Engineering Design Criteria and Standards Manual

The District Municipality of Muskoka and Area Municipalities

Town of Gravenhurst
Town of Bracebridge
Township of Muskoka Lakes
Township of Georgian Bay
Town of Huntsville
Township of Lake of Bays

July 2024

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INTRODUCTION

The **Engineering Design Criteria and Standards Manual** is intended to provide a sound engineering basis and consistent designs for municipal servicing projects within the District Municipality of Muskoka. The design criteria and standard drawings in this manual are to be read in conjunction with the Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD). In the event of a discrepancy, this manual shall take precedent.

As a minimum requirement, the design of municipal services which will be assumed by the District Municipality of Muskoka or an Area Municipality is to be based upon the current version of this manual. Approved drawings are considered compliant 24 months from the date of approval of drawings. An Area Municipality may have criteria which will take precedent and so should be individually consulted in that regard. Further, there may be local by-law requirements and/or instructions to fulfil, such as for permits or planning approvals. All design drawings are to be reviewed and approved by the municipality with jurisdiction prior to initiating installation of services. Such review shall not relieve the Applicant or their Consultant from primary responsibility for the design to meet all Federal, Provincial, District and Area Municipal requirements.

Municipal infrastructure responsibilities:

The District is responsible for:

- District highways;
- all municipal sanitary sewage collection and treatment systems; and,
- all potable water distribution and treatment systems within the District, whether such systems are on District or Area Municipal property.
- all stormwater infrastructure under District highways

Area Municipalities are responsible for:

- local roads;
- local storm drainage systems and storm water management facilities; and,
- lot grading requirements.

Recognising the varied jurisdictional responsibilities, for ease of reference and to facilitate future criteria updates this manual is structured in two parts, as follows:

Part A – The District Municipality of Muskoka Criteria;

Part B – Area Municipalities Criteria.

This manual is intended as a living document and subject to review and release of annual updates.

Glossary of Terms

“Applicant” – the property owner (also “developer”) submitting a development application, or its authorized agent.

“Area (or local) Municipality” – means a local incorporated municipality within the District of Muskoka, being any one or all of:

- The Town of Gravenhurst;
- The Town of Bracebridge;
- The Township of Georgian Bay;
- The Township of Muskoka Lakes;
- The Town Huntsville; and,
- The Township of Lake of Bays.

“Commissioner” – means the Commissioner of Engineering and Public Works for the District Municipality of Muskoka, or their designate.

“Director of Public Works” – means the Director of Public Works for an Area Municipality, or their designate.

“Design Consultant” or “Consultant” – a qualified professional engineer, or qualified engineering firm, licensed to practice in the Province of Ontario, engaged by the Applicant to provide engineering services on its behalf for a development project.

“Development Application” – refers to an application pursuant to the Planning Act submitted through the District or Area Municipality Planning Departments, respectively, including: Official Plan Amendment; Rezoning; Consent; Draft Plan of Subdivision; Condominium; Site Plan and Minor Variance.

“District” – means the District Municipality of Muskoka.

“EPW” – means the Engineering and Public Works Department of the District Municipality of Muskoka.

“Final Assumption” – the transition between the Maintenance Period and full ownership, operation and maintenance by the District.

“Initial Acceptance” – the transition between construction of the works to the Maintenance Period whereby the District accepts operation but not maintenance or ownership.

“Maintenance Period – period of time for which the District has accepted operation of the system and the Applicant is responsible for maintenance and deficiency repairs.

“Manual” – means this document, the Engineering Design Criteria and Standards Manual for the District and Area Municipalities.

“Ministry” – means the Ontario or Federal Ministry having jurisdiction.

“OPSD” – refers to the Ontario Provincial Standard Drawings.

“OPSS” – refers to the Ontario Provincial Standard Specifications.

PART A

The District Municipality of Muskoka Criteria

1 Engineering Submission Procedures for Development Applications

1.1 General

Part A is primarily intended to assist the Applicant's Design Consultant in obtaining clearance for the construction of services which will be operated by the District or Area Municipality, as applicable, upon completion of construction and assumption of the works.

The purpose of this section is to outline the engineering submission requirements for residential, commercial, industrial, and institutional development of land in the District.

1.2 Submissions to Government or Other Agencies

This manual does not address submissions or approvals which may be required from other levels of government or other agencies. It is the Applicant's responsibility to identify approval requirements and apply for, and obtain, any necessary approvals from all Federal, Provincial, District and local government agencies, utility companies or other agencies or authorities as necessary.

Agencies such as Ministry of the Environment, Conservation and Parks (MECP), Ministry of Transportation (MTO), Ministry of Natural Resources and Forestry (MNRF) and Department of Fisheries and Oceans (DFO) may need to be consulted depending on the project and type of works under consideration.

Transfer of Review

The District has Transfer of Review authority on behalf of the MECP for the review and recommendation of Environmental Compliance Approval (ECA) applications for District related storm water infrastructure. The Applicant shall confirm with the District which services in its proposed development may be addressed under Transfer of Review during the submission process. In the District of Muskoka, the Area Municipalities have jurisdiction over detail design approval, ownership and maintenance of storm sewer systems on local roads, storm water management facilities and related outfalls. As a result, ECA applications for local storm sewer works are to be signed by the Area Municipality before submission to the Ministry.

1.3 Hydraulic Modelling Requirements

The available water and wastewater capacity of the District's supply, collection and treatment systems is required to be confirmed for all multi-unit development applications over ten (10) units before comments are provided by the District on such applications. The District has prepared water supply system and sewer network capacity models in order to help fulfill this requirement. The demand data for a proposed development, as provided by an Applicant, will be entered into the District's models in order to confirm adequate level of service is maintained, or alternatively, to determine any upgrades required to the District's systems in order to service the development. Fees to perform this modeling exercise are the responsibility of the Applicant. The costs of any necessary upgrades or modifications to the District's water and wastewater systems as determined by the modeling results will be the responsibility of the Applicant, unless the upgrades/modifications are included in the District's Development Charge By-Law.

Modelling report results will expire with expiration of Draft Plan approval or 2 years from report date, whichever comes first.

The District Water and Wastewater Hydraulic Modelling Guidelines Document is included in Appendix A and should be referred to for further information.

1.4 Development Application Submissions

When considering a development application, the supporting documentation necessary will be confirmed through the planning application process. While the following list is not exhaustive, such supporting documentation may include:

- Water and wastewater hydraulic modelling;
- Functional Servicing Report addressing proposed sanitary servicing, watermain distribution, storm drainage and storm water management, and grading;
- Traffic Impact Assessment (TIA). TIA reports must, at a minimum, fulfil the guidelines included in Appendix E;
- Geotechnical report;
- Hydrogeological Assessment;
- Noise and Vibration Study;
- Environmental Impact Study;
- Archaeological Report.

Specifics of these report requirements are described in Section 2 of this manual.

1.5 Final Approval

Development Agreement

Before final municipal approval is granted, the Applicant may be required to enter into development agreements with the District and/or Area Municipality to ensure compliance with the terms and conditions of approval.

A development agreement prepared by the District to address District servicing interests consists of a body and specific schedules. The body and schedules are specific to each development.

Engineering review, construction inspection and assumption inspection fees as per the latest user-fee By-Law, and financial security requirements are included in the agreement.

Design Drawing Submissions

The proposed development shall have received planning approval before the engineering plans will be accepted for consideration. All submissions are to include a covering letter indicating the submission number, Applicant and development name. The Design Consultant shall address all engineering submissions to the attention of the Commissioner.

A submission checklist has been developed to assist the Design Consultant and is included in Appendix B. A completed checklist is to be included with each submission. Incomplete design submissions will be returned to the Design Consultant unreviewed.

Detail requirements for design drawings are defined in the following section.

1.6 Detail Design Submission Requirements

All designs are to conform to latest District Engineering Design Criteria and Standards Manual.

1.6.1 Barrier Free Considerations

All design projects throughout the District must give due consideration to the Accessibility for Ontarians with Disabilities Act and must incorporate ways to remove barriers for the public.

1.6.2 Drawing Requirements

Engineering design drawings are to be prepared in 24” x 36” paper format at an appropriate metric scale which ensures clarity of the work.

The following items are to be included, at a minimum, on all drawings submitted to the District for review and approval:

- The Development name identified on the agreement between the District and the Applicant is to be included in the title block on all drawings.
- A key plan is to be included on all drawings in the upper right-hand corner, indicating existing roads and highways around the site.
- All elevations are to refer to geodetic datum.
- General notes and details shall be on a separate sheet.
- All drawings shall be individually stamped and signed by a professional engineer licensed to practice in Ontario.
- All plans shall include street names.
- All title blocks shall show the following:

  - Applicant's name (in full)
  - Design Consultant's name (in full) including phone/fax number
  - Development name
  - Development phase
  - Revision block with submission number / status

General Servicing Plan

- A general servicing plan identifying all underground services at a standard metric scale. For larger developments scales can be selected to permit the use of one plan. For clarity, a scale of 1:1500 maximum is recommended. The general servicing plan for underground servicing shall include the following:

  - Lot fabric
  - Road centrelines and edge of pavement lines and/or curb lines
  - Proposed underground services including any external works
  - Construction limits
  - Lot services and existing services
  - Existing buildings complete with services (including size)
  - Street names

Sewer Drainage Area Plans

- Sanitary and storm sewer drainage area plans at a standard metric scale to show the total area to be drained by the sewers. The drainage area plans shall include such items as: area densities, flow directions, key plan, street names, existing and proposed sewers, maintenance hole numbers and sewer sizes.

Plan and Profile Drawings

- The elevations are to refer to geodetic datum. All base information reflecting the topographical conditions of the road within the limits of the right-of-way and on private side should be shown;
- All existing underground and above ground utilities shall be shown on the base plans. Any existing utilities that may conflict with the proposed road works shall be identified. It is the Applicant's responsibility to identify the utility conflicts, arrange for relocation and absorb all costs associated with such works;
- Drawing should indicate the right-of-way width with property line and reserve and/or buffer blocks if applicable along the frontage of a District road, except at approved access point(s);
- Existing centre line of the road shall be identified in plan;
- Existing road infrastructure must be identified where applicable (i.e. curb and gutter, sidewalks, culverts, trees and or shrubs, etc.);
- All ditches, driveways and drainage direction must be defined;
- Existing storm sewer system must be identified, and proposed design connection indicated;
- Centerline profile of proposed road is required;
- Indicate how the proposed access elevations will match the existing road elevations;
- Corner radii must be shown.

Typical Section Drawings

- Cross-sections every 20 metres are required and must indicate existing and proposed road composition within the limits of construction;
- Provide sufficient joint details;
- Existing and proposed slopes of top of pavement;
- Existing and proposed slopes of bottom of granular and pavement;
- In rural areas indicate side slopes towards the bottom of ditch;
- In urban areas indicate boulevard slopes and curb and gutter design;
- Centre line of road and widths of the lanes, shoulders, ditch, etc. should be defined with offsets to the property line;
- Existing ground indicated on the drawing;
- Cross-section locations shall be indicated on the Plan and Profile Drawing with reference indicator.

Pavement and Grading Design

- Elevations of existing and proposed pavement should be shown at 20 metre intervals and all grade break points;
- Centre line of road with edge of pavement and concrete curbs at centre islands and along corner radii should be shown;
- Existing access points should be shown.

- Grading shall be designed to ensure positive drainage to the internal and external drainage systems (storm sewer and/or ditches), ensuring that all runoff is properly conveyed and does not enter onto private property.

Sediment Control and Construction Mitigation Plan

- Existing and proposed contour information;
- Proposed sediment control measures for each stage of works;
- Sequence of construction notes.

Pavement Markings and Signage Drawing

- Existing and proposed pavement marking shall be shown on the drawings. The Applicant is responsible to obtain a contract for the application of necessary pavement markings in accordance with the Ontario Traffic Manual;
- Lane widths, skips and arrow spacing, stop bar widths, storage and taper lengths must be indicated with dimension details;
- Existing and proposed traffic signs must be indicated;
- Existing and proposed street name signs must be indicated;
- Sign offsets and heights must be indicated and must comply with the Ontario Traffic Manual.

Individual Site Servicing Plans – Development Sites

- Water, Wastewater and Storm (if applicable) service connections are to be reviewed and approved by the District prior to being issued building permits from the Area Municipality.

1.6.3 Engineering Submission Requirements

First Submission

One complete paper set of the following plans and documents may be required in addition to a digital pdf drawing set for the first submission.

Items to be included on the first submission include the following, where applicable:

- Proposed final draft plan for registration;
- General services plan showing aboveground and underground works;
- Plan and profile drawings for watermain, sanitary sewer and roadworks;
- Sanitary drainage plan and design sheets, including external areas and contours;
- Storm sewer drainage plan and design sheets;
- External watermain layout plan illustrating the existing distribution system;
- Miscellaneous and special details pertaining to sanitary, storm or watermain design;
- Grading plans.

- Traffic signal drawings or drawings indicating underground works (conduits, maintenance holes, hand wells, etc.) for future traffic signal installation;
- Pavement marking and signing where District roads are affected;
- Truck Turning Templates where District roads are affected;
- Cross-section drawing where District roads are being altered;
- Storm Water Management report if storm drainage from the site is proposed to discharge into the District's right-of-way or storm sewer system. Refer to the "Functional Servicing and Storm Water Management Report" section of this manual for additional information;
- Sanitary sewer design sheets. Pipe strength and bedding requirements are to be provided;
- Geotechnical report.

When these drawings, documents and calculation sheets are reviewed, comments will be returned to the consultant for revisions as necessary.

Second Submission

If comments provided under the first submission have not been fully addressed, the submission package will be returned for resubmission with a disposition “Not Reviewed, Incomplete”

One complete paper set of the following plans and documents may be required in addition to a digital pdf drawing set for the first submission.

In addition to first submission requirements, items to be included on the second submission include the following, where applicable:

- All drawings referred to in Section 1.6.1, incorporating all changes required from the first submission;
- Letter describing changes and updates;
- All revised calculation sheets, if required;
- Cost estimate of District services;
- Draft R-Plans and easement documents;
- *Sewers/Nominally Separate Sewers/Forcemains;*
- Submit applications, fees and documentation to respective agencies and inform the District for any other approvals required, e.g. MTO, pipelines;
- Landscape drawings where District roads are affected and landscaping is proposed.

Interim Submission

Note: If comments provided under the previous submission have not been fully addressed, the submission package will be returned for resubmission with a disposition “Not Reviewed, Incomplete”

- Submit a digital pdf copy of only those documents, drawings, schedules and calculations that required correction. The revised documents are to be stamped and sealed by a professional engineer;
- Letter describing changes and updates;
- Utility coordination plans.

Final Submission / Servicing Preparations

If comments provided under the previous submission have not been fully addressed, the submission package will be returned for resubmission with a disposition “Not Reviewed, Incomplete”

Three complete sets of construction plans and documents are required for the final submission and are to be stamped / sealed by a professional engineer, including the following:

- All drawings incorporating all changes as referred to in the first, second and interim submissions;
- All drawings in PDF format;
- Form 1 – *Record of Watermain Authorized as Future Alteration;*
- Form SS1 – *Record of Future Alteration Authorized for Separate;*
- Final sewer design calculation sheets;
- Final cost estimate of services.

PDFs shall be simplified for processing efficiency and shall not include CAD comments.

1.7 Construction Commencement Requirements

Prior to the commencement of construction, the District requires confirmation that:

- The development agreement has been registered;
- The Owner must provide proof of comprehensive liability insurance and have a limit of liability of $5.0 million, naming the District Municipality of Muskoka, the Area Municipality and the District’s third-party inspection consultant if applicable as additional insured;
- All Contractors working within a District right-of-way must provide proof of comprehensive liability insurance and have a limit of liability of $5.0 million, naming the District Municipality of Muskoka, the Area Municipality and the District’s third-party inspection consultant if applicable as additional insured.

The Consultant shall:

- Provide notification to the District a minimum of 5 days prior to the commencement of construction;
- Arrange a pre-construction meeting with the contractor, consultant, Local Municipality and District. This meeting is required to determine schedule,

approvals, main service connections and testing methods. The name and contact information of the Consultant's full-time Inspector are to be provided to the District at the pre-construction meeting;
- Supply full time inspection required to ensure that the work is performed as specified. Any changes or deviation from the plans and specifications will require clearance from the District and/or other agencies if required;
- Where concrete pressure pipe (CPP) watermains are proposed, shop drawings reviewed and signed off by the Applicant's engineer shall be supplied to the District for review & approval prior to construction.

In general, the Applicant's consultant shall be responsible to ensure the requirements in the development agreement and in this manual are carried out.

Road Occupancy Permit

All work carried out within the District's rights-of-way is subject to a Road Occupancy Permit. The Applicant or his contractor must complete this permit application; including 2 sets of folded, approved plans and the application fee as per the latest user fee by-law. All works conducted within the District's right of way must be done so in accordance with Ontario Traffic Manual Book 7, Temporary Conditions. In addition, the operation of District roads must be maintained at all times and all cost associated with traffic control shall be at the sole expense of the Applicant.

1.8 "As-Recorded" Requirements

"As-Recorded" submissions require the following:

- "As-Recorded" drawings shall be submitted to the District and/or Area Municipality, as applicable, upon Substantial Performance of a project and prior to issuing Initial Acceptance.
- "As-Recorded" submissions are to be in digital (pdf and CAD) formats. Red-line revisions will have been made to reflect any changes to the line and grade of roads and services. Manholes, catch basins, valves, hydrants, curb stops, etc. will have been tied into two above grade permanent reference points. Drawings that do not meet the requirements below may be rejected by the District or Area Municipality and resubmission will be required.
- The following guidelines for CAD "As-Recorded" submissions will help to ensure integration into the Districts GIS system.

    - The drawings shall be in the UTM NAD 83 Zone 17 coordinate system.
    - All linework is separated onto layers
    - All linework has been flattened
    - "exporttoautocad" function if applicable

- The “As-Recorded” drawings are to be revised to accurately reflect any changes made during construction that differ from the design and will include the following information as a minimum:

  - Centreline of road elevations at maximum 20 m intervals;
  - Invert elevations, pipe grades, pipe (manhole to manhole) distances;
  - Elevations and locations of valves, tees, wyes, bends, sweeps, fittings, reducers, service connections, cleanouts, curb stops, buried terminations, culvert inlets and outlets;
  - Elevations of the top of catch basins, maintenance holes and valve chambers,
  - Swing-ties to all at-grade structures and service laterals.

- The “As-Recorded” drawings shall be sealed by a professional engineer to verify that all documentation is correct and accurate.
- “As-Recorded” Service Record Sheets (see form DMM-501 in Appendix J) shall include service swing ties (two ties) to the curb stop valve or location where the sanitary sewer service crosses the property line, from each corner of the front of the building on each lot, or where no building is present, from two above grade permanent features.
- When all revisions/corrections have been made, and prior to the end of the maintenance period, a complete set of "As-Recorded” drawings (one paper plus digital pdf format) will be provided to the District and/or Area Municipality as applicable. No project shall be deemed complete, or receive Final Acceptance, until the Municipalities have received and approved a complete set of “As-Recorded” drawings.
- PDFs shall be simplified for processing efficiency and shall not include CAD comments.

1.9 Services Performed by the District

The District will perform the following services. Fees may be applicable as set out in the development agreement and in accordance with the District fee by-law.

Inspection

The District will conduct spot check inspections during construction to verify that the work is/was performed in accordance with the agreement. Inspections performed by the District do not relieve the Consultant from performing full time inspection and certification of all installed services in accordance with specifications. Initial Acceptance and Final Assumption inspections will be performed only after the Consultant has given written confirmation that they have inspected the District’s infrastructure and they are in good standing.

All subsequent preliminary and/or final inspections to confirm repair of deficiencies may be subject to surcharge fees on a time and material basis.

The District shall have the right to inspect the construction of works and services. Where the District has reason to believe the work is not being completed in accordance with the approved drawings and specifications, the District may order the work be made good, and in extenuating circumstances, may issue a stop work order until it has received sufficient assurances any future work will be completed in accordance with the approved drawings and specifications.

Valving (External to the project prior to construction clearance)

The District will perform valve operating in accordance with the connection procedure and schedule agreed to by the District, consultant and contractor.

The Contractor is not permitted to operate any existing water system valves or any valves once the mains are directly connected to the municipal drinking water system. All emergency valving required as a result of an unscheduled or accidental disruption of water supply by the contractor or to accommodate additional testing may be subject to surcharge fees on a time and material basis.

Charging of Watermains

The Contractor must take out a hydrant use permit and pay a fee per the District fee by-law in order for the District to charge the watermain. Charging of the same section (or the same subdivision/project) of watermain a second and subsequent times for the purpose of hydrotesting may be subject to surcharge fees on a time and material basis. Otherwise, the District's operations may be charging each street separately.

Hydrostatic Testing, Flushing, Chlorination and Sampling

For watermain to be assumed by the District, the District will test residual chlorination and collect two bacteriological samples in accordance with the testing and sampling procedures (SOP WS-09) established by the District.

Hydrostatic testing, flushing, chlorinating and sampling of the same section of watermain a second and subsequent times until the section being tested has passed each of the aforementioned tests, may be subject to surcharge fees for testing and sampling services provided by the District on a time and material basis.

For private works the District will not be assuming, proof will be required that AWWA C651, MECP procedure for disinfection of watermains has been followed prior to connection. These private works shall include a backflow preventer where required by the District Cross Connection Control By-Law.

Maintenance Fees

Should the District be involved in repair to any District services during the maintenance period, rates will be applied according to the District fee by-law.

Re-Inspection Fees

Should the District be required to re-inspect any District services during the maintenance period (including CCTV Inspection), rates will be applied according to the District fee by-law.

Public Notice of Watermain Shutdown

The District requires 3 weeks' notice for requests for a live watermain to be shut down. The District must be able to provide adequate notice to affected water customers in the event that there will be a water outage. The public notice will be prepared by District staff and is to be hand delivered to all affected water customers by the applicant.

1.10 System Maintenance to Assumption

Initial Acceptance

The Consultant shall refer to Appendix I for the District's Protocol and Procedure for Initial Acceptance, and subsequent Assumption, of services. In general, upon completion of the construction of the District infrastructure to a base course of asphalt as set out in the Agreement, the consultant shall verify in writing (stamped and signed by an Ontario registered professional engineer) to the District that the work is complete and ready for inspection by the District. Prior to the issuance of Initial Acceptance all easement documents shall be registered. At this time the securities may be considered for reduction if applicable in accordance with the Districts Policy FI-018-2020 Securities for Development Agreements and the development agreement.

Service record sheets and CCTV in MP4 format for all sewers must be supplied with the verification letter described above, as well as all servicing drawings in CAD format. CCTV reports shall be named, organized and combined so that there is one PDF report pertaining to each video and the order of the reports matches that of the video.

Watermain Connection

- Connection Timing

  Watermain connections for services to be assumed by the District will not be permitted until after Initial Acceptance has been granted.

  The Developer shall be responsible for coordinating timing of the connection with District staff to ensure that adequate District inspection is present, traffic

interruption is minimal, and the shutdown period is reasonable. This may result in the requirement for overnight work.

- Shutdown Notices

  For watermain connections that require the municipal main to be shutdown, the District requires a 3 week notice period:

  - Minimum 1-week for District staff to prepare and print notices to the public, staff and Council.

  - Minimum 2-week public notice period commencing at the completion of delivery of notices.
    Delivery of public notices door-to-door to affected customers shall be the responsibility of the Developer.

- Connection Work

  The Developer is responsible for obtaining any required permits (e.g. a road occupancy permit) and insurance as described in section 1.7.

Maintenance Periods

The Applicant shall maintain all District works for a minimum period of:

- Two (2) years on underground works, and;
- Two (2) years on surface works from the date of Initial Acceptance by the District. This includes wastewater collection systems, water distribution systems, District roads and District storm sewers.

Notwithstanding the above, the Applicant will be responsible for all District works that may be damaged by the construction of aboveground works or building activities until assumption by-law date set by the municipal Council having jurisdiction. The Applicant shall be responsible for locating all water and sanitary services when a locate request has been placed through Ontario One Call until final assumption has been granted.

Assumption of Services

Within 3 months of the end of the maintenance period, a request for a final assumption inspection shall be made and subsequently carried out along with District staff or designate to prove that all deficiencies have been corrected. Assumption will not take place until all deficiencies have been remedied to the satisfaction of District staff.

Any deficiencies shall be corrected prior to final assumption being issued and identified on the final report. All cost associated with re-inspection shall be in accordance with the fee by-law.

Within three months of the end of the maintenance period and prior to the request for final assumption inspection, the Consultant shall provide written confirmation to the District, in a format stamped and signed by an Ontario registered professional engineer, certifying that all of the District works have been inspected as set out in the agreement including repair of all deficiencies, and that the District requirements as set out in this manual have been satisfied and are ready for final clearance by the District. In particular:

- Sanitary Sewers

  The Applicant's Consultant/Contractor shall flush and complete a CCTV inspection of all lines including laterals and visually inspect all manholes for deficiencies and certify in writing, with a digital copy of the CCTV file, to the District that the sewers meet District standards and are ready for final clearance.

- Watermain

  An inspection is to be carried out by the consultant and all deficiencies repaired prior to request for District final inspection/clearance.

  The following items must be checked by the Consultant:

  Line Valves and Hydrant Branch Valves

  - No visible leakage;
  - Grade of valve box;
  - Valve or valve box damage;
  - Parts missing;
  - Condition of chamber;
  - Accessibility and no debris in valve box;
  - Tracer wire testing for conductivity / continuity.

  Hydrants

  - Confirm the distance from ground to bottom of flange is between 50 mm and 150 mm and ground fully restored;
  - Confirm hydrant is plumb;
  - Hydrant paint, damage or missing parts have been repaired;
  - Ensure minimum clearance around hydrant is achieved;
  - Confirm hydrant operability;
  - Confirm hydrant colour is acceptable;
  - All hydrants to be plugged.

Water Services

- Confirm no visible leakage;
- Ensure top of curb stop is 150 mm above ground if lot is not graded or at grade where lot grading and vegetation is complete;
- Ensure no water service damage or parts missing;
- Verify service box accessibility. All boxes are plumb and accessible (key will sit on rod).

- Storm Sewers

  The Applicant's contractor shall flush and complete a CCTV inspection of all lines and visually inspect all manholes and catch basins for deficiencies and certify in writing, with a digital copy of the CCTV file, to the District that the storm sewer meets District standards and is ready for final clearance.

- Roads

  A final inspection is carried out by the Consultant.

  Final clearance is issued after all deficiencies have been rectified.
  Road cuts shall be checked by the Applicant's consultant to ensure that pavement, gravel, curbs, sod, sidewalk, shrubs, trees, and restoration are acceptable and that design grades have been achieved to ensure proper drainage.

  Lawns shall be checked regarding new sod growth and settlement.

  Paved driveways shall be checked to ensure they were saw-cut and patched with hot mix asphalt. Concrete pattern driveways shall be checked to ensure they were saw cut and patched with concrete to match existing.

2 Supporting Study Reports

2.1 Introduction

The following guide is to assist with preparing and reviewing supporting study reports in the District. Details and requirements of any analysis will vary based on the proposed land use, development size and location, and if any studies have previously been completed. The need for any study will be confirmed by District staff during the planning application process and early consultations with the Applicant.

District and Area Municipality services are to be designed in conformance with the current version of this manual and Ministry Guidelines. All plans and reports are to be reviewed by the District and Area Municipality, as applicable, prior to construction of services. Such clearance shall not relieve the Design Consultant from primary responsibility for the design to meet all Federal, Provincial, District and Area Municipal requirements and/or codes.

2.2 Functional Servicing Report (FSR)

The objective of an FSR is to demonstrate the adequacy of the existing and proposed water and sanitary sewer systems to satisfy the demands of a proposed development.

The Functional Servicing Report shall include, but may not be limited to, the following:

- Location map and description of the subject property;
- Description of proposed development;
- External/future development requirements for municipal water and wastewater services;
- Illustration showing the proposed development, existing and proposed infrastructure and proposed servicing connection points and diameter for water, sanitary sewer (including identification of the connection manhole and storm sewer (if adjacent to a District Road));
- Rationale behind the proposed servicing plan and additional significant issues relevant to the development (i.e., high population densities, expected occupancy schedule);
- Originally allocated population densities for developed areas;
- Completed sanitary sewer design sheet;
- External sanitary sewer drainage plan;
- Calculations for sanitary sewer effluent;
- Calculations for domestic water demand;
- Calculations for fire flow requirements;
- Range of watermain operating pressures at ground level under the following conditions (note that if the pressure ranges vary significantly

throughout the development, a street-by-street table providing these operating ranges shall be provided):

  - Peak hour demand
  - Maximum day demand plus fire flow conditions

- Hydrant flow test(s);
- Signature and stamp of a professional engineer.

Every FSR should include a section titled "Design Basis" summarizing the assumptions used in the analysis.

Water Distribution

Water demands are to be calculated in accordance with the Design Criteria section. The FSR shall identify the demands of the proposed development and proposed water servicing plan. Confirmation of the suitability of the existing infrastructure to provide the supply of water necessary without reducing the service levels of the existing water supply system or any proposed changes to the existing system shall be identified in the FSR. The proposed development data may need to be entered into the District water and wastewater system models to confirm available capacity, depending on the size and type of development and potential impacts upon the capacity of District servicing infrastructure. Such modeling would be conducted in accordance with Section 1.3, Hydraulic Modelling Requirements, at the cost of the Applicant.

The details included in a FSR will depend on the type and scale of development.

The extent of an FSR should include, but may not be limited to, an examination of the development impacts on water treatment, pumping, storage, transmission and distribution watermains. At a minimum, the FSR shall include the following:

- Average day, maximum day and peak hour demand for the ultimate site or development requirements;
- Analysis of "maximum day plus fire flow" and "peak hour demand" conditions;
- Identification of capital improvements, if required, to meet the District’s design criteria and the Ministry design guidelines for drinking water systems;
- Analysis of recorded nominal pressure ranges experienced in the distribution supply mains and comparative anticipated maximum and minimum pressures to be experienced within the proposed service area during periods of maximum and minimum flows;

- Analysis of pumping capacity and storage requirements for the appropriate pumping station(s) to meet the development's demands (where required);
- Total equivalent population to be serviced within the development and total lands to be serviced;
- Pressure zone(s) which will service the development and parts serviced by each zone. The servicing scheme should incorporate full looping of the water systems within each zone and any permanent pressure reducing valves at the pressure zone boundaries;
- Designation of lands external to the development which are to be serviced through the internal development infrastructure;
- Blend the designs with District's long-term and permanent infrastructure (needs and benefits, capital costs, operation and maintenance costs, financial responsibilities).

Wastewater Collection

Sanitary sewer effluent flows are to be calculated using the current version of this manual, specifically the Sanitary Sewer Design Criteria in Section 3.6 below.

The details included in a FSR will depend on the type and scale of development. The extent of the FSR should include the following at a minimum:

- Any assumption used to reach a conclusion must be clearly outlined;
- Any deviation from this manual should be clearly referred to the authority accommodating such deviation;
- The FSR should illustrate how it conforms to current and future District infrastructure planning initiatives;
- Where the servicing strategy deviates from District infrastructure planning, the FSR should identify the benefits to the District system in terms of costs and servicing;
- The FSR should take into account the drainage scheme for the external lands;
- The need for any ancillary wastewater pumping stations shall be examined and, if required, shall comply with associated District standards.

2.3 Storm Water Management Report (SWMR)

The objective of a SWMR is to evaluate the effects of a proposed development on the storm water drainage pattern, available capacity and how to manage rainwater/snowmelt. The report should be consistent with the District's and Area Municipality’s design criteria and with provincial and federal regulations. In addition, SWM designs may be subject to other agency approval such the Provincial ministries of the Environment and/or

Natural Resources and Federal ministry of Fisheries and Oceans. It is the Applicant's responsibility to confirm the requirement for other agency approvals.

Specific drainage design criteria are included in Section 3.7 of this manual.

- Post-development flows must not exceed pre-development flows for the 2 to 100-year storm;
- Storms in excess of the 100 year storm must be safety conveyed overland to a suitable outlet in a way which minimizes detrimental effects on public safety and property;
- Storm sewers and ditches located within District roads are generally designed to convey flows generated within the road right-of-way. Runoff accepted from private lands or new developments must first be controlled to pre-development levels and address quality treatment in accordance with this manual and Ministry requirements for "Enhanced" level treatment;
- Low Impact Development (LID) measures to be used wherever possible to minimize peak flows and promote cleansing properties;
- Methods of quantity and quality control shall be based on the Ministry design manual and established storm water best management practices. Typical storm water storage methods include but are not limited to parking lot storage, rooftop storage, end of pipe pond facilities and oversized infrastructure;
- Drainage of storm water to adjacent tributaries shall be avoided.

For a SWMR to be considered complete, it shall include, but may not be limited to, the following:

- Site Plan of the subject property which includes property area, pavement areas and building areas;
- Property description;
- Pre- and Post-development drainage plans including flood lines and overland flow routes;
- Schematic layout of proposed and existing site services;
- Schematic layout of the sub-watershed showing the main watercourse, tributaries and outfall locations;
- Run-off coefficients;
- Summary table illustrating Pre- and Post-development flows for 2-year to 100-year and Regional storms including supporting calculations;
- A clause stating that "Post-development flows must be equal to or less than Pre-development flows";
- Description of storm water management techniques being used to maintain pre-development flows;
- Signature and stamp of a professional engineer.

2.4 Geotechnical Investigation Report

A geotechnical Investigation is required for all new watermains, sanitary sewers, storm sewers or road construction. The purpose of an investigation would be for the Design Consultant to determine the soil's type and composition; to identify potential contamination levels of the native soils and resultant disposal requirements; identify bearing strength, permeability and conductivity; determine safe excavation requirements; recommend pipe bedding, road base design, pavement structure and sub-drainage requirements; determine suitability of native material for use as trench backfill, road fill, and building foundation construction; identify the presence and depth of bedrock; and identify ground water tables and dewatering requirements. The consultant shall identify the ground water level, depth of bedrock, appropriate bedding requirements, road base design and safe excavation requirements on the drawings based on the findings of the Geotechnical Investigation.

Reports shall be sealed and signed by a professional engineer and be accompanied by a scaled drawing showing test pit and/or borehole locations complete with detailed test pit and/or borehole logs.

Boreholes shall be extended to bedrock or the deepest of the following;

- One (1) metre below the anticipated depth of the deepest watermain, sewer or other utility; or,
- Three (3) metres below anticipated finished road grade; or,
- Two (2) metres below bottom of previously placed fill.

Where variations in the identified soil composition suggest additional variation is likely at greater depth or poor soil conditions warrant additional investigation, the investigation depth shall be increased.

In general, the Design Consultant should establish the number of boreholes necessary based on good engineering design practice and in support of detail final design, e.g. such as one borehole per leg of sewer.

2.5 Hydrogeological Assessment

Hydrogeological studies shall characterize the groundwater regime from a site specific and regional perspective to address issues, as applicable, related to:

- Impacts to existing well water supplies within the project area;
- Soil permeability and associated properties where the design of septic systems are concerned;
- Groundwater impact assessment to area aquifers from construction activities and/or discharge of waste or wastewater;

- Test wells and associated testing in accordance with MOE D-5-5 guidelines to address water taking impact sustainability;
- Impacts to nearby surface water bodies.

For general road and servicing construction, the report should consider depth of services and identify likely areas where dewatering will be required, the rate of dewatering, requirements for dewatering, permits, and the strategy to achieve the required groundwater levels.

Where applicable, the report should also include an assessment of the use of sump pumps for building design.

Reports shall be sealed and signed by a professional engineer.

2.6 Traffic Impact Assessment (TIA)

Traffic Impact Assessment report guidelines are included in Appendix E for reference.

2.7 Noise and Vibration Study

Noise and Vibration Studies shall review all potential noise and vibration sources and evaluate the requirements to achieve compliance with MOE guidelines; detail the locations and height of noises fences required to attain acceptable noise levels; identify foundation requirements to attenuate vibration from railway traffic; and consider the construction activities typically expected and provide guidance on development of a pre-construction survey of adjacent buildings and structures.

2.8 Environmental Impact Study

The Environmental Impact Study shall be prepared by a qualified professional and will assess any potential impact of the proposed project upon the natural environment including, but not limited to, wetlands, woodlots, and natural habitats for threatened and/or endangered species. The report shall also characterize the impact and make recommendations for mitigation, if necessary.

2.9 Archaeological Report

The Archaeological Report shall assess any significant historical features on the site and recommend a mitigation plan if necessary. The study shall follow the Ontario Ministry of Culture guidelines for determining the archaeological potential of the area impacted by construction. As a minimum, the report shall follow the requirements of a Phase 1 Archaeological survey and proceed with Phase 2 and 3, if necessary.

3 Design Criteria for Underground Services

3.1 Introduction

The design of municipal services in the District Municipality of Muskoka is to be based upon the Ministry's Guidelines and the current version of this manual, including the most recent District policies, Standard Operating Procedures and approved material listings. Where District Standard Drawings do not exist, the latest version of the OPSD shall apply.

All plans are to be reviewed and approved by the District, and Ministry when required, prior to construction. Such review shall not relieve the Design Consultant from primary responsibility for the design to meet all Federal, Provincial, District and Area Municipality requirements.

3.2 Ontario Provincial Standard Drawings (OPSD)

In general, the District utilizes OPSD details wherever possible, except where they are superseded by standard drawings which are developed and issued by the District for its own purpose. The Design Consultant shall refer to the Standard Drawings, Appendix J, in this manual for standard drawings which are particular to the District and Area Municipalities and take precedent over OPSD's.

3.3 Easements

No District infrastructure shall be installed in a trench where the safe excavation slope of the native soil will cross onto private property or result in exposure of a foundation of any present or proposed permanent structure.

Easements are required where a watermain or sewer is to be installed on private property. The minimum easement width is 6.0 m. Additional width is required where soil conditions require flatter slopes or for multiple or larger diameter pipes. The watermain or sewer is to be centred within the easement. The Consultant is responsible to prove the required easement limits are met and define the limits of the easement.

Easements must be coordinated through and approved by the District which is usually completed during the planning approval stage.

3.4 Condominium Developments – Minimum Criteria

Where the District determines the proposed sanitary and/or watermains internal to a condominium development are to be assumed by the District, a minimum common element width of 12.0 m containing the roadway and service mains is required in order to address District needs for access,

maintenance and public safety. An easement shall be granted to the District over the full width of the common element. The watermain shall be located in grassed area behind curb or edge of pavement.

The Area Municipality may have additional common element width requirements and should be consulted early in the planning process.

3.5 Watermain Systems

3.5.1 General Specifications

All water distribution system components and lubricants are to be as stated on the District's Approved Products List and must meet the District's Drinking Water License requirements, applicable AWWA Standards, NSF/ANSI 60 and 61 Standards, and other appropriate standards for approved materials, coatings or linings for distribution system components or chemicals that come into contact with potable water.

Where non-metallic pipe (e.g., PVC, PE, concrete pressure pipe) is installed, continuous tracer wire must be installed with and along the pipe and brought to the surface at each valve box/chamber and hydrant (around port). Tracer wire connections are to be achieved with a waterproof and corrosion proof connector designed for the purpose and in accordance with the Approved Products List in Appendix C. Tracer wire is to be attached to the pipe and outside of each valve box by means of tape. See District standard drawings and specifications for additional details.

Drawings shall be supplied to the District for review and approval prior to construction.

All new metallic watermain fittings, valves, joint restraints, etc. shall be epoxy coated or stainless steel.

All existing metallic fittings, valves and joint restraints must be wrapped end to end with an approved corrosion protection system that includes petrolatum primer (paste), petrolatum moulding mastic, and low temperature petrolatum tape.

Shop Drawings shall be submitted for review and approval by the District prior to construction for all watermains made of concrete pressure pipe and all chambers, valves, hydrants and other fittings and appurtenances as requested by the District.

3.5.2 Watermain

Pipe Sizing

All watermain sizing and pressure requirements shall be in accordance with the Ministry's current Design Guidelines for Drinking Water Systems and shall be confirmed through the District's water system model.

Applicants are required to provide their proposed water system data to the District for entering into the District's water system model. This modeling exercise will be performed by the District at the cost of the Applicant. The results of the modeling exercise are to be incorporated into the water system design for the development.

The minimum pipe size for a watermain is 150 mm diameter unless approved in advance by the District and except for 50 mm diameter looped systems in residential cul-de-sacs in accordance with District Standard Drawings.

Fire Approval

Fire protection approval is required for all industrial, commercial, institutional and high-density residential servicing applications where municipal water is available. Local municipalities must review site plans in accordance with the Ontario Building Code for fire protection purposes.

Where watermains are to be used for fire protection purposes on private property they must satisfy the requirements of the Fire Underwriters Survey in addition to the requirements of the local building department.

Water Demands

Water demands for infrastructure design purposes are to be calculated using the criteria in the Table below, which is considered to include a margin of safety to address unknowns and infrastructure as it ages.

It is also noted the District has a Water and Sewer Capacity Allocation Strategy as per By-Law 2023-48 as amended for each area municipality based upon actual local demand data. This data is to be used by Design Consultants only for the calculation of Equivalent Residential Units (ERU's) when assigning available infrastructure capacity during the development agreement stage. Data in the Water and Sewer Capacity Allocation Strategy is updated annually and shall be obtained from the District by the Design Consultant.

Typical Water Demand Criteria

Development Type	Unit	Avg. Consumption Rate	Max Day Factor	Peak Hour Factor
Residential	L/Cap/day	450	As Per Ministry Guidelines	
Commercial and Institutional	As Per Ministry Guidelines			
Industrial	As Per Ministry Guidelines			

Building Type	Population Density (PPU)	Equivalent Residential Unit (ERU)
Single Family Home	3.5	1
Townhouse	3.0	0.85
Apartment	2.5	0.7

Custom demands for larger volume consumers or those with exceptional peak demands require special considerations regarding flow calculations. Each case will be reviewed on an individual basis.

Undeveloped Areas

When sizing watermains to service currently undeveloped areas the population or development type used to calculate demand shall be based on the Official Plan and Zoning By-Laws for the area being considered. It is the Design Consultant's responsibility to obtain and consider the Official Plans and Zoning By-Laws of the municipality having jurisdiction over the area being serviced. In case of a conflict between the Area Municipality's and District's Official Plans and By-Laws, the Official Plan and By-Law which produces the higher demand shall be used.

Minimum Water Pressure Criteria

Watermain supply systems are to be designed to achieve the following minimum pressures under the noted demand scenario:

Demand Scenario	Minimum Acceptable Pressure Range (PSI)	
	Preferred	Accepted
Maximum Day Demand	50-70	40-100
Maximum Day + Fire	>20	>20
Peak Hour Demand	50-70	40-100
Average Day Demand	50-70	40-100
Min Hour Demand	50-70	40-100

Watermain Locations

In general, watermains shall be located out of the paved roadway and in the boulevard area behind curb (or ditch invert) in accordance with the District and Area Municipality's standard location drawings and must have a minimum horizontal separation of 2.5 m (edge to edge) from sewers or manholes. Under unusual conditions such as prevailing bedrock, severe dewatering conditions, or congested areas, the District will consider closer spacing and alternate locations which comply with Ministry separation criteria and procedures, e.g. Procedure F-6-1.

