disconnect shall be grounded using 2 ground rods. A ground rod shall also be installed at every 5th lighting pole in each circuit as well as the last lighting pole in each circuit. Ground rods to be solid steel, 19mm diameter, 3.0m long, copper clad for full length and shall be according to CSA. C22.2 No. 41. Ground rods shall be driven to a depth of 300mm below finished grade.

The street lighting circuits between poles shall be run in main energy trench in 50mm flexible polyethylene ducts in accordance with CSA B137.1 Series 75. Ducts shall be direct buried with minimum 450mm cover to top of duct.

All road crossings shall be 75mm rigid PVC conduit in accordance with C22.2 No. 211.2. Conduits for road crossings shall be direct buried with minimum 1000mm cover to top of conduit.

I 5.00 STREET LIGHTING LUMINAIRES

All street lighting luminaries shall comply with all applicable requirements of CSA Standard C22.2 No. 9 "Electrical Lighting Fixtures" and CAN/CSA-C22.2 No. 250.13, "Light Emitting Diode (LED) equipment for use in lighting applications".

Type "A" shall be 90 watt LED decorative coachlight type, IES II-M-C or III-M-C c/w 120 volt dimmable driver and photo electric control receptacle as manufactured by:

Philips Lumec – L40U Series Coachlight L40U-STM-90W49LED4K-ES-LE3-120-DMG-RC- BKTX (Photometric file No. S26A-90W49LED4K-ES-LE3.ies)

Type "A" luminaires shall be suitable for mounting on a 1.5m decorative scroll arm as manufactured by USI Style 60, Stresscrete Style 170, Philips Lumec S25AU5 or approved equal.

Type "B" shall be 65 watt LED cobrahead type, IES II-F-C c/w 120 volt dimmable driver and photo electric control receptacle as manufactured by:

Philips Lumec – Roadstar Series GPLS-65W49LED4K-ES-LE2-120-BL-DMG-RC-GY3TX (Photometric file No. GPLS-65W49LED4K-ES-LE2.ies)

Type "C" shall be 130 watt LED cobrahead type, IES II-F-C c/w 120 volt dimmable driver and photo electric control receptacle as manufactured by:

Philips Lumec – Roadstar Series GPLM-130W49LED4K-ES-LE2-120-BL-DMG-RC-GY3TX (Photometric file No. GPLM-130W98LED4K-ES-LE2.ies)

Type "B" and "C" luminaires shall be suitable for mounting on a 2.4m elliptical bracket as manufactured by Utility Supply Specialists TER-8-MA or approved equal.

Each luminaire shall be controlled by a Nema CityTouch Connector Node LV as manufactured by Philips Lumec Cat. No. LLC7260 NEMA CityTouch Connector Node LV (order No. 9137 003 63303. The CityTouch Connector Node LV shall be mounted in the NEMA twist lock connector of the luminaire with the light sensor window pointing north. Each CityTouch Connector Node LV provided shall include luminaire dimming capability.

I 6.00 LIGHTING CRITERIA AND RESTRICTIONS

All lighting design in the Township of Uxbridge shall be based on either luminance criteria or illuminance criteria as set out in the Lighting Handbook of the Illumination Engineering Society of North America (IES).

On straight sections of roadway lighting calculations may be based on luminance criteria (the amount of light reflected from the roadway surface). The following table outlines the recommended luminance criteria.

Table 2

Roadway Classification	Average Luminance Lavg2 (cd/m2)	Uniformity Ratio Lavg2/Lmin	Uniformity Ratio Lmas/Lmin	Veiling Luminance Ratio Lvmax/LPavg
Residential Local	0.3	6.0	10.0	0.4
Industrial Local/Minor Collector	0.4	4.0	8.0	0.4
Major Collector	0.6	3.5	6.0	0.4

Since luminance calculations are only relevant for straight sections of roadway, lighting calculations for curving sections of roadway and at intersections should be undertaken based on illuminance levels (the amount of light falling on the roadway surface). The following table outlines the recommended illuminance criteria:

Table 3

Roadway Classification	Average Illuminance, Eavg (Lux)	Uniformity Ratio Eavg/Emin	Veiling Luminance Ratio Lvmax/LPavg
Residential Local	4.0	6.0:1	0.4
Industrial Local/Minor Collector	6.0	4.0:1	0.4
Major Collector	9.0	4.0:1	0.4

Average illuminance levels at intersections should be equal to the sum of the average levels for the two intersecting roadways. The uniformity of the intersection should be equal to the criteria of the roadway with the highest level.

