

TOWN OF AJAX
DESIGN CRITERIA

SECTION B
ROADWAYS

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 Town of Ajax prior to the commencement of the design.

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

| <u>CRITERIA</u> | <u>LOCAL</u> | <u>COLLECTOR</u> | <u>ARTERIAL</u> |
|--------------------|--------------------|---|---------------------------------------|
| 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 A.A.D.T. | 0-1,000 | 1,000-3,000 | Over 3,000 |

B 1.02 ROADWAY CROSS-SECTIONS

The following table summarizes the roadway cross-sections available and their intended uses.

| <u>Type</u> | <u>Uses</u> |
|---|---|
| <u>Std. No. AS-201</u> | |
| 8.5m Local Road in a 15 m Road allowance | To be used only as a service road in Urban Residential Areas |

Std. No. AS-202

8.5m Local Road
in a 18.5m road allowance.
(Curb and Gutter)

To be used in all Urban Residential Areas

Std. No. AS-203

10.0m Local Road
in a 20.0m road allowance.
(Curb and Gutter)

To be used in all Urban Residential Areas

Std. No. AS-204

12.0m Collector Road
in a 22.0m road allowance.
(Curb and Gutter)

To be used in all Urban Residential Areas

B 2.00 GEOMETRIC DESIGN ELEMENTS

B 2.01 RESIDENTIAL STREETS - URBAN

| <u>Geometric Detail</u> | <u>Local</u> | <u>Collector</u> |
|--|--------------|------------------|
| Minimum Right-of-Way Width (metres) | 15-20 | 20-27 |
| Minimum Design Speed (km per hour) | 50 | 50 |
| Minimum Safe Stopping Sight Distance (metres) | 65 | 65 |
| Minimum Sag Curve K value | 12 | 12 |
| Minimum Crest Curve K value | 8 | 8 |
| *Minimum Sag Curve Parameter in Illuminated K value | 5 | 5 |

SECTION B - ROADWAYS**DESIGN CRITERIA**

| <u>Geometric Detail</u> | <u>Local</u> | <u>Collector</u> |
|--|--------------|------------------|
| Minimum Curve Radius (metres) | N/A | N/A |
| Pavement Width (Face to Face of Curbs in metres) | 8.5 | 10.0 |
| Pavement Crossfall (per cent) | 2.0 | 2.0 |
| Minimum Grade (per cent) | 0.5 | 0.5 |
| Maximum Grade (per cent) | 6.0 | 6.0 |
| Intersection Angle (degrees) | 70-90 | 80-90 |
| Minimum Tangent Length at intersections (metres) | 30 | 50 |
| Minimum Tangent Length between Reverse Curves (metres) | 30 | 50 |

*Based on comfort criteria. Use in illuminated areas only when stopping sight distance requirements are met.

B 2.02 INDUSTRIAL STREETS

| <u>Geometric Detail</u> | <u>Local</u> | <u>Collector</u> |
|---|--------------|------------------|
| Minimum Right-of-Way Width (metres) | 22 | 26 |
| Design Speed (km per hour) | 50 | 60 |
| Minimum Safe Stopping Sight Distance (metres) | 65 | 85 |

SECTION B - ROADWAYS

DESIGN CRITERIA

| <u>Geometric Detail</u> | Local | <u>Collector</u> |
|--|-------|------------------|
| Minimum Sag Curve K value | 8 | 18 |
| Minimum Crest Curve K value | 8 | 15 |
| Minimum Curve Radius (m) | 90 | 130 |
| Pavement Width (Face to Face of Curbs in metres) | 10.0 | 10.0 |
| Pavement Crossfall (per cent) | 2.0 | 2.0 |
| Minimum Grade (per cent) | 0.5 | 0.5 |
| Maximum Grade (per cent) | 6.0 | 6.0 |
| Intersection Angle (degrees) | 70-90 | 80-90 |
| Minimum Tangent Length at Intersections (metres) | 30 | 60 |
| Minimum Tangent Length between Reverse Curves (metres) | 30 | 60 |

B 2.03 ARTERIAL STREETS

Arterial streets will be designed to Regional Design Standards.

B 3.00 DESIGN ELEMENTS

B 3.01 VERTICAL CURVES

All points of grade change in excess of 1.5% shall be designed with vertical curves as outlined in the current Ministry of Transportation - 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 m.

SECTION B - ROADWAYS

DESIGN CRITERIA

B 3.02 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 one to two percent 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.

B 3.03 CURB RETURN RADII AT INTERSECTIONS

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

| Pavement Width <u>Street A</u> | Pavement Width <u>Street B</u> | Curb Return <u>Radii</u> |
|--------------------------------------|--------------------------------------|--------------------------------|
| 8.5m | 8.5m | 8.0m |
| 8.5m | 10.0m | 10.0m |
| 8.5m | 11.0m | 10.0m |
| 10.0m | 10.0m | 12.0m |
| 10.0m | 11.0m | 12.0m |
| 11.0m | 11.0m | 12.0m |

Industrial designated streets will be required to have a minimum 15 m radius.