For partial watermain replacements, extensions or full reconstruction, the Design Consultant shall contact the District and the Area Municipality to establish the feasibility of locating the watermain within the boulevard. All non-standard watermain locations will require individual approval by the District and Area Municipality.

Joint deflection is not permitted. All changes in horizontal or vertical alignment shall be accomplished using manufactured bends.

Watermain Depth

Watermain shall be constructed with a minimum cover of 1.8 m to finished grade. Where cover requirements cannot be satisfied, insulation requirements shall be in accordance with the pertinent OPSD as appropriate. Approval of the reduced cover must be obtained from the

District prior to construction. Watermain depth shall not be greater than 3.0 m below finished grade.

Separation from Utilities

Generally, where watermains or services cross over utilities other than a sewer, a 0.3 m minimum clearance shall be provided. Where watermains or services cross under utilities, the minimum clearance shall be 0.5 m.

For a watermain or service crossing over a sewer, joints are to be offset a minimum of 2.5 m horizontally from the centerline of the sewer, maintain 0.5 m vertical clear separation and include 100 mm thick insulation placed between the sewer and main/service for a distance extending 1.8 m beyond the limits of the sewer crossing.

Watermains or services adjacent to a structure shall maintain a minimum separation of 0.5 m and be insulated for a distance extending 1.8 m beyond the limits of the structure.

Under no circumstances shall a watermain or sewer be constructed without complying with the separation requirements set out in the Ministry's Procedure F-6-1.

Abandonment of Watermain

All abandoned watermains shall be fully removed.

In certain severe circumstances, approval to abandon the watermain in place by capping and filling with grout may be granted by the District and the Local Area if applicable. The Consultant shall obtain this approval prior to completing the final submission for approval. A technical memo, detailing the basis for the request, must be provided for the District to consider this request.

Watermain in Casings

When installing watermains within casings, the following shall apply:

- Approval of the design must be obtained from the District;
- Casing pipe shall be designed by the Engineer to provide the necessary structural capacity to support both the live and dead loads applied to it and shall meet the requirements of the approval authority;
- All casing spacers are to be stainless steel or HDPE;
- Bearing surfaces (runners) shall be ultra-high molecular weight polymer or equivalent;
- Positioning of spacers along the watermain is to be as per the manufacturer's specifications;

- Position of pipe within casing to be centered and restrained, sufficient enough to provide no less than 19 mm (3/4 inch) clearance between the casing pipe and the outside diameter of the bell as per the manufacturers specifications and as approved by the District;
- The watermain shall be restrained laterally for the entire length of the casing;
- Casing to be sealed using wrap around rubber ends;
- The watermain shall be grouted inside the casing only where required by an outside approval authority.

Looping

Watermain designs shall eliminate dead-ends by looping the mainline back to the system creating a network. Designs that cannot provide looping, such as temporary stubs for future extension, shall be approved in advance by the District and will require a blow-off or fire hydrant installed at the discretion of the District. Permanent systems in cul-de-sacs shall be looped and include a blow off or hydrant as dictated by hydrant spacing requirements, in accordance with the standard drawings.

Thrust Restraints

Concrete thrust blocks are not permitted. Restrained joints shall be installed at all tees, bends, hydrants, end of mains and connections for all mains. Calculations will be required from the consultant in accordance with District standards and manufacturer's specifications to determine the number of joints to be restrained beyond the bend, fitting, tee, etc. See the Approved Products List for acceptable styles and products.

Disinfection and Testing of Watermains

Disinfection and testing of watermains shall be in accordance with the most current version of the Ministry "Watermain Disinfection Procedure" and current District Standard Operating Procedure WS-09 included in Appendix H. All sampling shall be performed by District staff.

Hydrostatic testing of watermains shall be in accordance with the current OPSS.MUNI 441.

Contractor shall submit a detailed plan and receive written approval of the plan from the District prior to connection. The supply of water for disinfection or testing shall be coordinated with the District. The watermain shall not be connected to the existing water distribution system without written authorization from the District. Connections, repairs or alterations to existing watermains must be completed under the direction, and in the presence of, the District's Chief Operator for the area or their designate. Super chlorinated water shall be dechlorinated prior to release.

3.5.3 Line Valves

General

All gate valves shall be resilient seat type to AWWA C-509 Standards. Line valves shall be the same size as the watermain except on mains 750 mm diameter and larger, where the valve size shall be one size smaller than the main.

Number, Location and Spacing

Valves are required on all legs of watermain intersections. These valves are to be located within 5 m of the watermain intersection.

Line valves shall be provided at a maximum spacing of 250 metres in residential areas, 150 metres in commercial and industrial areas and 300 metres on transmission mains.

When mainline (nonservice) connections are made to watermains 400 mm diameter or larger, a by-pass connection is required. The need for additional valves at by-pass connections is at the discretion of the District.

Valve Boxes

All valves shall be direct buried unless under special circumstances as required by the District.

The top of valve boxes and chamber covers shall be set flush with finished grade and remain accessible at all times. Tracer wire shall be installed to DMM 213.

Valve Box Protection

All line valve boxes and hydrant branch valve boxes are to be protected during construction and during the maintenance period. Valve boxes are to be brought flush with grade level prior to final approval.

3.5.4 Hydrants

General

All Hydrants shall be in accordance with the approved products list, construction specifications and be supplied with a location marker as per DMM 204.

All hydrants shall be post type, break-away flange, dry top, compression shut-off (with hydrant valve closing with the flow) and shall have two 2 1/2 " hose nozzles and one 4” STORZ connection. The operating nut shall be

1-1/4" square and the valve open counterclockwise. The barrel length shall be as specified on the plans. Barrel colour is either chrome yellow or red. Barrel and cap colour arrangement shall be verified by the designer with the District. Cap chains are not required.

Numbers and Spacing

Hydrants are to be installed at the following maximum allowable spacing measured along the right-of-way:

- 140 m in Residential Areas (detached and semi-detached)
- 110 m in Industrial, Commercial, Institutional and High-Density Residential Areas

The above maximums may be reduced at the Fire Department's request. Verify adequate fire protection for large buildings (i.e. distance to Siamese connection).

Branch Valves and Boxes

All hydrants shall have 150 mm branch valves and boxes. Hydrant branch tees from watermains 400 mm diameter and larger shall be flanged. Hydrant branches from watermains 300 mm diameter and smaller shall be fully restrained joints.

Locations

The location of the hydrants in relation to the street line shall be in accordance with the Area Municipality's approved relevant cross-section or in accordance with DMM 101 or 102 in the absence of local municipal standards. Valves shall be installed on the flanged outlet or fully restrained joints as applicable. Any non-standard location will require individual approval prior to construction.

Where possible, hydrants shall be installed at the side lot line between two lots. All hydrants shall have 1.2 m minimum horizontal clearance from all other utilities or structures and 12.2 m minimum horizontal clearance from all wood structures measured from the nearest point of the structure. Hydrants near driveways shall be located a minimum of 1.2 m clear from the projected garage (or edge of driveway, whichever is greater) in residential applications and 2.5 m separation in industrial, commercial or institutional areas.

If subsequent changes are made to the property or design during construction (i.e. driveway widened, entrance feature, etc.), all costs associated with the relocation shall be borne by Applicant.

Depth of Bury

1.8 m minimum cover is required over all hydrant service connections.

The hydrant safety breakaway flange must be located as required by OPSD 1105.010 and be field adjusted if required. Hydrant extension to adjust the length of a hydrant barrel, if necessary, shall be obtained from the manufacturer supplying the hydrant and installed as per the manufacturer's directions.

Drinking Water Sampling Hydrant

Drinking water sampling hydrants shall be installed as determined by District staff.

Generally, drinking water sampling hydrants are to be located in an accessible location, within a municipal right-of-way, preferably alongside lot boulevards or buffer blocks, as directed by District staff. Installation along lot/block frontage is discouraged.

3.5.5 Air Release Valves

Provision for air release is required at all high points. Refer to standard drawing DMM-208, all installations are to be within boulevard.

3.5.6 Water Services

All water services 50 mm diameter or less shall be HDPE Series 160.

Installation of watermain "stubs" for pre-servicing of future development is not permitted unless these undeveloped lands will be developed within 5 years and have an approved site plan in place.

Tracer wire must be installed with and along the pipe and brought to the surface at each service box.

Services 100 mm diameter or greater shall be disinfected in accordance with Ministry disinfection protocol.

Any residential services that are installed on a new PVC watermain will require the use of a stainless-steel double bolt service saddle or factory installed threaded fitting. Direct tapping will not be permitted under any circumstances.

Sizes

Single family polyethylene residential water services shall be 25 mm diameter minimum (smaller pipe sizes will not be permitted under any circumstances).

Where demand requires larger services, or where static system pressure is less than 45 psi, larger services may be required and should be confirmed through the design of the internal plumbing systems and in accordance with the Building Code Act. Where larger service sizes are proposed, a memo from the Designer explaining the requirement to increase the size shall be submitted prior to the final submission and will be subject to District approval.

Location

Water services shall be installed a minimum of 0.75 m from the edge of a driveway whenever possible. Water services shall maintain 0.75 m minimum horizontal clearance from all other service connections, utilities and structures. See DMM 202 and DMM 203.

Depth

Service depth shall have minimum 1.8 m cover to finished grade along their full length.

Main Stops

All corporation main stops shall be ball type taper inlet thread and compression joint outlet of warranted no lead brass or bronze construction, with blow out proof stainless steel stems and unfilled Teflon seats, rated for 300 psi conforming to ANSI/AWWA C800-05 and NSF/ANSI 61, Drinking Water System Components – Health Effects.

All water services shall have the same size main stop as the service pipe.

Curb Stops and Boxes

All curb stops shall be ball type with compression joint inlet and outlet, non-draining unless otherwise specified, of warranted no lead brass or bronze construction, with blow out proof stainless steel stems and unfilled Teflon seats, rated for 300 psi conforming to ANSI/AWWA C800-05 and NSF/ANSI 61, Drinking Water System Components – Health Effects.

For residential applications, all water service boxes (curb stops) shall be installed in grass areas with a minimum distance of 0.75 metres from the edge of the driveway.

Industrial and Commercial Water Services

All connections are to be located in accordance with DMM 202.

Planting Blocks

Water services to buffer blocks, parkettes and median plantings shall be no larger than 25 mm diameter and will only be permitted for Area Municipalities. Meters and backflow preventers are required.

Jurisdiction and maintenance agreements, including cost recoveries need to be clearly established when incorporating irrigation systems.

Water Meters

Water meters shall be supplied to the property owner by the District upon receipt of the completed connection permit application and appropriate fee.

3.6 Sanitary Sewer Systems

3.6.1 Sewer Use By-Law

Applicants will be required to abide by the District's Sewer Use By-Law which regulates and controls the discharge of waste into the District's sewer systems. Non-domestic and hauled wastewater dischargers shall contact the District to confirm whether a Waste Discharge Permit is required in accordance with the by-law, prior to discharging waste into the sanitary sewer system.

3.6.2 Design Flows

Design flows shall be in accordance with the Ministry's current version of the Design Guidelines for Sewage Works and the following;

Average Daily Flows

The average daily flow for infrastructure design purposes shall be calculated in accordance with the following table, which is considered to include a margin of safety. Actual usage data may be used for particular industrial uses when available and verifiable.

It is also noted the District has a Water and Sewer Capacity Allocation Strategy as per By-Law 2023-48 as amended for each Area Municipality based upon actual local demand data. This data is to be used by Design Consultants only for the calculation of Equivalent Residential Units (ERU's) when assigning available infrastructure capacity during the development agreement stage. Data in the Water and Sewer Capacity

Allocation Strategy is updated annually and shall be obtained from the District by the Design Consultant.

Average Daily Sanitary Sewage Flows

Development Type	Unit	Avg. Flow Rate	Peaking Factor
Residential	L/cap/day	450	As per Ministry Design Guidelines
Commercial and Institutional	As per Ministry Design Guidelines		
Heavy Industrial	m^3/ha/day	55	As per Ministry Design Guidelines
Light Industrial	m^3/ha/day	35	As per Ministry Design Guidelines

Population Equivalents Based on Land Use

Land use and population equivalents for infrastructure design shall be based on the District or Area Municipality's Official Plan and/or Zoning By-Law applicable to the area.

Residential

Population equivalent densities are to be calculated based on the Official Plan and/or the criteria in the following table:

Residential Population Densities

Density	Unit
Single Family	3.5 persons/lot or 15 persons/hectare
Semi-detached	3.5 persons/lot or 20 persons/hectare
Row dwellings	3.5 persons/lot or 40 persons/hectare
Apartments	240 persons/hectare

Extraneous Flows

Except for unusual circumstances, the infiltration portion of sewage flow for infrastructure design purposes shall be 0.28 L/sec/ha for all types of land use. This factor applies to the gross area of all lands.

Before Initial Acceptance and/or Assumption of new sewer installations, the source of any detected infiltration shall be found and rectified as a construction quality control matter such that infiltration is effectively zero.

Peak Domestic Sewage Flow Calculation

Q = IA + (PqM/86.4), where
I = peak extraneous flow (0.28 L/ha/s)
A = tributary area
P = population, in thousands
Q = average daily per capita domestic flow in L/cap/day
M = peaking factor (Harmon or Babbitt, min 2.0)

Harmon M = 1+ 14/(4+p0.5)
Babbitt M = (5/p0.2)

3.6.3 Gravity Sanitary Sewer Pipe Selection and Design

Minimum Sewer Size and Slopes

Minimum gravity sewer pipe size permitted is 200 mm dia. Minimum slopes shall be 0.5% except for the furthest upstream leg of sewer on any tributary of a system where a minimum grade of 1.00% is required if self-cleansing velocities cannot be achieved under pipe flowing full criteria. Any sewers proposed to be installed at a pipe slope less than 0.5% must be approved by the District prior to the final submission.

Pipe Size

Sewers shall be designed to ensure a flowing full velocity of between 0.6 m/s and 3.0 m/s using the Manning formula, and to flow at a maximum of 80 percent full flow design capacity of the pipe size. The Manning roughness coefficient shall be 0.013. Sanitary sewer design sheets shall indicate both actual and flowing full velocities.

Sewer Pipes and Appurtenances

Sewer pipes and appurtenances shall be in accordance with the current Approved Products List in Appendix C. All sewers with gradients of 4:1 or greater shall be anchored.

Location

Sanitary sewers shall generally be located on the centreline of the road, in accordance with the Area Municipality's standard locations and in accordance with the Standard Drawings in Appendix J, as appropriate. The sewer must have a minimum horizontal separation of 2.5 m (edge to edge) and a minimum vertical separation of 0.5 m (bottom of pipe to top of pipe) from any watermain as per Ministry design criteria. Where sewer is constructed in bedrock, a common trench design may be permitted in accordance with DMM 210 or 211 as applicable so long as the minimum vertical separation of 0.5 m (bottom of pipe to top of pipe) between the watermain and sewer is maintained. All non-standard sewer locations will require individual approval by the District and Area Municipality.

A 2.0 m horizontal separation between the sanitary sewer and storm sewer will be permitted to allow for common trench construction as long as the inverts of both sewers are relatively at the same elevation. Should the sewer inverts vary by more than 1.0 metre, a 3.0 metre separation shall be maintained.

Depth

Sewers shall be designed to service the minimum basement elevations in the adjacent lands. The sewer obvert shall be constructed a minimum of 1.8 m below the finished grade. Where cover requirements cannot be satisfied, insulation requirements shall be in accordance with OPSD. Approval of the reduced cover must be obtained from the District prior to construction. Any sewers proposed to be installed at a depth of 4.5 m or greater below finished grade are discouraged and will require particular approval by the District.

Installation

Sanitary sewers shall be installed in accordance with the appropriate OPSD. Bedding class and material shall be confirmed in the geotechnical investigation.

Maintenance Holes

Maintenance holes are required at the end of each line, at all junctions and at all changes in grade, pipe size, pipe material or alignment. All maintenance holes shall include frost straps conforming to DMM-309 and be designed according to the following criteria:

The maximum spacing shall be in accordance with Ministry Design Guidelines. For sewers of 375 mm diameter or less, maximum spacing is 120 m.

Minimum diameter shall be 1200 mm with minimum access diameter of 610 mm.

Minimum maintenance hole diameter shall be 1500 mm where an internal drop structure is required. All internal drop structures shall conform to OPSD 1003.031.

Drops through sanitary maintenance holes shall match the incoming and outgoing sewer slopes and be in accordance with the following:

Minimum drop on 0° turn	= 0.01 m
Minimum drop on 1° to 45° turn	= 0.03 m
Minimum drop on 45° to 90° turn	= 0.06 m
Maximum drop (without drop structure)	= 0.60 m

At maintenance holes where pipe sizes change, the above criteria shall be altered such that the obverts of the pipe are matched.

Prefabricated internal drop structures are required in maintenance holes where the difference in invert elevation is greater than 0.60 m. Approval of the use and type of drop structure must be obtained from the District.

All maintenance holes shall be prefabricated with a monolithic base.

Grade adjustment rings shall be HDPE and in accordance with the Approved Products List and shall not exceed 0.3 m total in height or 3 adjustment rings, whichever is less.

Ladder dimensions and spacing in all maintenance holes shall be in accordance with OPSD 406.010 and OPSD 704.010.

Watertight bolt down covers shall be provided on maintenance holes located in all easements and in areas where maintenance holes are susceptible to flooding and/or vandalism. The top of the cover shall be at least 0.3 m above finished grade. Where significant sections of sanitary sewers are provided with watertight covers, extended vents will be required at every third maintenance hole complete with vent filters to reduce odour. The elevation of the vents shall be above regional storm flood lines as determined by the appropriate authority and illustrated on the plan and profile drawings. Where possible, maintenance holes shall be accessible to maintenance vehicles and equipment and be positioned in a suitable location to allow for venting.

When a PVC or HDPE sewer is installed into a new or rebuilt maintenance hole an approved rubberized seal is required.

3.6.4 Sanitary Sewer Laterals Residential

All residential connections shall utilize materials listed on the current Approved Products list in Appendix C and be in accordance with OPSD 1006.010. The minimum diameter within the road allowance shall be 125 mm. The minimum cover at street line shall be 1.80 m, unless circumstances require otherwise. Connections directly into maintenance holes shall be minimized and reviewed on an individual basis. Cleanouts are required on the property (street) line on all residential gravity sewer connections in accordance with the Approved Products List and DMM-310A or DMM-310B.

Commercial / Industrial / Institutional

All commercial or industrial connections shall utilize materials listed on the current Approved Products list in Appendix C. The minimum diameter within the road allowance shall be 150 mm and installed in accordance with OPSD 1006.010. The minimum cover at street line shall be 1.80 m, unless circumstances require otherwise. At a minimum, a cleanout will be required at the street line. A maintenance hole will be required at the main for all services exceeding 150 mm diameter. Connection numbers are to be established prior to construction of the lateral. The District may require a maintenance hole be installed on the private property side of the ROW limit.

Users shall consult the District's Sewer Use By-Law which regulates and controls the discharge of waste into the District's sewer systems. Non-domestic and waste hauler dischargers may be required to obtain a Waste Discharge Permit prior to discharging to the District's sanitary sewer.

Non-Permitted Uses

In general, connections from foundation weeping tile drainage, roof drainage or any other storm water source are not permitted to discharge into the sanitary sewer system.

3.6.5 Lower Pressure Sewer (LPS) Pipe Selection and Design

All efforts must be made to design and construct sanitary sewer systems to operate under gravity. Only under very specific circumstances, the District will consider permitting the use of an LPS collection system. The Applicant must submit a Technical Memorandum justifying the need and setting out the criteria and methods for design of LPS systems. Approval must be obtained from the District before second design submission is made.

Should the District provide written approval to permit the use of a LPS collection system, the Applicant must comply with the following requirements as a minimum.

LPS Pipe Size

The low-pressure sewer shall be to have a flow velocity between 0.6 to 3 m/s with the lower limit preferred for initial phases. Sizing shall utilize the Hazen – Williams Formula. Minimum size of low-pressure sewer 50 mm diameter.

LPS Pipes and Appurtenances

Pipe shall be PVC conforming to the latest editions of AWWA C900, Class 150 or HDPE Series 160 or HDPE DR 17 and appurtenances shall be in accordance with the District's current Approved Products List.

LPS Location

Sewers shall be in accordance with the Area Municipality's standard locations and per Ministry separation criteria and procedures, e.g. Procedure F-6-1. All non-standard sewer locations will require individual approval by the District and Area Municipality.

LPS Depth

The obvert shall be constructed a minimum of 1.8 m below the finished grade. Where cover requirements cannot be satisfied, insulation requirements shall be in accordance with OPSD. Approval of the reduced cover must be obtained from the District prior to construction.

LPS Installation

Sewers shall be installed in accordance with the appropriate OPSD. Bedding class and material shall be confirmed in the geotechnical investigation. All LPS and services require tracer wire installed with the sewer and brought to grade at all valves, chambers or maintenance holes in accordance with the appropriate DMM.

LPS Maintenance Holes/Chambers

Maintenance Holes in accordance with Section 3.6.3 are required at all junctions between a LPS and a gravity sewer. Connection of the LPS to a maintenance hole shall be core drilled to provide direct discharge to the benching and utilize a rubberized seal adapter appropriate for the connection.

Drops through sanitary maintenance holes at the connection of the low pressure sewer shall be a minimum of 0.06 m and a maximum of 0.30 m, shall be fully benched and shall not be installed within 0.3 m of the ladder rungs.

Watertight bolt down covers shall be provided on maintenance holes located in all easements and in areas where maintenance holes are susceptible to flooding and/or vandalism. The top of the cover shall be at least 0.3 m above finished grade. Where the LPS discharge maintenance hole is provided with a watertight cover, extended vents will be required complete with vent filters to reduce odour. The elevation of the vents shall be above regional storm flood lines as determined by the appropriate authority and illustrated on the plan and profile drawings. Where possible, maintenance holes shall be accessible to maintenance vehicles and equipment and be positioned in a suitable location to allow for venting.

Air release valves and chambers shall be installed at all high points in the LPS system in accordance with DMM-306. Chambers shall be located outside of travelled portion of lanes.

LPS cleanouts in accordance with DMM 301 and 304, as applicable, shall be provided at all changes in low pressure sewer size and the terminal end of all LPS. Where cleanouts cannot be located in the boulevard, the Design Consultant shall submit an appropriate design in chamber for approval by the District. A fire hydrant shall be located within 20 m of the cleanout.

LPS Line Valves

Line valves shall be provided at a maximum spacing of 150 metres in high density residential, commercial and industrial areas, and 250 metres in other residential areas. Line valves shall be installed on both sides of a change in main diameter and all legs of any sewer main branches.

LPS Laterals

All service connections shall include a shut-off valve on property (street) line and a check valve on private property, utilizing materials on the District’s current Approved Products List. Low pressure services discharging to a gravity service connection shall be in accordance with DMM 303. The minimum cover at street line shall be 1.80 m, unless circumstances require otherwise. Connections directly into maintenance holes shall be minimized and must be approved by the District on an individual basis. Where HDPE pipe is utilized for the LPS main, all connections to the main shall utilize fused tees with threaded adaptors in place of service saddles.

LPS Connection Protocol

LPS connections directly to a sanitary gravity sewer main are not permitted.

Non-Permitted Uses

Connections from foundation weeping tile drainage, roof drainage or any other storm water source are not permitted to discharge into the LPS system.

3.6.6 Sanitary Forcemain Design

Design of forcemains shall be in accordance with the Ministry's current version of the Design Guidelines for Sewage Works.

Transient Analysis

A transient analysis will be required to support all forcemain design submissions to the District.

Force main Pipes and Appurtenances

Force main pipe shall be PVC conforming to the latest editions of AWWA C900, Class 150 or HDPE DR 17 at a minimum. The Design Consultant shall confirm the appropriate pipe type based on the operating pressure of the Pumping Station. Appurtenances shall be in accordance with the District's current Approved Products List.

Location

Force mains shall be located in accordance with the District and Area Municipality's standard locations and per Ministry separation criteria and procedures, e.g. Procedure F-6-1. All non-standard force main locations will require individual approval by the District and Area Municipality.

Depth

The force main obvert shall be constructed a minimum of 1.8 m and a preferred maximum of 2.4 m below the finished grade. Where minimum cover requirements cannot be satisfied, insulation requirements shall be in accordance with OPSD. Approval of burial depths outside the above limits must be obtained from the District prior to construction.

Installation

Force mains shall be installed in accordance with the appropriate OPSD. Bedding class and material shall be confirmed in the geotechnical

investigation. All force mains require tracer wire installed with the pipe and brought to grade at all valves, chambers or maintenance holes in accordance with the appropriate DMM.

Maintenance Holes/Chambers

Maintenance Holes in accordance with Section 3.6.3 are required at all junctions between a force main and a gravity sewer. Connection of the force main to a maintenance hole shall be core drilled to provide direct discharge to the benching and utilize a rubberized seal adapter appropriate for the connection.

Watertight bolt down covers shall be provided on maintenance holes located in all easements and in areas where maintenance holes are susceptible to flooding and/or vandalism. The top of the cover shall be at least 0.3 m above finished grade. Where the force main discharge maintenance hole is provided with a watertight cover, extended vents will be required complete with vent filters to reduce odour. The elevation of the vents shall be above regional flood lines as determined by the appropriate authority and illustrated on the plan and profile drawings. Where possible, maintenance holes shall be accessible to maintenance vehicles and equipment and be positioned in a suitable location to allow for venting.

Air release valves and chambers shall be installed at all high points in the force main in accordance with DMM 306. Chambers shall be located outside of travelled portion of lanes.

Vacuum relief valves shall be installed upstream of all areas where a siphoning effect may be encountered. All areas where a vacuum may be present shall be reviewed, and design criteria developed, in conjunction with the District at all stages of design review.

Swab launching chambers shall be installed at the sewage pumping station in accordance with DMM 308.

Line Valves

Line valves shall be provided where appropriate for isolation and maintenance. The need and locations for line valves shall be reviewed with the District during all design stages.

3.6.7 Sewage Pumping Station Design

Design of sewage pumping stations shall be in accordance with the Ministry's current version of the Design Guidelines for Sewage Works. All proposals including pumping stations shall receive advance approval from

the District. The criteria, methods and layout for design of sewage pumping stations shall be approved by the District in advance.

Minimum Station Requirements

All pump stations shall include the following;

- All pumping stations shall have standby power equipment. The need for a permanently mounted external generator or connection suitable for a portable generator shall be reviewed with the District during preliminary design stage,
- Pumping stations shall be designed, in general, to minimize the access requirements by personnel,
- All valves, including for air relief, are to be contained in an approved building structure,
- Pumps shall be selected from the Approved Products List,
- Climate control and ventilation system of all areas where maintenance personnel may enter, to be in accordance with the requirements of NFPA 820 and the Ontario Electrical Code,
- Piping and appurtenances shall be stainless steel or epoxy coated and in accordance with the District “Approved Products List”,
- Swab launching facility and bypass,
- Security system,
- Communication and SCADA system complying with the District Sewage Pumping Station Control Narrative and layout drawings, and compatible with existing system.

Location

The location of sewage pumping stations shall be approved in advance by the District and shall accommodate growth plans outlined in the Official Plans of the District and Area Municipalities.

Wet Wells

Precast concrete wet wells shall include frost straps as per OPSD 701.100, lockable stainless steel access hatches complete with thief hatch providing sufficient opening size to replace pumps, lifting davits for removing pumps and confined space entry equipment. Travel restraint bases as per District specifications and Approved Products List.

Watertight covers shall be provided on wet wells located in areas susceptible to flooding and/or vandalism. The top of the cover shall be at least 0.3 m above finished grade. Vents will require filters to reduce odour. The elevation of the vents shall be above Regional storm flood lines as determined by the appropriate authority and illustrated on the plan and profile drawings. Wet wells shall be accessible to maintenance vehicles

and equipment and be positioned in a suitable location to allow for venting.

Approved Products List

The products specified in Appendix C shall be utilized in the sanitary sewage system. All requested substitutions, or products for purposes not listed, shall be approved by the District prior to construction.

3.7 Storm Sewer Systems and Storm Water Management

3.7.1 General

District storm sewers and ditches are generally designed to convey run-off from the right-of-way of a District Road only. Where necessary, contributing flows from development sites are to be controlled in accordance with the criteria in this section prior to entering the District storm system.

General conveyance of storm water:

- Rural roads - ditches and culverts shall be provided for conveyance of storm water flow to outlet(s);
- Urban roads with curbs and gutters - provide storm sewers and catchment points equipped with catch basins.

In general, re-grading within any District right-of-way to support adjacent development will not be permitted, unless it can be demonstrated to the satisfaction of the Commissioner there is a net benefit to an existing situation.

3.7.2 Storm Water Management Requirements

- A storm water management report which addresses quality and quantity control in accordance with Ministry requirements will be required for all developments other than one single family residential dwelling. The report shall illustrate appropriate storm water management techniques and design flows;
- Post-Development flows must be equal to or less than Pre-Development levels for all storm events up to and including the 100 year event. Safe overland conveyance of flows from storms in excess of the 100 year event must be incorporated into the design;
- “Enhanced” level of water quality treatment (80% TSS removal) is to be provided prior to discharging from a site, in accordance with Ministry requirements,
- LID principles, including treatment train measures, shall be employed to achieve water quality and quantity objectives.

3.7.3 Design Flows

Design flows shall be calculated in accordance with the Ministry's current version of the Stormwater Management Planning and Design Manual, and with the Design Guidelines for Sewage Works, and the following;

- Design storms are to be modelled for 2, 5 10, 25 and 100 year design storms;
- Storm event criteria used in design shall be in accordance with The District's current Muskoka Rainfall Data - Intensity-Duration-Frequency Values in Appendix D;
- Use of the Rational, or Modified Rational Method, to calculate runoff is to be limited to drainage areas less than 5 ha, in general. Accordingly, the Rational Method shall be used for sizing storm sewer pipes in residential development areas for a 5 year return period storm event, at maximum 80% capacity in a subcritical condition;
- Urban commercial developments on local roads shall utilize a 10 year return period storm event for a minor system;
- Runoff from larger, complex drainage areas for stormwater management design and storage requirements is to be calculated using software programs such as OTTHYMO, MIDDUS or OTTSWMM, as appropriate. The designer shall justify their software selection in their design report;
- Pipe sizing shall be based on actual flow velocity as calculated using the Manning formula, Q = (1/n)AR2/3S1/2, with a minimum velocity of 0.75 metres per second and a maximum velocity of 6.0 m/s during the design event.

3.7.4 Gravity Storm Sewer Pipe Design Minimum Sewer Sizes

The following lists the minimum pipe sizes allowable;

- Single catch basin lead 300 mm
- Double catch basin lead 375 mm
- Storm sewer main 300 mm

Minimum Pipe Slope

The minimum pipe slope shall be 0.5%. Proposed lower slopes may be considered for large diameter trunk sewers or where constraints necessitate and shall require approval by the District or Area Municipality prior to construction.

Location

Sewers shall be located in accordance with the Area Municipality's standard locations. Where local municipal standards for sewer installation locations are not available or when installation is located within a District

roadway, installation shall be in accordance with DMM 102. The preferred location of the sewer main is in the centre of the driving lane. The sewer must have a minimum horizontal separation of 2.5 m (edge to edge) and a minimum vertical separation of 0.5 m (bottom of pipe to top of pipe) from any watermain as per Ministry design criteria. Where sewer is constructed in bedrock a common trench design may be permitted in accordance with DMM 210 or 211 so long as the minimum vertical separation of 0.5 m (bottom of pipe to top of pipe) between the watermain and sewer is maintained. All non-standard sewer locations will require individual approval by the District and Area Municipality.

A 2.0 m horizontal separation between the sanitary sewer and storm sewer will be permitted to allow for common trench construction as long as the inverts of both sewers are relatively at the same elevation. Should the sewer inverts vary by more than 1.0 metre, a 3.0 metre separation shall be maintained.

Depth

The sewer obvert shall be constructed a minimum of 1.2 m below the finished grade. Where frost cover requirements cannot be satisfied, insulation requirements shall be in accordance with OPSD. Approval of the reduced cover must be obtained from The District prior to construction. Applicants shall consider the minimum basement elevations in the adjacent lands if footing or similar private drains are to be connected to the storm sewer system.

Installation

Sewers shall be installed in accordance with the appropriate OPSD. Bedding class and material shall be confirmed in the geotechnical investigation.

Maintenance Holes/Catch Basins

- Spacing shall be determined based on inlet capacity of grates.
- The maximum spacing between maintenance holes shall be 110 m for sewers less than 300 mm diameter, 120 m for sewers 300 mm to 900 mm diameter and 150 m for sewers 975 mm to 1350 mm diameter.
- The maximum spacing between catch basins shall be 110 m for road gradients between 0.0 and 3.0%, 90 m for road gradients between 3.0 and 4.5% and 75 m for road gradients greater than 4.5%.
- Drops through maintenance holes shall match the incoming and outgoing sewer slopes and be in accordance with the following:

Minimum drop on 0° turn	= 0.01 m
Minimum drop on 1° to 45° turn	= 0.03 m

Minimum drop on 45° to 90° turn = 0.06 m
Maximum drop (without drop structure) = 0.30 m

- At maintenance holes where pipe sizes change, the above criteria shall be altered such that the obverts of the pipe are matched.
- Prefabricated internal drop structures are required in maintenance holes where the difference in invert elevation is greater than 0.60 m.
- A minimum 1500 mm diameter maintenance hole is required when there is an internal drop structure.
- Grade adjustment rings shall be in accordance with the Approved Products List and shall not exceed 0.3 m in height.
- When a PVC or HDPE sewer is installed into a new maintenance hole a sealing boot is required in accordance with the Approved Products List.
- Catch basin and storm maintenance holes shall include sumps with a minimum depth of 0.6 m.
- All maintenance holes shall be prefabricated with a monolithic base.

Catchment Points

- The design for catch basin location and type shall take into consideration the lot areas, lot grades, road widths and road grades. Design Consultant shall complete inlet grate review and confirm appropriate inlets types and catch basin spacing to suit.
- Road grading shall be assessed for efficient drainage of storm water to provide safe passage of vehicles.
- At street intersections, catch basins shall be located immediately upstream of sidewalk or pedestrian crosswalks.
- Catch basins shall be located upstream of the curb depression for any driveway and shall not be located within the driveway entrance area.
- Catch basins, inlet grates and connections shall provide for the expected maximum flow.
- Double catch basins are to be provided where flows are to be collected from two directions.
- Catch basin grates shall be to OPSD 400.010.
- Ditch inlet catch basins shall be designed to allow intake of expected flow rates at 50% blockage from debris.

Outfall Structures

All outfalls shall include a headwall to OPSD 804.030 or 804.040 as appropriate and include grating to OPSD 804.050. Design Consultant shall be responsible for confirming suitable erosion protection measures are included at the outfall and downstream of the outfall.

3.7.5 Storm Sewer Laterals

Residential

All residential connections shall utilize materials listed on the current Approved Products list in Appendix C and be in accordance with OPSD 1006.010. The minimum diameter within the road allowance shall be 125 mm. The minimum cover at street line shall be 1.20 m, unless circumstances require otherwise. Services with less than the minimum cover shall be insulated in accordance with OPSD. Connections directly into maintenance holes shall be minimized and reviewed on an individual basis.

Commercial / Industrial

All commercial or industrial connections shall utilize materials listed on the current Approved Products list in Appendix C. The minimum diameter within the road allowance shall be 150 mm and installed in accordance with OPSD 1006.010. The minimum cover at street line shall be 1.20 m, unless circumstances require otherwise. Services with less than the minimum cover shall be insulated in accordance with OPSD. A maintenance hole will be required at the main for all services exceeding 150 mm diameter.

Approved Products List

The products specified in Appendix C shall be utilized in the storm sewage system. All requested substitutions, or products for purposes not listed, shall be approved by the District prior to construction.

4 Design Criteria for District Road Projects

4.1 Introduction

The following procedures and guidelines provide a series of steps to ensure that all District requirements are met during the conceptual and design periods of a District Road.

All design works are to be carried out in accordance with the latest revision of this manual, Roadway Design Manuals from the Transportation Association of Canada (TAC), the Ontario Traffic Manual (OTM), and Ministry of Transportation of Ontario (MTO), OPS Standard drawings and specifications, the Occupational Health and Safety Act (OHSA), and the Ontario Electrical Safety Authority (ESA).

Bridge structures shall be designed in accordance with the latest edition of the Canada Highway Bridge Design Code (C.H.B.D.C.). Bridges shall be planned and designed in accordance with M.T.O. Standard Planning Guidelines; Structural Manual; Roadside Safety Manual and Geometric Design Standards.

Railway structures shall be designed to the latest edition of the American Railway Engineering Association (A.R.E.A.) and design guidelines of applicable authorities.

All municipal roadway projects are subject to the Environmental Assessment Process. The designer is to refer to the manual for the MEA Class Environmental Assessment in order to fulfil that process.

Prior to the commencement of any road project, confirm the availability of funds and the project scope.

4.2 District Roadway Classification

District roads shall be classified based on the intended function of the corridor and the anticipated traffic volumes. Residential areas shall encompass all road classifications, whereas roads within industrial areas shall be either Primary or Secondary, dependent on the length of street, traffic volumes and the anticipated volume of truck traffic. Proposed classifications of streets within developments shall be reviewed and confirmed with the District prior to final design.

The Table below presents various design elements considered appropriate for each road classification. It is intended as a guide only, and should be read in conjunction with the latest edition of the Official Plan of the District Municipality of Muskoka which categorizes District roadways as either Class A, B or C.

Road Classification Elements

Design Element	Primary Arterial Class A	Secondary Arterial Class B	Urban Class C
Speed Limits	80 km/h currently < 80 km/h due to road conditions but will be upgraded to 80 km/h as funds permit road reconstruction	80km/h or less currently < 80 km/h due to road conditions but will be upgraded to 80 km/h as funds permit road construction	80 km/h or less
Traffic Service Function	connect development centres or are generators of substantial traffic	intended to provide for the safe, efficient movement of traffic, and the provision of access to abutting lands	intended to provided equally for the safe, efficient movement of traffic and the provision of access to abutting lands
Traffic Volumes	< 12,000 AADT	< 3,000 AADT	-
Connections	freeway, highway, arterial, collector, local	highway, arterial, collector, local	highway, arterial, collector, local
Vehicle Usage	all types	all types	option to restrict heavy trucks under certain circumstances

Design Element	Primary Arterial Class A	Secondary Arterial Class B	Urban Class C
Location (Schedule H, Muskoka Official Plan)	generally located in the Rural and Waterfront designation	generally located in the Rural or Waterfront designation	generally located within Urban Centres, Communities, New Communities, Special Character Areas, and the more built up areas within the Waterfront and Rural designations
Minimum Lot Frontage	all new lots that front on roadway shall generally have a minimum lot frontage on the road of 150 m	all new lots that front on roadway shall generally have a minimum lot frontage on the road of 135 m	lots fronting on the roadway generally exhibit lot frontage standards detailed in local or other documentation
Road Cross Section	1 lane per direction with partially paved shoulders and open roadside ditches	1 lane per direction with partially paved shoulders and open roadside ditches	1 or 2 lanes per direction with curb and gutter
Traveled Lane Width *	3.75 m	3.75 m	3.75 m
Shoulder Width **	1.0 m paved + 0.5 m gravel	0.5 m paved + 0.5 m gravel	N/A

* Travel lane width on two lane arterial roads is considered to be from centreline to painted edge line.

Travel lane width on two lane urban roads with curb and gutter is considered to be from centreline to edge of asphalt.

** Consult Schedule G, Active Transportation Strategy, for additional requirements to fulfil AT recommendations.

4.3 Approvals

Approvals may need to be obtained prior to commencing construction. Approvals include but are not limited to Local Municipalities, Provincial authorities (MTO, MOE, MNRF), Federal authorities (DFO, NPP) and railroads (CN and CP Rail). An Archeological Study may also be required.

Approvals for road closures and detours shall be obtained from District Council and will require mandatory consultation with emergency services and Local Municipalities.

4.4 Traffic Impact Assessment (TIA)

A TIA shall be in accordance with the guidelines in Appendix E of this criteria document. A TIA and any other studies are required prior to the start of functional designs, Environmental Assessments and detailed design.

4.5 Property Requirements

Road Widening

District rights-of-way are designated with certain widths, as indicated in the District's Official Plan. If the right-of-way is not at its designated width, a widening would be required to bring the right-of-way to the designated width at a minimum, or as necessitated by detailed design.

Daylight Triangle

The daylight triangle is a designated piece of property located on all quadrants of an intersection. Its purpose is to allow clear sight lines to motorists entering the intersection. If not in place, a daylight triangle must be dedicated to the District, sized in accordance with TAC Roadway Design Manuals.

0.3 Metre Reserve

The 0.3 metre reserve is a parcel of land parallel to the property line including the daylight triangle, located immediately outside the right-of-way. The reserve is continuous except at legal approved access points, where it is either "lifted" or not imposed by the District.

Road widening, daylight triangle and 0.3 m reserves must be identified on a 35R-Plan created by the Applicant's surveyor in draft format for review and approval by the District prior to being deposited. Documents

transferring the property to the District must also be executed by the District's Legal Department. The draft reference plan is required to be accompanied with the necessary parcel abstracts and supporting documents indicating the District's ownership. The land is required to be dedicated free and clear of all encumbrances. All costs associated with the transfer are the responsibility of the Applicant/Owner.

“Lift” Land Reserve

Where a 0.3 metre reserve is already present, and a request is made for access, a portion of the reserve must be "lifted". The Applicant's surveyor shall create a 35R- Plan as stated above for approval by District staff.

4.6 Access to District Roads

The design and construction of access to a District Road shall be approved by the District as per The Policy and Procedures for Access onto District Roads, included in Appendix F, as amended. This would include the location of the access along the frontage of the property taking into consideration access spacing, sight lines, traffic safety and flow.

The following describe requirements and specifications for items that may be required for review, as determined by District staff, prior to permitting construction.

Access Agreements

An Access Permit shall be obtained from the District in accordance with District’s Policy and Procedures for Access onto District Roads

Securities

The Applicant must prepare a cost estimate for all works, including traffic control signals, within the District right-of-way. The estimate allows the District to ensure that all requirements have been addressed and that a realistic cost is applied to the project.

Works to be performed by the Applicant within the District right-of-way are required to be secured by a Letter of Credit or certified cheque for 100% of the estimated value of the approved works.

The security is reduced to 20% or $1,500.00 minimum, upon completion of the work and correction of any deficiencies. At the end of the two (2) year maintenance period, a final inspection will be conducted. When the final inspection, “As-Recorded” drawings and statutory letter of declaration are found to be satisfactory, the remaining holdback will be released.

Insurance Certificate

The District requires that the Applicant provide proof of comprehensive liability insurance at a minimum of 5-million-dollars and that the District be named on the certificate as additionally insured.

Access Engineering Plans

Engineering plans of access and related appurtenances shall be submitted for review and approval.