Where possible, pole locations are to be placed opposite side lot lines. Where super mail boxes are proposed within a plan of subdivision, street lights must be located within 10m of the super mail boxes.

No street lighting poles shall be placed within 3.0m of a transformer.

Staggered arrangements of street lighting poles are acceptable. On curving roadways, street lighting poles are to be placed on outer radii, where possible. The following Table 4 indicates the standard lighting configurations for the various roadway classifications within the Township of Uxbridge.

Table 4

RESIDENTIAL SUBDIVISIONS				
Roadway Type	**Road Width**	**Pole Type**	**Arrangement**	**Luminaire Type**
Local	8.5m	"A" Octagonal	Staggered	Type "A" Decorative c/w Scroll Arm
Minor Collector	10.0m	"A" Octagonal	Staggered	Type "A" Decorative c/w Scroll Arm
INDUSTRIAL SUBDIVISIONS				
Roadway Type	**Road Width**	**Pole Type**	**Arrangement**	**Luminaire Type**
Local	10.0m	"B" Round	Staggered	Type "B" Cobra Head c/w Elliptical Bracket
Major Collector	12.8m	"C" Round	Staggered	Type "C" Cobra Head c/w Elliptical

				Bracket

For the maximum spacing of approved luminaries and poles on straight roadway alignments refer to the Standard Roadway Layouts in the Standard Detail Drawings. The maximum spacing indicated on the drawings in the appendix may be utilized for the approved luminairies and poles. Where the roadway alignment deviates from straight lines, calculations shall be performed to ensure all lighting designs conform to recommended criteria outlined in table 3 and table 4. Lighting calculations indicating conformance shall be submitted if requested by the Township of Uxbridge.

On a case by case basis the Township of Uxbridge will consider allowing the use of LED luminaires which are not listed as approved. In order for an unapproved luminaire to be considered, lighting calculations must be submitted to the Township for review showing a comparison of the proposed luminaires vs. approved luminaires. The calculations must confirm equal or superior luminaire pole spacing, lighting levels and uniformities can be achieved using the proposed luminaire. The IES files from the unapproved luminaire must be third party tested in order to be considered.

SECTION J - LANDS DEVELOPED UNDER SITE PLAN CONTROL

J 1.00 SITE PLAN AGREEMENT

The Developer of lands under Site Plan Control, as specified in the Township's Official Plan and Site Plan Control By-law shall be required to enter into a "Site Plan Agreement" with the Township of Uxbridge prior to the commencement of construction of any building or service within the parcel of land.

J 2.00 REGIONAL MUNICIPALITY OF DURHAM RESPONSIBILITY

The Region of Durham is responsible for all sanitary sewers and watermains that are constructed or proposed for construction on all road allowances, blocks and registered easements within the Township of Uxbridge.

The Region of Durham is also responsible for the collection of revenue for water consumption and therefore the "metering" arrangement for the subject property shall also be approved by the Region of Durham.

J 3.00 TOWNSHIP OF UXBRIDGE REQUIREMENTS

Drawings showing the location, size, grade invert elevations, material and bedding requirements for all storm, sanitary and watermain service connections shall be prepared and submitted to the Township of Uxbridge for approval. Engineering drawings shall also be prepared for all sanitary and storm sewers and watermains that are required to be constructed within road allowances or Registered easements to service the subject property. These drawings are to be prepared to the Township of Uxbridge's requirements.

J 4.00 PROFESSIONAL ENGINEER

The Developer shall retain a qualified Professional Engineer to prepare all engineering drawings and to supervise the construction of all engineering services. The Consulting Engineer shall act as the Developer's representative in all matters pertaining to the design and construction of the services in the development.