B 3.04 CUL-DE-SACS AND BULBS

Permanent cul-de-sacs shall be constructed in accordance with the details provided in the standard drawings. Minimum gutter grades of 0.5% shall be maintained along the flow line of all gutters around the cul-de-sacs. All cul-de-sacs, 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.

Maximum length of a cul-de-sac shall be 90 metres.

B 3.05 TEMPORARY TURNING CIRCLES

Temporary turning areas are to be built to the geometric standards of permanent cul-de-sac standards.

B 3.06 LOCATION OF UTILITIES

The location of utilities within the road allowance shall be as per the Town of Ajax Standard Drawings. Utility Coordination Plans shall be submitted to the Town Engineer for approval as per Section M of the Design Criteria.

SECTION B - ROADWAYS

All utility wiring is to be constructed underground. Hydro transformers are to be housed in suitable enclosures and mounted on transformer pads installed at the final surface of ground. Bell Telephone junction and Cable TV boxes may be mounted at the surface in approved standard enclosures.

B 4.00 PAVEMENT DESIGN

The minimum pavement design for all streets in new subdivisions shall be detailed on the Town of Ajax Standard Drawings. A qualified Soils Consultant shall be engaged by the Developer to sample, test and design a suitable pavement section. Soil sampling shall be carried out in the presence of the Soils Consultant at intervals not exceeding 60 m along the centre line of the subdivision road. The composition and design thickness of the pavement section shall be determined from:

1. Mechanical Sieve Analysis of the Subgrade Soil
2. Frost Susceptibility
3. Drainage, and
4. Traffic Volumes.

Copies of all test results and proposed road designs shall be submitted with the engineering drawings. In no case will a pavement design less than the minimum Town of Ajax Standard as shown on the Standard Drawing for the particular road classification be considered acceptable.

The Consulting Engineer shall be responsible for approving the source of supply and quality of all materials supplied by the Developer and his Contractors. Testing and approval of all granular materials at the designated pits and subsequent in-situ verification tests shall be performed by the Consulting Engineer and shall be presented to the Town.

Prior to the placement of concrete and the asphalt pavement, the Consulting Engineer must submit to the Town Engineer for approval, the concrete and asphalt pavement mix designs for all mixes.

Asphalt and concrete designs and materials are to conform to OPSS Criteria.

B 5.00 CONCRETE CURB AND GUTTER

Concrete curb and gutter conforming to the Town of Ajax Standard Drawings shall be used on all new roadways.

Driveway depressions shall be formed in the curb according to the details and locations as shown on the Town of Ajax Standard Drawings. If the driveway depression should be improperly located, then that section of the 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, otherwise the curb is to be replaced.

B 6.00 SIDEWALKS

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

The sidewalk shall conform in details and dimensions to the current Town of Ajax Standard Drawings and shall be installed at locations as shown on the typical road cross-sections. The standard width of sidewalk for streets is 1.50 m except on arterial roads which are 1.80 m.

The sidewalks shall be increased in thickness at all driveway locations as shown on the Town of Ajax Standard Drawings. In cases where the sidewalk has been constructed prior to the establishment of an entrance the existing sidewalk shall be removed and shall be replaced with a thickened sidewalk section.

At street intersections the curb and the sidewalk shall be depressed to meet the roadway elevations as shown on the Town of Ajax 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. An expansion joint shall be provided to separate the back of the curb from the face of the sidewalk.

B 7.00 DRIVEWAYS

The subdivider, or his assign, is responsible for the grading and paving of the entire length of all driveways from garage to curb to Town of Ajax Standards.

B 7.01 MINIMUM DRIVEWAY DESIGN

The minimum consolidated depth requirements for the granular base and asphalt in driveways shall be as detailed on the Town of Ajax Standard Drawings AS-341 and AS-342.

B 7.02 DRIVEWAY GRADES

The maximum permissible design grade for any driveway shall be 8%. This maximum grade is not recommended and should be employed only in exceptional cases where physical conditions prohibit the use of lesser grades.

The driveway width should not exceed the width of the external walls of the garage.

SECTION B - ROADWAYS

Minimum design grade for any driveway shall be 2.0%. The specified grades for driveways shall be directed away from the houses. The use of reverse driveways is not permitted.

For industrial and commercial sites requiring site plan approval, a break in grade for driveways shall occur at the street line, providing positive drainage from property line to the roadway while keeping all flows from these properties contained within the property itself.

B 7.03 DRIVEWAY DEPRESSIONS

The width and location of the depressions in the curb and gutter for single family residential driveways shall be as detailed in the Town of Ajax Standard Drawings.