The plans shall include the following at a minimum:

- Cross-section of the access from centre median to property line;
- Relocation of all road and roadside appurtenances resulting from construction i.e. hydro poles, signs, CB's, etc.;
- Traffic control signs and pavement marking;
- Centre median, new or extended;
- Applications that include substantial reconstruction of the right-of-way in order to construct the access will require separate plans for roadwork, relocations, grading, drainage and pavement marking/ signs;
- Proposed modifications to the existing road shall clearly specify the works proposed to be carried out and shall indicate existing and proposed road composition;
- Proposed road design modifications shall be designed to the District's Engineering Design and Criteria Manual and comply with the latest OPS Standards;
- A key plan is to be included on all drawings in the upper right-hand corner, indicating existing roads and highways around the site;
- Plan drawings shall be prepared at a 1:500 scale and Profile Drawings at a 1:50 scale;
- A north arrow must be shown on all drawings.

The drawings set shall include:

- Typical Sections Drawing;
- Pavement Grading and Drainage Drawing;
- Pavement Marking and Signage Drawing;
- Traffic Control Signal Design Drawings.

All drawings shall be stamped and signed by a professional engineer registered in the Province of Ontario.

4.7 Road Project Design Review

30% Design Requirements

The following are required for review and comments:

- Design Criteria;
- Topographic Survey;
- Cross Sections;
- Preliminary Design Plan.

60% Design Requirements

Upon completion of preliminary road design, provide, at minimum, the following;

- One (1) complete set of contract drawings;
- Return redlined drawings with resubmission.

90% Design Requirements

Upon completion of road design, provide, at minimum, the following:

- One (1) complete set of contract drawings;
- One (1) complete set of contract documents;
- Return redlined drawings with resubmission.

Final Revisions

Revise contract drawings and documents if necessary and resubmit one set of complete drawings and documents with redline set for final review.

4.8 Geotechnical Investigation

A geotechnical Investigation is required for all reconstruction, widening or extensions to District roads and shall consider the following as a minimum;

- Assessment of the existing pavement condition and composition;
- Sub-surface investigation to determine soil composition, strength and type under the existing pavement including a chemical analysis of each type of soil encountered. In the event of sewer and/or watermain installation included as part of roadwork, the investigation should be carried to a minimum of one (1) metre below the deepest proposed pipe line inverts;
- Groundwater conditions and levels; and,
- The report from the geotechnical consultant shall contain the data collected from the investigation and provide recommendations with respect to any necessary drainage works, required granular base thicknesses and pavement composition based on the traffic volumes for the roadway or projected traffic volumes.

4.9 Construction Staging/Detours

All construction staging is to be reviewed and approved by the District prior to construction. This aspect of design needs careful consideration to provide motorists with as smooth as possible passage through the construction zone with no undue delays or surprises (i.e. unexpected design elements). The design must be in accordance with Ontario Traffic Manual Book 7, "Temporary Conditions" and shall take into consideration traffic patterns so that the level of service will not be significantly affected, especially during peak hours.

Temporary pavement marking and road signage are to be designed and applied in accordance with the OTM Book 11, "Pavement, Hazard and Delineation Markings", OTM Book 7 "Temporary Conditions" and OPS specifications and standard drawings.

In the event traffic flow will be considerably reduced, a detour shall be considered. If no practical detour is available, a temporary paved detour may be required. The detour may require illumination. All proposed detours require District approval prior to implementation.

In the event local roadways are to be used as a detour, Area Municipality consent is mandatory. Approval must be obtained from District Council for a District Road closure. Note that a two month lead time is required to close a District Road.

All staging plans to be designed as detailed traffic management plans in accordance with the requirements of the Ministry of Labour's Health and Safety Act and OTM Book 7 in advance of implementation.

4.10 Temporary Works

- Pedestrian access shall be maintained.
- Through lanes shall maintain a minimum width of 3.5 metres, unless otherwise approved.
- Delineation of traffic between motorists traveling in opposite directions shall be undertaken with a yellow centre line as opposed to traffic cones.
- New Jersey Barriers (NJB) with crash attenuation devices must be used on long term projects as opposed to barrels.
- Traffic signal heads shall be adjusted for visibility.

4.11 Drainage Design Requirements

The District utilizes the latest version of the following Ministry of Transportation (MTO) documents in drainage design for its roadway elements:

- Highway Drainage Design Standards; and,
- Drainage Management Manual.

The hydrology and hydraulics criteria presented in these documents for the design of bridges, culverts and roadside ditches shall be followed, at a minimum. The District reserves the ability to require more stringent criteria than recommended in these documents in any circumstance should conditions require, thus the designer should confer with District staff on this basis at the outset of a project.

4.12 Geometric Design Requirements

All roadway geometrics shall be designed in accordance with the latest editions of the TAC Geometric Design Guide for Canadian Roads (TAC-GDG-2017); MTO Geometric Design Supplement; and details outlined within these standards. The more conservative criteria shall govern for the following and all other requirements.

- minimum stopping sight distance
- minimum sag curve k value
- minimum crest curve k values
- minimum curve radius
- minimum lane width
- minimum width of pavement
- pavement crossfall
- minimum grade
- maximum grade
- intersection angles
- minimum tangent between intersections
- minimum tangent between reverse curves

Standard Drawings for road works shall be in accordance with the District Standard Drawings (DMM's) and Ontario Provincial Standards (OPS) for Roads and Municipal Services. General conditions of contracts and specifications for construction shall be in accordance with the District's Construction Specifications and Ontario Provincial Standards for Roads and Municipal Services. In case of conflict District standards shall govern.

4.13 Minimum Rights-Of-Way & Design Speed

The minimum rights-of-way and design speeds are noted in the table below.

Right-of-way widths may increase to accommodate lane requirements, utilities or grading requirements.

Design speed shall be 20 km/hr above the posted speed limit.

Minimum Rights-of-Way & Design Speed

	Primary Arterial	Secondary Arterial	Urban
Minimum Right-of-Way	26 m	26 m	26 m
Design Speed	80-100 km/h	60-100 km/h	60-80 km/h

4.14 Design Elements

Horizontal Curves

Centreline radii less than 90 metres will not be accepted. Curve widening is required in accordance with TAC Roadway Design Manuals.

Vertical Curves

All points of grade change in excess of 1% shall be designed with vertical curves. The minimum vertical curves to be used are outlined in the geometric references listed prior.

Super elevation

Super elevation is required on all District arterial roads and is to conform to TAC geometric design guidelines.

Intersecting Roadways

Roadways should be designed to intersect at 90 degrees. However, this may be reduced to 80 degrees if a 90 degree intersecting angle is not achievable. Intersections on curves are not desirable; however, should no other alternative exist sufficient calculations and drawings shall be submitted to the District for review to adequately demonstrate that sufficient sight distances exist to satisfy all geometric requirements.

Backfall at Intersection Streets

At all roadway intersections, the normal crossfall of the higher-class roadway shall not be interrupted by the crown line of the minor roadway. A 1% to 2% backfall shall be provided on the minor road at all road intersections. This backfall shall continue to the end of the approach or curb return radii to facilitate proper drainage of the intersection.

Cul-de-sacs & Bulbs

Cul-de-sacs will be permitted on dead end Secondary Arterials and Urban roads only. Sufficient details shall be shown to determine that the proper drainage shall be provided. Cul-de-sacs for rural roads shall be per OPSD 500.010 whereas those on urban roads shall be per OPSD 500.020. Islands will not be approved inside of cul-de-sacs. The design or installation of “hammer head” type turning facilities will not be permitted on District roads.

Transition Treatments and Frost Treatments

All subgrade transitions shall be treated with the appropriate 205 series OPSD (f=1.8 m). Frost treatments at culvert or utility crossings shall be in accordance with the appropriate 803 series OPSD (f=1.8 m).

Shoulders

The District’s Active Transportation Strategy shall be consulted to ensure shoulder requirements are achieved in relation to road shoulders. In general, Primary Arterial roads shall have a minimum 1.0 m wide paved shoulder except certain sections of 100 series roads (Muskoka Roads #117, 118, 169) which shall have a 1.5 m wide paved shoulder. Secondary Arterial roads with an AADT > 2000 shall have 1.0 m wide paved shoulder. Paved shoulders shall match the road crossfall and be equivalent to the surface course asphalt in material, thickness and quality of finish. All other Secondary Arterial roads shall have minimum 0.5 m paved plus 0.5 m wide granular A surfaced shoulders at 6% crossfall or as necessary to suit superelevation.

Concrete Curb & Gutter

On urban roads, and where required on rural roads, concrete curb and gutter shall be per OPSD 600.040 Barrier Curb with Standard Gutter. The District, at its discretion may require barrier, mountable or semi mountable curbs in specific instances.

Two stage curb and gutter may be permitted on local roads in accordance with OPSD 600.070 where circumstances warrant, such as with planned multiple unit house construction.

Minimum grade on curb shall be 0.5%, with a minimum of 0.75% being preferable.

Driveway depressions shall be formed in the required location. Saw cutting of curb to create a depression will be permitted. The capping of existing or improperly located depressions shall not be permitted. Minimum length of repairs shall be 1.0 metre.

Pavement Markings

Pavement markings are required on all classifications of District roads and are to be water based. Pavement marking design to be in accordance with Ontario Traffic Manual Book 11. All pavement marking installation to be per OPSS 710.

All temporary and final roadway and intersection markings shall be shown on a plan view drawing. The use of symbols to indicate line markings is not acceptable; rather, the drawings must clearly indicate to scale what is to be applied in the field.

Sidewalks

The requirement for concrete or asphalt sidewalk, along with the requirement for placement on either one side of the roadway or both shall be confirmed with the District prior to the start of detail design. When required, the location will be per the District's typical cross sections. On 26.0 m roadways with an urban cross section, sidewalk shall be placed on both sides.

The necessity for sidewalk along rural roadways will be evaluated on a site/area specific basis, but generally will only be considered in locations adjacent to schools and recreational areas.

The minimum width of sidewalk shall be 1.5 metres and shall be in accordance with OPSS 351, OPSD 310.010, OPSD 310.020, OPSD 310.030 and the District's typical cross sections. Asphalt sidewalks shall include 150 mm thick Granular A base and 50 mm thick HL 3 Asphalt. All sidewalk designs must satisfy the requirement of the applicable provincial legislation for accessibility including, but not limited to curb ramps and tactile walking surface indicators to the satisfaction of the District.

Guiderail

The need for guiderail shall be determined and designed in accordance with the current Roadside Design Manual (MTO) and Roadside Evaluation Manual (MTO).

Driveway Access

Driveway access shall be in accordance with the District's Policy and Procedures for Access onto District Roads manual included in Appendix F, Highway Access Management Guidelines, Commercial Site Access Policy and Standard Designs and/or the TAC manual. The more stringent guidelines shall govern.

The table below illustrates the minimum driveway access requirements.

Driveway Access Requirements

Design Element	Residential	Commercial, Light Industrial & Apartments	Heavy Industrial
Surface Asphalt	50 mm HL3 (optional)	40 mm HL3	50 mm HL3
Binder Asphalt	-	50 mm HL4	2x50 mm HL4
Granular A	150 mm if asphalt, 200 mm if gravel	150 mm	150 mm
Granular B	-	200 mm	450 mm

Rural driveways shall include an entrance culvert unless located at a high point in the drainage system. Minimum length of the culvert shall be 9.0 metres and shall be made of either polymer coated CSP (2.0 mm minimum gauge) or HDPE (320 kPa) with a minimum diameter of 450 mm. Smaller diameters will be allowed where ditch depth does not suit 450 mm, and/or adequate cover cannot be achieved. Entrance side slopes shall be 3H:1V.

Grading, Drainage and Erosion Protection

Road grading and drainage elements shall be designed for efficient drainage of storm water and safe passage of vehicles. Where ditches are required in earth, the invert of the "V" ditch shall be a minimum of 0.5 m below the bottom of Granular B. Where ditches are required in rock, the invert of the 1.0 m wide flat bottom ditch shall be a minimum of 0.25 m below the bottom of Granular B. Ditches steeper than 4% shall be protected from erosion. Roadside and cut slopes steeper than 3:1 or

where earth is highly erodible shall be protected from erosion. Erosion protection measures shall be designed by a professional engineer.

Retaining Walls

Where stable roadside slopes cannot be achieved within the available property limits retaining walls may be considered at the discretion of the District. Where retaining walls are permitted, they shall be heavy precast concrete or reinforced cast in place concrete. In general, retaining walls shall be located entirely on the property they are designed to retain. In all cases, retaining walls shall be designed by a professional engineer.

Pavement Elevations

A grading and drainage plan view of intersections or non-typical sections shall show centreline and pavement edge elevations at all grade break points and at 20 metre intervals or less, as may be required. Centreline elevations will be controlling elevations along the through road. Special attention is required when establishing grades at intersections to provide a smooth riding surface while providing surface drainage.

Active Transportation Requirements

All road projects shall comply with or implement the District's Active Transportation Strategy included in Appendix G.

Removals and Adjustments

Existing pavement removal and grinding, removal of poles, fences, islands, curb and gutters, signs, etc. shall be reviewed and shown on separate plan view drawings. Further these drawings shall show required adjustment of manholes, catch basins, hydrants, valve boxes and other appurtenances.

Roundabouts

All proposed roundabouts shall be designed in accordance with the Canadian Roundabout Design Guide (TAC).

Landscape/Streetscape Plan

Landscaping for District roads shall be minimal, project specific and be in accordance with the Area Municipality's standards and have regard for clear zones, sight lines, utilities, site conditions and cost.

Check species for salt tolerance, maintenance, location at street line, snow drift, and sight triangle.

Landscape drawings will be completed by a landscape architect and shall be in accordance with terms and conditions set down by the District and Area Municipality.

Sidewalks will be constructed by the District in conjunction with the roadworks as required by the Area Municipality.

Multi-use recreational trails shall be included in projects where the right-of-way is available and a trail is requested by the area municipality or in accordance with The District's Active Transportation Strategy.

Ensure all landscaping will not obscure the location of fire hydrants.

Traffic Signs

All temporary and final traffic signs shall be shown on a plan view drawing and be in accordance with the OTM manuals. The use of symbols to indicate traffic signs is not acceptable; rather, the drawings must clearly indicate to scale what is to be applied in the field.

All required traffic signs, whether regulatory, warning, temporary or guide/directional in nature shall be installed in accordance with the standards specifications and legislation contained in the OTM manuals, the HTA and District requirements.

All signs are to be supplied by the Contractor.

Traffic Signals and Street Lighting

Electrical works shall conform to the Ontario Provincial Standard drawings and District requirements. General conditions of contracts for construction shall be in accordance with the Ontario Provincial Standards for Roads and Municipal Services. The location of traffic controllers are to be approved by the District.

Equipment shall not encroach on private property without permission to enter/ easement/permanent or temporary undertakings. Traffic controller equipment shall require adequate dedicated access.

Street lighting must comply with all material, style and dark sky requirements of the District and Area Municipality.

Prior to design, arrange a meeting with The District to obtain information and instruction regarding the following:

- The "Design/Tender Package" for street lighting and signalization
- The drawing contents and preparation

- street lighting layout along the road and intersections
- street lighting schematic wiring diagrams
- temporary traffic signal installations
- permanent traffic signal installations and schematic wiring diagram
- electrical standards
- combine street lighting, pavement markings and signing on one plan, where practical, for any given section of road

- Electrical quantity sheet(s) for each of the following may be required:

  - electrical manholes and underground junction boxes
  - ducts and associated wiring
  - pole assemblies and footings
  - removal of electrical equipment
  - traffic signal equipment
  - power supply equipment
  - concrete pads
  - high voltage cable terminators
  - groundings
  - traffic signal controller, controller components and external detection devices
  - emergency services pre-emption equipment

4.15 Winter Maintenance

For road projects that will not be completed prior to the end of the construction season, the following will need to be considered in order to winterize the construction project to ensure safe conditions during winter:

- Where applicable, curb and gutter sections are to be completed and the base course asphalt shall be complete and ramped to existing finished asphalt surface were required, to the satisfaction of the District.
- Catch basins and maintenance holes frames and grates shall be set to base course asphalt.
- Steel plating not permitted.
- Hot mix asphalt (HMA) only.
- Lane delineation and pavement marking completed.
- The road and boulevard must be free of obstructions to accommodate safe snow plow operation considering that a wing and plow is 6 m wide and 1.5 m snow storage minimum required.
- Winter shut-down meetings with the District of Muskoka road maintenance staff are required prior to seasonal shut-down and shall be organized by the Project Manager or designate.

4.16 Utilities

Relocation of utilities to be undertaken at Applicant's expense in the case of a road extension or widening as a result of private development. All relocations to be completed shall be aesthetically pleasing.

Coordination of the required relocations is needed to ensure that conflicts are avoided during the construction period.

All utility relocation requests must be approved by the District prior to submission to the affected utility.

Electric Power Utility Relocation

As soon as is practical, consult with local Hydro commissions to assess the necessity and timing for relocation of their overhead and/or underground lines.

Coordination with electric power utilities to commence during the 60% design review stage.

Other Utility Relocation

Underground and overhead power and communication lines, gas lines, Bell Telephone, Cable, etc.

- Consult with each utility company and assess the necessity and timing for relocation of their plant.
- Provide the utility companies with all the necessary drawings for their design.

Scope and Schedule

Review the intended works and schedule them prior to road construction if at all possible. Otherwise, work must complement construction staging to minimize outside contractor interference with road reconstruction.

4.17 Drawing Requirements

The following drawings are required for District Road projects.

- Title sheet and Index
- Removals and adjustments
- Staging/Detours
- Plan and Profile drawings showing all road design as well as storm sewers, sanitary sewer and watermain works (if applicable)
- Pavement markings and signs
- Landscaping

- Details, notes and typical sections
- Electrical - traffic signals (including wiring diagrams)
- Street lighting – illumination

All final electrical, pavement marking and signing plans shall be submitted for review and approval by The District prior to tender advertisement.

Alignment, Horizontal, Vertical and Intersection Layout

The centre line alignment shall be defined on plan and profile drawing(s), by a single line, where practical, at 1:500 scale, and shall include:

- Chainage commencing with 1+000 on the extreme left hand and continue to the right. The drawings shall show centre line deflection angles and curves, points of intersection, vertical alignment and deflection angles and intersecting street centre line angles and stationing.
- All vertical and horizontal points of intersection shall be assigned stations, elevations and geodetic coordinates, for ease of alignment layout.
- Vertical curves are to be shown by their length, "K" value and their respective stopping sight distance.
- Horizontal curves are to be defined by their radius, as well as beginning and end of curve stations.

All pertinent information required to lay out the design shall be shown on the drawings.

Typical Cross Sections

Cross-sections shall include all components of the roadway. This includes pavement composition, lane widths, median, offsets, curb and gutter, splash pad, sidewalks, grading, etc.

The number of cross-sections required will depend on the nature of the road alignment, i.e. rural or urban, number of intersections and the number of areas with special grading concerns.

Miscellaneous Details

The Design Consultants, where required, will provide detail drawings for works which are not possible to be clearly presented on other drawings, or are not to standards. These may include special manholes, storm outlets, structures, bridge paths, grading, signal poles, bases, etc.

“As-Recorded” Drawings

“As-Recorded” drawings shall be submitted to the District within 60 days of "Substantial Completion" of the project.

4.18 Solid Waste

The District of Muskoka is responsible for Waste Management and Collection Services and is available to comment on all development and redevelopment applications in the District’s Collection Area.

The District will only provide Waste Curbside Collection Services if road maintenance and road design accommodating collection vehicles are adhered to, as detailed below, following a site inspection by the District’s Solid Waste Management Department and Collection Contractor.

The District reserves the right to provide Waste Collection Services on a seasonal (summer) basis only.

Should a road be deemed for seasonal collection, it is the responsibility of the homeowner / Developer (Condo) to dispose of waste materials in the winter season. There are several District Waste Facilities to accommodate disposal.

Roads will be inspected to ensure design meets Ontario Provincial Standards, District and Municipal Standards and inspected to ensure the road is maintained to a standard acceptable to the District, to ensure safe travel for collection services.

The District reserves the right to revoke Collection Services to any Serviced Unit that does not adhere to the requirements as laid out in this document and within the District of Muskoka’s Waste Management By-Laws as amended.

New Development Collections

If a Development Agreement is in place and includes the consideration of the assumption of solid waste curbside collection services, the process is as follows:

The District is to receive a formal request from the Developer regarding the assumption of Solid Waste Curbside Collection services. Staff will then evaluate the development from an occupancy standpoint, and if deemed that there is acceptable occupancy, the District’s Solid Waste Management Department and Collection Contractor will complete a development assessment to verify that collection vehicles can safely and efficiently pass without obstructions.

Request for assumption may be deferred until the following spring to determine if the development poses any potential seasonal impacts and to verify the winter maintenance program is adequate. If at this point the development is deemed appropriate for the District to assume Curbside Collection services from the developer under the Development agreement, District staff will engage the Developer to create a transition plan and enter into an agreement with the District that is to describe any respective obligations (prior to assumption of roads by Area Municipality).

These plans are to include at the minimum a winter maintenance plan, requirements to keep the roadway clear of construction equipment and materials, minimum width of roadway to be maintained etc.

Once the agreement has been executed between the Developer and the District, the transition process will then begin by informing the residents effected, updating the Contractor's route maps and communicating with Area staff, District staff and Members of Committee and Council, as required.

The District's provision of Curbside Collection services for private roads are conditional on the following requirements;

1. The Roads must have an unobstructed clear width of at least 4.5 metres at all times and must be kept free of equipment, materials, impediments, parked vehicles, etc. to ensure this clearance is maintained at all times;
2. The Roads must have an unobstructed height clearance of 3.6 metres and any potential encroachment by wire, vegetation, equipment, eaves, etc. shall be avoided;
3. Surfaces of the Roads must be free from significant potholes, vegetation, erosion, protrusions, puncture hazards, excessive slope, soft shoulders, standing water, etc. to ensure safe and unimpeded operation of the collection vehicle(s); and
4. Such further and other conditions as the District, in consultation with its curbside collection contractor or otherwise may determine to be appropriate, acting in its sole discretion.

Additionally for curbside collection on private roads they must meet the following Turn Around requirements;

1. The developer must maintain a turnaround at the end of the road and road branch(s), as applicable, adequate to allow for the collection vehicle to complete a three-point turn;
2. Turnarounds may be of a cul-de-sac, loop, or hammerhead-type (i.e. 'T' or 'L') design;
3. It is recommended that hammerhead turnarounds have a depth of 9 metres (including adjacent road width), and a width of 4.5 metres

as specific turnaround geometry will impact the ability for a collection vehicle to perform a three-point turn, specific approval for turnarounds rests with the Manager of Collection and Diversion;
4. The turnaround does not need to be dedicated (reserved for waste use), however the developer is responsible to ensure any turnaround is free from parked cars and other obstructions on the day of collection; and
5. Such further and other conditions as the District, in consultation with its curbside collection contractor or otherwise may determine to be appropriate, acting in its sole discretion.

The following additional conditions and requirements must be satisfied to continue service during the winter months.

1. The Roads shall be maintained to provide a minimum cleared/plowed width of 4.5 metres, with no more than 5 cm of snow accumulation or in compliance with the applicable road classification outlined in O>Reg. 239/02: Minimum Maintenance Standards, whichever of the two is more restrictive;
2. The Roads shall be maintained to provide a surface free from ice accumulation or adequate applicable sand and/or salt applied to areas where ice has accumulated or in compliance with the applicable road classification outlined in O.Reg. 239/02: Minimum Maintenance Standards, whichever of the two is more restrictive;
3. The Road Owner(s) must ensure standards 1 and 2 are met by 7:00 am on the day of collection. During a storm event, ongoing maintenance is required to maintain these standards; and
4. Such further and other conditions as the District, in consultation with its curbside collection contractor or otherwise may determine to be appropriate, acting in its sole discretion.

PART B

AREA MUNICIPALITIES CRITERIA

1 Design Drawing and Supporting Study Requirements

Sections 1 and 2 of Part A may be referenced for drawing and report requirements for Area Municipalities within the District.

2 Road Design Criteria

2.1 General

The Area Municipality's objective is to achieve a network of roads in compliance with the standards of each classification contained in this section. The minimum road classification criterion is provided in Table 2.1. The classification of each new roadway shall be confirmed with the Area Municipality prior to the commencement of engineering design.

All roadways within the urban core are to be designed to urban standards unless specific approval is received from the Area Municipality. New roadways designed to suburban or rural standards may only be considered for estate residential or industrial developments.

Right of ways shall be a minimum of 20 m for local and seasonal roads, 26 m for collector roads, and 30 m for arterial roadways.

Where development is proposed, the Area Municipality may require land dedication in order to accommodate anticipated road widenings or sight triangles which may exceed the standard 20 m in width.

2.2 Pavement Design

The minimum road design and construction standards for each classification are provided in Table 2.2.

The Area Municipality will require a Traffic Study completed by a Traffic Engineer to recommend the pavement width on collector road and arterial roads.

The Area Municipality will require a Geotechnical Report completed by a Geotechnical Engineer to recommend the depth of Granular 'B' subbase, and type and thickness of asphalt based on site conditions for each project. The actual pavement structure may need to increase as a result of the following:

- Local conditions such as soil type or water table;
- Anticipated traffic loading;
- To ensure that there will be no half load restrictions on collector, arterial, or industrial roadways; and
- Any other requirements identified in the geotechnical report.

2.3 Geometric Design

All roads shall be designed to MTO Geometric Design Standards of Ontario Highways, unless otherwise approved by the Area Municipality.

Superelevation of any roadway is not permitted without prior approval from the Area Municipality.

Edge of pavement radii shall be 10.0 m min. at intersections, 15.0 m min. on industrial roads and 90.0 m on curves or corners.

Table 2.1 – Road Classification Criterion

Dominant Land Use	Average Lot Frontage (m)	Typical Hard Services	AADT	Road Classification
Residential	0.0-30.0	SL, SAN, W, SW, STM, UG	0-1,000	Urban Local
Residential			1,000–3,000	Urban Collector
Residential			>3,000	Urban Arterial
Industrial/Commercial			Varies	Ind./Comm. Urban
Residential	30.0-100.0	SL, SAN, W, SW, D, UG	0-1,000	Suburban Local
Residential			>1,000	Suburban Collector
Industrial/Commercial	>30.0	SL, SAN(*), W(*), D, OH	Varies	Ind./Comm. Suburban
Residential	>100.00	D, OH	0-50	Rural Local

Dominant Land Use	Average Lot Frontage (m)	Typical Hard Services	AADT	Road Classification
Residential			50-400 (**)	Rural Collector
Seasonal Residential	Varies	D, OH	0-50	Seasonal Local
Seasonal Residential			50-400 (**)	Seasonal Collector

Legend:

SL - Streetlight
SAN - Sanitary Sewer
W - Watermain
SW - Sidewalk
STM - Storm Sewer

UG - Underground Utilities (all)
OH - Overhead Utilities (hydro, telecom)
D - Ditches
AADT - Average Annual Daily Traffic
(*) - Optional
(**) -Over 400 AADT use Suburban Local

Table 2.2 – Road Design/Construction Standards

Classification	Min. ROW Width (m)	Min. Pavement Width (m)	Surface Type	Min. Surface Depth (mm)	Shoulder Width (m)	Min. Granular B Depth (mm)*	Maximum Grade (%)
Urban Local Ind./Comm. Urban	20.0	8.5	Asphalt	80	n/a	400	8.0
Urban Collector	26.0	**	Asphalt	100	n/a	400	8.0
Urban Arterial	30.0	**	Asphalt	100	n/a	400	8.0
Suburban Local	20.0	7.5	Asphalt	80	0.6	300	8.0
Suburban Collector	26.0	**	Asphalt	80	1.5	300	8.0

Classification	Min. ROW Width (m)	Min. Pavement Width (m)	Surface Type	Min. Surface Depth (mm)	Shoulder Width (m)	Min. Granular B Depth (mm)*	Maximum Grade (%)
Ind./Comm. Suburban	20.0	7.5	Asphalt	80	1.5	300	6.0
Rural Local	20.0	7.5	DST	n/a	0.6	300	10.0
Rural Collector	26.0	**	DST	n/a	1.5	300	10.0
Seasonal Local	20.0	7.5	Granular A	n/a	0.6	300	10.0
Seasonal Collector	26.0	**	Granular A	n/a	1.5	300	10.0

2.4 Cul-de-Sacs

Cul-de-sacs are to be provided at all dead-end streets, where there is no proposed connection to an existing street.

Where cul-de-sacs are used, a minimum radius of 20.75 m at property line and 15.0 m at edge of pavement shall be applied.

2.5 Clearing and Grubbing

Work shall conform to OPSS 201 as amended below.

Unless otherwise approved by the Director of Public Works, all trees, brush, stumps, boulders, etc. shall be removed over the full width of the right-of-way.

Where clearing is required off the right-of-way to provide adequate sight distances, an easement will be provided in favour of the Area Municipality from the affected property owner.

2.6 Subgrade Construction

Work shall conform to OPSS.MUNI 206 as amended below.

All organic material and unsuitable native material shall be removed prior to placing fill or granular sub-base material.

The subgrade shall be excavated or filled to the required grade for the required width of the road surface, plus shoulders or curbs, plus the additional width necessary for the required depth of granular road base.

Imported fill material shall be Select Subgrade Material (SSM) conforming to OPSS 1010 or better. Suitable native fill material and/or imported fill material shall be compacted to minimum 95% Standard Proctor Density (SPD), or as indicated in the approved Geotechnical Report.

The subgrade shall be shaped to conform to the required longitudinal grade and cross- section and shall have a cross-fall of three percent (3%) from the centreline of roadway to each side. The subgrade shall be compacted with suitable mechanical compaction equipment as required to produce a solid base for the road granulars. All soft spots shall be excavated and backfilled with granular base material and compacted to the required density specified in the approved Geotechnical Report.

Frost tapers, transition zones and culvert installations shall be constructed with an assumed frost depth of 1.5 m and to OPSS specifications.

2.7 Road Base Construction

Work shall conform to OPSS.MUNI 206 and OPSS 314 as amended below.

The granular base shall be laid on dry, smooth, properly graded subgrade and shall be spread for the required width of surface plus shoulders and tapered at the edges to meet the edge of subgrade. Granular materials used in the road base shall be placed in layers not exceeding 150 mm and compacted to 100% SPD, or as indicated in the approved Geotechnical Report.

2.8 Subdrains

Work shall conform to OPSS 405 as amended below.

A minimum 100 mm diameter polyethylene pipe subdrain, complete with 19 mm clear stone backfill wrapped in filter cloth (or alternative only as approved by the Area Municipality), shall be provided on both sides of the road for the purpose of draining the granular road base to a suitable outlet.

Subdrains are to connect to the storm sewer system at manholes or catch basins. When a subdrain is extended to discharge at grade, a 3.0 m section of non-perforated rigid pipe, rodent grate, and marker shall be provided.

Connection of other piping and drainage systems such as sump pumps to the subdrain system is not permitted.

2.9 Curb and Gutter

Work shall conform to OPSS 353 and OPSS.MUNI 1350 as amended below.

For local streets, OPSD 600.040 curb and gutter is required. Semi-mountable curb OPSD

600.060 may be used upon prior written approval of the Director of Public Works, provided full barrier curb is not required to convey stormwater within the road allowance.

Concrete shall be supplied in accordance with the "Performance Specification Alternative" of OPSS.MUNI 1350 with a minimum compressive strength of 30 MPa at 28 days.

2.10 Hot Mix Asphalt Pavement

Work shall conform to OPSS 310, OPSS 1150 and the recommendations of the Geotechnical Report.

Where two layers of asphalt are proposed, the surface course of asphalt shall be placed no sooner than 6 months following placement of the base course of asphalt, unless otherwise approved by the Director of Public Works.

2.11 Double Surface Treatment

Work shall conform to OPSS 304, OPSS 1006, OPSS 1103 and the recommendations of the Geotechnical Report.

2.12 Sidewalks

Work shall conform to OPSS 351, OPSS.MUNI 1350, OPSD 310.010, OPSD 310.030 and OPSD 310.033 as amended below.

Sidewalks are to be installed in all new residential and commercial developments within the growth area of the Area Municipality as defined by the Official Plan, and on major streets adjacent new developments, and be included as part of applicable development agreements. Exemptions may be granted for the following developments at the discretion of the Director of Public Works:

- Rural and seasonal residential developments;
- Industrial areas;
- Where the majority of lots have minimum frontage of 30 m in R-1 zones.

The requirements for a 1.5 m wide concrete sidewalk shall be confirmed with the Director of Public Works prior to commencing the roadway design. The developer may be required to provide cash to the Area Municipality in lieu of sidewalks, the sum of which shall be agreeable to both parties and reflect the costs of sidewalks not installed.

Sidewalks shall be constructed in the locations shown on the typical road cross-sections. Curb- face sidewalk may be permitted when natural features prevent it from being constructed in the locations shown on the typical road cross-sections, with prior approval from the Director of Public Works. At the discretion of the Area Municipality, wider sidewalks may be required to accommodate large pedestrian volumes or shopping carts, etc.

All sidewalks are to be constructed in a manner that provides safe adequate passage for pedestrians, maximum assistance to individuals with limited mobility and without creating hazards to individuals who are visually impaired, minimizes road crossings, and provides the most direct route to existing and future amenities for the majority of users.

Directional lines shall be inserted in the sidewalk at all street intersections and be aligned with the pedestrian crossing to meet the curb ramp on the opposite side of the street.

All sidewalks are to be constructed on a properly compacted foundation of a minimum of 300 mm of Granular ‘B’ and 150 mm of Granular ‘A’.

Concrete shall be supplied in accordance with the “Performance Specification Alternative” of OPSS.MUNI 1350 with a minimum compressive strength of 30 MPa at 28 days.

Sidewalk Maintenance

The Area Municipality maintains a portion of the sidewalks within the municipality during the winter months. The Area Municipality may add to or remove sidewalks from the winter maintained sidewalk classification depending on level of use, cost and/or convenience.

The following activities are not permitted:

- Placing snow or debris on a sidewalk, or parking a vehicle on a sidewalk so as to obstruct the safe normal use of the sidewalk.
- Drive or park any vehicle on a sidewalk that may cause damage to the sidewalk.

Any damages or failures to meet with the above stated requirements are subject to charges for the full cost of the repair or removal, at the discretion of the Director of Public Works.

2.13 Boulevard Grading

Work shall conform to OPSS 206, 802, 803 and 804, as amended below.

For roads having an urban cross-section, the boulevard area from the curb to the property line shall be graded to provide positive drainage toward the roadway at a minimum slope of 2% and a maximum slope of 8%.

For roads having a rural cross-section, the area between the edge of the road shoulder and the street line shall be graded and the ditches cut with slopes of 2 m horizontal to 1 m vertical maximum (3 m horizontal to 1 m vertical preferred) from the edge of the shoulder to the bottom of the ditch and from the bottom of the ditch to the original ground.

All disturbed areas shall be restored with minimum 100 mm depth of topsoil and sod. Seed and mulch is permitted in rural areas with prior approval from the Director of Public Works.

Suitably sized rip-rap shall be placed in the ditch where flow velocities indicate erosion control is required. Alternate materials may be utilized with prior approval from the Director of Public Works.

2.14 Driveway Entrances

All parties desiring to construct an entrance onto an Area Municipal roadway must obtain an Entrance Permit from the Area Municipality prior to construction. Upon approval and direction from Director of Public works or designate, and payment of the permit fee, the applicant may proceed with installing the entrance. Following construction, the Area Municipality shall inspect the entrance to confirm the installation was completed in accordance with the Entrance Permit and confirm the approval to the applicant in writing.

Maintenance of the driveway entrance is the responsibility of the property owner.

Driveway entrance grades shall match the road shoulder grade for a distance of at least 5.0 m from the edge of the travelled portion of the road. The maximum grade for driveway entrances thereafter shall be 8%, except in site specific cases that receive prior written approval from the Area Municipality. This maximum grade is not recommended and should be employed only in exceptional cases where conditions prohibit the use of lesser grades. The minimum grade permitted is 1%.

For residential driveways in the urban area, the portion of the driveway entrance on the road allowance shall have a minimum of 300 mm of

Granular ‘B’, 150 mm of Granular ‘A’ and 40 mm of hot-mix asphalt surface, or other hard surface as approved by the Area Municipality.

For residential driveways outside of the urban area, the portion of the driveway entrance on the road allowance shall have a minimum of 300 mm of Granular ‘B’ and 150 mm of Granular ‘A’.

For non-residential entrances in the urban area, the portion of the driveway entrance on the road allowance shall have a minimum of 300 mm of Granular ‘B’, 150 mm of Granular ‘A’ and 80 mm of hot-mix asphalt surface, or other hard surface as approved by the Area Municipality. A more stringent pavement structure may be required and must be confirmed by the Geotechnical Engineer.

Entrance Culverts

Work shall conform to OPSS 421, OPSD 802.014 and OPSD 802.034, as amended below.

The preferred minimum size for entrance culverts is 400 mm. 300 mm will be considered where achievable depth or cover constraints will not suit 400 mm. The minimum depth of cover for all culverts is 300 mm. The minimum length of culvert shall be 7.0 m, the maximum continuous length (i.e. without a manhole) shall be 20.0 m.

Where the conveyance capacity of the minimum size culvert is not sufficient, a larger diameter culvert shall be sized using the rational design method. Detail drawings and calculations shall be submitted to the Area Municipality for approval.

Headwall or end treatment designs shall be submitted to the Area Municipality for approval.

At the discretion of the Director of Public Works, Area Municipality personnel may install a driveway culvert at the applicant’s request. The fee for the installation will be the lesser of $2,000.00 or the actual cost of the work as calculated by the Area Municipality.

The Area Municipality will be responsible for the maintenance of entrance culverts provided an Entrance Permit was obtained prior to construction and the installation was approved by the Area Municipality in writing. The necessity of maintenance to approved culverts will be at the discretion of the Director of Public Works.

2.15 Traffic Signs and Pavement Markings

Work shall conform to OPSS 710, 1716 and 1750 as amended below.

Street name signs are to be provided by the Municipality, and paid for and installed by the proponent.

Traffic signs of the standard type approved under the Ontario Traffic Manual, Book 1A (Appendix A - Illustrated Sign and Sign Display Index) shall be mounted on 3.6 m (1.2 m lower channel and 2.4 m upper channel), double-slide, “U- Channel” galvanized steel posts, embedded 0.9 m in the ground.

All signs shall be 0.081” (2.0 mm) thick aluminum and on Type III High Intensity Sheeting minimum. The signs shall be located as required by the Area Municipality after a by-law is passed for their installation.

Pavement markings shall be painted conforming with the Ontario Traffic Manual, Book 11 (Pavement, Hazard and Delineation Markings) at all intersections, school crossings, walkways and railway crossings to clearly indicate the proper traffic zones, lanes and stop lines.

Pavement markings are to be water borne traffic paint complete with glass beads. All lane marking applications to new asphalt require two applications of paint. The second application shall not be applied until the first is tack free.

Local streets do not require centreline pavement marking, but stop bars are required with a minimum of 7.0 m centreline marking.

2.16 Bicycle Lanes

The requirements for bicycle lanes are to be discussed at the planning stage and within the Traffic Impact Study.

All bicycle infrastructure shall be in accordance with MTO Book 18 and the Transportation Association of Canada (TAC) Urban Supplement to the Geometric Design Guide for Canadian Roads.

The designer shall confirm with the Area Municipality if there will be any requirements for the provision of bicycle lanes prior to the commencement of the engineering design.

2.17 Parking Lot Design

The designer shall meet the parking requirements identified in the Area Municipality Zoning by-law as well as setbacks from property line.

Parking lot designs shall consider the following:

- The turning requirements for delivery vehicles and emergency vehicle access;
- Queue development at the entrance;
- Pedestrian flow through the parking area;
- Dropped curb with ramps at convenient locations for wheelchair accessibility;
- An area for snow storage that does not impact accessible parking; does not reduce the total parking spaces by more than 5%; and has consideration for the features of the landscaping plan;
- Provide for an overland flow route to an adequate drainage outlet without exceeding a ponding depth of 0.3 metres anywhere on the parking lot;
- Increase the sidewalk width to 1.8 m where monolithic curb and sidewalk is used if a car bumper may overhang the curb.

Parking spaces are to be delineated with yellow paint lines.

2.18 Fire Routes

Fire routes shall have a minimum width of 6.0 m and be designed to meet the requirements of the Ontario Building Code. The fire route is to be signed and with no parking signs installed as required.

The fire route design is subject to approval by the Area Municipality Public Works and Fire Departments.

2.19 Community Mailboxes

Provisions shall be made in subdivision design for community mailboxes. The designer must propose locations that are conducive to the pedestrian and vehicular movements anticipated in the area for approval by the Area Municipality and Canada Post. Mailboxes should be located away from intersections, preferably on a lot line and near a streetlight. Community mailboxes must have direct sidewalk access and are to face the sidewalk. Where sidewalk is not present, access is to be provided from the roadway.

2.20 Fencing

At the discretion of the Area Municipality, standard 1.2 m black vinyl covered galvanized chain link fence with top rail shall be placed along all walkways, steep slopes, adjacent to commercial properties, between stormwater management facilities and private property, and elsewhere as required by the Area Municipality.

In some instances, the Area Municipality may require that 1.8 m high wood privacy fence be installed between residential properties, between residential and commercial properties, or between commercial and institutional properties.

Gates for access from private property are not permitted to be installed in any municipal fence. Further, no gates shall be permitted in an acoustical fence, unless written approval is received from the Area Municipality.

The requirement for, location, and extent of acoustical fence shall be defined in the noise and vibration study and must be approved by the Area Municipality. If the noise and vibration study concludes that additional height must be added to the acoustical fence to achieve the required noise levels, this must be accomplished by installing the fence atop a berm.

2.21 Roadway Occupation Permits

All parties desiring to perform work onto an existing municipal roadway must obtain a Roadway Occupation Permit from the Area Municipality prior to construction.

Applications for a Roadway Occupation Permit are to be submitted a minimum of ten (10) working days prior to construction.

Where emergency work is required, the Municipality shall be notified immediately, and an application for a Roadway Occupation Permit shall be made the next working day for the work.

Restoration shall be completed as soon as possible and to the pre-existing condition or better, and as specified on the Roadway Occupation Permit. The Area Municipality shall inspect the restoration and confirm it was completed in accordance with the Roadway Occupation Permit and confirm the approval to the applicant in writing.

The applicant shall guarantee the restoration for a maintenance period of 24 months from the approval date. Any defects observed during the maintenance period shall be the responsibility of the applicant and repaired without delay.

When the applicant fails to correct defects to the satisfaction of the Area Municipality within a reasonable period of time, the Area Municipality may correct the defect and find the applicant liable for the costs.

Where past performance has indicated an inability by an applicant to perform acceptable work, the Area Municipality may deny issuing a Roadway Occupation Permit to the applicant for a period of time to be determined by the Director of Public Works.

2.22 Road Maintenance

The Area Municipality maintains a network of roads that are legally open and used by the public. The degree of service depends on the road standard, use, funding, priority and condition.

Area Municipality maintained roads are classified as Year Round Maintained or Seasonal Maintained. Year Round Maintained Roads are maintained by the Area Municipality all times of the year. Seasonal Roads are maintained by the Area Municipality from June 1st to November 1st only. The Area Municipality accepts no responsibility for the condition or maintenance of Seasonal Roads from November 1st to June 1st. Anyone desiring to maintain a Seasonal Road from November 1st to June 1st, does so at their own risk and expense, and must first obtain permission from the Area Municipality Public Works Committee.