J 5.00 ENGINEERING DRAWINGS

J 5.01 REQUIREMENTS

Engineering drawings will be required for each development. These drawings shall be titled as follows:

(a) Site Grading Plan
(b) Site Services Plan
(c) Landscaping Plan
(d) Electrical Services Plan
(e) Drainage Area Plan

Additional engineering drawings shall be prepared where required or when requested by the Township Engineer. Prior to receiving a building permit, all plans must be approved by the Township.

All storm drainage facilities proposed must be constructed before receiving a Building Permit.

All engineering drawings shall be prepared from one base plan prepared at a minimum scale of 1:200 and shall contain the following information:

(a) a key plan at a scale of 1:10,000 showing the site location
(b) a north arrow

(c) the street names, lot and Registered Plan numbers, and property dimensions
(d) the outline of all buildings with the building numbers and unit numbers indicated and garage locations within the unit
(e) the roadway and driveways
(f) adjacent lands
(g) existing land features (trees, watermains, etc.)
(h) the reference bench mark (geodetic) used to establish vertical control and the site bench marks to be used for construction.

J 5.02 SITE GRADING PLAN

The site grading plan shall show the following information:

(a) centreline grades at 15 m. intervals along all existing streets bounding the property and existing grades
(b) a legend indicating which are existing and proposed elevations
(c) contours at maximum 0.5 m. intervals to indicate the existing elevations of the site. These contours are to extend to a minimum distance of 15 m. beyond the property limits to indicate the grading and drainage patterns of the adjacent lands. As an alternate to contours, spot elevations may be noted on the drawings to illustrate existing grade conditions providing that these elevations were obtained from field survey on a regular grid pattern with the interval not to exceed 15 metres.
(d) cross sections as required to clarify the proposed grading, particularly in relation to adjacent lands
(e) proposed elevations on paved areas, around proposed buildings, along swales, along roadways, parking areas, driveways, catchbasin rim elevations, and any other elevations necessary to establish the grading and drainage patterns for the development. Arrows to be used to indicate direction of the surface drainage
(f) all manholes, catchbasins, hydrants, valves to be shown by a symbol with a legend provided
(g) all sidewalks and walkways
(h) all building elevations to be established and referenced to a "Finished First Floor" or a "Finished Entrance Floor" elevation and a "Finished Basement Floor" elevation
(i) a typical roadway cross section to indicate the pavement and granular base design
(j) roadway dimensions and curb radii
(k) the location and detail of all curbs
(l) the location of embankments, retaining walls, stairs, play areas, swimming pools, etc.
(m) the location and width of all curb depressions
(n) the location of wells, waste disposal tile bed areas, etc.

J 5.03 SITE SERVICES PLAN

The Site Services Plan shall show the following information:

(a) all existing underground services on the streets and easements adjacent to the property
(b) the location, size, grade, invert elevations of all storm and sanitary service connections to the property
(c) the location and size of all watermain connections to the property
(d) the basement floor elevations of all buildings to be constructed
(e) the location, size, length, grade, material and bedding requirements for all sanitary services to be constructed within the development
(f) the location, size, length, grade, material and bedding requirements for all storm sewers to be constructed within the development
(g) the location, size and material specifications for all watermains to be constructed within the development
(h) the location, invert elevation and rim elevations for all sanitary and storm manholes to be constructed

(i) the location of all hydrants, valves and water meters within the development
(j) the location and size of all sanitary, storm and water service connections to the individual units
(k) the location of all roof water leaders that are to be connected to the storm sewer
(l) all construction notes required to describe the construction detail or requirements
(m) the locations of prime and reserve tile bed areas, including mantles where required
(n) the locations of water supply wells to be constructed within the development

J 5.04 LANDSCAPING PLAN

The Landscaping Plan shall be prepared by a qualified Landscape Architect if required by the Township. The Landscaping Plan shall show all landscaping details as required by the Site Plan Agreement.