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 minimum width of any driveway depression for commercial, apartment or industrial driveways shall be a minimum 15.7 metre. All apartment, commercial and industrial driveways shall be provided with barrier curbs constructed to blend into the roadway curb and gutter.

B 8.00 BOULEVARDS

All boulevard areas are to be graded according to the details shown on the Town of Ajax Standard Drawings and to the satisfaction of the Town Engineer. In order to minimize construction problems for the other utility companies, the grade of the boulevard shall be constant from the back of the curb to the municipal right-of-way. Terracing or embankments within the road allowance on new subdivision streets shall not be permitted.

All debris and construction materials shall be removed from the boulevard area upon completion of the initial stage of road construction and the boulevards shall be maintained in a clear state until the roadway section is completed.

Clean, weed free, topsoil shall be placed on all boulevard areas prior to sodding. The minimum depth of topsoil required shall be such that the combined thickness of the topsoil and sod is at least 100mm. Number 1 nursery sod shall be used for all boulevard areas.

B 9.00 STAGING OF CONSTRUCTION

The construction of all roads in new subdivisions shall be staged in order that the completion of the roadway coincides with the completion of the development of the surrounding lands. The initial stage of construction shall provide a roadway of proper granular base and base asphalt with first stage curb for building construction, traffic movement and land access.

The second stage of roadway construction shall complete the roadway to the final design cross section and will not commence in any area until ALL the following conditions are met:

- 1) A minimum period of one year has expired from the completion of Stage 1 construction.
- 2) 85% of the dwellings with frontage or flankage on the street are completed to the fine grading and topsoil stage.
- 3) All undeveloped blocks and lots are graded in accordance with the approved Lot Grading Plan.
- 4) All service connections for multiple family, commercial, institutional or other blocks are installed.
- 5) The approval of the Town is obtained in writing.

B 9.01 RESIDENTIAL AND LOCAL COLLECTOR ROADWAYS

For residential and local collector roadways, the initial stage of construction shall consist of:

- the grading to the full cross sectional width as shown on the Town of Ajax Standard Detail Drawing
- the complete granular base
- the first stage of curb and gutter
- the base course of asphalt.

The second stage of road construction shall comprise the following:

- the installation of the second stage curb and gutter and sidewalk
- the grading, topsoiling and sodding of all boulevards
- the grading, gravelling, curbing and paving of all driveways
- the completion of the surface courses of asphalt
- the final adjustment to grade of all utilities
- all other work necessary to complete the roadway to the final design cross section including boulevard tree plantings.

B 9.02 MAJOR COLLECTOR, INDUSTRIAL COLLECTOR AND ARTERIAL ROADWAYS

For these roadways, the initial stage of construction shall consist of:

- all work necessary to complete the roadway to the final design cross section, with the exception of the surface asphalt
- the boulevard sodding
- the driveway approach paving
- the full curb and gutter and sidewalk.

The second stage of construction shall comprise the following:

- the surface asphalt
- the final adjustment to grade of all utilities in the surface asphalt
- all other work necessary to complete the roadway to the final design cross section including boulevard tree plantings.

SECTION B - ROADWAYS

B 10.00 CONSTRUCTION REQUIREMENTS

B 10.01 CLEARING AND GRUBBING AND AREA ROUGH GRADING

The road allowance shall be cleared of all trees and shrubs not to be included in final landscaping, and of all other obstructions for such widths as are required for the proper installation of roads, services, 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 placement of granular materials in the roadways. 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 stock piled at locations approved by the Consulting Engineer.

All sediment and erosion control as outlined on the Sediment and Erosion Control Plan must be in place and functioning before any clearing, grubbing or earth work operations start.

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 10.02 ROAD SUB-DRAINS

Due to the impervious soils predominant in the Town, 100mm diameter perforated filter cloth wrapped plastic corrugated sub-drains will be required to run continuous along both sides of all roads with curb and gutter, and connected to the storm sewer system, at a grade matching the proposed road grade.

B 10.03 SNOW CLEARING

Snow clearing operations will be carried out by the Town if so requested by the Developer in writing, and on the condition the roads are kept in a condition acceptable to the General Manager - Property. The associated costs will be charged back to the Developer.

B 10.04 OTHER REQUIREMENTS

Whenever it is necessary to cut through an existing Town road, the Developer's contractor will be responsible for obtaining a Road Occupancy Permit and 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 Town's Planning and Development Department. Where the road is not part of the Town road system, approval from the appropriate road

SECTION B - ROADWAYS

authority will also be necessary. In all cases, the Fire and Police Departments, School Boards, Ambulance Service, Town of Ajax Operations Department and Transit Authorities must be notified by the Developer or his contractor.

All work will be done in accordance with ordinances and by-laws of the Town of Ajax.