The Area Municipality will consider requests to assume a Seasonal Road into the Year Round Maintained classification. Such request must be received no later than September 1st to be eligible for the next winter season. The following guideline will be followed in assessing a road for Year Round Maintained:

- It must be a public highway under the jurisdiction of the Area Municipality within the terms of the Highway Traffic Act;
- It must be in good winter condition based on the following criteria:
  - Road width and clearance must be adequate for snow removal equipment;
  - Road structure must be adequate to withstand damage from frost heaves and during spring thaw;
  - Ditches and culverts must be adequate to provide proper drainage without freezing or washout;
  - Road grades and curvature must be suitable for safe winter travel and maintenance procedures;
  - Brush must be cut back a minimum of 6 m from the centreline of road for proper visibility, daylighting, and drying of the road in the spring;
  - A suitable turning circle (13 m radius minimum) must be provided at the end of the road.
- At the discretion of the Area Municipality, a sufficient permanent population exists to warrant the expense.

3 Utilities, Streetlighting and Traffic Signals

3.1 General

The location of all utilities must be established and resolved in conjunction with the Area Municipality and the Utility Companies, while generally following the locations shown on the typical road cross-sections.

On existing Area Municipality roads, installation will be by trenchless methods unless otherwise approved by the Director of Public Works. Installation by open cut methods is permitted on new developments. Compaction of backfill for utility trenches shall be 95% Standard Proctor within boulevards and 100% for driveways and road crossings.

The Area Municipality must be provided with a construction drawing approved by the utility company prior to the works proceeding to construction.

A roadway occupation permit is required for any utility installation on existing Area Municipality rights-of-way.

3.2 Utilities

In urban areas, electrical, telephone, CATV, gas and fibre optic services shall be underground in locations shown on the typical road cross-sections and shall be installed by the utility or by an approved utility Contractor.

Overhead electrical, telephone, CATV and fibre optic services may be permitted in rural areas with prior approval from the Director of Public Works.

3.3 Streetlighting

Unless written approval is received from the Area Municipality, streetlighting shall be provided throughout all streets and developments and may be required on roadways bordering developments, if deemed necessary by the Area Municipality.

A qualified engineering consultant shall prepare the streetlight design, including photometric layouts using an industry standard computer lighting program. Lighting design criteria shall be based on the “American National Standard Practice for Roadway Lighting”, ANSI/IESNA RP-8-00. All drawings must be sealed by a registered electrical professional engineer, licensed to practice in the Province of Ontario.

All components such as pole style and height, length of bracket arm, luminaire style, wattage, etc. shall be supplied to the satisfaction of the

Director of Public Works. Luminaires shall be photocell controlled LED cut-off type and shall be dark sky compliant. Streetlights and power pedestals should be located on the extension of lot lines where possible.

Power supply shall be underground wiring installed in ducts between poles, to the satisfaction of the electrical utility having jurisdiction.

Any attachments to hydro poles must have Lakeland Power or Hydro One approval. All roadway lighting design and construction is subject to Electrical Safety Authority (ESA) inspection and approval.

The installation of the streetlighting system shall be compliant with ESA, CSA, the electrical authority requirements, the Area Municipality's standards and specifications, as well as the manufacturer's installation instructions.

3.4 Traffic Signals

Traffic signal design is to be prepared in accordance with the Ontario Traffic Manual Book 12. In addition to accommodating traffic flow, the signalized intersection design shall include pedestrian requirements and accessibility features. Accessibility features must include gentle grades for sidewalks, drop curbs, and directional lines in the sidewalk to provide guidance for the visually impaired. The use of accessible pedestrian crosswalk features such as countdown heads, and audible pedestrian heads with tactile push button will be evaluated by the Director of Public Works on a case-by-case basis.

A qualified engineering consultant shall prepare the traffic signal design. All drawings must be sealed by a registered electrical professional engineer, licensed to practice in the Province of Ontario.

All work shall be compliant with MTO, ESA, CSA, the electrical authority requirements, the Area Municipality's standards and specifications, and the manufacturer's installation instructions.

4 Storm Drainage and Stormwater Management

4.1 General

Generally, storm drainage shall be accommodated by a system of curb and gutters as well as storm sewers, with the exception of rural roadways or estate residential subdivisions, where an open ditch and culvert system may be permitted with prior approval from the Director of Public Works.

4.2 Design Flows

Drainage systems are to be designed to convey the year of storm shown in Table 4.1 without surcharge. Runoff rates in excess of the design capacity of drainage systems shall be conveyed via roadways, swales, walkways, drainage easements, etc. and in special circumstances the storm sewer system, to a sufficient outlet to prevent unacceptable flooding damage to private property. Flood lines shall not extend onto private property unless a drainage easement is provided in favour of the Area Municipality.

All new developments must demonstrate that the stormwater generated onsite is directed to a sufficient outlet such as a lake, river or permanently flowing watercourse. Sufficient outlet may also include a public right-of-way with prior approval from the Area Municipality. An easement must be provided in favour of the Area Municipality for any drainage that is directed over private land.

The designer shall provide calculations for the conveyance capacity of the downstream conveyance routes to demonstrate that upstream, downstream and adjacent landowners do not incur significant adverse impacts, including increased runoff volumes, and that the flow is conveyed in a safe manner.

Table 4.1 – Design Storms (Years)

Road Classification	Bridges/Major Culverts	Road Culverts	Storm Sewers	Ditches/ Channels
Urban	1:100	1:25	1:10	1:25
Suburban	1:100	1:10	1:5	1:10
Ind./Comm	1:100	1:10	1:5	1:10
Rural	1:100	1:10	n/a	1:5
Seasonal	1:50	1:5	n/a	1:5

The design flows used to size the storm drainage systems are to be calculated using the Rational Method, or approved equivalent.

The average rainfall intensity for the Site is to be derived from the MTO web-based IDF Curve Look Up application.

Composite runoff coefficients are to be developed in accordance with the MTO Drainage Management Manual.

4.3 Culvert Design

Culverts shall be sized by the MTO conventional culvert design method, or equivalent approved by the Director of Public Works.

4.4 Open Ditch Design

Open ditches shall be designed at a minimum of 0.15 m below the sub-grade of the roadway. Where this cannot be achieved, a sub-drain may be provided under the invert of the ditch and day-lighted once the minimum depth can be attained.

The minimum ditch grade shall be 1.0% and the maximum 10%, and shall be suitably protected against erosion based on flow velocities, to the satisfaction of the Area Municipality.

The minimum ditch protection on all ditches shall be 100 mm of topsoil and seed and mulch.

4.5 Storm Sewer Design

The full flow capacity of the storm sewer shall be determined by Manning's Formula. Roughness coefficients, minimum/maximum flow velocities, and minimum/maximum pipe slopes shall be in accordance with MOE Design Guidelines for Sewage Works, 2008.

The minimum pipe size is 250 mm.

The minimum depth of cover shall be 1.2 m to the obvert of the sewer, provided that there are no conflicts with utility crossings. Where sufficient cover does not exist, the Area Municipality may consider shallower insulated sewers on an individual basis.

The maximum height of fill is not to exceed OPSD unless pipe strength design calculations are provided for approval by the Area Municipality.

Storm sewers shall generally be located as per the typical road cross-sections. Where storm sewers are located in easements, the easement width shall be a minimum of 5.0 m.

Manholes

Manholes shall be as per OPSD 701 and be pre-benched up to springline, to the satisfaction of the Area Municipality. Sumps shall be provided in lieu of benching when catch basin manholes are used. Location and spacing shall be in accordance with MOE **Design Guidelines for Sewage Works, 2008.**

All new manholes within an asphalt roadway shall include a self-adjustable auto stable frame. Structures outside roadways or existing frame and grates in base asphalt which require adjustment may use lift rings. A minimum of one to a maximum of three adjustment units (Moduloc) shall be installed on the top of the structure. The maximum vertical adjustment of manholes via Moduloc shall not exceed 300 mm. Any adjustment exceeding this amount shall consist of precast concrete riser sections.

Catch Basins

Catch basins shall be as per OPSD 705 and located upstream of pedestrian crossings. The maximum spacing shall be in accordance with MOE Design Guidelines for Sewage Works, 2008.

When adjusting the top elevation of catch basins, a minimum of one to a maximum of three adjustment units shall be installed on the top of the structure. The maximum vertical adjustment of shall not exceed 300 mm. Any adjustment exceeding this amount shall consist of precast concrete riser sections.

Leads shall connect to manholes where possible and be minimum 250 mm for single catch basins and minimum 300 mm for double catch basins.

Foundation Drainage System

A foundation drainage system is to be provided for each residential lot in the urban and suburban area and consist of either:

- A sump pump discharging to an underground storm sewer service connection; or
- A sump pump discharging to an Area Municipality ditch; or
- A gravity connection to the storm sewer, provided the 100 year hydraulic gradeline is a minimum of 0.5 m below the finished basement floor elevation of the dwelling; or
- A sump pump or gravity connection to a third pipe (foundation drain) collection system that is separate from the storm sewer system, which discharges to a sufficient outlet such as a valley or hillside.

The owner of any sump pump drain that discharges to a Area Municipality ditch is solely responsible for its operation and maintenance. The Area Municipality shall not be liable for any damage to such drain that occurs during regular ditch maintenance.

Storm Service Connections

Single 100 mm PVC DR28 service connections for residential lots shall be constructed in accordance with OPSD 1006.010 or 1006.020. Connections for commercial, institutional or multiple use will be considered on an individual basis.

Where a sump pump discharges to a storm service connection, a 25 mm air gap shall be provided at the building such that there is no direct connection between the building sump pump outlet and the storm service.

Roof leaders shall not be connected to the storm sewer system and shall discharge to the ground surface onto erosion proof splash pads, and flows shall be directed away from the building in such a way as to prevent ponding or seepage into the foundation weeping tile. Further, roof leader discharge shall not cause an icing condition on municipal sidewalks.

Private Drain

Direct connection from any private storm drain, roof drain, sump pump, etc. to a municipal storm sewer or culvert is not permitted unless prior approval has been received from the Director of Public Works. Where such connection has been granted by the Area Municipality, the applicant is responsible for installing proper back-up devices. The Area Municipality shall not be held responsible for damages caused by water backing up into private drains.

Testing

All newly installed PVC and polyethylene storm sewers shall be subjected to deflection testing in accordance with OPSS 410. Deflection testing is not required for concrete storm sewers.

All newly installed storm sewers shall be subjected to a CCTV Inspection in accordance with OPSS 409. The Consulting Engineer shall review the DVD's and reports prior to submitting to the Area Municipality, to ensure completeness, accuracy and that no deficiencies exist.

All manholes and catch basins shall be visually inspected by the Area Municipality for deficiencies.

Any sections of sewer or service connections which fail to meet the requirements shall be repaired or replaced at the direction of the Area Municipality.

Approvals

All new sewers require an Environmental Compliance Approval (ECA) from the Ministry prior to construction, a copy of which shall be provided to the Area Municipality prior to construction.

4.6 Stormwater Management Facilities

All stormwater management facilities are to be designed to ensure that post-development peak flows do not exceed pre-development levels for storm events up to and including the 1:100 year event. An emergency spillway shall be provided and designed with suitable erosion protection given the velocities associated with the uncontrolled flow.

All stormwater management facilities are to be designed in accordance with the preferred criteria listed in the Ministry of the Environment “Stormwater Management Planning and Design Manual”.

Maintenance access is required to the inlet and outlet structures, forebays, and emergency spillways. Where possible, the maintenance access is to be looped to provide two access points to all key features. When this is not possible, dead-end access may be provided with a turning area with a 13 m centreline turning radius.

Water Quality Treatment Units

Consideration will be given to the use of oil/grit separators or other stormwater quality treatment unit where a stormwater management pond is not practical. These should be used in conjunction with additional quality control measures to provide a treatment train approach. Supporting calculations shall be provided to the Area Municipality for approval.

Operations and Maintenance Manual

A detailed operations and maintenance manual shall be required as part of the design of each stormwater management facility, including inspection checklists, maintenance description and frequency, etc.

4.7 Sediment Control

Temporary sediment controls are required for any construction project and must be detailed on a Sediment Control and Construction Mitigation Plan. The controls should be designed using a phased approach whenever feasible to minimize the exposed area of the site at any given time. There must also be a contingency plan for repair, replacement and upgrading of control measures as required to achieve adequate performance at all times.

Protection of all potentially affected storm drain inlets and catch basins shall be accounted for in the design.

Construction Access Mats shall be installed at all exits from the site, and shall be designed and maintained to remove most of the sediment accumulated on construction vehicle tires.

Effluent from site dewatering operations must be adequately treated prior to discharge into receiving water bodies, ditches or storm sewers.

5 Lot Grading

5.1 General

For residential lots, it is preferable to have one consistent slope of between 2% - 5% for the entire rear yard area; however, where this is not possible, lots are to be provided with a rear yard amenity area in which a slope of between 2% - 5% is provided for a minimum of 6 metres. Slopes from the end of the rear yard amenity area to the rear lot line shall not exceed 4:1. All exceptions must receive written approval from the Area Municipality.

All other areas shall have a minimum slope of 2% and a maximum slope of 3:1, to a maximum vertical difference of 1.0 metre. Where the vertical difference is greater than 1.0 metre, a retaining wall system shall be implemented.

5.2 Swales

All swales are to be designed with a minimum slope of 2%, a maximum slope of 5%, and a maximum side slope of 3:1.

All swales shall have a minimum depth of 0.15 m. The maximum depth for side yard and rear yard swales shall be 0.3 m and 0.4 m respectively.

The flows from the contributing areas should be calculated and the capacity of the swale confirmed to ensure adequate conveyance.

5.3 Rear Yard Catch Basins

Rear yard catch basins are discouraged and will only be considered where necessary and where all structures are protected from flooding if the inlet is blocked or surcharged by a major storm event.

Where the rear yard catch basin lead extends between houses, the rear yard catch basin shall be placed on a 5.0 metre wide easement split equally on the adjacent lots. The catch basin shall be placed such that the center is 1.5 m offset from the rear lot line.

Where the rear yard catch basin lead extends across the rear yard of a corner lot, the rear yard catch basin shall be placed on a 3 metre wide easement with the catch basin placed such that the center is 1.5 m offset from the rear lot line.

All rear yard catch basin leads are to be concrete and a minimum of 300 mm in diameter.

6 Landscaping

6.1 General

This section provides guidelines for plant materials, including nursery grown trees, topsoil, sod and seed mixtures.

6.2 Topsoil

Topsoil shall conform to OPSS 802 as amended below.

The subgrade is to be scarified immediately prior to topsoil application and the topsoil is to be placed no longer than 7 days prior to seeding or sodding. Topsoil depth requirement is minimum 100 mm after settlement or compaction to 85% SPD.

6.3 Sodding

Sodding shall conform to OPSS 803.

6.4 Seeding and Mulching

Seeding and mulching shall conform to OPSS 804. Quality Assurance requirements specified in Section 804.08 will be strictly enforced.

Permanent seed mix shall be Standard Roadside Mix. Salt Tolerant Mix may be permitted where resistance to road salt is preferred, at the discretion of the Director of Public Works.

6.5 Tree Planting

Acceptable Species

The following tree species are pre-approved. Alternate species may be acceptable with prior approval from the Director of Public Works.

Small Stature Trees (50 mm cal. minimum): Choke Cherry, Canada Plum, Serviceberry, Staghorn Sumac.

Large Stature Trees (50 mm cal. minimum): Autumn Blaze Maple, Freeman Maple, Red Oak, Honey Locust, Bitternut Hickory.

Small stature trees shall only be used in situations where space is limited.

Plant Materials

All plant materials shall be No. 1 Grade, nursery grown stock meeting the highest horticultural standards of the Canadian Nursery Landscape Association with respect to grading and quality.

Ball sizes shall be sufficiently large to contain at least seventy-five percent (75%) of the fibrous root system. Ball sizes shall be in accordance with the Canadian Nursery Landscape Association Standards.

All plants shall be legibly tagged with their proper name and size and source. Tags must remain in place until approved by the Area Municipality.

Plants shall be sound, healthy, vigorous, well branched and densely foliated when in leaf. They shall be free of disease, insect pests, eggs or larvae and shall have healthy, well-developed root systems. All shrubs and trees shall possess all characteristics of the specified kind with the leader intact, undamaged and uncut, growing from an un-mutilated root system and exhibiting previous 2 years shoot elongation as typical. The stems shall be free from sun scalds, frost cracks, abrasions, fire and rusts. All old injuries shall be completely callused over. Pruning wounds must show vigorous bark on all edges.

Mulch

Shredded cedar bark: varying in size from 35 to 75 mm in length, undyed, and free of chemicals.

Fertilizer

Complete commercial slow-release fertilizer with a maximum 35% water soluble nitrogen with the following percentages by weight of nitrogen, phosphorus, and potassium, in that order: 10-10-10 or as determined by soil tests.

Planting

All work shall be carried out by experienced personnel under the direction of a skilled foreman and in accordance with best horticultural practice.

Planting shall conform to BBDS-501 and be completed during suitable weather conditions. Trees and other plant materials shall be planted vertically and faced to give the best appearance or relationship to adjacent structures, road and walkways to the approval of the Area Municipality.

Acceptance

Prior to acceptance by the Area Municipality, all plants and materials shall be completely free of disease and/or insect infestation and in a healthy

and vigorous growing condition. Tree stakes shall be taut and all accessories in good condition as specified. Planting areas and tree saucers shall be freshly cultivated and free of weeds and debris.

Replacements

Plant material found dead, not in a healthy, satisfactory growing condition or that do not meet the requirements of the specifications within the Warranty period, shall be replaced. Replacement of plants only at the end of the warranty period will not be acceptable.

All replacements shall be plants of the same size and species as originally specified as directed by the Area Municipality.

The Warranty period for replacements shall be 12 months following Acceptance of the replacement. Any replacement must be undertaken immediately upon notification by the Area Municipality. Plant replacements shall be conducted at a time which is in accordance with good horticultural practice.

7 Agreements

7.1 General

From time to time it is necessary and proper for the Area Municipality to enter into legal agreements or arrange procedures which would ensure desirable and uniform development of the services offered to its clients.

- Such agreements can include the following:
- Purchase of Land for Road Improvements
- Transfer of Land by Others
- Severances
- Local Improvement Petitions
- By-Law Work
- Site Plan Agreements
- Subdivision Agreements

7.2 Purchase of land for Road Improvements

Where the Area Municipality, on its own initiative, proceeds to make improvements to roads which require additional land and where it would be in the best interests of the Area Municipality to own such lands it shall be acquired in the following manner:

- Prepare a site plan clearly defining the required land (i.e. Draft Reference Plan).
- Discuss requirements with land owner.
- Establish purchase price based on appraised value.
- Arrange for transfer of land by the Area Municipality, where legal and survey costs are carried by the Area Municipality.

All land acquired by the Area Municipality must be free and clear of all encumbrances.

7.3 Transfer of Land by Others

The Transferor shall notify the Area Municipality of all intents to transfer lands to the Area Municipality. Title will be taken only where it is deemed to be in the best interest of the Area Municipality. The ownership of such lands does not place any obligation on the Area Municipality to maintain or service any improvements that may exist on such lands.

Where the property to be transferred benefits an existing Area Municipality maintained road, a minimum width of land of 20.0 m is required.

All transfer costs, including legal, survey and registration costs, shall be borne by the Transferor. A certificate of title from the solicitor for the

Transferor confirming the property is free from all encumbrances shall accompany the deed forwarded to the Area Municipality.

7.4 Severances

When providing comments on a request for severance, the Area Municipality will consider the impact on the municipal servicing system. The applicant for severance will clarify the ownership of adjacent roads, when requested.

Each severance will be considered on its own merit regarding:

- Impact on road use;
- Future plans for road relocation;
- Road access to severed parcels;
- Drainage patterns.

Trespass roads are to be established and transferred to the Area Municipality, where possible.

Right-of-way transfers shall be consistent with the procedure outlined in Section 7.3 above.

7.5 By-Law Roadwork

Where it is deemed not possible or expedient to complete road improvements by Local Improvement, and where the Area Municipality requests local residents cover some or all of the costs of the improvements, the following procedure shall apply:

- The Area Municipality shall provide local residents with an estimate for the work;
- Local residents shall provide the Area Municipality with a list of users who are prepared to cover the costs;
- A by-law shall be passed authorizing the Area Municipality to invoice the contributing users and providing a breakdown of costs to each user;
- The Area Municipality will manage the work in a manner that best suits the cost, timing and quality of work.

Unless specifically approved otherwise, no person(s) shall make improvements to a municipal road except in the case of an emergency.

The Area Municipality may request the cost of an improvement be carried out by others when a request is made to:

- Upgrade the road standard;
- Provide services not normally associated with the existing standard.

7.6 Subdivision Agreements

Unless specifically authorized otherwise, where lands with the jurisdiction of the Area Municipality are to be developed by a plan of subdivision, or where services are being installed with the implied or expressed intent of those services being assumed by the Area Municipality for maintenance, the work shall proceed under a signed Agreement with the Area Municipality.

Notwithstanding the requirements and authority of any other Board, Committee, Agency, Government Body, etc., the following general procedure shall apply:

- The proponent shall provide a draft proposal of the subdivision or services to the Area Municipality for comment;
- The Area Municipality shall provide comments outlining the servicing requirements including but not limited to:

  - Road standard, alignment and pattern;
  - Streetlighting;
  - General site drainage;
  - Pedestrian safety;
  - Right-of-ways, easements and blocks;
  - Utilities;
  - Natural features, and vegetation.

- These comments shall be incorporated into the Agreement.
- A complete set of construction drawings and specifications shall be provided to the Area Municipality for approval. Refer to Section 1.2 for further details.
- The proponents Consulting Engineer shall provide a cost estimate for the construction to the Area Municipality for approval.
- The Area Municipality shall then prepare an Agreement for the work for signature by the proponent and the Area Municipality. The Agreement will stipulate the amount of the Letter of Credit among other requirements.
- Once the Agreement is signed, and the Area Municipality has received the Letter of Credit and the approved construction drawings, construction may proceed.
- The proponent shall retain the services of a Consulting Engineer who shall supervise the construction and ensure the work is completed in accordance with the Agreement, and the approved plans and specifications.
- Subject to the terms of the Agreement, the value of the Letter of Credit may be reduced during the construction, however, at no time shall the value of the Letter of Credit be less than 100% of the cost of

uncompleted work or work not acceptable to the Area Municipality, plus 15% of the cost of completed and accepted work.

- All works installed under the Agreement will be subject to the maintenance guarantee specified under the Agreement. The guarantee will commence on the date the works were formally accepted by the Area Municipality. During the guarantee period, the proponent will repair all defects in workmanship, material, design, and operation of the work as they become evident, no matter how caused, to the satisfaction of the Area Municipality. The Area Municipality may, with proper notice to the proponent, extend the guarantee period to cover any repairs or modifications made.
- Upon completion of the work specified in the Agreement to the satisfaction of the Area Municipality, and expiration of the maintenance guarantee period, and receipt of a letter from the proponent's Consulting Engineer certifying the work was completed in accordance with the approved plans and specifications, and when all lands specified in the Agreement have been transferred to the Area Municipality, and when all other conditions of the Agreement have been fulfilled, the Area Municipality will return the balance of the Letter of Credit to the proponent and assume the work for municipal maintenance.

Appendix A

Water and Wastewater Modelling Guidelines

WATER AND WASTEWATER HYDRAULIC MODELLING GUIDELINES

July 2024

Introduction

The intent of these guidelines is to provide a clear and consistent approach to be applied by District of Muskoka staff and followed by developers with respect to water and wastewater hydraulic modelling requirements within the context of the development application process.

Hydraulic modelling will be required for development or redevelopment projects requiring more than 10 Equivalent Residential Units (ERUs) of capacity over and above the existing maximum number of ERUs permitted as-of-right through the Area Municipal Comprehensive Zoning By-law. Where the extension of municipal services is required, a Holding (H) provision will be applied to the property and modelling will be required to ensure that capacity is not allocated and/or services are not extended until the project is ready to proceed. Lifting of the H will be contingent on an agreement with the District of Muskoka to address capacity, modelling and other Engineering Department requirements.

Purpose of a Hydraulic Modelling Assessment

The purpose of a Hydraulic Modelling Assessment for the District of Muskoka is to evaluate the impact of modifications, upgrades, and/or additions to a community's water distribution and wastewater collection systems. As new developments are proposed, the hydraulic capacity of the existing water distribution and wastewater collection systems to service the new development must be confirmed to assure that an adequate level of service is maintained. Where the new development causes deficiencies in the system(s), solutions must be developed, and their effectiveness validated by numerical modelling.

The resultant modelling report will also be required as back up documentation for the Ministry Form 1 Water and Form SS1 Sewer.

Developer's should note that early recognition of potential restrictions in the distribution and collection system would be advantageous as these may impact the timing of approvals, which in turn may have financial implications with respect to their developments.

Outcomes of Hydraulic Modelling

The Hydraulic Model determines if the water distribution and wastewater collection system are suitably sized for both the proposed developments and the external works affected by the inclusion of the proposed developments.

The model will provide recommendations with respect to the impact on the water distribution

and wastewater collection system. If the recommendations of the model conclude that upgrades or expansions to the water distribution and wastewater collection system are required for external works that are directly attributable to the proposed development; then approvals may not be issued until these matters are addressed and resolved.

Hydraulic Modelling Analysis

All-pipe water and wastewater models have previously been developed using InfoWater and InfoSWMM software for the following District communities: Huntsville, Baysville, Port Sydney, Bracebridge, Gravenhurst, Bala, Port Carling, MacTier, and Port Severn. A hydraulic modelling analysis is conducted using the existing water and wastewater models to assess the impact of a new development.

The analyses typically consist of the following tasks:

- Review and incorporate the proposed development into the District's water and wastewater models (existing conditions).
- Run the water and wastewater models (existing conditions) for various demand/load scenarios
- Analyze the impact of the development on the performance of the water and wastewater systems
- Analyze and select preferred development alternative(s) for water and wastewater servicing
- Provide recommendations to improve the performance of the existing water and wastewater networks
- Provide recommendations to address system deficiencies
- Prepare final deliverables

The analysis will be undertaken by the District's consultant at the cost of the Developer. On request from the Developer the District will obtain a quotation from the consultant for the analysis work which, will be passed on to the Developer for payment to the District. The District will instruct the consultant to proceed with the analysis on receipt of funds. The final modelling report will be reviewed by the District and provided to the Developer.

Information Required for Hydraulic Modelling Assessment

The size and complexity of a new development may vary considerably and therefore, the size and complexity of the hydraulic modelling analysis may vary. The size and complexity is effected by, but not limited to, the following factors:

- Number of proposed servicing alternatives for the new development
- Number of watermains, valves, fire hydrants, sewers, manholes/chambers/etc.
- Infrastructure upgrades (new or upgraded pump stations, etc.)
- Proximity to other proposed developments in the community

The data required to complete the scope of work are summarized in the following table.

Table 1 Information Required for Hydraulic Modelling Assessment

Water Distribution Modelling	Wastewater Collection Modelling
Proposed watermains: locations, sizes, materials, Hazen-Williams C Factor (if the C factors vary from MECP guidelines)	Proposed sewermains: locations, inverts, sizes, materials • Indicate which pipes are low pressure system pipes (if applicable)
Proposed valves: locations, types, sizes, open/closed settings	Proposed manholes: locations, pipe inverts
Proposed fire hydrants: locations, connections, elevations	Valves/cleanouts/chambers/etc.: locations, pipe inverts
Connection into existing water distribution network: location	Connection into existing wastewater collection network: location, invert
Proposed development: • Number of units, proposed population • Water demand • Peak hour and maximum day factors • Fire flow requirements (if applicable) • finished floor elevations, highest floor elevation for buildings with wet sprinklers (if applicable) If not provided, values from MECP guidelines, the Fire Underwriter's Survey, and/or standards for the community will be used	Proposed development: • Number of units, proposed population • sewage loading rates • peak flow estimates If not provided, values from MECP guidelines and/or standards for the community will be used If sewage pumping station will be required: • Wet well dimensions (depth, area) • Wet well invert • Type of pump and pump curve • Number of pumps • Pump start/stop elevations and operational details if variable speed • Sewermain connections to wet well: inverts • Forcemain: location, size, material, inverts (leaving pump station and entering the wastewater collection network)
Any additional proposed modifications to the existing water system to accommodate the proposed development. These include, but are not limited to, the following examples: • Existing valve and/or watermain modifications (watermain replacements, put in/out of service, valve setrtings etc.) • Any additional existing or future dwellings proposed to be connected to water system by the proposed servicing scenario(s)	Any additional proposed modifications to the existing wastewater system to accommodate the proposed development. These include, but are not limited to, the following examples: • Existing sewermain modifications (sewermain replacements, put in/out of service etc.) • Any additional existing or future dwellings proposed to be connected to wastewater system by the proposed servicing scenario(s).
Additional information (if available): • Report/memo for the proposed development • CAD/GIS files for the proposed water and wastewater servicing plans • Detailed design drawings for the water and wastewater servicing scenarios • Water demand and/or sewer flow calculations (e.g. sanitary sewer design sheet) • Field monitoring results conducted for the development (e.g. hydrant testing results, sewer flow monitoring) • Results from preliminary water/wastewater modelling conducted by the developer	

Appendix B

Engineering Submission Checklist

THE DISTRICT MUNICIPALITY OF MUSKOKA	**District Municipality of Muskoka** **Engineering Design Criteria and Standards Manual** **Detail Design Submission Checklist**

Project Name: _____

District Planning File Number: _____

***All submissions are required as applicable**

***One paper copy of all drawing submissions is required along with PDF version. Exemption to paper copies may be exempted upon request. PDF shall be free of comments and optimized for processing efficiency.**

Submission	Item	✓ or n/a
First Date: _____	• Geotechnical Report	
	• Stormwater Management Report	
	• General Servicing Plan	
	• Plan and Profile Drawings	
	• Sanitary drainage sheet with design sheets	
	• Grading Plans	
	• Road and intersection drawings	
	• Pavement marking drawings	
	• Truck turning templates	
	• Cross-section drawings	
Second Date: _____	• Updated drawings and documents	
	• Declaration of other required agency approvals	
Interim Date: _____	• Updated drawings and documents	
Third Date: _____	• One stamped paper set paper drawing set	
	• Completed Form 1	
	• Completed Form SS1	
	• Final sewer design sheets	
	• Shop drawings	
	• Request to initiate servicing agreement	
	• Easement legal descriptions	
	• Cost estimate of district services for assumption	
	• Owners legal name and contact information	

Appendix C

Approved Products List

District Municipality of Muskoka

Approved Products List

July 2024

WATERMAIN

*** All listed water apputentances must comply with NSF 61 Standards**

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Pipe	Polyvinyl Choride (PVC)	DR 18 AWWA C900-16 AWWA C905 CSA B137.3	Ipex	Blue Brute	Rubber gasketed bell and spigot joints
			Royal Pipe Systems	C900 High pressure	Installed with 12 Gauge stranded tracer wire wire approved connectors
			Next Polymers	Aqualoc	Joints restrained where required by design with approved materials
			Diamond Plastics Corp.	C900	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Fittings	Ductile Iron (Epoxy Coated)	AWWA C153 ANSI A21.53	Star		All fittings to be mechanical joint type
			Sigma		fusion bonded epoxy coated c/w stainless steel hardware or equivalent coating
			RCT	Internal Restaint fitting	"No standard uncoated fittings allowed"

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Joint Restraint	For PVC Pipe Bell and spigot push-on joints	ASTM F1674 All fitting hardware to be stainless steel	Star	Series 1000/1100/1200	
			Sigma	PV Lok / One Lok	c/w stainless steel hardware
			Ford	Uni-Flange UFR1350	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Joint Restraint	For PVC Pipe to Mechanical Joint Fitting	ASTM F1674 All hardware to be stainless steel	Star	Stargrip	C555 Standards (Protective fusion bonded epoxy coatoings for the interior and exterior of DI fittings)
			Sigma	PV Lok / One Lok	
			Ford	Uni-Flange UFR1500/3500	
			Romac	Romac Grip Ring C/W SS Hardware	
			Clow	TUF Grip Dual Wedge	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Restrained Couplers	Epoxy coated C/w SS Hardware		Hymax	Grip	
			Georg Fischer	Multi Joint 3000	

District Municipality of Muskoka

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WATERMAIN

*** All listed water apputentances must comply with NSF 61 Standards**

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Service Saddles	For PVC Pipe , Stainless Steel, Double Bolt. Fully gasketed.		Robar	2616 Boss Pad	Service saddles manditory on all PVC watermains.
			Cambridge Brass	8403 PG	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Main Stops (corporation) All brass water services are "No Lead"	25mm - 50mm	AWWA C800-05 NSF 61 AWWA X compression type - stainless steel ball style, saddles to be used on all PVC pipe. CTS OD Tubing size.	Ford Meter Box Inc.	FB1000-X-NL	Must comply with NFS/ANSI 61 Drinking Water System Components - i.e. Lead- Free Brass.
			Cambridge Brass	Series 301NL	
			Mueller Canada	Series 300N	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Curb Stops	25mm to 50mm	Stainless steel Ball Type - compression joint non draining - ANSI / AWWA C800- 05 and NSF/ ANSI 61	Ford Meter Box Inc.	B44 Series NL BH 44-233G NL	Must comply with NFS/ANSI 61 Drinking Water System Components - i.e Lead- Free Brass. Non Draining .
			Cambridge Brass	202 NL	
			Mueller Canada	300 series	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Valves	Ductile Iron valves shall be epoxy coated (Interior/exterior). All valves shall have mechanical joint ends and be the resilient seat type.	AWWA C-509	Clow	Model 2639	Ductile Iron valves shall be epoxy coated (Interior/exterior). All valves shall have mechanical joint ends and be the resilient seat type.
			Mueller	A-2361	
			AVK	Type 25/01	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Tapping Sleeves	Stainless Steel blind flange outlet, Full surrond girded gasket.	AWWA C223	Smith Blaire	663 SS	
		AWWA C207	Robar	6606	
		NSF - 61	Ford meter Box Co.	Fast Tap	
		ASTM D2000			

District Municipality of Muskoka

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WATERMAIN

*** All listed water apputentances must comply with NSF 61 Standards**

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Tapping Valves	Ductile Iron valves shall be epoxy coated (Interior/exterior). All valves shall have mechanical joint one side and blind flange on the other and be the resilient seat type.	AWWA C-509	Clow	Model 2639	Ductile Iron valves shall be epoxy coated (Interior/exterior). All valves shall have mechanical joint ends and be the resilient seat type.
			Mueller	T-2361	
			AVK	Type 25/31	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Valve Boxes	Epoxy paint or Black Aspaltic Bitimous Paint Cast Iron	5SL-48 Sliding Valve Box C/W Guide Plate, 6mm predrilled round hole with grommet for tracer wire in upper section. ASTM A48M-03 Class 30B.	Mueller		Valve and Valve boxes to be installed as per OPSS 441.
			Bibby	VB1100 + GP	
			Conquer BM. Inc		
			Star Pipe Products	VB-5002	
			DomCast	DF64	
			Sigma Corp		

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Valve Box Extensions		Less than or equal to 1.8m total extension length	Clow		
			Mueller		
			Sigma Corp		
			DomCast		
			Star Pipe Products		

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Service Boxes	Epoxy paint or Black Aspaltic Bitimous Paint Cast Iron Cast Iron, Satinless Steel service box rods where required.		Bibby	VSB1/B2	
			Clow	D1 /D2	
			Mueller	A726/A728	
			SigmaCorp	#8	
			Star Pipe Products	SB-5001/5002	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Water Service Pipe	Copper Tube Size (CTS) Municipal Service Tubing Series 200 / PEX (C904)	CSA B137.1 CSA B137.5 AWWA C904 AWWA C901	Polytubes PE	CTS Series 200	SS. Insert stiffeners required at all compression fittings. * Service pipe requires tracer wire.
			Ipex Blue *	SDR9 CTS	
			Reau "Municipex" *	SDR9 CTS	
			Trinus Pipe & Tubes		

District Municipality of Muskoka

Approved Products List

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WATERMAIN

*** All listed water apputentances must comply with NSF 61 Standards**

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Hydrants		AWWA C502	Clow Canada	Concord Premier D67-M	Factory applied epoxy coated.
			Mueller Canada	Canada Valve Century	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Transition Couplings		AWWA C-219	Krausz	Hymax	Hymax grip, Romac Alpha or George Fisher to be used were restained fittings are required.
			Romac	Macro HP	
			Krausz	Hymax Grip	
			Romac	Alpha	
			George Fisher	3000 Plus	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Tracer Wire	12 AWG Type (PE or HMWPE) insulated strand, Rated for direct burial				Provide manufacturers corrosion testing data.

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Tracer Wire Connectors			Copperhead ™	Snakebite	All direct bury connectors require to be prefilled dielectric silicone sealant type.
			Dryconn -King Innov	Lug Aqua	
			Dryconn -King Innov	DBSR Aqua	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Air Release Valves	Direct Bury ARI units		ARI	D 090	New installations require sub surface

District Municipality of Muskoka

Approved Products List

July 2024

SEWER

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Pipe (Main Line Non Pressure)	PVC DR35	CSA B182.2	IPEX	Ring-tite	Rubber Gasket, Bell and spigot Joints
		ASTM D3034	Royal Pipe Systems	Royal Seal	Green in Colour
			Next Polymers	Duraloc	
			Diamond Plastics	Sani -21	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Service Pipe (Non Pressure)	PVC DR28	CSA B182.2	IPEX	Enviro-tite	125 mm min single service residential
			Royal Pipe Systems	Royal Seal	150mm min industrial / commercial
			Next Polymers	Duraloc	Rubber Gasket, Bell and spigot Joints
			Diamond Plastics		Green in Colour

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Fittings	Gaskets moulded PVC Fittings	CSA B182.1	Ipex	Ring Tite	All Gaskets meet requirements of
		CSA B182.2	Royal Pipe Systems	Royal Seal	ASTM F477 and D3213
		ASTM D3034	Galaxy		
		ASTMF1336	Tigre-ADS		

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Sewer Service Saddle			Romac	CB	Epoxy Coated
			Clow	D-50	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Service Cleanout	PVC	Solvent weld to ASTM F656 Regular or Medium bodied	Galaxy Plastic Ltd.	Solvent Weld	100 mm dia. vertical pipe, Wye GXGXG (5"x5"x4"), threaded plug countersunk, cleanout adaptor FIPT X S DMM-310A and DMM-310B

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Couplings	Rubber Couplings		Fernco		
			Mission Rubber		

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Precast Maintenance Holes and Components			Con Cast		1200 mm Min maintenance structure
			Decast		
			Munro		

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Pipe to Manhole Connection			Trelleborg	Kor-N-Seal	
			Garlock	Link-Seal	

District Municipality of Muskoka

Approved Products List

July 2024

SEWER

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Manhole Frames			Bibby (Autostable)	C-50M-ONT (6")	
			Mueller "adjustable"	AJ633 (152) (6")	
			Sigma	Self Leveling	
			East Jordan		

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Manhole level adjusters			Ipex - Lifesavers adjustment	27"	Ipex flat adjusters 1.25"- 4" sloped 1.5"

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Air Release Valves	Combination Air Release / Vacuum Breaker		ARI	D-025 SB	New installations require sub surface installation. (Direct Bury)
			H-Tech	986	

Product	Type	Specifications	Manufacturer	Description / Model	Comments
Low Pressure sewer Pipe and Fittings	Copper Tube Size (CTS) Municipal Service Tubing Series 200 / PEX (C904)- Brass Fitting	AWWA C900	Trinus Pipe & Tubes		Green sewer tape required on LP Lines. Tracer wire required on pipe.

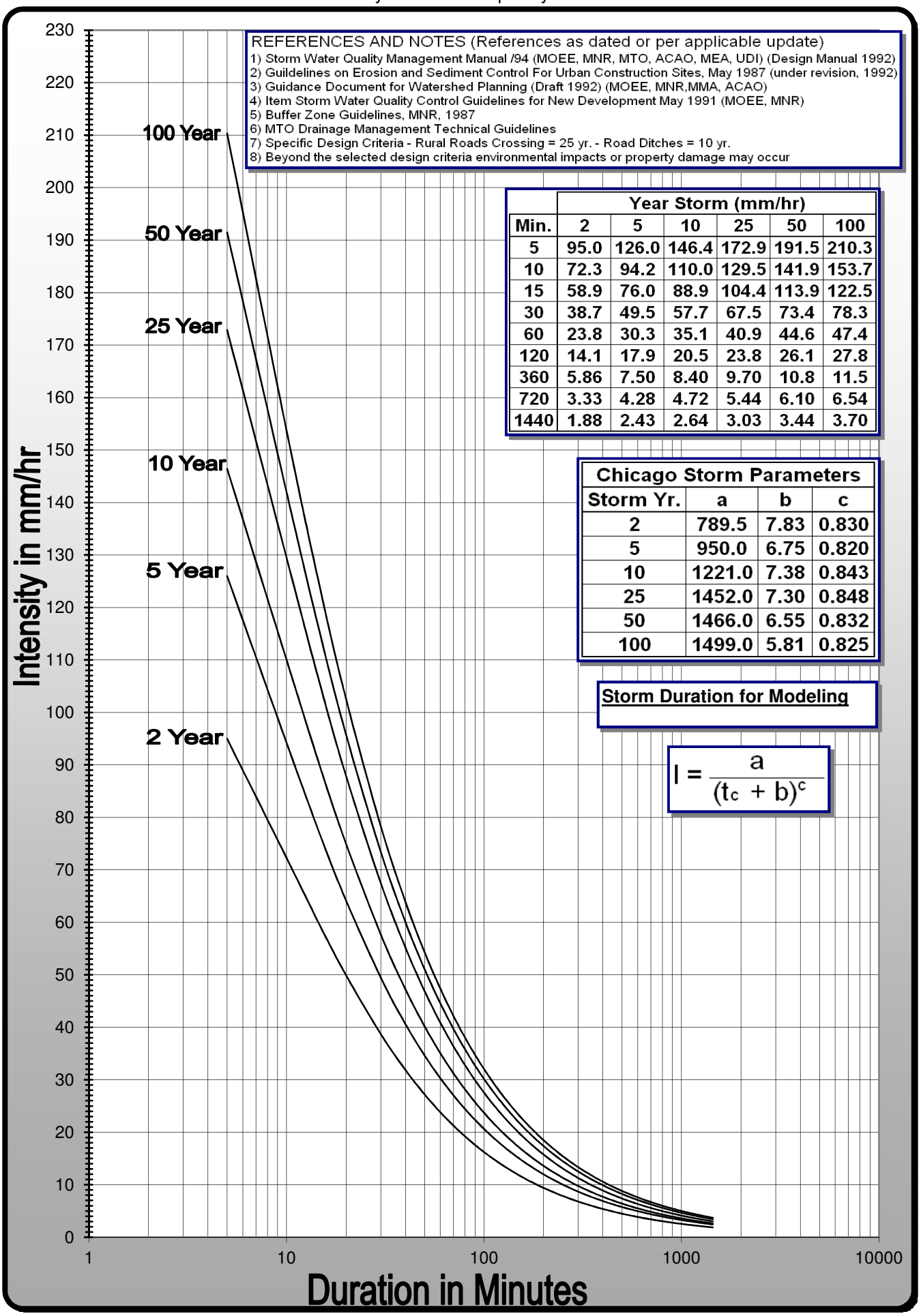
Product	Type	Specifications	Manufacturer	Description / Model	Comments
Grinder Pump		Min. 2 HP			LPS pumps to be grinder type and have a minimum of 2HP

Appendix D

District of Muskoka Storm Intensity – Duration - Frequency Chart

MUSKOKA RAINFALL DATA

Intensity-Duration-Frequency Values



	Year Storm (mm/hr)					
Min.	2	5	10	25	50	100
5	95.0	126.0	146.4	172.9	191.5	210.3
10	72.3	94.2	110.0	129.5	141.9	153.7
15	58.9	76.0	88.9	104.4	113.9	122.5
30	38.7	49.5	57.7	67.5	73.4	78.3
60	23.8	30.3	35.1	40.9	44.6	47.4
120	14.1	17.9	20.5	23.8	26.1	27.8
360	5.86	7.50	8.40	9.70	10.8	11.5
720	3.33	4.28	4.72	5.44	6.10	6.54
1440	1.88	2.43	2.64	3.03	3.44	3.70

Chicago Storm Parameters			
Storm Yr.	a	b	c
2	789.5	7.83	0.830
5	950.0	6.75	0.820
10	1221.0	7.38	0.843
25	1452.0	7.30	0.848
50	1466.0	6.55	0.832
100	1499.0	5.81	0.825

Storm Duration for Modeling

$$I = \frac{a}{(t_c + b)^c}$$

Updated: Jan. 24, 2006

Appendix E

Transportation Impact Assessment Guidelines

THE DISTRICT MUNICIPALITY OF MUSKOKA

ENGINEERING AND PUBLIC WORKS DEPARTMENT
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TRAFFIC IMPACT ASSESSMENT GUIDELINES DOCUMENT

December 2017

Introduction

The intent of these guidelines is to provide a clear and consistent approach to be applied by District staff and followed by proponents with respect to traffic impact assessment requirements within the context of the development application process.