All manholes, catchbasins, hydrants, valves, street lights and other servicing features that appear above grade shall also be shown on the landscaping plan.

J 5.05 ELECTRICAL SERVICES PLAN

The Electrical Services Plan shall be prepared by a qualified Electrical Consultant. The Electrical Services Plan shall show all details of the electrical distribution system and the street and parking lot lighting systems.

The design of parking lot illumination must be in accordance with the guidelines of the Illuminating Engineering Society of Canada.

All lighting shall be in accordance with “Darkskies” recommendations and all luminaires shall be cut-off fixtures.

To confirm the average maintained lighting level and the absolute minimum lighting level, a lighting layout plan of the lighting levels throughout the parking lots may be required. The lighting layout plan shall include a summary or table clearly indicating lighting design criteria including levels and uniformities that are targets to be achieved for the facility usage type. The lighting layout plan must identify lighting levels 10 metres beyond the property line in all directions in order for the Township Engineer to assess light trespass.

Resulting lighting levels must be produced for the following elevations where development is proposed adjacent to residential areas:

- at grade
- 2.0 metres above grade
- 3.0 metres above grade

The Electrical Services Plan shall be submitted to Ontario Hydro and/or Uxbridge Hydro Electric Commission for approval.

J 5.06 DRAINAGE AREA PLAN

A plan shall be prepared to a scale of 1:1,000 or 1:2,000 dependent upon the size of the watershed area, to show the nature of the drain- age of the lands surrounding the development site and to show all external drainage areas that are contributory to the drainage system for the development. The external drainage areas shall be divided into smaller tributary areas and the area and the location to which the tributary area is considered in the design shall be clearly shown. The Plan shall clearly show all existing contours used to justify the limits of the external drainage areas.

In lieu of precise information on development on the whole or any part of a watershed area, the latest zoning by-law and official plan issued by the Township of Uxbridge shall be used to determine the correct values of the run-off parameters to be used for all external areas in the design and to determine the specific areas to which these values apply.

An internal storm drainage plan shall be prepared to a scale of 1:200 and shall include all streets, lots, blocks and other lands within the development. The proposed storm sewer system shall be shown on this plan with all manholes numbered consecutively from the outlet. These manholes shall be the tributary points in the design and the area contributing to each manhole shall be clearly outlined on this plan. The area, in hectares, of each contributing area (to the nearest hundredth) and the run-off parameter used shall be shown in a circle located within the contributing area. In cases where areas of different run-off parameters may be tributary to the same manhole, the areas and the parameters shall be separately indicated on the plan.

J 6.00 DESIGN REQUIREMENTS

J 6.01 SITE GRADING DESIGN

(a) The drainage of the site is to be self-contained.
(b) The grading of the site is to be compatible with the elevation of the surrounding lands.
(c) All grassed embankments shall have a maximum slope of 3:1.
(d) The grade of grassed or other landscaped areas shall have a maximum slope of 10% and a minimum slope of 1%.
(e) Swales on grassed areas shall have a minimum slope of 1.5% and a maximum slope such that the velocity for the flow contained does not exceed 1.25 metres per second.
(f) The maximum length for any drainage swale shall be 75 m.
(g) The minimum depth for any drainage swale shall be 250 mm.
(h) The maximum depth for any drainage swale shall be 750 mm.
(i) The maximum side slope on any drainage swale shall be 3:1.
(j) All driveways shall have positive drainage towards the roadway.

J 6.02 ROADWAY DESIGN

(a) All roadways shall be designed in accordance with the most recent engineering requirements of the Township of Uxbridge.
(b) The minimum pavement design for all multiple-family roadways shall be:
- subgrade compacted to 95% proctor density
- 300 mm. compacted depth of Granular "B"
- 150 mm. compacted depth of Granular "A" or crushed limestone
- 50 mm. compacted depth of HL8 Asphalt basecourse
- 40 mm. compacted depth of HL3 Asphalt surface course

(c) All driveways in multiple-family projects shall be paved with asphalt or an approved alternate from the edge of the roadway to the garage. The minimum asphalt pavement design for all driveways shall be:
- subgrade compacted to 95% proctor density
- 150 mm. compacted depth of Granular "A" or crushed limestone
- 50 mm. compacted depth of HL3 asphalt