It is typical that a traffic impact study be required when:

- the proposed development will generate 100 or more vehicle trips during the peak hour (peak hour of the road or peak hour of the development); or
- the proposed development will generate less than 100 vehicle trips during the peak hour, however, the site or study area characteristics are such that traffic or other transportation issues or concerns may have to be addressed to accommodate the development.

As stated by ITE[1]: This site trip generation threshold is appropriate for the following reasons:

- *an additional 100 vehicles per hour can change the level of service or appreciably increase the volume-to-capacity ratio of an intersection approach; and*
- *left or right-turn lanes may be needed to satisfactorily accommodate site traffic without adversely impacting through (non-site) traffic.*

For smaller scale developments (i.e. less than 100 trips during the peak hours) where little or no impact to the external road system is anticipated, a traffic study of reduced scope is typically accepted.

Terminology

There are several names given to studies that assess the potential traffic impacts of proposed development (i.e. traffic impact assessment, traffic impact study, traffic review, traffic brief, traffic statement, etc.). For the purpose of clarity, the following terminology has been adopted in developing the traffic impact assessment guidelines for the District:

Traffic Impact Assessment Refers to the generic requirement that an assessment be completed to address the potential traffic impacts of a proposed development on the adjacent road network. The traffic impact assessment will be in the form of a *Traffic Impact Brief*

[1] *Transportation Impact Analyses for Site Development, An ITE Proposed Recommended Practice*. ITE, 2005.

or *Traffic Impact Study*, whichever is deemed appropriate based on the thresholds contained herein and in consultation with the District's Engineering and Public Works Department. In part, the Traffic Impact Assessment Guidelines provide guidance to the District and proponents with respect to establishing the appropriate scope of traffic impact assessment required (i.e. Traffic Impact Brief or Traffic Impact Study).

Traffic Impact Brief This is a reduced scope traffic impact assessment, usually required for small scale developments where little or no impact to the adjacent road network is anticipated.

Traffic Impact Study This is a comprehensive traffic impact assessment, usually required for medium and large scale development where greater impacts to the adjacent road network are anticipated.

The thresholds and content requirements for a Traffic Impact Brief and Traffic Impact Study are detailed in the following section; Traffic Impact Assessment Guidelines.

Traffic Impact Assessment Guidelines

Purpose of a Traffic Impact Assessment

The purpose of a Traffic Impact Assessment for the District of Muskoka, regardless of scope, is to examine and document the potential impact of traffic generated by a proposed development on District Roads, and to identify any mitigating measures/improvements that may be required to accommodate the additional traffic volumes. Depending on the required scope, the assessment may be limited to the proposed access, or expanded to include impacts at nearby intersections, interchanges and adjacent road sections. The type of Traffic Impact Assessment required, be it a Traffic Impact Brief or Traffic Impact Study, and content to be included shall be determined based on the thresholds noted below and in consultation with the District's Engineering and Public Works Department.

Traffic Impact Assessment Thresholds

The following thresholds are to be considered by applicants as a general rule. Prior to undertaking a Traffic Impact Assessment, the applicant must confirm the appropriate level of assessment through consultation with the District's Engineering and Public Works Department.

Traffic Impact Brief For developments expected to generate less than 100 vehicle trips during the peak hours (total of inbound and outbound trips), a Traffic Impact Brief may be considered, *provided that* the site or study area characteristics are not such that would indicate traffic or other transportation issues/concerns are likely to arise given the proposed development.

Traffic Impact Study For developments expected to generate 100 or more vehicle trips during the peak hours (total of inbound and outbound trips), a Traffic Impact Study is required for review and approval by the District.

A Traffic Impact Study may also be required for a development that will generate less than 100 vehicle trips during the peak hour, if the site or study area characteristics are such that traffic or other transportation issues or concerns may have to be addressed to accommodate the development.

MTO and/or Municipal Requirements

Should a development have frontage and/or access to a Provincial highway or municipal road, or be considered a major traffic generator in close proximity to a Provincial highway, consultation with the Ministry of Transportation of Ontario and/or appropriate municipality is recommended to confirm their requirements with respect to a Traffic Impact Assessment. While the District's Traffic Impact Assessment Guidelines have been developed in consideration of the requirements of MTO, the applicant must confirm the requirement of all relevant road authorities. Regardless, it is expected that developments impacting District roads will submit a Traffic Impact Assessment that, at a minimum, satisfies the requirements of the District's own guidelines.

Traffic Impact Brief - Scope of Work

A Traffic Impact Brief has a reduced scope in context of the anticipated trip generation of the development, and hence reduced potential for impacts that may result. A Traffic Impact Brief is to be certified by a professional engineer and address the following:

1. Study Area: Inventory the existing road system to which the development fronts and/or in the immediate area of the development. This should include the number of lanes, speed limits, urban/rural cross-sections, sidewalk locations, pedestrian crossings, etc. The study area is to be confirmed with the District prior to commencing the assessment.

2. Proposed Development: Detail the proposed land use and development phasing/completion year. Provide an overall plan illustrating the proposed access locations, the internal road network, building locations, parking, etc. as applicable.

3. Site Traffic: Based on the land uses, determine trip estimates for the most appropriate peak hours. Typically, these will be the weekday AM and PM peak hours of the adjacent road, although for commercial, entertainment, religious, institutional or sport facility uses, a weekend peak may be required. For uses that are expected to experience seasonal variations, the peak seasonal conditions should be considered. The trip estimates should be based on published trip rates, data from other representative sites, or based on sound engineering ("First Principles").

4. Site Access Assessment: The site access should be reviewed in consideration of the volume and type of vehicles to be generated by the site, and the proposed access location and configuration. The site access assessment should consider the District's standards as outlined in *The District Municipality of Muskoka Policy and Procedures for Access onto District Roads*.

5. Sight Line Assessment: At each access point, the sight distance requirements should be determined based on appropriate standards (MTO or TAC, as noted in the District's *Policy and Procedures for Access onto District Roads*), and the availability of appropriate sight lines determined from actual field measurements or engineering plans.

6. Site Plan Review: On-site circulation should be reviewed in context of the volume and type of vehicles to be served (including emergency vehicles, garbage collection or other appropriate design vehicles) and the ability of the site to accommodate site traffic without impact to the adjacent road system. Circulation of pedestrians and cyclists should also be considered as well the potential impact the development may have on existing pedestrian/cycling facilities. Queueing assessments may be required for land uses that induce on-site queues (i.e. restaurants with drive thru facilities, gas stations, drive-thru bank machines, car washes, etc.) The intent of a queueing assessment is to ensure that on-site queues can be accommodated wholly within the site without causing disruption to the operations of the adjacent road system (i.e. queue lengths that block access points or on-site parking or circulation, or spill back onto the adjacent road).

7. Documentation: A letter report should be prepared to detail the findings related to the above. Relevant maps, graphs, tables and figures should be provided. The Traffic Impact Brief should be able to provide a conclusive statement that the proposed development will not adversely affect the operations or the safety of the adjacent road system, or conversely, identify any improvements that may be required to accommodate the development. It should confirm that the development plan, including the access, parking area and internal circulatory system, is adequate to suit the site traffic.

Traffic Impact Study - Scope of Work

A Traffic Impact Study is to be certified by a professional engineer and shall address the following:

1. Study Area: The study area should extend far enough, within reason, to contain all local and District municipal and provincial roads that will be noticeably affected by the traffic volumes to be generated by the proposed development. The study area is to be confirmed with the District prior to commencing the assessment. The District reserves the right to establish the study area as may be deemed necessary.

   A description of the existing transportation system in the study area, using a combination of maps and other documentation, should identify relevant information, such as:

   - existing roads, number of lanes, on-street bike lanes, posted speed limits, sidewalk locations, pedestrian crossings;
   - the lane configurations and control of the key intersections/roundabouts to be considered in the study;
   - the provision of on-street parking in the vicinity of the development site and the potential for this to impact key intersections being analyzed;
   - other traffic controls and transportation facilities; and
   - other features of interest such as designated trails, walkways, etc.

2. Horizon Years & Periods of Analysis: The horizon years should coincide to the anticipated full build-out of the site, in addition to 5 and 10 years beyond full build-out. Interim horizon years must also be considered as necessary for the staged implementation of the identified road system improvements.

   Typically, the weekday AM and PM peak hours of the adjacent street will constitute the peak hours to be addressed. However, in the case of commercial, entertainment, religious, institutional or sport facility use, the weekend peak hours may be more appropriate. During the initial consultation process with the District, the Consultant should determine the selected peak periods for analysis and identify an appropriate method for considering peak seasonal conditions.

3. Existing Traffic Volumes: Figures illustrating the existing traffic volumes and turning movements for the study area roads and intersections are required. Traffic volumes may be acquired from the District, respective Town/Township, MTO, from other transportation studies in the area, or through new traffic counts. To ensure representation of existing conditions, traffic count data should be no more than 3 years old. Ideally, traffic counts will be conducted so as to capture peak seasonal conditions; however, where such data capture is not feasible due to timing constraints, a reasonable adjustment to account for peak seasonal variations should be established and verified by the District and applied to the existing traffic volumes.

4. Future Road Network & Background Volumes: Future transportation improvements to the study area road network that are currently being considered should be identified. These improvements should be described to a level of detail sufficient to assess their implications for travel to/from the development site. In each case, identify the status and anticipated date of implementation for consideration in the Future Background and Future Total traffic conditions.

Future traffic volumes should be prepared for each horizon year, with consideration for annual growth rates to reflect general growth in traffic in addition to the growth specific to new development.

General growth can be estimated based on historic growth in area traffic volumes, and/or future projections of area population and employment as approved by the District. Consideration can also be given to other area transportation studies.

All significant developments under construction, approved or in the approval process and that are likely to contribute additional traffic volumes within the horizon period, should be identified. The trips that are expected to be generated by these developments should be included in the future background volumes (trips can be established from a corresponding Traffic Impact Study or based on the land uses and published trip generation rates). The respective Town or Township within which the subject development is located should be consulted to establish the approved/active development proposals within the study area.

5. Proposed Development: The Traffic Impact Study should provide a full description of the proposed development, including the following as applicable:

   - municipal address;
   - existing and proposed land uses;
   - total development area and summary by use (e.g. type and number of residential units, commercial gross floor area, etc.);
   - anticipated tenants;
   - planned phasing and build-out period.

   A site plan, concept plan, draft plan, or similar as applicable, is to be included in the Traffic Impact Study document. If the proposed development is to be constructed in phases, describe each phase and the proposed implementation timing for each.

6. Site Traffic - Trip Generation: Trip generation estimates are to be based on the proposed land uses, size of development and trip generation data from:

   - the *ITE Trip Generation Manual* (most recent edition);
   - trip generation surveys conducted at similar developments/proxy sites; or
   - "First Principles" calculations of anticipated trips to/from the site.

   Where appropriate, it may be justified to reduce the base trip generation estimates to account for pass-by trips and/or internal/shared trips (in the case of a multi-use development). The resulting estimates are referred to as "new" vehicle trips. All trip generation assumptions employed in the calculation of the "new" vehicle trips should be supported and well documented.

   Sensitivity analysis should be undertaken where trip generation parameters have the potential to vary considerably and most probable values cannot be readily identified (i.e. the exact tenant or use of commercial space is not known). A trip generation table should be provided in the report to summarize the land uses and sizes, with the corresponding trip generation rates and the resulting number of trips. For large developments that will be phased in over time, the table should identify each significant phase separately.

7. Site Traffic - Trip Distribution & Assignment: Trip distribution assumptions should be supported by an adequate assessment of surrounding development, proximity to major trip generators, likely origin/destinations and existing/anticipated travel patterns. Sound engineering judgement should be utilized when establishing trip distribution.

   Trip assignments should consider logical routings, available and projected road capacities, and travel times. Trip assignments may be estimated using a transportation demand model or "hand assignment" based on knowledge of the proposed/future road network in the study area. The trip assignment should also take into consideration varying assignments for pass-by trips, link-diverted trips and internal trips.

8. Future Total Traffic Volumes: Future total traffic volumes are to be presented, representing the culmination of the future background traffic volumes and the site generated traffic volumes for each horizon year.

9. Traffic Impacts: An evaluation of the key signalized and unsignalized intersections within the study area for all relevant peak periods for the existing and future planning horizons (both with and without the subject development traffic) is required and summaries are to be provided in a tabular format (e.g. level of service, volume to capacity ratio and delay). The intersection capacity/operational analysis should be completed using Synchro/Sim Traffic Simulation Software or the like. The objective should be to ensure that no new problem movements are created by the proposed development and that existing problem movements are not worsened to an unacceptable level with the addition of site generated traffic. Where intersections are closely located, queueing assessments should be included with respect to appropriate storage, queue encroachment, back to back left turns, etc.

   Should operational issues result, means of mitigation and the related operations are to be presented (e.g. introduction of traffic signals, additional through lanes, turn lanes, etc.) Appropriate warrants for improvements and associated operational review worksheets should be appended to the report.

10. Site Access Assessment: The site access should be reviewed in consideration of the volume and type of vehicles to be generated by the site, and the proposed access location and configuration. The site access assessment should consider the District's standards as outlined in *The District Municipality of Muskoka Policy and Procedures for Access onto District Roads*. Access points should be evaluated in terms of capacity, safety and adequacy of queue storage capacity.

    Should operational issues result at the site access, means of mitigation and the related operations are to be presented (e.g. introduction of traffic signals, additional through lanes, turn lanes, etc.). Appropriate warrants for improvements and associated operational review worksheets should be appended to the report.

11. Sight Line Assessment: At each access point, the sight distance requirements should be determined based on appropriate standards (MTO or TAC, as noted in the District's *Policy and Procedures for Access onto District Roads*), and the availability of appropriate sight lines determined from actual field measurements or engineering plans.

12. Site Plan Review: On-site circulation should be reviewed in context of the volume and type of vehicles to be served (including emergency vehicles, garbage collection or other appropriate design vehicles) and the ability of the site to accommodate site traffic without impact to the adjacent road system. Circulation of pedestrians and cyclists should also be considered as well the potential

impact the development may have on existing pedestrian/cycling facilities. Queueing assessments may be required for land uses that induce on-site queues (i.e. restaurants with drive thru facilities, gas stations, drive-thru bank machines, car washes, etc.) The intent of a queueing assessment is to ensure that on-site queues can be accommodated wholly within the site without causing disruption to the operations of the adjacent road system (i.e. queue lengths that block access points or on-site parking or circulation, or spill back onto the adjacent road).

13. Documentation: The structure and format of the Traffic Impact Study should follow the guidelines outlined in this document as applicable. This format will facilitate review, discussion and communication. Relevant maps, graphs, tables and figures should be provided.

End of Document

Appendix F

Policies and Procedures for Access onto District Roads

THE DISTRICT MUNICIPALITY OF MUSKOKA

Managing Our Legacy Together

POLICY AND PROCEDURES

FOR

ACCESS ONTO

DISTRICT ROADS

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1. INTRODUCTION

1.1 Purpose

The purpose of this policy is to preserve and/or improve upon the integrity of the roadway network while recognizing that one of the keys to successful development is a properly designed access. This is accomplished by promoting a progressive and high caliber design standard for access.

1.2 Goals

The factors which affect the operation of an access and the roadway include the location, geometrics of the access, auxiliary lane requirements, capacity of the roadway, drainage, safety and operational efficiency of the access as they relate to the roadway and land use. Access to private property should consider the location and number of accesses required and provide good service to users while at the same time minimizing interference to roadway traffic.

The goals of this policy are:

a) to provide the maximum protection to the public through the orderly control of traffic movements onto and from the road network;

b) to maintain the traffic carrying capacity of the road network;

c) to protect the public investment in roadway facilities;

d) to reduce the potential for and the severity of collisions thereby protecting investment in property and personal well being.

e) to minimize public investment in maintenance functions;

f) to ensure uniform practices in the design and construction of accesses for the safety of the general motoring public;

g) to maintain and regulate legal access to private property fronting onto a highway.

2. DEFINITIONS

A sketch illustrating various terms defined herein is attached as Figure 1, Page 18.

Entranceway

An entranceway is the means by which vehicles are provided with ingress to or egress from a public or private property to the roadway.

Non-Commercial Access

A non-commercial access is one providing access to a residential use of six units or less or to agricultural land, including field accesses

Commercial Access

A commercial access is one providing access to property being used other than for a residential use of six units or less or for farm or field uses.

High Volume Commercial Access

A high volume commercial access is one providing access to facilities which generate high volumes of traffic and/or heavy truck traffic, i.e. shopping centres, athletic fields, hospitals, industries, temporary subdivision roads, etc.

Mutual Access

A mutual access is one providing access to adjoining properties under common and/or separate ownership.

Temporary Access

A temporary access is one providing access to a property for a specified period of time for the purpose of construction, repairs or improvement on that property or to facilitate staged development.

Auxiliary Lane

An auxiliary lane is a lane parallel to the roadway and its associated taper which are provided to assist in the acceleration or deceleration and storage of vehicles entering or leaving the roadway.

Boulevard

A boulevard means that portion of the highway situated between the curb line and the property line of the lot abutting the highway, but does not include a sidewalk or shoulder.

Centre Line

The centre line is the line dividing an access into two parallel portions.

Curb Line

a) Where a curb has been constructed, means the line or curb, and
b) Where no curb has been constructed, means the edge of the roadway.

Day-Light Triangle

A day-light triangle includes land acquired as part of the highway which is intended to provide clear vision for the safe movement of traffic or improved turning lanes.

District

The District means The District Municipality of Muskoka.

Engineer

The Engineer means the District Engineer for the District Municipality of Muskoka or his designate.

Frontage

The frontage is the length of property line abutting a highway.

Highway

A highway includes a common and public highway, street, avenue, parkway, driveway, square, place, bridge, viaduct or trestle designed and intended for, or used by, the general public for the passage of vehicles and pedestrians and includes the area between the lateral property lines thereof.

Property Line

A property line is the common boundary line between two adjoining properties under common and/or separate ownership.

Radius

The radius is the curved outer edge of an access connecting the throat to the curb line.

Roadway

Roadway means that part of the highway that is improved, designed or ordinarily used for vehicular traffic, but does not include the shoulder, and, where a highway includes two or more separate roadways, the term "roadway" refers to any one roadway separately and not to all of the roadways collectively.

Low Speed Roadway

A low speed roadway is one with a designated speed limit less than 70 km/h.

Shoulder

The shoulder is that part of the highway lying adjacent to the roadway which is improved with granular or paved surface and is not intended for the passage of vehicular traffic.

Throat Width

The throat width is defined by the minimum width dimension at the intersection of the radius points with the parallel portion of the access.

Traffic

Traffic includes all vehicular and pedestrian activity occurring on or adjacent to the highway.

3. ADMINISTRATION

3.1 Authority

An access permit is required to ensure conformity with Controlled Access By-law 79-15 as amended of the District Municipality of Muskoka and with this policy.

3.1.1 Controlled Access

No person shall construct, alter the geometric design of, enlarge or otherwise use any access to a highway designated as Controlled Access unless said access has been approved by the Engineer upon issuance of an access permit pursuant to this policy.

3.2 Penalty

Any person violating any provision of a Controlled Access By-law as amended shall be guilty of an offense and shall be liable on conviction to a fine as indicated therein.

3.3 Access Permit

An access permit may be required as a condition of approval of a development approval application including a severance, plan of subdivision, rezoning, variance or site plan approval or when a new access or change to an existing access is proposed. The permit fee shall be established by by-law from time to time.

The District may require the applicant to construct, alter the geometric design of or retain any access within the highway.

An access constructed or altered under the provisions of Controlled Access By-law #79-5 as amended shall conform to this policy and all conditions and provisions attached to any access permit issued.

3.4 Application For Access

Applications for access forms may be obtained by telephone or in person from the Traffic Engineering Section of the District Roads and Traffic Division. Applications are to be completed by the applicant and delivered by mail or in person to the District Traffic Engineering Section along with two copies of a site plan. The site plan should be drawn to scale and when applicable provide the following information:

Existing:
- property lines (dimensions and bearings)
- width and location of roadway and highway
- curbs
- shoulders
- boulevard
- ditches
- existing accesses
- aboveground utilities
- parking and traffic control devices
- landscaping
- existing structures
- adjacent land uses
- a key plan (indicating location of property)
- legal description of property
- north arrow

Proposed: The geometrics of:
- proposed accesses
- curb returns
- highway widenings
- auxiliary lanes
- pavement markings
- parking layout
- landscaping
- paved areas
- buildings
- site circulation

The applicant may be required to stake or suitably mark the location of a proposed access and/or the limits of the frontage of the subject property immediately following an application for access. The applicant is responsible for ensuring that any application for access complies with any applicable local land use and zoning by-laws.

3.5 Processing Procedures For Applications For Access

Since the District receives a large number of applications for access and as the amount of time required to process each application varies with the complexity of the specific proposal, applicants are advised to make application well in advance of the proposed commencement of work.

Upon receipt of an application for access the District Traffic Engineering Section will circulate the application to District and local agencies affected. Where an access permit is issued, the final design, number and location of accesses may reflect the concerns expressed by the agencies circulated.

3.6 Access Permit Approval

Once an application has been approved an access permit will be forwarded to the applicant. No work shall be undertaken on the highway until the access permit has been received by the applicant.

The access permit will be issued only for the specific development proposal indicated on the application for access.

An access permit shall not release the applicant from compliance with other District and local by-laws or other requirements.

An access permit is transferable within the time period specified on the permit should ownership of the subject property be changed. The new property owner will be bound by the conditions of the access permit.

An access permit shall indicate a specific date by which construction of the access must be completed otherwise the permit will expire and become null and void. The maximum time period is one year from the date of approval. Should the applicant desire to amend his application at anytime or construct an access after expiry of the access permit, he is required to re-apply in writing. The above time limit will not apply to plans of subdivision which have received "Draft Approval". Should "Draft Approval" status be rescinded the permit will become null and void.

Access permits may be issued for the construction and operation of a temporary access for a specified period of time. Such permits will indicate the date upon which the access will be removed. should the applicant desire to extend the expiry date of a temporary access permit, he is required to re-apply in writing. The maximum period is one year from the date of approval.

Where access is desired for a period of seven days or less to allow for construction, repair or improvement on that property, and no alternate point of access is available, an access permit is not required. However, the applicant will be required to obtain a Roadway Occupation Permit from the Traffic Engineering Section which will specify the restoration requirements.

3.7 Appeal

An applicant may appeal the decision of the District Engineer or his designate as to the issuance of a permit or any conditions thereto by requesting a review in writing within 30 days of the date of the dates in dispute. Unless Council directs otherwise, all such requests shall be referred to the Engineering Committee of the District Municipality of Muskoka for report to Council.

3.8 Costs

All costs associated with the approval and installation of the access shall be borne by the applicant. These costs may include any and all costs for the construction or alteration of an access such as labour and materials for the access itself, alteration to the roadway, utilities, traffic control devices, layout and surveying of the access, legal costs, preparation of plans, removal of non-conforming works, etc.

Where the District constructs or reconstructs a roadway, the District may improve existing accesses within the highway where required at the District's expense.

3.9 Roadway Occupation Permit

An applicant may be required to obtain a Roadway Occupation Permit as a condition of an access permit. (While work is carried out, care must be taken to ensure the protection of workmen and minimization of interference with normal traffic operation. All signing and traffic control shall be in compliance with the Manual of Uniform Traffic Control Devices for Ontario (M.U.T.C.D.))

A copy of the Access Permit and Roadway Occupation Permit shall be available on - site during construction at all times.

All works carried out under a Roadway Occupation Permit within the highway shall be done by the District, its' designate or an approved contractor.

3.10 Acceptance Of The Works

A field inspection will be carried out upon completion of the works or at the expiration of the access permit whichever occurs first. The District reserves the right to have any modifications performed if the installation does not conform to the access permit at the applicants cost.

Where a culvert is installed it shall be inspected by the District prior to the placement of any backfill material. Culverts installed otherwise shall be removed at the discretion of the District at the applicants cost.

3.11 Maintenance Of Accesses

Property owners having access onto a District Road are fully responsible for the maintenance of the access serving the property including the removal of snow and ice and keeping the portion of the access within the highway in a safe condition for vehicular traffic.

A culvert installed under the terms of the access permit shall become the property of the District upon acceptance of the work and all subsequent maintenance, repairs, alterations, etc. shall be the responsibility of the District.

4. PRINCIPLES

This policy has been prepared using fundamental engineering and planning principles and is provided to afford property owners a better understanding of District requirements relating to access.

4.1 General Principles

a) Access to the District Road may be allowed where it is determined by the District Engineer that District Road access is required to support an arterial oriented land use designation and safe access can be designed according to the criteria set out in this policy.

b) New subdivisions shall be provided with access from local streets. Exceptions to this provision will be considered where development is of an infilling nature and/or it is evident that direct access is acceptable from a traffic operations viewpoint.

c) New access to District Roads for new non-farm related, residential lots created outside settlement areas as designated in the District and Area Municipality Official Plans will conform to provisions of the District Official Policies Plan and the Area Municipality Official Plan.

4.2 Principles Of Design

a) Reduction of the speed differential between through vehicles and vehicles using the access;

b) Compatible interaction among all points of access;

c) Prohibition of the use of the highway as a portion of the internal circulation system of abutting property;

d) Discouragement of hazardous traffic movements which may prove detrimental to the operation of the roadway;

e) Preservation or improvement of the effectiveness of traffic control devices (i.e. traffic control signals);

f) Control of the method and type of access construction in order to minimize hazards to traffic.

4.3 Auxiliary Lanes

Auxiliary lanes to promote smooth ingress or egress at an access may be necessary for capacity purposes where the roadway and/or turning volumes are high or for the motorists safety when the roadway speeds dictate. The final determination of the need for such facilities shall rest with the District.

The design of auxiliary lanes shall be in accordance with the current edition of the Roads and Transportation Association of Canada (R.T.A.C.) Manual and shall take into consideration the speed differential between through vehicles and those using the access and the amount of vehicular storage that will be required. Where circumstances dictate, the volume and size of trucks that will use the auxiliary lane and the steepness of an ascending or descending grade shall be taken into consideration.

4.4 Median Openings

Where roadways have been constructed with a centre median, openings in the median for new private accesses will generally not be permitted. Under special circumstances and based on substantial trip generation calculations, the District may consider the need for additional mid-block median openings and their related traffic control strategy.

The layout of accesses should take advantage of existing or pre-planned openings. In such cases, the construction of left turn lanes should be considered.

4.5 Shoulders

The shoulders adjacent to an access shall be constructed/reconstructed to match the shoulders in the immediate area. A paved access constructed where drainage is carried by an open ditch, shall have in addition to the required width of pavement, a shoulder constructed parallel to the pavement edge of at least 1.0 metre width. This shoulder shall be constructed within the highway and extend onto private property as required.

4.6 Illumination

Property owners may be required to illuminate a Commercial or High Volume Access used after dark. Such illumination may be erected on private property or on the highway subject to an encroachment agreement. Any illumination must not constitute a nuisance to traffic nor resemble traffic control signals.

4.7 Traffic Control Devices

Property owners may be required to permit a traffic control device such as regulatory or warning signs, traffic control signals, delineators, pavement markings, parking meters, etc. to be installed, relocated or removed on a highway. All such devices shall be in accordance with the M.U.T.C.D. and District Municipality of Muskoka standards. The installation, relocation, removal and maintenance of such devices shall only be undertaken by the District or its designate.

Property owners may also be required traffic control devices to be installed, relocated or removed on private property. All such devices shall meet the approval of the District and the installation, maintenance, relocation and removal of such devices shall be the responsibility of the applicant.

4.8 Location Of Accesses

In the interest of public safety and convenience, the location of an access may be restricted to a particular location along the applicant's frontage. Generally an access must be located so as to provide:

a) favourable vision, grade and alignment conditions for all traffic using the proposed access and the roadway;

b) no undue interference with the safe movement of through traffic;

c) safety and convenience for pedestrians and other users of the highway.

In general, accesses will not be permitted:

a) along a lane which is identified for the purpose of an exclusive vehicular turning movement;

b) in close proximity to traffic control signals;

c) in close proximity to intersections

d) in close proximity at grade railway crossings;

e) in close proximity to abutments or structures on a highway;

f) within the day-light triangle at an intersection;

g) where minimum sight distance requirements are not met.

Additional requirements regarding the location of accesses are included in Appendix "C", Page 26.

4.9 Number Of Accesses

Each application for an access permit shall be considered on its own merit. Need must be demonstrated or substantiated where multiple accesses are requested. Careful consideration must be afforded to the internal circulation, layout and frontage with a view to minimizing the disruption of traffic while achieving optimum spacing between points of intersection with District Roads. Direct access from single lots of a new subdivision onto a District Road will be discouraged.

4.10 Layout Of Accesses

The throat width, angle, radius and other geometric features of an access and islands will be considered when determining access layout.

4.10.1 Throat Width

The throat width of accesses shall be based on the speed and volume of through traffic on the roadway and the type and volume of vehicles using the access. Accesses shall be wide enough to prevent vehicular conflict in the access or on the roadway yet definitive enough to prevent parallel entry in to the traffic stream, while at the same time recognizing its use by pedestrians. Throat width requirements are included in Appendix "B", Page 25.

4.10.2 Radius

In all cases, the throat width shall be increased by a specified radius to allow for smooth ingress and egress at the roadway connection. The radius for an access is dependent upon and must be compatible to the desired departure speeds of the drivers and must be correlated to the required level of service for known or planned use. The outside edge of a radius will be curved around a radius point and shall tie into the throat of the access and the existing curb line. Where the width of the highway is restrictive, a compound curve may be acceptable. Radius requirements are included in Appendix "B", Page 25.

The selection of a radius for an access with truck generated traffic will require special consideration and will be determined using turning vehicle templates designed in accordance with R.T.A.C. specifications so as to prevent vehicles which use the access from encroaching outside the curb lanes of traffic. All radii for Commercial and High Volume Commercial Accesses shall be defined by curbing where the adjacent roadway has curb and/or gutter existing.

The radius may fall onto the applicant's property where the highway is narrow and may project beyond the point of intersection of the property line at the curb line. However, it shall not interfere or prejudice the design of an adjacent access.

4.10.3 Definition

Multiple accesses will require separation by the use of curbing and/or landscape treatments to create positive identification of the access and good on site circulation characteristics. At the discretion of the District, curbing may also extend into the highway to reinforce positive access definition. All such treatments shall conform with applicable back by-laws, if any.

Where on site parking facilities are in close proximity to the access itself, curbing may be required to extend onto private property so as to ensure an adequate queuing area and to minimize on site interference between those intending to use the access and the internal traffic.

4.10.4 Mutual Access

4.10.4.1 Non-Commercial Accesses

A mutual Non-Commercial Access shall straddle or abut the property line and shall not exceed twice the minimum access width specified for the appropriate speed classification of the roadway.

4.10.4.2 Commercial Accesses

A mutual Commercial Access shall straddle or abut the property line and shall not exceed the maximum access width specified for the appropriate speed classification of the roadway.

4.10.5 Angular Placement

All accesses should be constructed so that the centre line is at right angles to the curb line. No access shall be constructed with a centre line angle measured from the roadway of less than 70 degrees.

An angled Commercial Access may be allowed for high speed or one way roadways, large volume movements or special function land uses.

4.10.6 Number of Lanes

A High Volume Commercial Access shall be designed to avoid congestion caused by traffic entering or exiting the facility. The number of lanes on the access shall be determined by the District in consideration of the anticipated trip generation and distribution.

5. DESIGN SPECIFICATIONS

Property owners are advised that it may be in their best interests to retain the services of a professional engineer or other qualified consultant for the purposes of identifying grade, drainage, construction, circulation, illumination and other development requirements.

5.1 Grades

5.1.1 Existing Gutter

The grade of an access within the highway where the gutter exists shall not exceed 10%. Where the access profile forms a crest curve, the access grade beyond the highway shall not exceed 8% change within any 3.0 metres distance as shown on Figure 2 on Page 19. This will avoid vehicles "bottoming" on the crest. Where the access profile forms a sag curve, the access grade beyond the highway shall not exceed 10% change within any 3.0 metres distance as shown on Figure 2 on Page 19. This will avoid the bumper of a vehicle "dragging" on the sag.

5.1.2 Existing Ditch

The grade of an access where no curb and gutter exists shall slope away from the curb line at a rate equal to the slope of the shoulder and shall continue for a distance equal to the prevailing shoulder width. Beyond the shoulder the access profile shall not exceed 8% change within any 3.0 metres distance as shown on Figure 2, Page 19.

5.2 Cross Section and Material

5.2.1 Existing Sidewalks

Where a sidewalk is located across a proposed access and does not meet the applicable District Specifications, it shall be removed and replaced. Where a sidewalk is located close to a curb line, and the access opening is to be provided across a depressed curb, the sidewalk shall be removed and replaced with a concrete sidewalk, ramped to District Specifications, and conforming to the access profile. In special cases (i.e. High Volume Commercial Accesses) where the sidewalk is to be discontinued across the access, the access shall be defined by curbing and a sufficient amount of sidewalk shall be replaced meeting the necessary District wheelchair specifications.

5.2.2 Existing Curbs

Where a depressed curb must be provided or restored, the entire curb and gutter section to the nearest expansion joint shall be removed and replaced to District Specifications. The removal of only the raised portion of the curb will not be allowed, unless an approved grinding or cutting method is employed.

5.2.3 Surfaces

Accesses must be surfaced and maintained to ensure the original profile is retained, that operational speeds are not reduced by pot holes or rough surfaces, and that no damage or deterioration of the highway is caused by the condition of the access.

All accesses shall be surfaced with an asphaltic or concrete material to District Specifications within the limits of the highway, except all non-commercial accesses in locations where no curb and gutter exists. In this case, as a minimum, the access is required to be surfaced with a thickness of gravel or crushed stone to District Specifications.

5.3 Drainage

Accesses must be constructed so that they do not adversely affect the roadway drainage, drainage on adjacent properties, or the drainage or stability of the roadway subgrade. The construction or an access must not cause water to flow across the road pavement, or to pond on the shoulders or in the ditch, or cause erosion within the highway.

5.3.1 Existing Gutter

Where drainage is carried along the curb, the access must be sloped to prevent run-off spillage into private property and the flowline of the gutter through the access shall be maintained.

5.3.2 Existing Ditch

Where an access will cross an open ditch, a culvert pipe shall be installed. The culvert shall be installed such that the invert elevation is compatible with the profile of the existing ditch line. A ditch or gutter shall not be filled without adequate provision for drainage being made.

Culvert pipes shall be of a size adequate to carry the anticipated flow in the ditch as determined by the District. In general the culvert pipe shall not be less than 500 mm inside diameter.

The material and gauge of the culvert pipes shall be adequate to withstand the anticipated vehicular traffic across the access and shall meet District Specifications.

5.4 Sight Distance

The location of an access should provide sufficient sight distance for the motorists on the access and the roadway to perceive potential conflicts and to carry out the actions needed to prevent a collision.

5.4.1 Low Speed Roadways

An access should not be permitted on a low speed roadway where the available "crossing sight distance" does not meet or exceed the minimum standards contained in the latest edition of the Manual entitled "Geometric Design Standards for Canadian Roads And Streets" published by the Roads and Transportation Association of Canada.

"Crossing sight distance" a measure of the distance required to allow a vehicle time to cross or enter the roadway without unduly affecting an approaching vehicle. The crossing time required is dependent upon the perception and reaction time of the crossing motorist, vehicle acceleration time, the width of the roadway, the length of the crossing vehicle and the speed of an approaching vehicle. "Crossing sight distance" requirements are included in Appendix "A", Page 24.

5.4.1.1 Commercial and High Volume Commercial Accesses

Where "crossing sight distance" requirements cannot be satisfied at any point along the frontage of the property to which access must be provided, the construction of an auxiliary lane should be considered.

Where "crossing sight distance" requirements cannot be satisfied in one direction, the prohibition of a turn in that direction should be considered.

Where a property has frontage onto two roadways, and where "crossing sight distance" requirements cannot be satisfied onto one of those roadways access should only be provided onto the roadway where "crossing sight distance" requirements are satisfied.

5.4.2 High Speed Roadways

An access should not be permitted on a high speed roadway where the available "safe sight distance" does not meet or exceed the minimum standards contained in the latest edition of the Ministry of Transportation and Communications "Geometric Design Standards for Ontario Highways".

"Safe sight distance" is a measure of the distance required to allow a vehicle time to enter the roadway and attain the posted speed limit before being overtaken by a vehicle approaching in the same direction. The time required is dependent upon the perception and reaction time of the entering motorist, vehicle acceleration time, the width of the roadway and the speed of an approaching vehicle. "Safe sight distance" requirements are included in Appendix "A", Page 24.

5.4.2.1. Commercial and High Volume Commercial Accesses

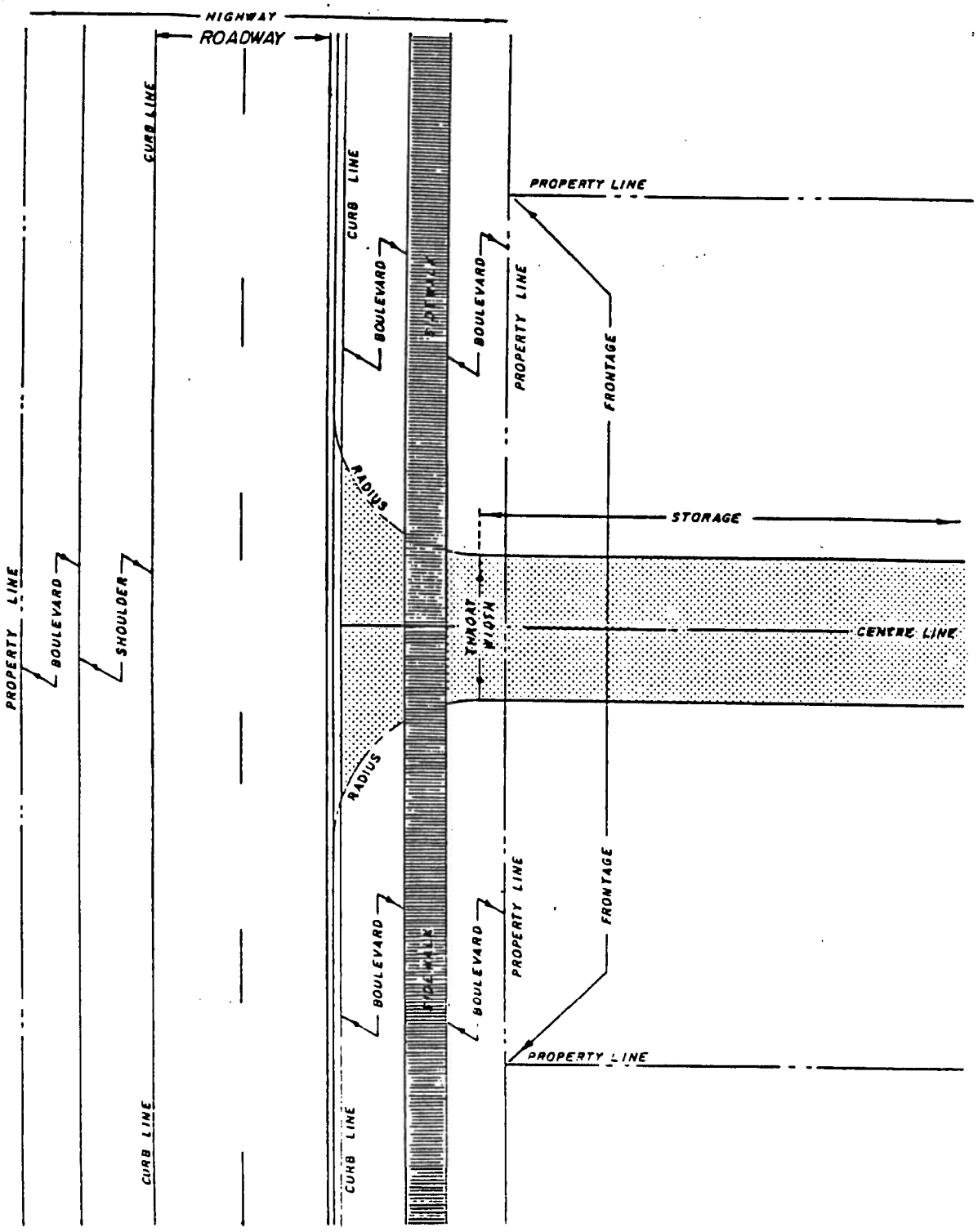
Where "safe sight distance" requirements cannot be satisfied at any point along the frontage of a property to which access must be provided, the construction of an auxiliary lane should be considered.

When a property has frontage onto two roadways and where "safe sight distance" requirements cannot be satisfied onto one of those roadways, access should only be provided onto the roadway where "safe sight distance" requirments are satisfied.

5.4.3. Sight Lines

The applicant must ensure that clear vision is maintained at the mouth of an access and no structure or vegetation is allowed to obscure the vision of an entering or exiting motorist.

F I G U R E S

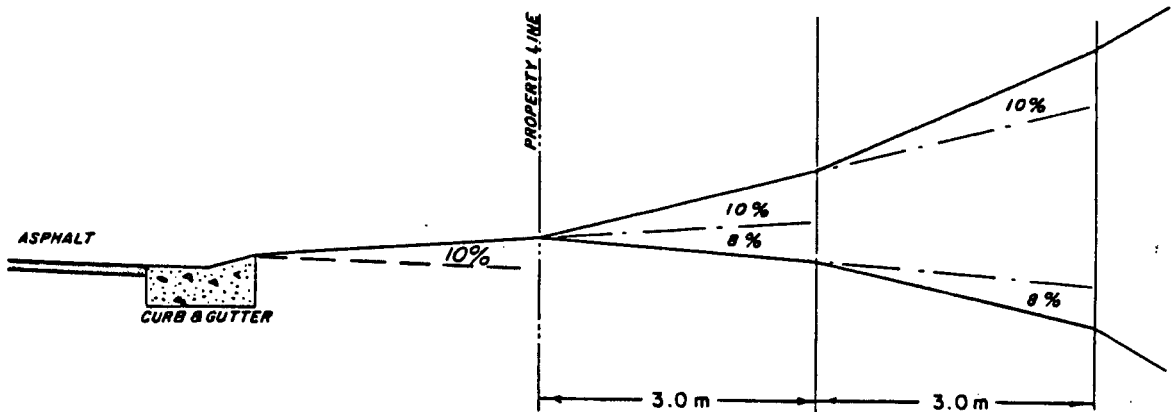


The District Municipality of Muskoka

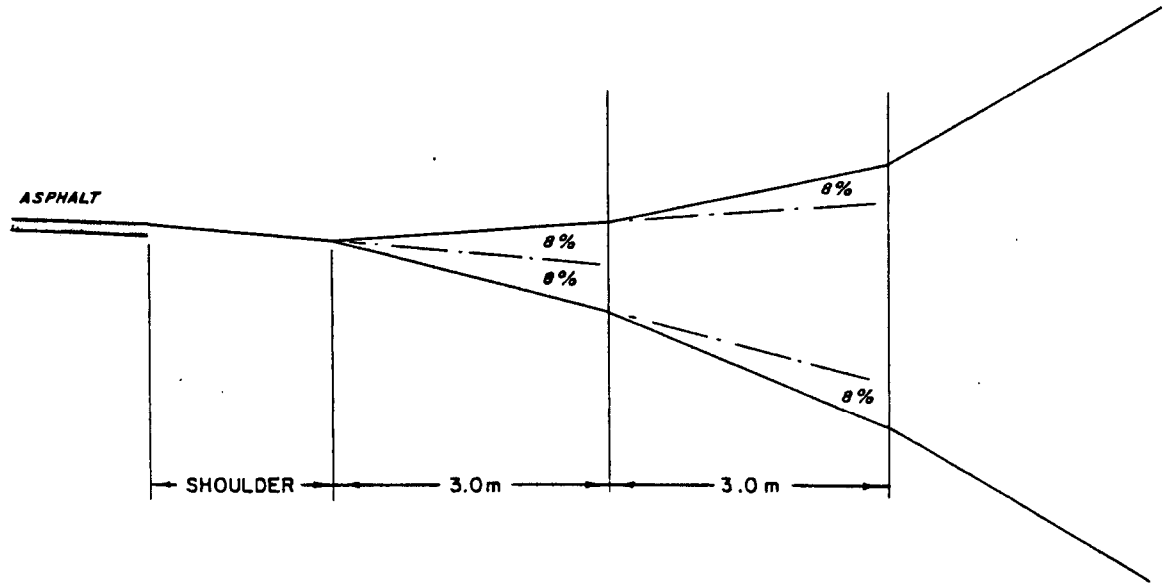
Policy And Procedures For Access Onto District Roads

ILLUSTRATION DEPICTING ACCESS TERMS

FIG. 1



EXISTING GUTTER



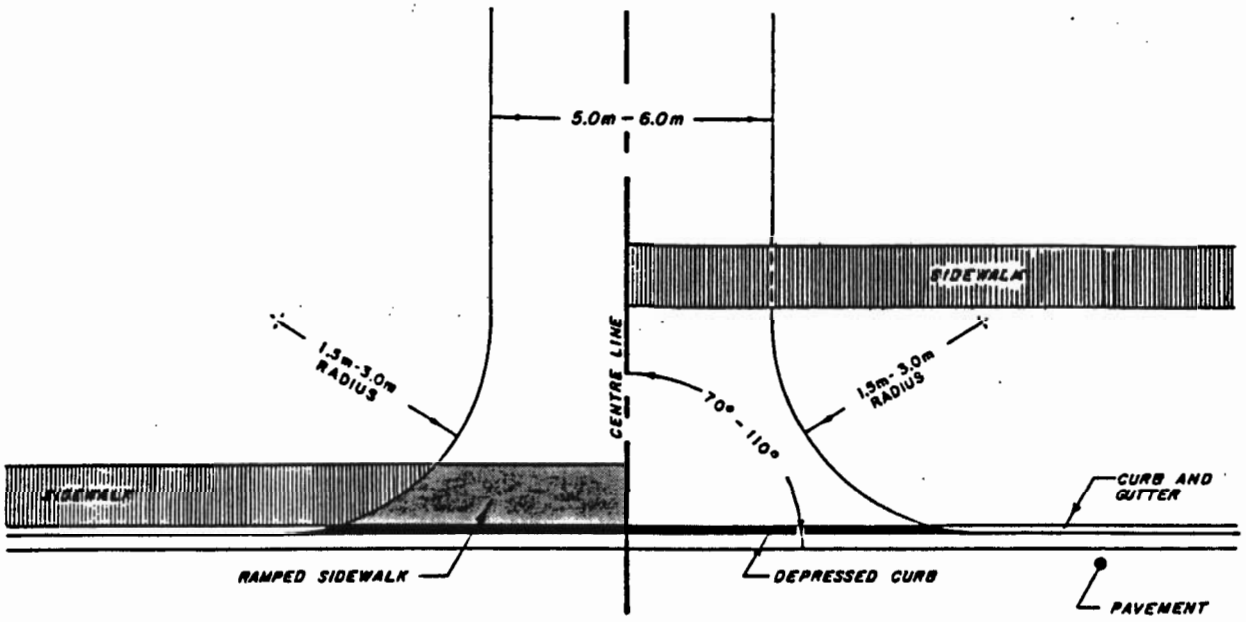
EXISTING DITCH

The District Municipality of Muskoka

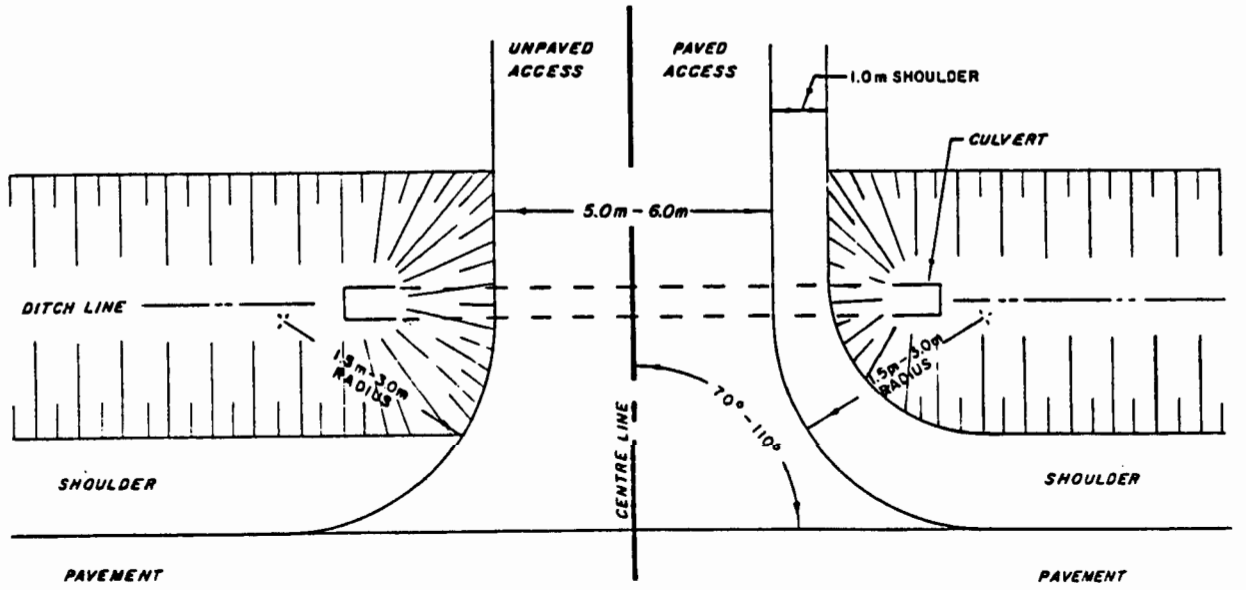
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ACCESS PROFILES

FIG. 2



EXISTING CURB AND GUTTER



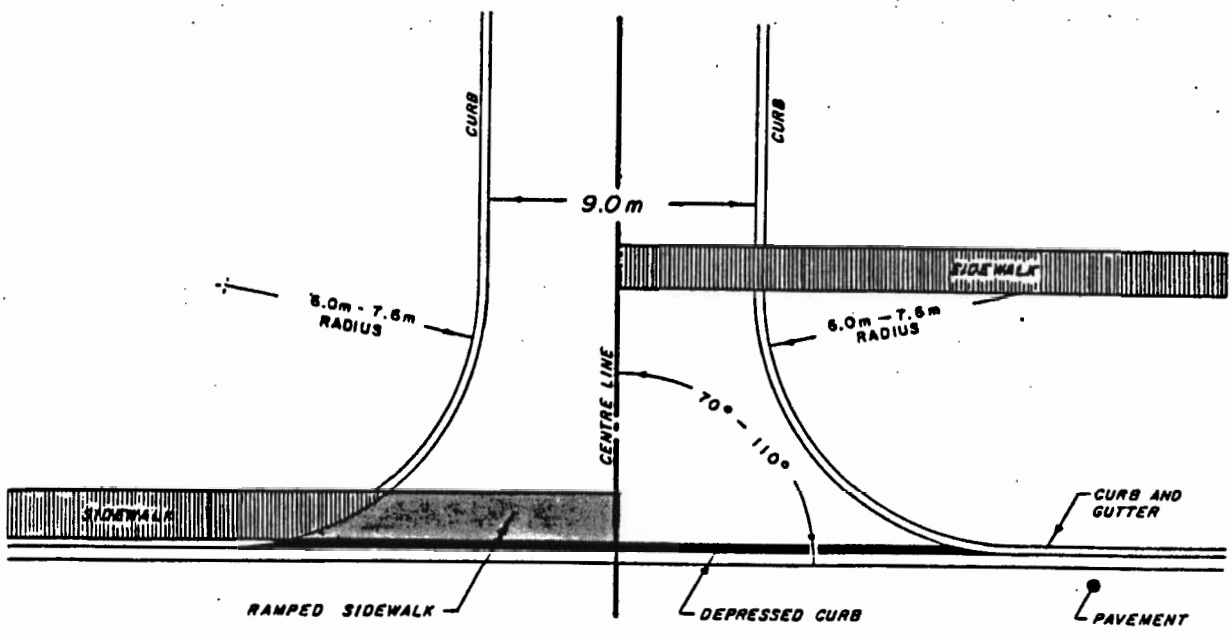
NO CURB AND GUTTER WITH
OPEN DITCH

The District Municipality of Muskoka

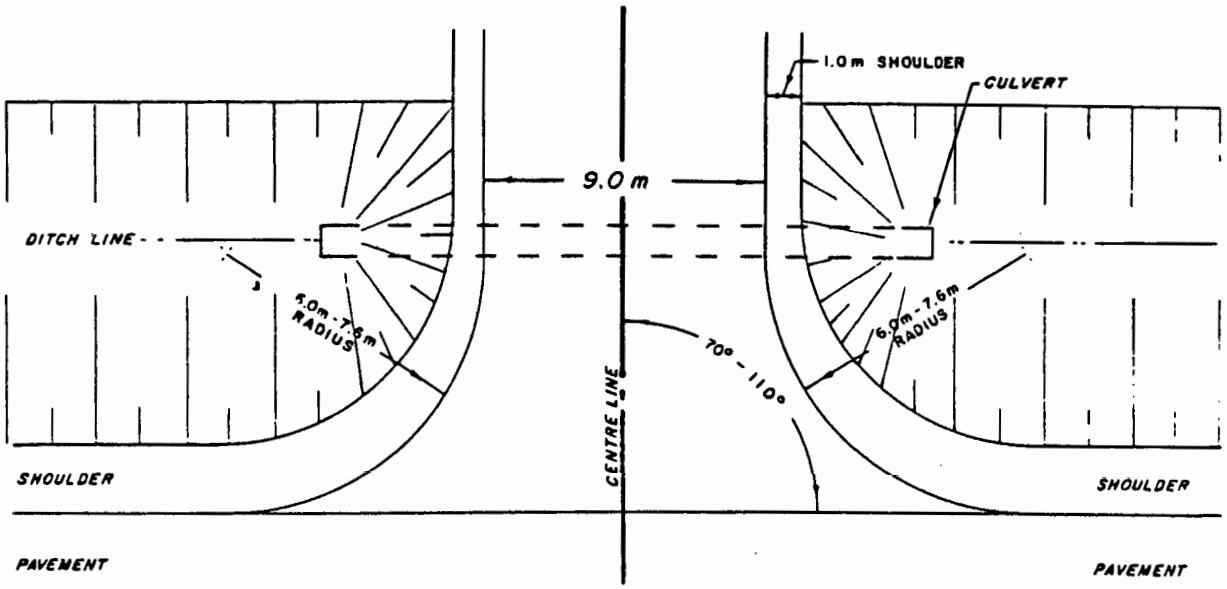
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NON-COMMERCIAL ACCESS REQUIREMENTS

FIG. 3



EXISTING CURB AND GUTTER



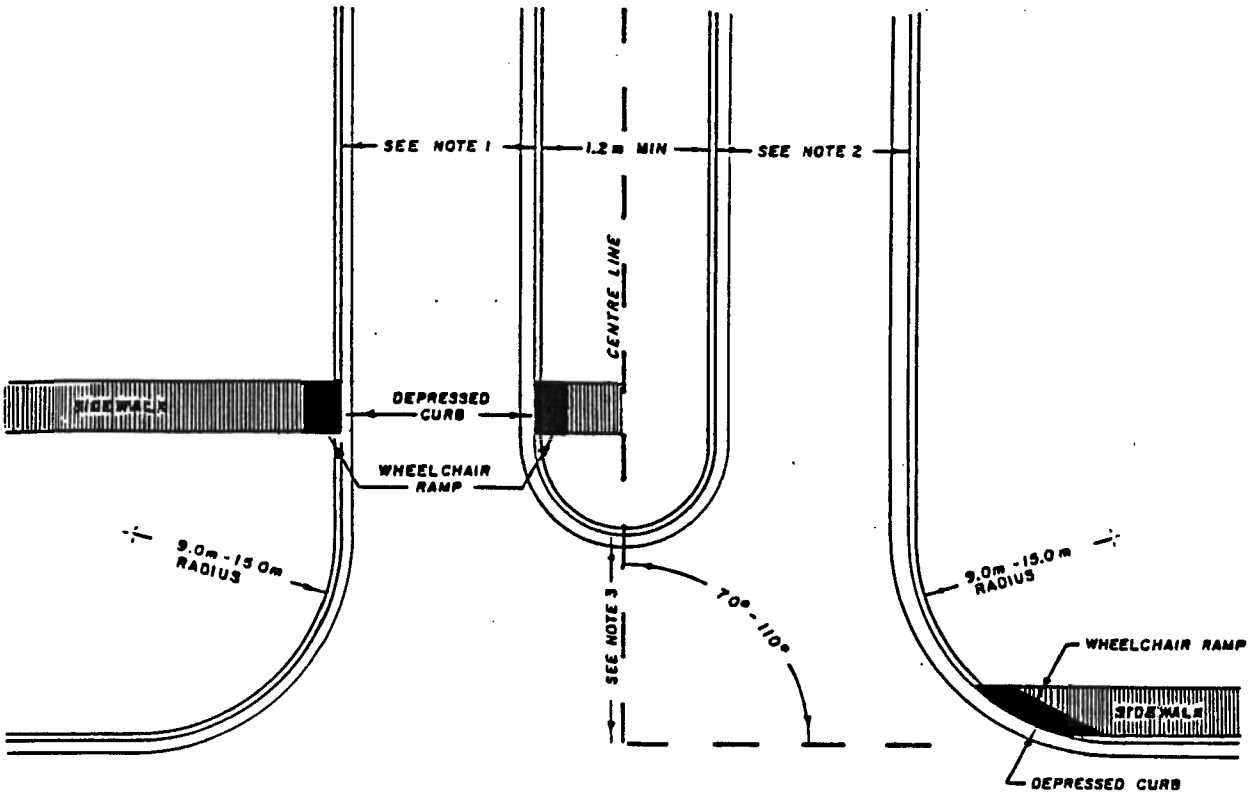
NO CURB AND GUTTER WITH
OPEN DITCH

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Policy And Procedures For Access Onto District Roads

COMMERCIAL ACCESS REQUIREMENTS

FIG. 4



NOTES:

1. THROAT WIDTH VARIES WITH PROJECTED VOLUMES AND TURNING MOVEMENTS;
   - A 3.6 m WIDTH SHALL BE PROVIDED FOR EACH THROUGH LANE AND RIGHT TURN LANE.
   - A 3.0 m WIDTH SHALL BE PROVIDED FOR A LEFT TURN LANE.
2. THROAT WIDTH VARIES WITH PROJECTED VOLUMES AND TURNING MOVEMENTS;
   - A 3.6 m WIDTH SHALL BE PROVIDED FOR EACH LANE.
3. THE POSITION OF THE BULLNOSE SHALL TAKE INTO CONSIDERATION THE TURNING RADIUS OF VEHICLES.

The District Municipality of Muskoka

Policy And Procedures For Access Onto District Roads

HIGH VOLUME COMMERCIAL ACCESS REQUIREMENTS

FIG. 5

APPENDICES

APPENDIX "A"

Sight Distance Requirements (1)

Type of Vehicle	Posted Speed Limit in km/h	Number of Lanes on Roadway	Sight Distance In Metres	
			Non-Commercial	Commercial
Passenger Car	50	2	65	120
	60	2	85	140
	70	2	110	160
	80	2	135	180

(1) Based upon recommendations contained within the Manuals entitled "Geometric Design Standards for Canadian Roads And Streets" published by the Roads And Transportation Association of Canada and "Geometric Design Standards For Ontario Highways" published by the Ministry of Transportation and Communications.

APPENDIX "B"

Layout of Accesses

Access Classification	Roadway Classification	Throat Width	Radius	Angular Placement
Non-Commercial	Low Speed	5m	1.5m min.	70 - 110
	High Speed	6m	3.0m desirable	70 - 110
Commercial (Two Way)	Low Speed	9m	6.0m min	70 - 110
	High Speed	9m	7.6m min	70 - 110
Commercial (One Way)	Low Speed	4.6m	6.0m min	70 - 110
High Volume Commercial	Low Speed	Variable	9.0m-15.0m	70 - 110
	High Speed	Variable	9.0m-15.0m	70 - 110

NOTES:

1. Non-Commercial access requirements are illustrated on Figure 3, Page 20.
2. Commercial access requirements are illustrated on Figure 4, Page 21.
3. High Volume Commercial Access requirements are illustrated on Figure 5, Page 22.

APPENDIX "C"

Number And Location of Accesses

Access Classification	Roadway Clasification	Number of Accesses Allowed (note 1)	Minimum Dimension From Non-Signalized Intersecting Highway (note 2)	Minimum Dimension From Signalized Intersecting Highway (note 2)	Minimum Dimension From Pedestrian Signals (note 3)	Minimum Dimension From Adjacent Non-Commercial Access (note 4)	Minimum Dimension From Adjacent Commercial Access (note 4)	Minimum Dimension From Adjacent High-Volume Commercial Access (note 4)	Minimum Dimension From At Grade Railway Crossing (note 5)	Minimum Dimension From Abutment or Structure on A Highway (note 6)
Non-Commercial	Low Speed	One	16.0m	33.0m	33.0m	7.0m	13.0m	37.0m	8.0m	varies
	High Speed	One	28.0m	55.0m	N/A	8.0m	16.0m	59.0m	8.0m	varies
Commercial	Low Speed	One	33.0m	65.0m	65.0m	13.0m	20.0m	69.0m	13.0m	varies
	High Speed	One	55.0m	110.0m	N/A	16.0m	24.0m	114.0m	13.0m	varies
High Volume Commercial	Low Speed	One	60.0m	120.0m	120.0m	37.0m	69.0m	124.0m	100.0m	varies
	High Speed	One	100.0m	200.0m	N/A	59.0m	114.0m	204.0m	100.0m	varies

NOTES:

1. Need must be demonstrated where multiple accesses are requested. Refer to Section 4.9 Number of Accesses on Page 11.
2. Minimum dimension shall be measured from centreline of access to property line abutting an intersecting highway.
3. Minimum dimension shall be measured from centreline of access to centre of crosswalk.
4. Minimum dimension shall be measured from centreline of access to centreline of adjacent access.
5. Minimum dimension shall be measured from centreline of access to property line abutting railway right-of-way.
6. Minimum sight distance requirements must be satisfied. Refer to Appndix "A", Page 24.

SOURCE: Based upon recommendations contained with the Manuals entitled "Geometric Design Standards For Canadian Roads And Streets" published by the Roads And Transportation Association of Canada and the "Manual of Uniform Traffic Control Devices" for Ontario by the Ministry of Transportation and Communications.

ONTARIO
PROVINCIAL
STANDARD
SPECIFICATION

METRIC
OPSS 577
FEBRUARY 1996

CONSTRUCTION SPECIFICATION FOR TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

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.02	Sediment Removal - Item

577.01 SCOPE

This specification describes the requirements for the installation, maintenance and removal of erosion and sediment control measures and the removal of sediment accumulated by the control measure.

577.02 REFERENCES

This specification refers to the following standards and publications.

Ontario Provincial Standard Specifications, Construction:

OPSS 206 Grading

Ontario Provincial Standard Specifications, Material:

OPSS 1004 Aggregates - Miscellaneous
OPSS 1801 Corrugated Steel Pipe Products
OPSS 1840 Polyethylene Pipe Products
OPSS 1860 Geotextiles

Canadian General Standards Board:

CAN/CGSB-148.1 M85 - Methods of Testing Geotextiles and Geomembranes

577.03 DEFINITIONS

For the purposes of this specification the following definitions apply.

Earth: means earth as defined in OPSS 206.

Downstream: means downhill and down-gradient.

Inflection point: means the point where a turbidity curtain changes angle to a significant degree.

Upstream: means uphill and up-gradient.

577.05 MATERIAL

577.05.01 Straw Bales

Straw bales shall consist of wheat or oat straw, shall be dry, firm, tightly tied in at least two places, show no evidence of straw or tie decay, and be free of sediment. They shall be of standard agricultural rectangular conformation and dimensions, approximately 600 mm x 600 mm x 1200 mm.

577.05.02 Geosynthetics

577.05.02.01 Geotextile

Geotextile shall conform to the requirements of OPSS 1860. It shall be free of holes, tears, and punctures.

577.05.02.02 Silt Fence Geotextile

Geotextile utilized as silt fence geotextile shall be a woven, Class I geotextile, having a width of 1.0 m minimum. It shall have a filtration opening size (FOS) of 840 μm maximum, meeting CAN/CGSB 148.1, Method 10.2.

577.05.02.03 Temporary Rock Flow Check Geotextile

Geotextile utilized in temporary rock flow checks shall be a woven, Class II geotextile. It shall have a filtration opening size (FOS) of 300 μm maximum, meeting CAN/CGSB 148.1, Method 10.2.

577.05.02.04 Turbidity Curtain Geosynthetic

Turbidity curtain geosynthetics shall have a grab tensile strength of 990 N minimum, meeting CAN/CGSB 148.1, Method 7.3. and be one of geotextile or geomembrane.

Geotextile shall be a woven material. The filtration opening size (FOS) shall be 300 μm maximum, meeting CAN/CGSB 148.1, Method 10.2.

Geomembrane shall be a low-permeability synthetic material or a geotextile impregnated with electomeric spray.

577.05.03 Stakes

Stakes shall be of sufficient strength to satisfy control measure performance and maintenance requirements.

Stakes for light duty sediment barriers and anchoring straw bales shall be a minimum of 1.2 m in length. Stakes for all other control measure applications shall be a minimum of 1.5 m in length.

577.05.04 Control Measure Support Material

Control measure support shall be a separate product, or one bonded to silt fence geotextile; it shall have a minimum sheet width of 750 mm, if in sheet form, and shall provide support for the entire length of the control measure without sagging.

577.05.05 Sandbags

Sandbags shall be made from heavy gauge plastic, agricultural burlap, or silt fence geotextile. Heavy gauge plastic shall contain stabilizers or inhibitors resistant to deterioration by ultra violet radiation. Sandbags shall be approximately 450 mm by 350 mm by 150 mm when filled. Sandbags shall be filled with sands or gravelly sands, containing little or no silt or clay.

577.05.06 Turbidity Curtain Hardware

577.05.06.01 Floatation

Turbidity curtain floatation shall be a material which has sufficient bouyancy to provide the curtain with continuous support, and a minimum of 50 mm freeboard.

577.05.06.02 Load Lines

Turbidity curtain load lines shall be 8 mm steel cable, or 19 mm nylon or polypropylene rope.

577.05.06.03 Ballast

Turbidity curtain ballast shall be 8 mm steel chain.

577.05.06.04 Anchors

Turbidity curtain anchors shall be mushroom or kedge anchors with a minimum mass of 34 kg for firm mud bottoms, or self burying Danforth anchors with a minimum mass of 5 kg for sandy bottoms.

577.05.06.05 Mooring Buoys

Turbidity curtain mooring buoys shall have provision for the mooring line to be securely attached and be sufficiently buoyant to remain afloat under normal load conditions.

577.05.06.06 Mooring Lines

Turbidity curtain mooring lines shall be 19 mm nylon or polypropylene rope.

577.05.06.07 Adjustment Lines

Turbidity curtain adjustment lines shall be 13 mm nylon or polypropylene rope.

577.05.07 Flow Check Rock

Rock utilized in temporary rock flow checks shall conform to the requirements for riprap and gabion stone specified in OPSS 1004.

577.05.08 Chutes

577.05.08.01 Corrugated Pipe

The corrugated pipe chutes shall be metal or plastic,

non-perforated, 300 mm in diameter and shall conform, respectively, to the requirements of OPSS 1801 and OPSS 1840.

577.05.08.02 End Sections

End sections utilized at the inlet and outlet of chutes shall conform to the requirements of OPSS 1801.

577.07 CONSTRUCTION

577.07.01 Operational Constraints

577.07.01.01 Dewatering

Dewatering effluent shall be controlled to prevent passage of sediment into a water body. Discharge of dewatering effluent to dewatering traps shall be controlled to avoid exceeding trap capacity and to limit scour or washout.

577.07.01.02 Chutes

Where chutes are specified, the chute and associated berm barrier shall be constructed in the same day.

577.07.02 Light Duty Sediment Barriers

The work shall consist of the installation, maintenance and removal of light duty sediment barriers.

Light duty sediment barriers are light duty straw bale barriers or light duty silt fence barriers.

Where the contract specifies light duty sediment barriers, the option of selecting either of the light duty sediment barriers or any combination of these control measures shall exist. Where the contract specifies either one of light duty straw bale barriers or silt fence barriers, there shall be no option of substitution for the control measure.

Light duty sediment barriers shall include, at each end of the barrier, a minimum 2 m end-run angled upstream to direct runoff to the main-run of the barrier.

Light duty sediment barriers shall include protection placed against the downstream side, at the low points of the barrier, so that any overflow of the barrier is prevented from causing soil scour and erosion.

Light duty sediment barriers shall be installed and maintained in place without gaps, and without undermining, to prevent sediment passage from the upstream to the downstream side of the barrier.

577.07.02.01 Light Duty Straw Bale Barriers

Light duty straw bale barriers shall be constructed of a single row of anchored straw bales.

Straw bale ties shall not be placed in contact with the ground.

Where straw bale barriers are to be installed on earth surfaces, a trench measuring 750 mm wide by 75 mm deep shall be excavated at the location specified for the barrier. The bales shall be placed in the trench and staked, and the remaining trench space shall be backfilled and compacted to existing grade.

Where straw bale barriers are to be installed on sod, erosion control blanket, or existing turf, they shall be placed and staked so that there are no gaps between the bales and the underlying cover.

The ends of adjacent bales shall be placed tightly against one another without gaps.

Each bale shall be firmly secured in place by two stakes. The stakes shall be spaced 150 mm from each end of the bale. Stakes shall be driven through the bales without breaking the bale ties or otherwise disturbing bale firmness and shape. Stakes shall be driven flush with the top of the bales.

Straw bale barriers shall be maintained such that bales remain firm, intact, of original shape, and without decay.

Maintenance shall include the replacement of each bale at intervals not exceeding 45 days.

577.07.02.02 Light Duty Silt Fence Barriers

Light duty silt fence barriers shall be constructed of silt fence geotextile supported on stakes.

The stakes shall be spaced a maximum of 2.3 m apart, and shall be driven vertically into the ground to a minimum depth of 600 mm.

A trench measuring 200 mm wide by 200 mm deep shall be excavated to anchor the geotextile along its entire length.

The geotextile shall be attached firmly, without sagging, to the upstream side of the stakes, and shall extend into the trench a minimum of 300 mm. It shall be placed without gaps or breaks along its length. Where the geotextile is joined to provide a continuous run, the ends shall be securely fastened and overlapped a minimum of 500 mm.

The trench shall be backfilled and compacted to existing grade to hold the base of the geotextile firmly in place. The completed silt fence shall have a minimum height of 600 mm above the ground surface.

577.07.03 Heavy Duty Sediment Barriers

The work shall consist of the installation, maintenance and removal of heavy duty sediment barriers.

Heavy duty sediment barriers are heavy duty straw bale barriers, heavy duty silt fence barriers, berm barriers, or sandbag barriers.

Where the contract specifies heavy duty sediment barriers, the option of selecting any of the heavy duty sediment barriers or any combination of these control measures shall exist. Where the contract specifies any one of heavy duty straw bale barriers, heavy duty silt fence barriers, berm barriers, or sandbag barriers, there shall be no option of substitution for the control measure.

Heavy duty sediment barriers shall include, at each end of the barrier, a 2 m end-run angled upstream to direct runoff to the main-run of the barrier.

Heavy duty sediment barriers shall include protection placed against the downstream side, at the low points of the barrier, so that any overflow of the barrier is prevented from causing soil scour and erosion.

Heavy duty sediment barriers shall be installed and maintained in place, without gaps, and without undermining, to prevent sediment passage through or under the barrier.

577.07.03.01 Heavy Duty Straw Bale Barriers

Heavy duty straw bale barriers shall be constructed of a light duty straw bale barrier, with the addition of control measure support installed on stakes.

In addition to the requirements for light duty straw bale barriers the following shall apply.

a. The 1.5 m stakes control measure support shall be spaced a maximum of 2 m apart, and shall be driven vertically into the ground to a minimum depth of 900 mm.

b. The control measure support shall be attached on the upstream side of the 1.5 m stakes.

c. The straw bales shall be placed firmly against the upstream side of the control measure support.

577.07.03.02 Heavy Duty Silt Fence Barriers

Heavy duty silt fence barriers shall be constructed of silt fence geotextile and control measure support installed on stakes.

Control measure support shall extend the entire height and length of the installed silt fence, without gaps or breaks. The control measure support shall be attached on the upstream side of 1.5 m stakes.

The requirements for light duty silt fence barriers shall apply with the following exceptions.

a. The geotextile shall be attached to the upstream side of the control measure support.

b. Stakes shall be spaced a maximum of 2 m apart, and be driven into the ground to a minimum depth of 900 mm.

Heavy duty silt fence barriers shall be maintained vertical, without tears and without sagging.

577.07.03.03 Berm Barriers

Berm barriers shall be constructed of earth material placed in windrows to a minimum height of 600 mm above the surface on which they are placed. The upstream slope of the barrier shall be 1.5:1 maximum. The downstream slope of the barrier shall be 4:1 maximum.

Berm barriers shall be maintained at specified height and slope, and without sloughing and slumping.

577.07.03.04 Sandbag Barriers

Sandbag barriers shall be constructed of three layers of sandbags. The bottom layer shall consist of three rows of bags, the middle layer shall consist of two rows of bags, and the top layer shall consist of one row of bags. The bags within each row shall be placed with the sides of the bags butted tightly against one another without gaps. The ends of sandbags in adjacent rows shall be butted tightly against one another without gaps.

The sandbags in each row shall be uniformly staggered to one another. The sandbags in each layer shall uniformly overlap the layer below.

Where sandbag barriers are to be installed on earth surfaces, a trench 75 mm deep, and sufficiently wide to accommodate three sandbags laid end to end, shall be excavated at the location specified for the barrier. The

sandbags shall be placed, and the remaining trench space shall be backfilled and tamped to existing grade.

Where sandbag barriers are to be installed on sod, erosion control blanket, existing turf, or bedrock, they shall be placed so that there are no gaps between the sandbags and the underlying surface.

Sandbag barriers shall be maintained with bags untorn and firmly seated.

577.07.04 Light Duty Channel Flow Checks

The work shall consist of the installation, maintenance and removal of light duty channel flow checks.

Light duty channel flow checks are straw bale flow checks, silt fence flow checks, or sandbag flow checks

Where the contract specifies light duty flow checks, the option of selecting any of the light duty flow checks or any combination of these control measures shall exist. Where the contract specifies any one of straw bale flow checks, silt fence flow checks, or sandbag flow checks, there shall be no option of substitution for the control measure.

Light duty flow checks shall include protection placed against the downstream side, at the lowest point of the flow check, so that any overflow of the flow check is prevented from causing soil scour and erosion.

Light duty channel flow checks shall be installed and maintained in place, without gaps, and without undermining, to prevent sediment passage through or under the flow check.

577.07.04.01 Straw Bale Flow Checks

Straw bale flow checks shall be constructed of a double row of bales. The requirements for light duty straw bale barriers shall apply, with the exception of end-runs and with the addition of the following.

a. Where straw bale flow checks are to be installed on earth surfaces, the trench shall be 1500 mm wide.

b. The two rows of bales shall be butted tightly beside one another without gaps.

c. The bales in the two rows shall be uniformly staggered to one another, so that the ends of the upstream row of bales are adjacent to the centres of the downstream row of bales.

d. The ends of the flow check, at ground level, shall be higher than the top of the lowest point of the flow check.

e. The upstream row of bales shall be one bale longer than the downstream row.

577.07.04.02 Silt Fence Flow Checks

Silt fence flow checks shall be constructed of silt fence geotextile and control measure support installed on stakes.

The requirements for heavy duty silt fence barriers shall apply with the following exceptions and additions.

a. Stakes shall be spaced a maximum of 1 m apart.

b. Stakes shall be placed at the centre of V-shaped ditches and at the point where side slopes meet the bottom of channels and trapezoidal-shaped ditches.

c. The ends of the flow check, at ground level, shall be higher than the top of the lowest point of the flow check.

d. The completed silt fence flow check at its lowest point shall have a height of 375 mm minimum and 500 mm maximum above the ground surface.

e. End runs are not required.

Silt fence flow checks shall be maintained vertical, without tears and without sagging.

577.07.04.03 Sandbag Flow Checks

The requirements for sandbag barriers shall apply, with the following modifications.

a. End-runs are not required.

b. The ends of the flow check, at ground level, shall be higher than the top of the lowest point of the flow check.

577.07.05 Temporary Rock Flow Checks

The work shall consist of the installation, maintenance and removal of rock flow checks.

Rock flow checks shall be constructed of geotextile and two lifts of rock.

A first lift of rock shall be piled across the ditch or channel to a height of 450 mm above the lowest point

of the ditch or channel. The upstream slope of the flow check shall be 1.5:1 maximum. The downstream slope of the flow check shall be 4:1 maximum. The top of the first lift shall be of sufficient width to accommodate the second lift of rock.

A trench measuring 200 mm wide by 200 mm deep shall be excavated across the entire length of the upstream side of the flow check.

Geotextile shall be placed:

a. 300 mm into the trench;

b. over the first lift of rock; and

c. up the side-slopes of the ditch or channel to the fullest extent covered by the completed flow check.

The trench shall be backfilled to existing grade to hold the geotextile firmly in place.

A second lift of rock shall be placed over the exposed geotextile and first lift of rock to form a spillway and anchor the geotextile as follows:

a. The minimum depth of rock over the geotextile shall be 100 mm.

b. The tops of the sides of the completed flow check shall be a minimum of 700 mm above the lowest point of the ditch or channel.

c. A level spillway measuring 150 mm deep shall be formed in the top of the flow check so that it extends from the upstream to the downstream side, and its crest is centred over the lowest portion of the ditch or channel. Where rock flow checks are to be installed in V-shaped ditches, the spillway crest shall extend 300 mm on either side of the centre of the ditch. Where rock flow checks are to be installed in channels or trapezoidal-shaped ditches, the spillway crest shall extend to the greater of the following:

    1. 300 mm on either side of the centre line of the ditch; or

    2. to the point where the side slopes meet the bottom of the channel or ditch.

Rock flow checks shall be installed and maintained in place, without gaps, and without undermining, to prevent sediment passage through or under the flow check.

577.07.06 Excavated Sediment Traps

The work shall consist of the installation, maintenance and removal of excavated sediment traps.

Excavated sediment traps shall be constructed as a single control measure, consisting of an excavated basin and either a light duty channel flow check or temporary rock flow check. The flow check shall be constructed approximately 1 m downstream of the excavated basin.

The excavated basin shall have a minimum depth of 1 m below the existing ground surface as measured at the lowest point of the channel at the downstream end.

The bottom of the excavated basin shall be horizontal, shall have a length measuring 20 m maximum, and shall have a width which is a minimum of one half the length. The sides of the excavated basin shall be no steeper than 0.5 : 1.

A temporary fence shall be erected around the sediment trap to restrict public access.

Excavated sediment traps shall be installed and maintained to prevent sediment passage from the upstream to the downstream side of the excavated trap, and so that the majority of the sediment is collected in the excavated basin.

577.07.07 Chutes

The work shall consist of the installation, maintenance and removal of chutes. The berm barrier constructed in association with the chute is not part of this work.

Chutes shall be constructed as a single control measure, consisting of corrugated pipe, two end sections, and an excavated sediment trap constructed at the outlet end of the pipe.

The pipe inlet shall be placed through a berm barrier in such a manner that flow is directed to the pipe inlet without scouring of the berm. The toe plate of the inlet end section shall be fully imbedded into the ground surface. The inlet end section shall have a minimum grade of 3% towards the pipe opening.

The pipe outlet shall be placed such that the outlet end section discharges into the excavated sediment trap, and so that the toe plate of the outlet end section is fully imbedded into the edge of the trap.

The pipe shall be firmly secured to the slope.

Protection shall be placed below the pipe outlet end section to prevent scour of the excavated trap.

Pipes shall be maintained in place, without gaps, and without undermining, so that water is conveyed from the upstream side of the berm and collected in the sediment trap.

577.07.08 Dewatering Traps

The work shall consist of the installation, maintenance and removal of dewatering traps.

Traps for dewatering shall be constructed as a single control measure, consisting of an excavated basin, surrounded by a light duty sediment barrier, with a temporary rock flow check at the point of water outlet.

The excavated basin shall have a minimum depth of 1 m below the existing ground surface. The bottom of the excavated basin shall have a maximum length and width of 20 m. The sides of the excavated basin shall be no steeper than 0.5 : 1. The shape of the dewatering basin may be varied to suit site characteristics.

The sediment barrier and temporary rock flow check shall be installed a minimum of 1 m from the edges of the excavated basin.

Installation of the sediment barrier shall conform to the requirements for light duty sediment barriers with the following exceptions:

a. end runs are not required; and

b. the temporary rock flow check shall be located at the low point of the barrier.

The spillway height in the temporary rock flow check shall be adjusted so that it is 75 mm lower than the top of the adjacent barrier. The temporary rock flow check shall be constructed at the point where the top of the sediment barrier is lowest. The geotextile used in the flow check shall overlap the light duty sediment barrier a minimum of 500 mm.

Traps for dewatering shall be installed, operated and maintained to prevent sediment passage beyond the perimeter of the trap.

577.07.09 In-Water Controls

The work shall consist of the installation, maintenance and removal of in-water controls, which for the purposes of this specification may be either Turbidity Controls or Coffer Dams.

577.07.09.01 Turbidity Curtains

Turbidity curtains shall consist of turbidity curtain geosynthetic, load line, flotation, ballast, anchors, mooring buoys, mooring lines, adjustment lines, and tie-downs.

Turbidity curtains shall be constructed as follows.

a. A sleeve shall be formed and heat-sealed or sewn along the entire top edge of the turbidity curtain geosynthetic, to contain the floatation and load line in the sleeve. The floatation shall provide support along the length of the turbidity curtain.

b. A sleeve shall be formed and heat-sealed or sewn along the entire bottom edge of the turbidity curtain geosynthetic, to contain the ballast in the sleeve. Breaks may be made in the sleeve to facilitate pulling, provided they are a minimum 100 mm in size and spaced at minimum 3 m intervals.

c. Where turbidity curtain geosynthetic is joined to provide a continuous run, the sections shall be connected to provide a continuous seal and prevent the escape of turbid water between the sections.

d. The turbidity curtain, as prepared for installation, shall be of sufficient width to account for water depth and wave action.

e. Adjustment lines shall be placed at maximum intervals of 10 m, and to encircle the turbidity curtain from top to bottom.

f. The turbidity curtain shall be prepared for installation by furling and tying with furling ties every 1.5 m for the entire length of the curtain.

g. Anchor locations shall be established as is necessary to maintain the turbidity curtain in place and functioning.

Turbidity curtains shall be installed to prevent sediment passage, from the area enclosed by the curtain, to the remaining water body. Turbidity curtains shall be installed and maintained in a manner that avoids entry of equipment, other than hand-held equipment or boats, to the remaining water body. The sequence of installation is as follows:

a. Tie-downs shall be provided to firmly anchor the turbidity curtain to the shoreline at locations specified.

b. One end of the furled curtain shall be firmly attached to the upstream or up-current tie-down.

c. The furled curtain shall be launched and shall be placed as specified.

d. The remaining end of the furled curtain shall be attached to the downstream or down-current tie-down.

e. Each anchor shall be attached to the turbidity curtain load line with a mooring line.

f. At inflection points, mooring buoys shall be attached to the mooring line at a distance of 1 m from the load line.

g. The furling ties shall be released to allow the turbidity curtain ballast to sink to its maximum depth.

h. The location and depth of the ballast shall be adjusted as necessary by using the adjustment lines.

Equipment is permitted in the work area enclosed by the turbidity curtain.