(d) The minimum width of a multiple-family roadway for two way traffic with no street parking shall be 7.50 m.
(e) All roadways serving multiple-family projects shall be designed to facilitate passage of emergency and service vehicles. Curb returns having a 8.0 m. radius and inside bends having at least a 15.0 m. radius are required. On dead end streets provision shall be provided for vehicle turning.
(f) The minimum grade for any multiple-family roadway shall be 1.0% and the maximum grade shall be 5.0%.

(g) The maximum grade for any commercial driveway shall be 4.0%.
(h) The minimum grade for any driveway in the multiple-family project shall be 1% and the maximum grade shall be 7.0%. This maximum grade creates an undesirable condition and should be used only when necessary due to site conditions.
(i) The minimum grade in any parking lot area shall be 1.0%.
(j) The maximum grade for any parking lot area shall be 4.5%.
(k) The location of driveway entrances on Township roads must be such that the minimum sight distance is maintained on the Township's road in both directions. The following criteria will apply to new driveway entrances:

Posted Speed Limit (km/h)	Minimum Sight Distance (metres)
40	45
50	65
60	90
70	120
80	150

J 6.03 SITE SERVICES DESIGN

(a) All sanitary and storm sewers shall be designed in accordance with the requirements of the Ontario Plumbing Code and the Township of Uxbridge. The provisions of Section 24, Ontario Water Resources Act, R.S.O., 1980, may apply to sanitary and storm sewer works.
(b) All storm sewers shall be located within the limits of the roadway with storm service connections being provided for the roof water leaders along the front of the building. Weeping tile foundation drains shall also be connected to the storm sewer.
(c) All storm sewer connections shall be sized according to the requirements of the Ontario Plumbing Code and shall be installed on a minimum grade of 2.0%.
(d) Yard catchbasins shall be provided where required for drainage of landscaped areas.
(e) Catchbasin manholes may be used for roadway drainage.
(f) All watermains shall be designed in accordance with the requirements of the Ontario Plumbing Code, and Township of Uxbridge Fire Department. The watermain design shall be submitted to the Township of Uxbridge Fire Department for approval of the watermain layout and the hydrant locations. The provisions of Section 23, Ontario Water Resources Act, R.S.O. 1980 may apply to the watermain works.

J 6.04 LOADING SPACE REQUIREMENTS

The Developer shall provide a report that discloses the appropriate number of loading spaces required for the site. This report shall be based on the size and intended use of the proposed Development.

J 6.05 PRIVATE SERVICES

All private wells and/or waste disposal systems shall be constructed in accordance with the appropriate legislation and regulation administered by the Ontario Ministry of the Environment and such requirements specified by the Durham Regional Health Unit.

J 6.06 LANDSCAPING DESIGN

The landscaping requirements shall be detailed in the Site Plan Agreement.

J 6.07 ELECTRICAL DESIGN REQUIREMENTS

The requirements for the design of the electrical distribution system and the street lighting shall be agreed upon with Ontario Hydro and the Township of Uxbridge.

J 7.00 "AS CONSTRUCTED" DRAWINGS

After all construction is complete, the design drawings shall be amended to incorporate the changes and alterations made during construction in order that the drawings as amended represent the services and conditions as constructed. Four sets of "As- Constructed" drawings must be submitted to the Township of Uxbridge.

J 8.00 CERTIFICATION

Upon completion of construction the Consulting Engineer shall provide written certification to the Township of Uxbridge that all works have been constructed in accordance with the approved plans and specifications and in accordance with good engineering practices.

J 9.00 FINAL INSPECTION

Upon completion of all construction the Developer shall request the Township of Uxbridge to carry out a final inspection of the works. All deficiencies found during this final inspection shall be immediately corrected by the Developer. This final inspection is carried out for the benefit of the Township of Uxbridge and shall in no way relieve the Developer of his obligations under the Condominium Act and the Site Plan Agreement.