Turbidity curtains shall be operated and maintained in the specified location, with the entire top edge above the water surface. The curtain shall be free of tears and gaps, and the bottom edge of the curtain is to be continuously in contact with the water course bed so that sediment passage from the area enclosed is prevented.

Any folds in the turbidity curtain which form next to the floatation collar shall be regularly monitored and freed of collected sediment.

577.07.09.02 Coffer Dams

Coffer dams shall be installed and maintained in a manner that:

a. isolates the work area from the water body;

b. avoids entry of equipment, other than hand-held equipment or boats, to the remaining water body; and

c. prevents release of sediment and debris to the water body.

Equipment is permitted in the work area enclosed by the coffer dam.

577.07.10 Monitoring

To ensure that erosion and sediment control measures are in effective working order, their condition shall be monitored prior to any forecast storm event and following a storm event.

577.07.11 Maintenance

All measures installed under the terms and conditions of this specification are to be maintained in an effective, functioning and stable condition.

577.07.12 Sediment Removal

The work shall consist of the removal and management of accumulated sediment.

Sediment that is accumulated by sediment barriers, channel flow checks, excavated traps, sediment interceptors, and dewatering traps, shall be removed in a manner that avoids escape to the downstream side of the control measure and avoids damage to the control measure. Sediment shall be removed to the level of the grade existing at the time of the control measure installation and shall conform to the following:

a. For light duty sediment barriers and light duty channel flow checks, accumulated sediment shall be removed once it reaches the lesser of:

   1. a depth of one-half the effective height of the control measure, which for channel flow checks, shall be determined relative to the lowest point of the flow check; or

   2. a depth of 300 mm immediately upstream of the control measure.

b. For heavy duty sediment barriers, heavy duty channel flow checks, excavated traps, sediment interceptors, and dewatering traps, accumulated sediment shall be removed once it reaches one-half the effective height or depth of the control measure.

c. For all control measures, accumulated sediment shall be removed as necessary to perform maintenance repairs.

d. Accumulated sediment shall be removed immediately prior to the removal of the control measure.

Sediment removed shall be managed as excess earth material.

577.07.13 Control Measure Removal

Ditch, channel, permanent slope, and any other embankment cover specified elsewhere in the contract to be placed within the area controlled by the temporary erosion and sediment control measure, shall be in place prior to the removal of such temporary control measure.

Temporary erosion and sedimentation control measures shall be removed and associated excavations backfilled and compacted when, in the opinion of the Contract Administrator, the measures are no longer required.

Erosion and sedimentation control measures shall be removed in a manner that:

a. avoids entry of equipment, other than hand-held equipment or boats, to any watercourse; and

b. prevents release of sediment and debris to any watercourse.

Prior to removal, the area enclosed by turbidity curtains and coffer dams shall be cleaned of all debris, and for coffer dams, accumulated sediment shall be removed.

Any seeding and mulching, temporary cover, sodding, other surface application, or original turf cover disturbed by removal or backfilling of erosion and sedimentation control measures and removal of accumulated sediment, shall be brought to final grade and restored.

577.09 MEASUREMENT FOR PAYMENT

577.09.01 Actual Measurement

577.09.01.01 Light Duty Sediment Barriers
Light Duty Straw Bale Barriers
Light Duty Silt Fence Barriers
Heavy Duty Sediment Barriers
Heavy Duty Straw Bale Barriers
Heavy Duty Silt Fence Barriers
Berm Barriers
Sandbag Barriers

Measurement will be by the metre of barrier installed, from end to end, following the contours of the ground.

577.09.01.02 Light Duty Channel Flow Checks
Straw Bale Flow Checks
Silt Fence Flow Checks
Sandbag Flow Checks
Temporary Rock Flow Checks

For measurement purposes a count will be made of the flow checks installed.

577.09.01.03 Excavated Sediment Traps
Chutes
Dewatering Traps

For measurement purposes a count will be made of the excavated sediment traps, chutes, and dewatering traps installed. Component parts will not be counted separately for payment.

577.09.01.04 Turbidity Curtains
Coffer Dams

For measurement purposes a count will be made of the Turbity Curtains and Coffer Dams installed, by location.

577.09.01.05 Sediment Removal

Measurement will either be by the volume of sediment excavated in cubic meters, or by the number of hours required for excavation of sediment, as specified in the Contract.

577.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement will be based on the units shown in the clauses under Actual Measurement.

577.10 BASIS OF PAYMENT

577.10.01 **Light Duty Sediment Barriers - Item**
Light Duty Straw Bale Barriers - Item
Light Duty Silt Fence Barriers - Item
Heavy Duty Sediment Barriers - Item
Heavy Duty Straw Bale Barriers - Item
Heavy Duty Silt Fence Barriers - Item
Berm Barriers - Item
Sandbag Barriers - Item
Light Duty Channel Flow Checks - Item
Straw Bale Flow Checks - Item
Silt Fence Flow Checks - Item
Sandbag Flow Checks - Item
Temporary Rock Flow Checks - Item
Excavated Sediment Traps - Item
Chutes - Item
Dewatering Traps - Item
Turbidity Curtains - Item
Coffer Dams - Item

Payment at the contract price for the above tender items shall be full compensation for all labour, equipment and material required to do the work. Partial payments will be made on the following basis:

a. 50% for initial installation;

b. 30% for maintenance, and

c. 20% for removal.

Payment for the item Coffer Dams shall be in addition to dewatering requirements which may be specified elsewhere in the Contract.

577.10.02 **Sediment Removal - Item**

Where the contract provides a tender item for sediment removal, payment at the contract price shall be full compensation for all labour, equipment and material to perform the work.

Where the contract does not provide quantities in support of sediment removal, and where sediment removal is directed to be performed, payment shall be made according to Extra Work provisions of the contract.

Appendix G

District of Muskoka Active Transportation Strategy

Muskoka Active Transportation Strategy



As amended
June 14, 2010

Prepared by
The District of Muskoka
Planning and Economic
Development Department

THE DISTRICT MUNICIPALITY OF MUSKOKA
Managing Our Legacy Together

1. Introduction

On September 14, 2006 the Muskoka Trails Council and Take Heart Muskoka, with assistance from the Ontario Ministry of Health Promotion, hosted an Active Transportation Workshop at Kirrie Glen Golf Course in the Town of Bracebridge. This one-day session, facilitated by 'Go for Green', was intended to introduce the concept of Active Transportation (AT) to the Muskoka community, and to work with interested stakeholders to determine whether further activity should be undertaken in this area. 'Go for Green', was a national non-profit, community-based organization, which focused on supporting communities and regions across Canada that encourage and support the integration of physical activity into everyday life. Walking and cycling are popular recreational activities and provide a means of transportation that is affordable and accessible for most of the population. Active transportation (AT) includes these and other forms of non-mechanized transport. There is growing evidence around the world that as facilities that support AT are made available or improved, use increases.

The AT workshop was well attended by those representing a variety of interests including District and Area Municipal Council members and staff, and other interested stakeholders throughout Muskoka. Throughout the workshop, the numerous personal, community and environmental benefits of integrating AT into our communities were discussed. Generally, the personal benefits outlined at this workshop included improvement to physical and mental health and increased social interaction. It was also discussed that the risk of coronary heart disease, high blood pressure, obesity, depression and certain types of cancer has been shown to be reduced with increased physical activity.

The community benefits of AT that were outlined at the workshop included an increased "sense of community", increased tourism appeal, decreased traffic, and increased access to community facilities and businesses. It was also noted that the construction and maintenance of trails often brings partners from government, interest groups, schools and other members of the public together, working toward a common objective. The presence of AT infrastructure within a community was also noted to have the potential to increase community safety as traffic congestion and speed is reduced. AT was also attributed with playing an important role in downtown revitalization efforts. The promotion of community design that prioritizes the need for pedestrian and cycle routes as well as roads was also reported as leading to an overall healthier population that can also translate into lower overall healthcare costs.

The workshop also highlighted a number of community economic benefits to AT. These benefits include increased property values along trails as well as increased tourism interest. It was discussed that in small urban areas and on nearby surrounding lands, where the population is relatively small and densities are low, public transit is uncommon and AT offers an alternative for those who may otherwise rely on or desire to use public transit. It was also noted that studies have shown that workplaces can benefit from AT as it creates healthier, more positive work environments and lower rates of absenteeism, in addition to reducing the requirements for, and costs of, on-site parking facilities.

The many benefits of AT from an environmental standpoint were also outlined. One of the most obvious benefits is a reduced reliance on cars thereby reducing vehicle emissions which lead to air pollution and ultimately contribute to climate change.

The term *Active Transportation* was also discussed at length and participants explored what AT means in Muskoka. Many organizations, including 'Go for Green', provided definitions for the term, but acknowledged that each geographic area is unique in terms of topography, demographics and community needs. There was general agreement amongst workshop attendees that AT involves any form of self-generated, human powered method of transportation. AT integrates physical activity into normal daily life within the community, such as commuting to and from work, school or shopping. In addition, it was the general opinion that in Muskoka, AT should include recreational activities such as walking and cycling. Although the 'Go for Green' group no longer exists, this workshop was an important initial step in engaging the community on the topic of AT in Muskoka.

Representatives from a community active transportation group (a subsidiary of the Muskoka Trails Council) subsequently attended a Muskoka Engineering and Public Works Committee meeting as a delegation on March 28, 2007. During the delegation, they outlined the benefits of AT and the importance of considering AT infrastructure in future decision-making. Subsequent to this delegation, and as part of the budget process, a reserve fund was established within the Engineering and Public Works capital budget to be used specifically for AT related projects. The initial contribution to the reserve fund was $200,000 and this has continued in each subsequent budget year.

2. District of Muskoka Active Transportation Committee

In response to this community interest, the Muskoka Active Transportation Committee was established in 2007 as an ad-hoc Committee of Muskoka District Council, reporting through the Planning and Economic Development Committee. The purpose of this Committee was to explore what AT means for Muskoka, to recommend AT objectives for Muskoka, to define Muskoka's potential role in AT and to develop a strategy to meet the objectives. In particular, the Committee's intent was to undertake an AT Strategy in consultation with the public.

In order to determine the potential role the District could play in the implementation of AT initiatives, the Active Transportation Committee hosted two public workshops in December 2007. Participants generally agreed that the District's role should be high-level in nature and should be inclusive of urban, waterfront and rural areas. It was also suggested that efforts be focused on better coordinating road projects to incorporate road widening, sidewalks and other AT infrastructure in a comprehensive manner. In general, a more seamless AT network was desired.

Furthermore, the groups indicated that stronger official plan policy and Muskoka-wide subdivision and condominium design guidelines are potential areas to explore through the development of a District AT Strategy.

In considering the potential role of Muskoka in AT, the public was of the opinion that Muskoka should focus on the development of a regional cycling network, based primarily on the existing District road system linking communities and other destinations, particularly tourism destinations, across Muskoka. The public also stated that Muskoka should work together with the Area Municipalities and other stakeholders regarding the development of sidewalks and other infrastructure on District roads within communities.

3. Legislative Framework

In order to explore how the District could move forward with an AT program, a review of the legislative framework was undertaken, as follows.

Planning Act

Section 2 of the Planning Act outlines those matters of provincial interest that must be considered in any planning decision and includes "the promotion of development that is designed to be sustainable, to support public transit and to be oriented to pedestrians". Section 51(24) of the Act requires an approval authority for subdivisions (in this case the District of Muskoka) to have regard for a number of matters, including the effect of the proposed subdivision on matters of provincial interest. In addition, the Act allows for the approval authority to impose conditions and require road widening to accommodate pedestrian and bicycle pathways.

Provincial Policy Statement

Pursuant to the Planning Act, the 2005 Provincial Policy Statement requires decision makers to promote healthy and active communities. In particular, emphasis is placed on the need to accommodate pedestrian and non-motorized travel in our communities as well as on the creation of opportunities for recreation.

Highway Traffic Act

Bicycles are defined as vehicles in the Highway Traffic Act, and can operate on public roadways with the same rights and responsibilities as motor vehicles. The standard to which a road must be constructed and maintained is based on the primary use (e.g. vehicles). Where there are paved shoulders, if the intent of the municipality is to maintain them to the vehicle standard, they may not necessarily be suitable as an area to be promoted specifically for pedestrians. The Highway Traffic Act contains a number of clauses/requirements relating to bicycles, including bicycle lanes on municipal roadways and the regulation or prohibition of bicycles on highways.

Municipal Act

Section 55 of the Municipal Act outlines the responsibilities for highways and sidewalks, with sidewalks generally being the responsibility of the lower tier municipality, while the upper tier municipality would be responsible for upper tier roads. A sidewalk is generally considered to be a portion of land set aside for the primary use of pedestrians. Therefore, the determination as to whether or not a particular piece of active transportation infrastructure is a sidewalk is important from responsibility and liability perspectives.

The provisions of the Municipal Act and Highway Traffic Act assist in establishing an AT focus for Muskoka on bicycles on Muskoka roads. In order to ensure a comprehensive and effective strategy, it is suggested that this District focus be coordinated with an Area Municipal focus on sidewalks, particularly in existing settlement areas.

4. Active Transportation Discussion Paper

On January 8, 2009 a Discussion Paper respecting a future Muskoka Active Transportation Strategy was accepted by the Active Transportation Committee and was released for public comment. This document was intended to generate discussion on this topic and obtain input from the public on a number of key questions.

A recurring theme in Muskoka is the need to recognize that AT includes both functional and recreational non-motorized travel. While in some instances, purposeful and functional routes require differing forms of programs and infrastructure, Muskoka and its Area Municipalities cannot afford to separate these different types of uses, due to our dispersed populations and communities, and relatively small budgets.

Therefore, the definition of AT across Muskoka included in the Discussion Paper was:

any human-powered mode of transportation, including purposeful and recreational travel.

As a result of the previous public consultation, values and objectives were also identified for an AT Strategy and outlined in the Discussion Paper. It was agreed that the core values to be promoted in an Active Transportation Strategy should include:

- Enhancement of the quality of life in Muskoka;
- Provision of opportunities to improve health;
- Contribution to a strong economy;
- Provision of infrastructure that is accessible;
- Incorporation of links, including walking and cycling routes to schools;
- Provision of infrastructure that addresses safety concerns;
- Contribution to the improvement of the natural environment;
- Establishment of linkages with heritage and cultural destinations; and
- Accessibility to people of all income levels.

The objectives of the Active Transportation Strategy should include:

- Development policy in order to promote planning decisions that incorporate an AT component;
- Recommendations for improved infrastructure that promotes AT;
- Documentation of the roles and responsibilities of Muskoka and the Area Municipalities and other agencies and recommendations for working together to implement the Strategy;
- Provision of education and awareness of the benefits of AT; and
- Focus at the District level on District roads in order to further inter and intra-community AT.

As the Discussion Paper explored how a regional cycling network might be developed, the following questions were posed:

1. Is a regional cycling network an appropriate focus for Muskoka?
2. Is any AT infrastructure missing from the inventory identified in the Discussion Paper?
3. Should the strategy focus on evaluating and prioritizing routes, or should it focus on the road reconstruction schedule?
4. Are the criteria for evaluating potential projects appropriate?
5. Should Official Plan policy be developed through Muskoka's OP Review or as a separate Official Plan Amendment?
6. What is an appropriate AT budget?
7. Should Muskoka be involved in funding other projects?
8. Should signs be posted on known cycle routes or only on those routes where specific improvements are made?
9. Who should pay for the signs?
10. Are there other ways in which Muskoka could work with the Area Municipalities and other stakeholders?

The paper concluded that the most appropriate AT focus for Muskoka is the development of a regional cycling network consisting of a number of individual routes, based primarily on the existing District road network. This network of AT routes should take into account criteria such as including scenic routes, routes that link communities and other destinations, particularly tourism and recreational destinations, and routes that have amenities along them. It was also important to ensure that each Area Municipality was represented within the AT network.

The Discussion Paper also identified next steps as including the preparation of a draft AT Strategy, based on direction provided by the Active Transportation Committee.

4.1 Feedback on Discussion Paper

Input on the Discussion Paper was received from the Simcoe Muskoka District Health Unit, the Township of Lake of Bays, Muskoka Watershed Council and the Muskoka Trails Council Active Transportation Committee. A summary of these comments is provided in Appendix "I". Each group was generally supportive of the initiative, and there was general agreement that AT in Muskoka should include both purposeful and recreational human-powered travel.

All stakeholders agreed that the development of a regional cycling network is an appropriate focus for the District AT program. However, they all highlighted the importance of considering the use of any identified routes by pedestrians. The importance of including routes within close proximity to urban centres and communities was highlighted, in order to maximize the number and types of users of these routes, including pedestrians. Comments received favoured the development of an AT network that is not focused solely on the District's Five Year Roads Capital Budget for roadway reconstruction, in order to ensure connected and functional routes. There was also general agreement with the criteria that was proposed in the Discussion Paper, although emphasis was placed on the importance of pedestrians, connectivity to communities, and signage. The development of official plan policy as a separate official plan amendment was also supported. While an appropriate AT budget was not identified in the comments received, there appeared to be a general feeling that Muskoka may have a role in funding other projects and ensuring coordination with the Area Municipalities and other

stakeholders. Lastly, there was a variety of opinions on the installation of signage, ranging from the need to sign all roads with paved shoulders to "safe" cycling routes, routes known to be used, and all District roads. In terms of who should pay for the signs, it was the general consensus that the authority for the road along which the signs are posted should pay for them. It was also noted that there are several organizations that provide funding opportunities that should be explored to assist with funding this portion of the project.

5. Development of Preliminary AT Network – Technical Methodology

Based on the feedback received on the Discussion Paper, a preliminary AT network for Muskoka was proposed for review. A variety of AT routes were identified based on the criteria identified in the Discussion Paper and public input received. Particular attention was given to ensuring that routes were identified taking into account the values and objectives identified in the Discussion Paper and in particular ensuring that routes were identified within each Area Municipality, routes were in close proximity to communities in order to increase the number and type of users, and routes were included that are popular today or which have the potential to become popular if improvements are made. A number of routes were also identified that have connections to urban centres or communities, have a number of amenities located along them, and/or lead to key destinations, such as resorts, public beaches, schools, and parks.

In order to evaluate and prioritize the routes identified within the overall network, three types of routes were identified: i) loops, ii) connection routes, and iii) near-community routes. These three types of routes balance the need to address recreational transportation needs and purposeful transportation needs across Muskoka. The loops were identified to represent mainly recreation travel, whereas the connection routes and near-community routes were identified to highlight the importance of purposeful transportation and may possibly be used by pedestrians as well. Once the locations and types of routes were identified, potential AT infrastructure improvements were considered.

5.1 AT Route Identification

In order to evaluate and prioritize the routes within the proposed network, each route was broken down into sections based on (where possible) common road cross-sections, posted speeds and traffic volumes. In many cases the sections were created to coincide with road intersections. Each section of each route was then evaluated using the criteria (see chart below), which were based on those outlined in the Discussion Paper. The evaluations were undertaken through detailed field assessments. The criteria were then weighted based on importance and assigned numeric scores. This assisted in prioritizing routes within the network, in terms of their importance and possible order of development.

Evaluation Criteria	
Destinations of Interest	highest priority
Proximity to Urban Centres/Communities (variety of users)	
Posted Speed	
Connectivity	
Traffic Volume	
Total Cost	
Current Usage (Cyclists)	
Scenic Quality	
Scheduled Work	
Amenities	lowest priority

5.2 Review of Road Treatment Options

The class environmental assessment (EA) for the reconstruction of Muskoka Road 50 (High Falls Road) from Highway 11 to Muskoka Road 4 considered the feasibility of constructing facilities to support AT as part of the project. Muskoka District Council endorsed a design that incorporated a 3

metre traveled lane with a 1.5 metre paved bike lane and a 0.5 metre unpaved shoulder on each side of the road. The estimated cost of this project was approximately $450,000 for a 3.5 kilometre length of road. However, due to higher than anticipated road construction and land acquisition costs, the actual cost was closer to $1,000,000. In addition, the 1.5 metre wide bike lane was subsequently constructed as a 1.25 metre paved shoulder, in order to address concerns respecting the width of the travelled lanes, especially in areas of steep grades and tight curves.

Although paved bike lanes along both sides of a road represent the most preferred approach from a design perspective, the development of an entire network with this design standard would be cost prohibitive. Therefore, alternative AT improvements were investigated, including paved existing shoulders and 'Share the Road' (STR) signage.

Based on a review of best practices of other municipalities and governments across Canada, paved shoulders of between 1.0 metre and 1.25 metres along the edge of the roadway accompanied by a painted white line are proposed for Muskoka's AT network. As the following chart indicates, where a roadway has low traffic volume and low speed, no road improvements are recommended other than the installation of 'Share the Road' signage. If the road has either high traffic volumes or high speeds, a 1.0 metre paved shoulder is recommended. A 1.25 metre paved shoulder is recommended for roads with both high traffic and high speeds. In all cases, the installation of 'Share the Road' signage is recommended.

Shared Roadway (width of paved shoulder)

Posted Speed (km/h)	Average Summer Daily Traffic	
	<2000 vehicles trips per day	>2000 vehicle trips per day
≤70	Standard auto lane	1.0 m
>70	1.0 m	1.25 m

In addition to the benefits of paved shoulders to cyclists and pedestrians, there are also many road safety and maintenance benefits to paving the shoulders of District roadways. Paved shoulders provide space for vehicles to make evasive maneuvers, they provide for stormwater discharge farther from the travel lanes, they provide safer locations for vehicles to pull off the road, and they allow for trucks to ease over when passing one another, especially on curves. In terms of road maintenance benefits, paved shoulders assist in mitigating rutting and washouts during rain storms and provide structural support for the pavement which extends the life of the road.

As the AT network develops over time, any one route may include a mix of road treatments. Some sections of some routes may require the installation of paved shoulders (either 1 metre or 1.25 metres, depending on the characteristics of the road), whereas other sections may only be signed. As well, it is more financially feasible in some cases to divide large-scale projects into phases so that the cost can be spread over several years. The disadvantage of this mix of treatments is that users of the routes may be expecting consistent route treatments along the length of the route. Therefore, when education programs are being developed, it will be important to explain that each route may include a variety of treatments along it, depending on a number of factors, such as traffic speed and volume counts, road reconstruction work, and overall project priorities and timelines.

5.3 Feedback on Preliminary AT Network

Two public open houses were held on December 14th and 17th, 2009 in order to present the proposed network and evaluation criteria to the public and to receive input. Presentations were also made to Councils or Committees of each Area Municipality in order to obtain general feedback as well as specific input on the proposed network. These presentations were also intended to explore potential interest in sharing and coordinating joint projects (for example where a short off-road path along a 100-series District road could complete a loop or connect a community) and whether there were other Area Municipal projects that should be considered.

The Town of Bracebridge provided comments on the 2009 Discussion Paper and outlined their general support for the initiative including the development of a regional cycling network. The Town also noted that the District should be responsible for establishing AT route construction and maintenance standards as well as planning policies in the District Official Plan that would guide future policy development in Area Municipal Official Plans. They also emphasized that Muskoka should work with the Area Municipalities to identify a logical and reasonably developable AT network that utilizes the existing road network as much as possible. The Town also noted that on a number of roadways, the most significant barrier to the development of AT routes may be the lack of road right of way width to accommodate the AT infrastructure.

The Township of Lake of Bays provided general support for the proposed preliminary network, and expressed interest in coordinating projects with the District. They also noted that the Province should consider extending the Fairy Vista Trail along Highway 60 into the Township Lake of Bays, providing an alternative to cyclists and pedestrians using Highway 60.

Several comments from the public were received subsequent to the open house in addition to a number of comment forms that were filled out by open house participants. In general, all respondents were supportive of the development of a District-wide AT network that is focused on the District road network. Many highlighted the importance of a well-designed education program to coincide with the approval of an AT Strategy. Several individuals emphasized the need to encourage students to cycle and walk to school. The importance of considering the needs of pedestrians in the network was also reiterated. Several respondents also stressed that the economic benefits of effectively developing and marketing a District-wide AT network would be substantial, as cycle tourism is a growing niche market in Canada and abroad. Economic development initiatives, such as the Bike Train initiative (a program aimed at transporting cyclists by train to cycle-friendly destinations) were also identified as opportunities for Muskoka.

A number of additional routes were suggested for consideration through the consultations. All suggested routes were reviewed and analyzed by staff for inclusion on the proposed AT network (see Appendix “II”). Several of the suggested routes were included in the proposed network based on an assessment of connectivity, amenities, traffic volumes and posted speeds, among others.

6. Proposed Muskoka AT Strategy – Recommendations and Implementation

6.1 Recommended Muskoka AT Network

Based on the feedback and route suggestions that were received on the proposed preliminary AT network, a proposed final AT network as well as recommended improvements for routes within this network have been developed (see Appendix “III” and “V” respectively). In some cases, it was necessary to include portions of Area Municipal roads and, in one case, a Provincial highway (Highway 141) in some AT routes in order to provide connectivity. However, no road treatment improvements were recommended to non-District roads. The affected sections of routes have been identified in Appendix “IV”. In this regard, it will be important to work with the Area Municipalities and the Province in order to complete this proposed Strategy.

The proposed AT network was based on a number of factors and considerations. Each Area Municipality is included in the network, and routes that are currently being used are also represented. Particular attention was given to including routes that provide connections within and between communities, as well as connections to tourist and recreational destinations, such as resorts, beaches, and off-road trails. The network also includes a mix of routes that range in length and difficulty in order to meet the needs of a variety of users. A number of routes were also selected based on their scenic quality as well as the availability of amenities, such as cycling staging areas and washroom facilities.

As mentioned above, a number of additional routes were suggested through the public open house process for inclusion in the AT network. Each of these suggestions were evaluated against the same criteria as the other routes in the preliminary network and as a result, some additions have been

made to the proposed AT network. Some of the routes that were added include Muskoka Road 7 (Peninsula Road), Falkenburg Road (Muskoka Road 47) and the Gravenhurst Parkway (Muskoka Road 1).

There are three 100-series roadways within the District: Muskoka Roads 117, 118, and 169. Muskoka Road 117 was included in the preliminary AT network that was reviewed at the public open houses and members of the public also suggested including Muskoka Roads 118 and 169 in the AT network. However, 100-series roads are amongst the most frequently travelled roads and have the highest operating speeds of any District roads within Muskoka. These high traffic speeds and volumes create additional challenges and risks related to the provision of AT. A higher standard of AT road improvements than the paved shoulders that are currently proposed through this proposed AT Strategy could possibly assist in mitigating these risks. However, these improvements would be quite costly, and would take a considerable amount of time to complete. In addition, cyclists currently using these roadways are generally more advanced riders than those that would use the other lower traffic speed/volume routes across Muskoka. The riders that currently use these lower traffic speed/volume routes, or would be more likely to use these routes if the proposed infrastructure is installed, represent a larger portion of the population, which is the target group of riders for this Strategy. Therefore, AT improvements to Muskoka Road 117 or any other 100-series road are not recommended in the proposed AT Strategy at this time.

In five (5) instances there are small sections of 100-series roads that have been included in the proposed AT network:

- Muskoka Road 118 from Muskoka Beach Road to Bracebridge;
- Muskoka Road 118 from Golden Beach Road to Bracebridge;
- Muskoka Road 118 west of Port Carling from Muskoka Road 7 to Eveleigh Road;
- Muskoka Road 117 from Bonnie Lake Road to Cedar Lane; and
- Muskoka Road 118 from Port Carling to Brackenrig Road.

These sections have been included in order to provide connections into the urban centres of Bracebridge and Port Carling. However, this may be a topic for further discussions with the affected Area Municipality to determine other future options for AT that do not include District roads.

6.2 Implementation

It is recommended that the development of the proposed AT network be taken into account when assessing Muskoka's roads needs and that AT infrastructure requirements be included in the Transportation Capital Budget and Forecast. This would result in the majority of the network being built out within the next ten years, with two exceptions: Highway 118 from Golden Beach Road to Bracebridge and Highway 118 from Muskoka Beach Road to Bracebridge. In these cases there is no resurfacing or reconstruction work scheduled for the affected sections within the next ten years. However, there are existing paved shoulders widths of 0.5 metres. Due to the overall cost of completing this type of road work, it is most economical to install paved shoulders as part of a more comprehensive project; especially when there is an existing paved shoulder already in place. In addition, the seam of such a small retrofit paved shoulder would run directly along where a cyclist would be cycling, which could lead to maintenance and safety issues should the seam fail. Therefore, it is suggested that Muskoka increase these shoulder widths to the recommended width when the road is either reconstructed or resurfaced, which is anticipated to be undertaken sometime after the initial ten year timeframe.

Although an approximate time frame of ten years is anticipated for completion of the AT network, the timing of individual projects would be determined in conjunction with the Roads Needs Study and Capital Budget and Forecast in order to ensure that all AT road design, cost and other engineering considerations are taken into account.

In addition to the development of the AT network across Muskoka, it is also recommended that all urban road improvements (for example, curb and gutter replacements) be reviewed to better

accommodate AT. Possible opportunities to accommodate AT include bicycle-friendly catch basin grates and recessed catch basins, where appropriate.

Although pedestrians may use the paved and unpaved shoulders along District roads, the paved shoulders recommended through this Strategy are not intended to replace the need for the installation of sidewalks where a District road passes through urban centres and communities (ie. in close proximity to schools, parks, and residential areas). The responsibility for the installation and maintenance of sidewalks within these areas remains with the Area Municipality, although Muskoka should continue to work cooperatively with the Area Municipalities to accommodate their road infrastructure requirements.

6.3 Budget

Costs of building out the proposed AT network have been estimated in Appendix "V". These estimated costs are based on a number of assumptions, which are outlined in Appendix "VI". It is noted that actual costs will need to be determined through the detailed design and tendering process. However, most routes generally fall within Muskoka's 5-Year Road Resurfacing/Reconstruction Capital Works Forecast and 10-Year Road Needs Study. It is therefore recommended that AT improvements to District roads be funded within the Engineering and Public Works Roads Capital Budget.

It is also recommended that contributions to the Active Transportation Reserve Fund continue. While this reserve fund would not be a grant fund, it could be used towards joint projects with the Area Municipalities aimed at developing AT routes that offer alternatives to using Muskoka's 100-series roads.

6.4 Outside Funding Sources

There are a variety of outside funding sources that have been established to support the development and promotion of AT. Muskoka successfully obtained funding ($18,000) from the Ontario Ministry of Transportation's Transportation Demand Management Program to share in the cost of installing 'Share the Road' signage along all identified AT routes in Muskoka. Muskoka should endeavor to obtain funding from similar sources wherever possible in order to support construction of the AT network. Muskoka could also, where requested and appropriate, provide letters of support as well as other available information, such as mapping and air photos to assist other AT groups in their efforts to obtain funding from other organizations.

6.5 Public Education and Promotion

Public education and promotion are two essential components of a successful AT network in Muskoka. In addition to the physical infrastructure improvements, such as signage and paved shoulders, there is also a need to ensure that the public is aware of the AT program and how it may affect them. Once portions of the network are established, they can then be used to promote tourism and economic development for the area.

6.5.1 Signage

It became very clear through the public consultation process that all of the District roads that have been identified in the proposed AT Strategy are currently used by cyclists and pedestrians for active transportation pursuits. In order to address this, way-finding and 'Share the Road' signage should be placed on the District roadways included in the proposed AT network.

Although the 100-series District roads are not, for the most part, included in the AT network, these roads should also be signed with 'Share the Road' signage in order to increase driver awareness of the use of these roads by cyclists. Placement of signage on these 100-series roads should not be in close proximity to communities in order to avoid confusing these roads with those included in the AT network.

6.5.2 AT Promotion

The development of an AT network across Muskoka could have direct impacts on tourism and economic development in Muskoka. Cycling tourism is a growing market that other areas of Canada have been able to capitalize on for many years, including the Niagara Region in Ontario and Velo Quebec throughout that province. The Bike Train initiative, which brings cycle tourists from Southern Ontario to cycling destinations across the province, has planned a pilot program for Muskoka in the summer of 2010. This initiative will offer an excellent opportunity to promote Muskoka's network of AT routes to a wider audience, and Muskoka should encourage agencies, such as Muskoka Tourism, to support this initiative.

6.6 Proposed Amendment to Muskoka's Recreational Trail Policy (AD:33)

In order to facilitate this AT Strategy, Administration Policy AD:33 needs to be updated including clarification respecting the roles of the District and Area Municipalities and the distinction between sidewalks and paved shoulders.

6.7 Subdivision/Condominium Design Guidelines

Opportunities exist to strengthen community connections through residential subdivisions and condominiums within Muskoka's urban areas and communities. These opportunities include the provision of sidewalks, pathways, lighting, signage, and overall streetscape design. Therefore, it is recommended that subdivision and condominium design guidelines be developed which promote the integration of AT considerations and the establishment of linkages between streets, parks, and other surrounding residential and commercial areas. This design guideline document should be aimed at planners, municipalities, developers and other stakeholders as a guideline for the inclusion of AT transportation infrastructure in urban and community design and development.

6.8 Muskoka Official Plan Amendment

As trails, sidewalks and other related AT infrastructure have historically been the responsibility of Muskoka's Area Municipalities, little policy direction respecting AT is found in the current Muskoka Official Plan other than general principles related to the desire to enhance tourism and recreational opportunities. An amendment to the Muskoka Official Plan should be developed to encourage AT. In particular, the policies contained in Section C-Strategic and General Development Policy (Community Building) should be amended to highlight the importance of community connectivity from a pedestrian and cycling perspective. Section G-Transportation should also be amended to include a new sub-section which outlines a definition of AT in Muskoka, Muskoka's role in the provision of AT infrastructure across Muskoka, and how Area Municipal policies can also support the provision of AT infrastructure. This section of the Muskoka Official Plan should also promote the development of subdivision and condominium design guidelines noted above.

6.9 Muskoka Facilities

In order to encourage District employees and visitors to District facilities to consider AT as an alternative means of travel, the District should continue its efforts to provide AT related infrastructure at appropriate locations. For example, the District's administrative building already has shower facilities and has recently installed an improved covered bike storage area. Other possible opportunities include the installation of bike racks at satellite offices across Muskoka.

7. Other AT Stakeholders

Muskoka and its Area Municipalities should continue to work together on AT initiatives, especially in regards to the development of AT infrastructure within and directly adjacent to communities and urban centres. Not only is it important to ensure consistency in design as well as the provision of logical connection between systems, but this collaboration is also important from an educational perspective. In addition, the Area Municipalities are in the best position to deal with the design and provision of urban

and community AT infrastructure such as sidewalks and trails through planning applications such as site plans and subdivisions. In addition, opportunities for enhanced AT policy frameworks in Area Municipal official plans also exist.

Other organizations could also play a role in enhancing and promoting AT in Muskoka. Key roles for provincial ministries and the Health Unit should be education and promotion of active transportation as part of an overall active lifestyle, as well as providing funding for projects. Collaborating with the Ontario Provincial Police in their efforts to improve road and cycling safety, through radio and online public service announcements, could be explored by other stakeholders. Local cycling clubs also play an important role in supporting and promoting this proposed AT Strategy, such as providing the District with information on routes that are in need of repair or maintenance, or recommending the addition of new popular routes to the network, if required. Events hosted by community groups, such as the Amazing Race or cycling training sessions increase overall awareness of cycling in Muskoka and information regarding these types of events could be posted on the District website.

8. Summary

Muskoka District Council's goal in forming the Active Transportation Committee was to develop a practical and implementable active transportation strategy for the District of Muskoka. The proposed Muskoka Active Transportation Strategy results from input generated through the release of a public discussion paper, as well as a number of public and special interest group information sessions over the past 3 years. The resultant Strategy proposes a core network of AT infrastructure on suitable District roads across Muskoka, which could be further enhanced and expanded based on future identified needs and priorities.

Appendix "I"

Summary of Comments on the Muskoka AT Strategy – Discussion Paper

Question 1:
Is the development of a regional cycling network an appropriate focus for the District of Muskoka?

Agency	Comment
Simcoe Muskoka District Health Unit	• The District of Muskoka should direct Area Municipalities to develop and implement AT plans that will complement District AT policies • The District has a role as a partner in educating residents and visitors about the benefits of AT and promoting AT within Muskoka through the Muskoka Tourism Marketing Agency (MTMA) and other marketing channels
Township of Lake of Bays	• A District wide cycling network is an appropriate focus • The District should be a lead partner in the development and implementation of an AT Strategy
Muskoka Watershed Council	• A regional cycling network is a logical starting point for a strategy • A network must also include an appropriate balance for other modes of human powered transport (i.e. walking) • Focusing on long distance routes will benefit recreational users, but may not have sufficient uptake by residents and visitors to maximize benefits to watershed • The focus should be on ensuring functionality of newly formed AT routes
Muskoka Trails Council Active Transportation Committee	• A regional cycling network is a viable plan • A consistent approach should be taken to form, function, and safety protocols • Consideration should be given to the development of paved shoulders, no less than 1 metre in width on both sides of the road • 'Share the Road' signs should be posted • Consideration should also be given to off road pedestrian trails/sidewalks • General terms of reference for AT infrastructure should be developed to encourage local municipalities to develop AT routes

Question 2:
Is any existing AT infrastructure missing from Schedule A?

Agency	Comment
Township of Lake of Bays	• The schedule should be renamed to "Known Routes and Existing Trails" • Bike racks and "Share the Road" signs should be installed on known routes
Muskoka Trails Council Active Transportation Committee	• The District should endeavor to include private land trails, including historical trails, into the network • Partnerships between landowners and municipalities should be explored, with the possibility of property tax benefits or the development of a stewardship recognition plan for landowners • Gaps in the network should also be identified in AT Strategy

Question 3:
Should the Muskoka AT Strategy focus on identifying a network of possible AT routes and then prioritizing them, or should the Strategy focus on the District's road reconstruction schedule?

Agency	Comment
Simcoe Muskoka District Health Unit	• The identification of possible AT routes should occur rather than basing projects on the road reconstruction schedule
Township of Lake of Bays	• The focus should be on high priority routes for improvements that can be implemented with some minor budget implications that accommodate a high user group and/or those that logically connect specific destinations (i.e. schools, shopping areas, linkages from rural or suburban development noted to urban cores) • The District should not rely on the road reconstruction schedule. However, when roads are reconstructed, AT should be considered within the planning process
Muskoka Watershed Council	• Both approaches have merit/drawbacks • The main strategy should encourage AT opportunities around towns and villages as well as a secondary strategy that addresses the needs of the recreational cycling community • The main strategy should identify a network of possible AT routes then prioritize them based on the likelihood of use by the public • The barriers to using AT should be explored with the public and efforts should be made to address them • The strategy should identify destinations, create logical connections within communities, quantify existing and potential usage of AT facilities, include improvements to the District roads for AT, identify other actions that will increase benefits of AT and reduce barriers to use • AT should be considered during the planning of District road reconstruction projects
Muskoka Trails Council Active Transportation Committee	• A network should be based on connectivity, not on the road reconstruction schedule • General road construction standards should consider the inclusion of AT infrastructure

Question 4:
Are these criteria appropriate? Are there any additional criteria that should be considered in the prioritization of future road projects?

Agency	Comment
Simcoe Muskoka District Health Unit	Emphasis was placed on the following criteria: **Safety** -Location -Lighting -Signage -Education (i.e. bike safety, helmet use) **Usage** -Projected use of route

	-Suitability for pedestrians -Health **Connectivity** -Linkages to workplaces, shops, services -Connection to downtowns, meeting places, social hubs -Sense of community (social inclusion) **Cost** -Signage -Promotion -Assess health impacts as well as economic impact -Scenic Value -Aesthetics **Facilities** -Accessibility for all -Washrooms -Benches, bike racks, garbage bins etc. -Lighting -Parking **Complete Community Design** -Connection within settlement areas to workplaces, schools, shops, services etc. -Ability to retrofit older communities with sidewalks and trails
Township of Lake of Bays	• The criteria listed are appropriate • The on-going maintenance of routes should be considered within these criteria as well • Future demographic forecasts should be included in the usage criteria to determine or review appropriate age distributions of the population over the next 20-30 yrs
Muskoka Watershed Council	• Although MWC encourages appropriate reduction in hardened surface, it is understood that public will likely prefer hardened trails, especially for cyclists • Design and construction techniques should aim to reduce stormwater flows over the trails into adjacent watercourses, where possible
Muskoka Trails Council Active Transportation Committee	Suggested additions include: • Safety of use – such as location, suitable lighting, appropriate signage, and education plans • Projected usage opportunities • Connectivity – linkages to workplace, shops and services, downtown social hubs, social inclusions • Cost considerations – including, but not limited to signage, promotion, health vs. economic impact, etc. • Scenic value and marketing opportunities • Environmental impacts and suggested remediation or mitigation measures • Accessibility to existing or planned facilities (washrooms, benches, bike racks, lighting, parking etc.) • Consideration for 'Complete Community Design' (i.e. community planning to encourage improving areas of limited accessibility and/or social isolation (Bracebridge Villa on Hwy 118)

Question 5:
Should official plan policy be developed through Muskoka's comprehensive OP Review or as a separate OPA?

Agency	Comment
Simcoe Muskoka District Health Unit	• AT policies should address all concepts listed in this section and should be included directly into Muskoka's Official Plan • Policy should also give consideration to the creation of a regional public transit system
Township of Lake of Bays	• A separate OPA should be completed to address AT policies, which would encourage local municipalities to implement AT policies as well
Muskoka Watershed Council	• A separate OPA be completed to address AT
Muskoka Trails Council Active Transportation Committee	• The completion of a separate OPA is preferred

Question 6:
What is an appropriate AT budget?

Agency	Comment
Simcoe Muskoka District Health Unit	• Funds should be re-allocated from other budget lines, such as public works, recreation, tourism etc.
Township of Lake of Bays	• Funds should be allocated among all 6 municipalities on an equitable basis that reflects the needs of each municipality
Muskoka Trails Council Active Transportation Committee	• Costs per kilometre, proposed redevelopment timeframes and feasible annual redevelopment potential should be considered • The existing AT Reserve should be committed to projects as outlined in Q #7 • An Active Transportation Infrastructure Support Fund should be set up to leverage other funding sources

Question 7:
Should Muskoka be involved in funding other projects?

Agency	Comment
Simcoe Muskoka District Health Unit	• The District should set criteria for funding other projects and should require applications to be filled out
Township of	• Muskoka should take advantage of all possible funding opportunities

Lake of Bays	• Those initiatives aimed at non-capital items such as education and signage will have a broader district-wide impact
Muskoka Trails Council Active Transportation Committee	• AT funding should be used to develop AT plans as well as leverage funds from other sources • Funding should also be used to develop District marketing and insurance plan

Question 8:
Should signs be posted on all known cycle routes or only on those specifically identified in a strategy, or where specific improvements have been made?

Agency	Comment
Simcoe Muskoka District Health Unit	• Signs should be posted on all known cycle routes as well as on all roads, to reduce risk and decrease injuries and fatalities
Township of Lake of Bays	• Signs should be posted on highly used routes (ie. triathlon routes, scenic routes, etc) • The District should balance the need for signs as educational tools with the desire for fewer signs on roadways • Community based social marketing will be an important component of the education component
Muskoka Watershed Council	• Appropriate signage should be implemented on all known safe cycling routes • The signage will bring about awareness and will identify Muskoka as a pro-active community encouraging healthy active lifestyles
Muskoka Trails Council Active Transportation Committee	• 'Share the Road' signs should be placed on all routes with paved shoulders, either those that have undergone specific improvements, or those that are identified as part of the network • Other possible signs include Community Safety Zone, educational signs, and/or pedestrian friendly community signs

Question 9:
Who should pay for the signs?

Agency	Comment
Simcoe Muskoka District Health Unit	• The cost of the signs should be shared between Area Municipalities and the District, based on ownership of the road/route • There are grants available to complete this work
Township of Lake of Bays	• Grants could be applied for to pay for the signs • Local municipalities could also contribute based on the routes that run through their area
Muskoka	• District of Muskoka should be responsible for all signs on District roads

Trails Council Active Transportation Committee	• Signs should be consistent across Muskoka

Question 10:
Are there other ways in which Muskoka could work together with the Area Municipalities and other stakeholders to promote AT?

Agency	Comment
Simcoe Muskoka District Health Unit	The District should: • Work with school boards and other stakeholders to promote walking to school • Partner with MTMA to promote AT and trails • Work with partners to provide programs to increase personal skill • Investigate bike sharing programs in urban centres • Adopt Pedestrian and/or Active Living Charters
Township of Lake of Bays	• A community based social marketing program should be implemented to improve the public's understanding of the benefits of AT and to encourage more AT users • Partners could include the District, the Area Municipalities, the Simcoe Muskoka District Health Unit, the Muskoka Trails Council, the Muskoka Watershed Council and others
Muskoka Watershed Council	• There is a need for a coordinated approach and an overall communication plan across Muskoka • The District should lead a community based social marketing workshop to increase the implementation and public's use of AT infrastructure in Muskoka • A communication plan will also ensure good public awareness of AT opportunities in Muskoka as well as etiquette on trails
Muskoka Trails Council Active Transportation Committee	• The District should identify an AT network • A portion of AT Reserve Fund should be available to groups to use as leverage towards securing further funds • A strategy should include consideration of historical and private trails • All stakeholders should be consulted in the AT planning process • Muskoka should have a staff member dedicated to AT and trail projects (District and Area Municipal level)

Appendix "II"
AT Route Suggestions from Public Open Houses

Suggested Route	Staff Analysis	Staff Recommendation
Peninsula Road (MR 7) from Port Carling to Rosseau	• Connects Port Carling to Port Sandfield and Minett, as well as to Rosseau (Seguin Township) • Very high traffic volumes in the summer months (large number of resorts and cottages along route) • Large number of resorts, amenities and destinations along this route • Currently highly used by cyclists as a route around Lake Rosseau	• Route has been added to the AT network • Staff recommend posting STR signage along this route in 2010
Around Lake Rosseau	• Portions of two District roads have already been identified as part of the network (MR 24, MR 7) • Large portion of this route would need to extend over Provincial highway and roadways of neighbouring municipalities • High traffic volumes along much of the route, traffic speeds vary, depending on the road • Large number of resorts, amenities and destinations along this route • Connects a number of small communities	• Muskoka should work with local and surrounding municipalities towards identifying an appropriate route around Lake Rosseau over the long term
Around Lake Muskoka	• Challenging route which would be aimed at cycling tourism and long-distance cyclists • 100-series roadway surrounds the majority of Lake Muskoka • Due to risks and safety concerns respecting high traffic speeds and volumes, 100-series roads are not recommended to be included in the AT Strategy	• Should not include MRs 169 and 118 in the AT network at this time • Staff recommend posting STR signage along roadways in 2010
Port Carling/ Foreman Road/ Mortimer's Point/Muskoka Road 169 Loop	• This route has already been included as part of the proposed AT network	• No change recommended

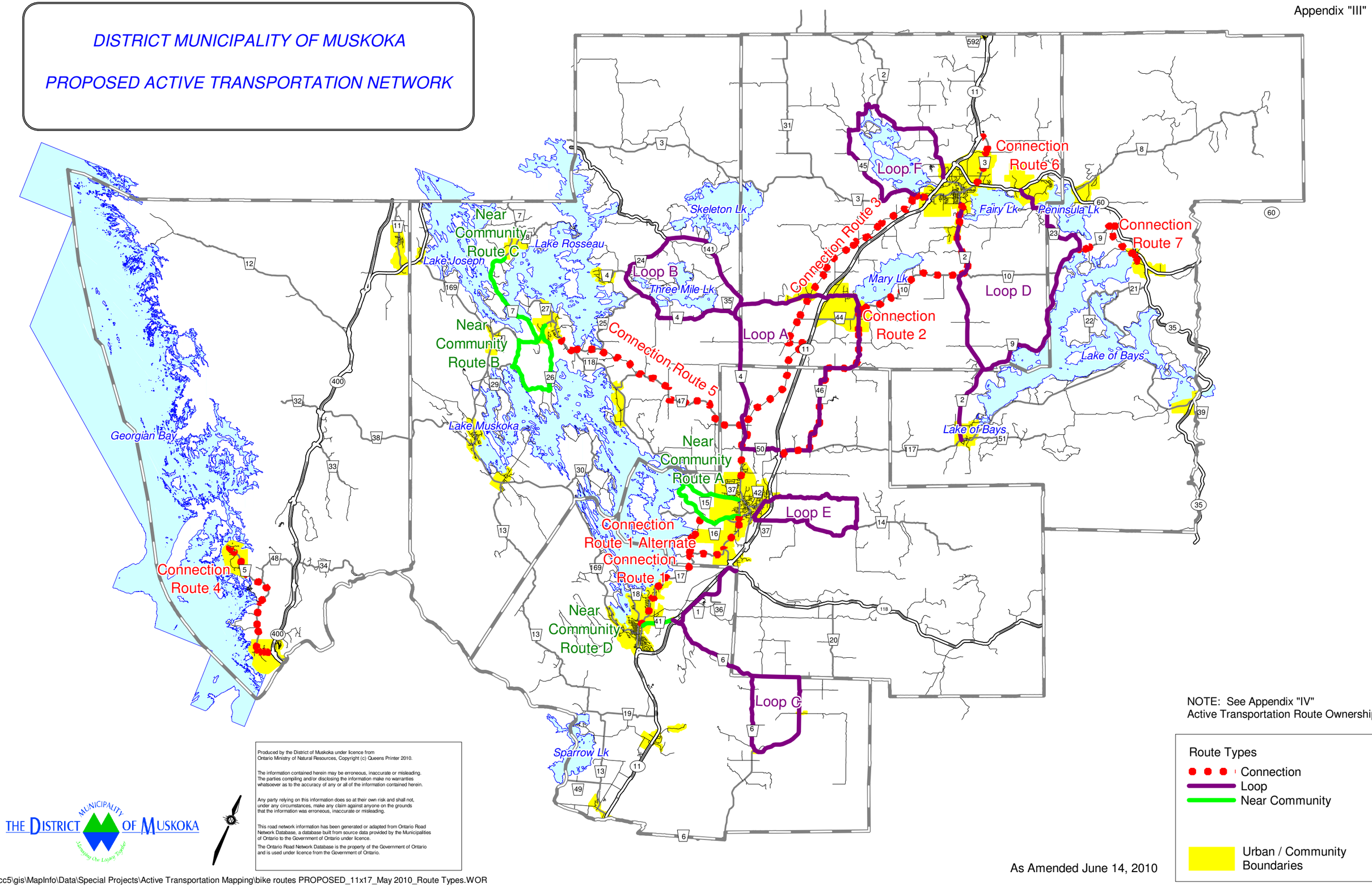
Signage on Southwood Road (MR 13) and Muskoka Beach Road (MR 17)	• Muskoka Beach Road (MR 17) has already been identified as part of the proposed AT network • Southwood Road (MR 13) was initially reviewed by staff for inclusion on the AT network. Due to the relatively low number of amenities/destinations along the route and the low connectivity it provides, as well as the fact that it is not in close proximity to largely populated communities, staff do not recommend its inclusion in the proposed network at this time	• To avoid the over proliferation of signage along District roads, staff recommend signing only core network routes
Muskoka Road 117 from Bracebridge to Baysville	• This route was identified as part of the preliminary proposed AT network • Due to risks and safety concerns respecting high traffic speeds and volumes, 100-series roads are not recommended to be included in the AT Strategy	• Staff recommend posting STR signage in 2010
Bethune Drive (MR 41) from Gravenhurst to Doe Lake Road (MR 6)	• Major access to/from Gravenhurst town centre • Leads directly to 2 routes in the proposed network • High traffic speeds and volumes along route	• Staff recommend posting STR signage in 2010 • Include route in AT network
Aspdin Road (MR 3) from Domtar to Huntsville town centre	• Identified as a high priority section of Aspdin Road (MR 3) by those in attendance at Open House • Shoulders of roadway are in need of repair • This portion of road is included in 2 routes in the proposed network • Provides access to/from Huntsville town centre • High traffic speeds and volumes along route	• Include this section of Aspdin Road (MR 3) in AT network • Staff recommend posting STR signage in 2010
Muskoka Road 169/ Muskoka Road 118 between Footes Bay and Bracebridge or an alternative route	• Connects several communities and urban centres • Could increase cycle tourism if designated route carried on around Lake Muskoka • Due to risks and safety concerns respecting high traffic speeds and volumes, 100-series roads are not recommended to be included in the AT Strategy	• Staff recommend posting STR signage along both roads in 2010 • Muskoka Road 118 from Port Carling to Brackenrig Road (MR 25) to Falkenburg Road (MR 47)/Hewitt Road to Raymond Road (MR 4) has been included in the proposed network as an alternative link between Port Carling and Bracebridge due to the lower traffic speeds and volumes along this route

Muskoka Road 169 between Gravenhurst and Bala	• Due to risks and safety concerns respecting high traffic speeds and volumes, 100-series roads are not recommended to be included in the AT Strategy	• Staff recommend posting STR signage in 2010
Highway 118 East	• Provincial highway, District has no jurisdiction • Highly used by avid cyclists • Main connection between Muskoka & Haliburton	• As this is not a Muskoka road, the District has no authority over infrastructure improvements • MTO should be advised of the Muskoka AT Strategy
Add Gravenhurst Parkway Road (MR 1)/Morrow St/Fredrick Street to Loop C	• Addition to Loop C is highly connected and is highly used by cyclists	• Staff recommend that this section be added to Loop C
Muskoka Road 3 N from Highway 60 to Arrowhead Provincial Park	• Currently used by cyclists and pedestrians • Many cyclists use this route from Provincial park to other routes in the network	• Staff recommend that this portion of MR 3 be added to the network
Routes that include TransCanada Trail	• Many routes in the network are included in the road-portions of the TransCanada Trail system	• No change recommended
Limberlost Road (MR 8)	• Although this route is very scenic and is used by cyclists and pedestrians, does not offer the same number of amenities or destinations as other routes in the proposed network	• To avoid the over proliferation of signage along District roads, staff recommend signing only core network routes
Brunel Road (MR 2) from Baysville to Huntsville	• A large portion of MR 2 has been included in both Loop D and Community Connections Route C • This section was assessed and offers increased connectivity, destinations and amenities to both routes listed above	• Staff recommend that this section of Brunel Road (MR 2) be added to Loop D in the network
Extend Fairy Vista Trail	• Suggestion that Fairy Vista Trail be extended along Provincial Highway 60 from Town of Huntsville into Township of Lake of Bays • As this roadway is not owned or maintained by the District, the Township should initiate a discussion with the Province regarding this request	• No change recommended • MTO should be advised of the Muskoka AT Strategy

Appendix "III"

DISTRICT MUNICIPALITY OF MUSKOKA

PROPOSED ACTIVE TRANSPORTATION NETWORK



NOTE: See Appendix "IV"
Active Transportation Route Ownership

Route Types
- Connection
- Loop
- Near Community

Urban / Community Boundaries

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The Ontario Road Network Database is the property of the Government of Ontario and is used under licence from the Government of Ontario.

THE DISTRICT MUNICIPALITY OF MUSKOKA
Managing Our Legacy Together

As Amended June 14, 2010

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Appendix "IV"

DISTRICT MUNICIPALITY OF MUSKOKA

PROPOSED ACTIVE TRANSPORTATION NETWORK

ROUTE OWNERSHIP

Near Community Route C
Lake Rosseau
Lake Joseph
Skeleton Lk
Loop B
Three Mile Lk
Near Community Route B
Connection Route 5
Loop A
Connection Route 3
Loop F
Connection Route 6
Fairy Lk
Peninsula Lk
Connection Route 7
Mary Lk
Loop D
Connection Route 2
Lake of Bays
Georgian Bay
Lake Muskoka
Near Community Route A
Loop E
Connection Route 1 Alternate
Connection Route 1
Near Community Route D
Connection Route 4
Loop C
Sparrow Lk

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THE DISTRICT MUNICIPALITY OF MUSKOKA
Imagine Our Legacy Together

Road Type
- DISTRICT
- TOWNSHIP
- PROVINCIAL

Urban / Community Boundaries

As Amended June 14, 2010

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Appendix 'V'
Summary of AT Route Improvements and Estimated Costs

	Section	Road	From/To	Suggested route improvement	Cost / km ($ x 1000)	Total Cost
Loop A	1	117	Hwy 11 to MR 46	1.25m paved shoulders & STR signage	$42	$ 126,000
	2	46	MR 117 to MR 10	STR signage	$0	$ -
	3a	10	MR 46 to Hwy 11	1.0m paved shoulder & STR signage	$35	$ 171,500
	3b	Hwy 141	Hwy 11 to MR 4	STR signage (paved shoulder exists)		
	4	4	Hwy 141 to MR 50	1.0m paved shoulders & STR signage	$35	$ 427,000
	5	50	MR 4 to Hwy 11	STR signage (1.25m paved shoulder exists)	$0	$ -
Loop B	1	35	MR 4 to Hwy 141	STR signage	$0	$ -
	2	Hwy 141	MR 35 to MR 24	STR signage (paved shoulder exists)	$0	$ -
	3	24	Hwy 141 to MR 4	STR signage	$0	$ -
	4	4	MR 24 to MR 35	STR signage	$0	$ -
Loop C	1	1	Hwy 118 to MR 6	STR signage	$0	$ -
	2	6	MR 1 to MR 20	1.0m paved shoulders & STR signage	$35	$ 294,000
	3	6	MR 20 to Housey's Rapids	STR signage	$0	$ -
	4	Barkway	MR 6 to MR 20	STR signage	$0	$ -
	5	20	Barkway Rd to MR 6	STR signage	$0	$ -
Loop D	1	23	Hwy 60 to MR 9	STR signage	$0	$ -
	2	9	MR 23 to MR 2	STR signage	$0	$ -
	3	2	MR 9 to Townline Rd.	1.0m paved shoulders & STR signage	$35	$ 584,500
	4	2	MR 117 to MR 9	1.0m paved shoulders & STR signage	$35	$ 231,000
Loop E	1	varies	Farm and ballpark, continuing east to Monsell Road, South To	STR signage	$0	$ -
	2	14	Monsell Rd to Cedar Lane	STR signage	$0	$ -
	3	Cedar Ln	MR 14 to MR 42	STR signage	$0	$ -
Loop F	1	2	Hwy 11 to MR 45	1.0m paved shoulders (for part of the section) & STR signage	$35	$ 87,500
	2	45	MR 2 to MR 3	STR signage	$0	$ -
	3	3	MR 45 to Hwy 11	1.0m paved shoulders & STR signage	$35	$ 164,500

Summary of AT Route Improvements and Estimated Costs

	Section	Road	From/To	Suggested route improvement	Cost / km ($ x 1000)	Total Cost
NC Route A	1	15	MR 16 to MR 118	1.0m paved shoulders (excluding center section) & STR signage	$35	$ 262,500
	2	118	MR 15 to Ball's Dr.	1.25m paved shoulders & STR signage	$42	$ 168,000
NC Route B	1	118	Donald Dr to MR 26	STR signage (paved shoulder exists)	$0	$ -
	2	26	MR 118 to Eveleigh Rd	STR signage	$0	$ -
	3	Eveleigh	MR 26 to MR 118	STR signage	$0	$ -
	4	118	Eveleigh Rd to MR 26	1.25m paved shoulders & STR signage	$42	$ 231,000
NC Route C	1	118	Donald Dr to MR 26	STR signage (paved shoulder exists)	$0	$ -
	2	7	MR 118 to MR 28	1.0m paved shoulders & STR signage	$35	$ 385,000
NC Route D	1	41	Winewood Ave to Hwy 11	1.25m paved shoulders & STR signage	$42	$ 118,000

'**NC**' - Near Community Routes

Summary of AT Route Improvements and Estimated Costs

	Section	Road	From/To	Suggested route improvement	Cost / km ($ x 1000)	Total Cost
CR Route 1	1	118	MR 16 to MR 17	1.25m paved shoulders & STR signage	$42	$ 121,800
	2	17	MR 118 to Winewood Ave	STR signage	$0	$ -
	3	varies	Alternate - Stage Coach Road/Stephens Bay Road between MR 16 and MR 17	STR signage	$0	$ -
CR Route 2	1	117	Hwy 11 to MR 46	1.25m paved shoulders & STR signage	$42	$ 126,000
	2	46	MR 117 to MR 10	STR signage	$0	$ -
	3	10	MR 46 to MR 2	1.0m paved shoulders & STR signage	$35	$ 371,000
	4	2	MR 10 to Townline Rd	1.0m paved shoulders & STR signage	$35	$ 250,000
CR Route 3	1	4	Meadow Heights Dr to Lone Pine	STR signage (paved shoulder exists)	$0	$ -
		Lone Pine	MR 4 to Stephenson Road 4	STR signage	$0	$ -
	2	Steph. Rd 4	Lone Pine Rd to Old Muskoka Road	STR signage	$0	$ -
	3	Old Musk. Rd	Stephenson Rd 4 to Old Ferguson Road	STR signage	$0	$ -
	4	Old Ferg. Rd	Old Muskoka Rd to MR 3	STR signage	$0	$ -
	5	3	Old Ferguson Rd to Hwy 11	1.0m paved shoulders & STR signage	$35	$ 38,500
CR Route 4	1	5	Port Severn (Lone Pine Road) to Honey Harbour	STR signage	$0	$ -
CR Route 5	1	4	Meadow Heights Dr to MR 47	STR signage (paved shoulder exists for most of section))	$35	$ 20,000
	2	47	MR 4 to Falkenburg Rd	STR signage	$0	$ -
	3	Falkenburg	MR 47 to MR 25	STR signage	$0	$ -
	4	25	Falkenburg Rd to MR 118	1.0m paved shoulders & STR signage	$35	$ 84,000
	5	118	MR 25 to Carr Rd	1.25m paved shoulders & STR signage	$42	$ 71,400
CR Route 6	1	3	Hwy 60 to Arrowhead Park Rd	1.0m paved shoulders & STR signage	$35	$ 175,000
CR Route 7	1	9	MR 23 to Hwy 60	STR signage	$0	$ -
	2	Dwight Beach Rd	MR 23 to Dwight Bay Rd	STR signage	$0	$ -

'**CR**' - Connection Routes

Note: The cost of the 'STR' (Share the Road) signage has not been included in this chart

Appendix "VI"
Assumptions used for determining costs

Before each AT route section could be evaluated against the cost criteria (capital cost to retrofit the existing road), retrofit design guidelines were developed and a recommended retrofit for each section was assigned. For low traffic volume and low speed roads, no road improvement was recommended. If either the road had a high traffic volume or high speed, then a 1.0m paved shoulder was recommended. A 1.25m paved shoulder was recommended for the high traffic, high speed roads.

Designated Shared Roadway (width of paved shoulder)

Posted Speed (km/h)	Average Summer Daily Traffic	
	<2000 vehicles trips per day	>2000 vehicle trips per day
≤70	Standard auto lane	1.0 m
>70	1.0 m	1.25 m

Assumption: SADT = 1.5 X AADT

Retrofit costs were determined for the 1.0m and the 1.25m paved shoulder scenarios.

Cost assumptions are as follows:

- The cost per km includes both sides/directions along the road
- An incremental cost for the paved shoulder was first determined (assumes the paved shoulder is being carried out as part of a repaving project for the entire road)
- 0.5m width of shoulder is standard with the repaving project (i.e. the width beyond that is the cost associated with this study)
- A retrofit factor was applied to the incremental cost to account for economies of scale and the extra asphalt width necessary when no amount of paved shoulder exists.
- There exists a minimum 1.0m shoulder suitable for paving
- Shoulder pavement depth 50mm
- Granular 'A' depth 100mm

In all cases, a cost for "*Share the Road*" signage was estimated. This cost is small relative to the paved shoulders cost.

Per km retrofit costs used in the comparison of alternatives are summarized as follows:

Retrofit costs per KM

Posted Speed (kph)	Avg. Summer Daily Traffic	
	< 2000 vpd	> 2000 vpd
≤ 70	signage cost only	$35,000 + signage
>70	$35,000 + signage	$42,000 + signage

Appendix H

Watermain Disinfection and Sampling Procedures

WATER AND WASTEWATER – STANDARD OPERATING PROCEDURE

Name: Disinfection & Sampling Procedures for Newly Constructed Watermains		**Number:** WS-09
Supersedes: Revision 8	**Most Recent Amendment Date:** May 2024	**Effective Date:** May 2024
Director Approval:	**Commissioner Approval:**	

PURPOSE

To outline a disinfection and bacteriological sampling procedure for newly constructed watermains and temporary watermains installed for cleaning or construction purposes.

This procedure only applies to works to be assumed by the District Municipality of Muskoka.

EQUIPMENT REQUIRED

Chorine test kit, Bacteriological (BacT) sample bottles, dilution method testing equipment, and/or high range chlorine testing device

PROCEDURE

1. The disinfection process for newly constructed watermains will be in accordance with the Ministry's "Watermain Disinfection Procedure" as revised. The Contractor will provide 24 hours minimum notice to the District of Muskoka (District) prior to commencing new watermain disinfection. The procedure is performed by a contractor with procedural oversight by a District certified water operator.

   A certified reduced pressure zone (RPZ) type backflow prevention device and meter (in circumstances where operations deems metering required) must be in place at all times and at no time will the new watermain be connected to the existing system prior to passing required tests. The new watermain is then super-chlorinated to > 50 mg/L chlorine but not more than 200 mg/L chlorine. A District certified water operator will take samples of the super-chlorinated water to determine the initial chlorine residual. This shall be done either by dilution testing or use of a high range chlorine testing device. The initial residual and disinfection start time shall be recorded in the system log. Any result above 200 mg/L or below 50 mg/L shall be deemed a fail, and the watermain shall be flushed and re-chlorinated.

2. After 24 hours, the new watermain super chlorination level is tested (final residual), the time and result is recorded in the system log. The final residual must be at least 60% of

the initial test and have decreased no more than 50 mg/L. Any new watermain failing this must be flushed and super-chlorinated following Step 1 above.

Note: De-chlorination of the super-chlorinated water must be undertaken for any water that is directly discharged into surface water or into the natural environment.

3. After the disinfection process has been completed, and after final flushing, a District certified water operator will test for free chlorine residual to determine if all super-chlorinated water has been removed; residual must be representative of the free chlorine residual entering the new pipe.

4. If the residual from Step 3 above indicates normal line residual, a District certified water operator will then take samples for bacteriological analysis. The tests shall include as a minimum Escherichia coli and Total Coliforms. Samples will be marked “non-reportable” and sent the same day by courier (or hand delivered) for delivery to a laboratory certified to perform such tests.

5. Two consecutive sets of acceptable samples, taken at least 24 hours apart shall be collected from the new main prior to connection to the distribution system. Sets of samples shall be collected every 370 m (1,200 ft) of the new water main, plus one set from the end of the line and at least one from each branch greater than one pipe length (6 metres).

6. A bleeder should only be activated after all bacteriological sampling has been completed and accepted and not before, especially in between Bac T sampling. At this time a “bleeder” line, “blow-off” line, or yard hydrant shall be set up at the distal end of the newly constructed main to ensure a free chlorine residual of at least 0.05 mg/L is maintained through to final connection to the municipal system.

7. If all of the bacteriological test results are clear, an authorization to connect the new watermain to the existing system will be issued by the Chief Operator. Immediately prior to final connection, a District of Muskoka certified water operator will test the still running “bleeder” line, “blow-off” line, or yard hydrant to ensure an acceptable residual greater than 0.05 mg/L free chlorine has been maintained.

   Note: The Watermain connection is to be less than 6 metres total and shall be hand swabbed and spray disinfected using a greater than 1% sodium hypochlorite solution immediately prior to installation.

8. A failure of the BacT test in this process will necessitate repeating the flushing and sampling. A second BacT sample failure will require repeating the entire process of super-chlorination process.

9. Where the above method is not feasible, other disinfection methods outlined in the Ministry’s “Watermain Disinfection Procedure” may be approved for use by the District of Muskoka’s Director of Water and Wastewater Operations on a case by case basis. (Example: small diameter overland temporary mains where ambient temperature may make it impossible to adhere to the District’s standard disinfection procedure)

RELATED POLICIES/DOCUMENTS

AWWA C651
District Municipality of Muskoka's Engineering Design Criteria and Standards Manual, as revised

Ministry of the Environment, Conservation and Parks - Procedure for the disinfection of watermains in Ontario, as revised

Appendix I

Initial Acceptance and Final Assumption Procedures

INITIAL ACCEPTANCE / ASSUMPTION OF SERVICES PROTOCOL

Prior to application for either initial acceptance or final assumption, the engineer of record shall submit CCTV in MP4 format including individual corresponding pdf reports. The submission shall have been reviewed by the engineer and any deficiencies listed and provided with the submission for audit by District Staff.

1 Procedure for Initial Acceptance of Services:

A. Engineer of Record to submit formal written request to EPW for Initial Acceptance of underground services and corresponding reduction of securities.

Engineers Submission Checklist (Initial Acceptance)	
Certificate of Substantial Performance	
Engineer's statement certifying installation of services is in accordance with design and all applicable criteria	
Water and sewer testing documents	
Contractor progress payment certificate	
Deficiency list pre-approved by District staff	
PDF As-Recorded Drawings	
CAD As-Recorded File	
Security reduction calculation *	
Owner's statutory declaration	
All other deliverables per development agreement including property requirements	

* Security reduction calculation shall generally follow:

Security Reduction Calculation	
Original LC	$
Less holdback %	$
Less value of outstanding works or invoices	$
Less value of deficiencies	$
Amount to be released	$

B. EPW to issue Certificate of Initial Acceptance and reduce securities, commencing 24 month warranty period.

C. After issuance of Certificate of Initial Acceptance, the developer may connect to the municipal watermain as outlined in the District's Criteria and Design Standards Manual - Section 1.10 System Maintenance to Assumption.

2 Procedure for Assumption of Services (following expiry of warranty period):

A. Engineer of Record to submit formal written request to EPW for Assumption of underground services and corresponding release of securities.

Engineers Submission Checklist (Final Assumption)	
Certificate of Completion	
Engineer's statement certifying installation of services is in accordance with design and all applicable criteria	
Final Record drawings	
OLS Certificate (as applicable)	
Contractor progress payment certificate	
Final corrected deficiency list	
Lateral locate sheets	
Value of security release	
Proof of lien resolution	
Owner's statutory declaration	
All other deliverables per development agreement	

B. EPW to issue Certificate of Assumption and release securities.

3 Certificate of Substantial Completion, Initial Acceptance and Final Assumption:

CERTIFICATE OF
SUBSTANTIAL PERFORMANCE
INITIAL ACCEPTANCE, FINAL ACCEPTANCE AND ASSUMPTION

BY

THE DISTRICT MUNICIPALITY OF MUSKOKA

CONTRACT /FILE NO. _____
DESCRIPTION OF WORKS: _____
_____
_____

LOCATION (LOT &CONCESSION):
_____

This is to certify that the above project has been substantially performed in a proper and workman like manner in accordance with the Approved Specifications and Engineering Drawings, and in compliance with the term of the servicing agreement, if applicable.

SIGNATURE OF CONSULTANT/ENGINEER_____
DATE_____

PARTIES

OWNER _____ TEL: _____
ADDRESS _____ CONTACT: _____
_____
_____
_____

ENGINEER _____ TEL: _____
ADDRESS _____ CONTACT: _____
_____
_____
_____

CONTRACTOR _____ TEL: _____

ADDRESS _____ CONTACT: _____

_____

_____

Securities held by District prior to Initial Acceptance $_____

Securities to be released on Initial Acceptance $_____

Securities held by District during Maintenance Period $_____

Form of Securities: Cash_____ Bond_____

Letter of Credit_____ Other_____

Miscellaneous Charges: Levies_____ Easements_____

Property Dedications_____ Other_____

MINISTRY OF ENVIRONMENT AND ENERGY CERFICATES OF APPROVAL

Certificate No.: Water_____ Date_____

Sanitary Sewage_____ Date_____

Storm Sewage_____ Date_____

Other_____ Date_____

Special Terms or Conditions on the Certificates? Yes_____ No_____

If Yes, (i) Specify

(ii) Terms and Conditions Fulfilled? Yes_____ No_____

CONSTRUCTION DETAILS

"As Constructed" Documentation and Major Drawings, accepted by District Municipality of Muskoka - Includes 0 & M Manuals, Shop Drawings, Warranties, **Locate Sheets**, **Video and Photographic Records**, Permits, Spares, Training, Bonds, etc.

Date_____

Date of Initial Acceptance Inspection_____

Inspection By: Engineering Div._____ Operations Div._____

Consultant:_____ Contractor _____

List of Deficiencies Enclosed? Yes_____ No_____ N/A_____

Contractor_____

Test Results - for works to be assumed

Sewer:	Exfiltration/Infiltration	Yes_____ No_____ N/A_____
	Rod Test	Yes_____ No_____ N/A_____
	Video Inspection	Yes_____ No_____ N/A_____
Water:	Pressure Test/Flushing Yes _____	No_____ N/A_____
	Bacteriological	Yes_____ No_____ N/A_____
Asphalt:	Graduation Test	Yes_____ No_____ N/A_____
	Other:_____	Yes_____ No_____ N/A_____

Concrete:	Compression Test	Yes_____ No_____ N/A_____
	Other:_____	Yes_____ No_____ N/A_____

Maintenance Bonds: Expiry_____

Date of Initial Acceptance: _____

LIENS

Identification of premises for the preservation of liens (where liens attach to premises) _____

or

Office to which claim for lien and affidavit must be given to preserve lien _____

Liens Registered? Yes_____ No_____

If Yes Specify _____

Property Owners' Release Certificates? Yes____ No_____ N/A_____

Remarks _____

COMPLETION AND SECURITY HOLDBACKS

Date of substantial performance as set by the Engineer_____

Specified maintenance period_____ months Bond Expiry_____

Date of Initial Acceptance Inspection_____

Inspection By: Engineering Div._____ Operations Div._____

Consultant _____ Contractor_____

Value of works to be assumed by the District Municipality of Muskoka

Water $_____

Sewer $_____

Roads $_____

Other $_____

Total $_____

Date of Final Acceptance:_____

ACCEPTANCE AND ASSUMPTION OF WORKS

BY

THE DISTRICT MUNICIPALITY OF MUSKOKA

Date Application Received _____

Securities Acceptable? Yes _____No_____

Special terms and conditions of servicing agreement fulfilled? If no specify.

Yes_____No_____N/A_____

Comments _____

_____

Date of Initial Acceptance_____

Date of Final Acceptance subject to final inspection_____

Comments and/or Conditions_____

_____

Initial Acceptance/Substantial Performance Approved

Date	Operations Area Manager
Date	Director of Transportation, Engineering and Public Works
Date	Manager of Development Engineering
Date	Director of Water and Wastewater Services

Final Acceptance/Assumption of Works Approved

Date	Operations Area Manager
Date	Director of Transportation, Engineering and Public Works
Date	Manager of Development Engineering
Date	Director of Water and Wastewater Services

Appendix J

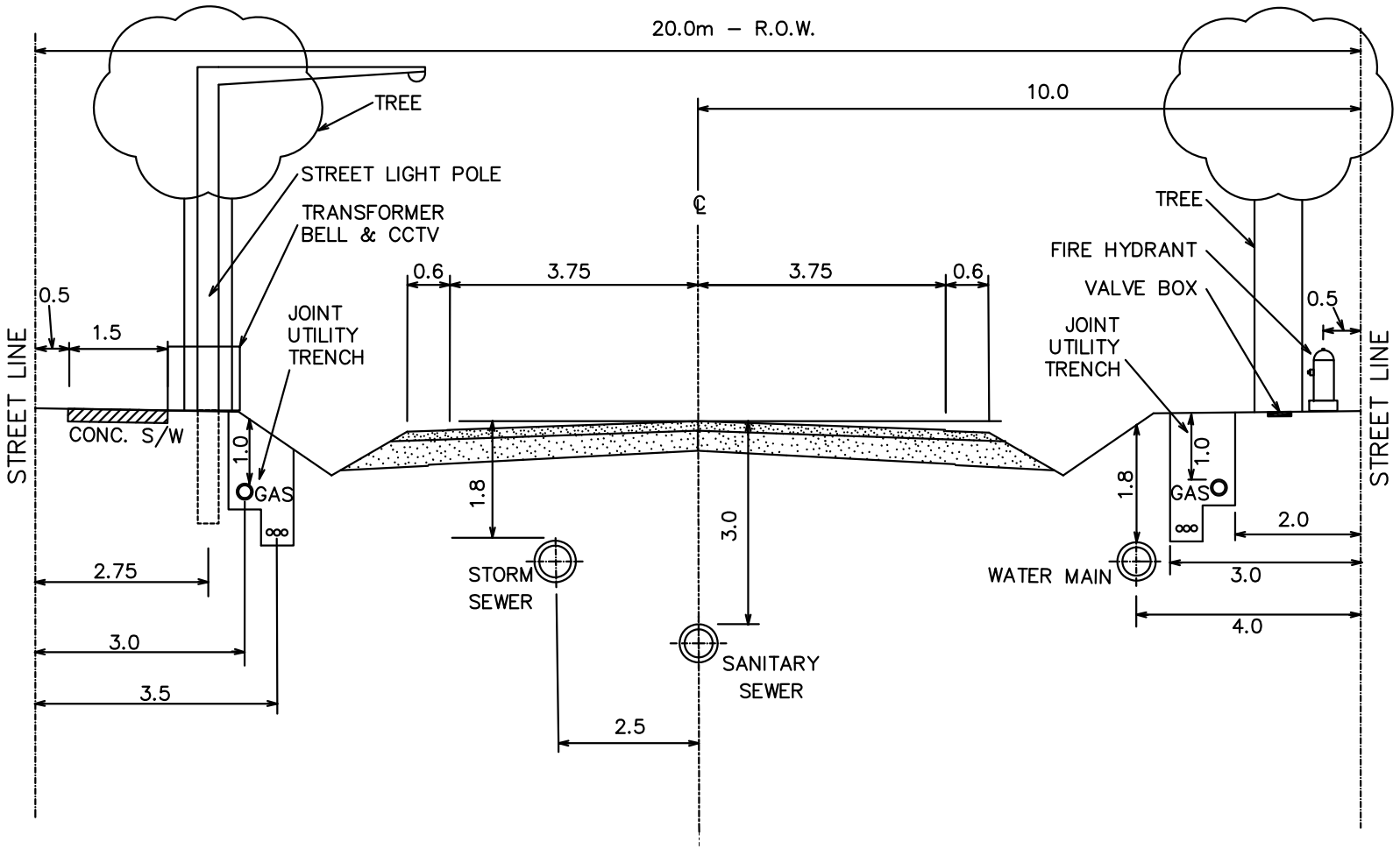
Standard Drawings

Engineering Design Criteria and Standards Manual
District Standards Drawings
Index

DRAWING NUMBER	TITLE	REVISION DATE
	100 Series - Roadways	
DMM-101	Typical Roadway Cross Section Ditches 20.0m -R.O.W	June 2024
DMM-102	Typical Roadway Cross Section Curb and Gutter 20.0m -R.O.W	June 2024
DMM-103	Typical Roadway Cross Section Ditches 26.0m -R.O.W	June 2024
DMM-104	Typical Roadway Cross Section Curb and Gutter 26.0m -R.O.W	June 2024
DMM-105	District Service Locations In Condominium Roadways	June 2024
DMM-106	Permanent Cul-De-Sac	June 2024
DMM-107	Deciduous Tree Planting	June 2024
DMM-108	Concrete Bollard	June 2024
	200 Series - Watermain	
DMM-201	Water Main Thrust Restraint At Fittings	June 2024
DMM-202	Lot Service Locations - Multi-Units Residential Or Commercial Building	June 2024
DMM-203	Lot Service Locations - Single Family And Townhouse Residential	June 2024
DMM-204	Fire Hydrant Marker Installation	June 2024
DMM-205	Typical Cul-De-Sac Water Main Design- 50mmØ P.E. Looping	June 2024
DMM-206	400mm Gate Valve And Larger Valve Box On PVC Water Mains	June 2024
DMM-207	Air Relief Valve Boulevard Installation - Water	June 2024
DMM-208	Air Relief Valve & Chamber Installation - Water Main In Boulevard	June 2024
DMM-209	150mm Check Valve Chamber	June 2024
DMM-210	Water Main And Sewer Common Trench Detail	June 2024
DMM-211	Water Main And Two Sewers Common Trench Detail	June 2024
DMM-212	Water Main Insulation In Ditched Areas	June 2024
DMM-213	Tracer Wire Arrangement At Valve Box For Water Main	June 2024
DMM-214	Details Of Support For Water Main Larger Than 300mmØ	June 2024
	300 Series - Sanitary Sewer	
DMM-301	Sanitary Forcemain Line Valve / Drain Valve Chamber	June 2024
DMM-302	Low Pressure Forcemain Detail At Property Line	June 2024
DMM-303	Sanitary Forcemain Terminal Cleanout Chamber - In Road	June 2024
DMM-304	Low Pressure Sewer Terminal Cleanout - In Boulevard	June 2024
DMM-305	Air Relief Valve & Chamber Installation - Sewage (In Road)	June 2024
DMM-306	Typical Sewage Pumping Station Forcemain By-Pass Connection	June 2024
DMM-307	Typical Swab Launcher Forcemain Sewage Pumping Sation	June 2024
DMM-308	Tracer Wire Arrangement AtValve Box For Sewage Forcemain	June 2024
DMM-309	Frost Strap Installation	June 2024
DMM-310A	Sewer Cleanout	June 2024
DMM-310B	Sewer Cleanout - Hard Surface	June 2024
	400 Series - Storm Sewer	
DMM-401	Sump Pump Discharge Connection To Storm Sewer	June 2024
	500 Series - Miscellaneous	
DMM-501	Location Sheet	June 2024
DMM-502	Manhole Inspection Sheet	June 2024
DMM-503	Maintenance Hole Inspection Diagram	June 2024

THE DISTRICT MUNICIPALITY OF MUSKOKA

TYPICAL ROADWAY CROSS SECTION DITCHES 20.0m - R.O.W.



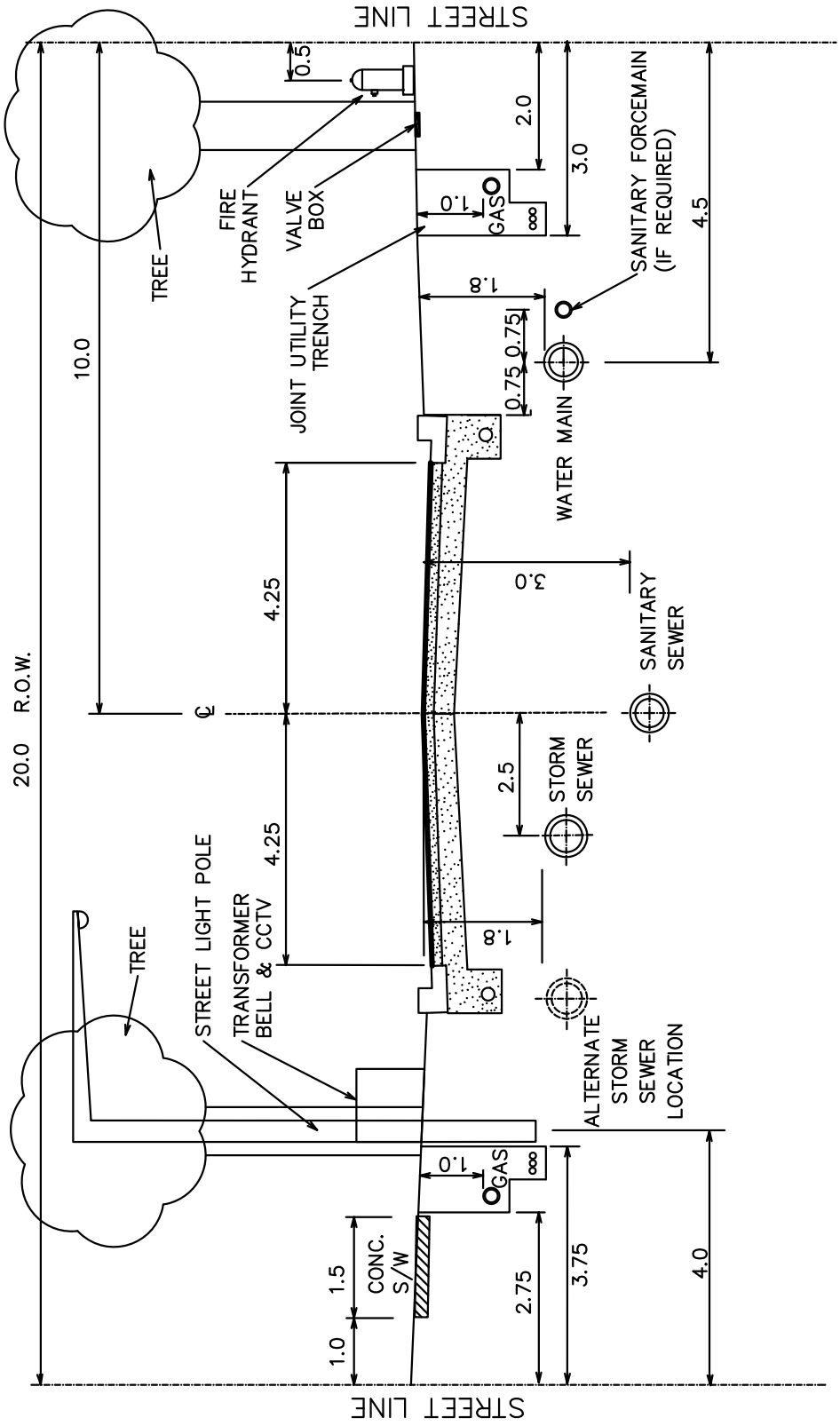
NOTES:

1. GAS, WATER MAIN, & FIRE HYDRANT TO BE LOCATED ON OPPOSITE SIDE OF ROADWAY TO SIDEWALK, TRANSFORMERS AND STREET LIGHTS WHERE POSSIBLE.
2. ALL DIMENSIONS ARE IN METRES.

NOT TO SCALE

DATE: JUNE 2024

DMM-101



NOTES:

1. GAS, WATER MAIN, & FIRE HYDRANT TO BE LOCATED ON OPPOSITE SIDE OF ROADWAY TO SIDEWALK, TRANSFORMERS AND STREET LIGHTS WHERE POSSIBLE.
2. ALL DIMENSIONS ARE IN METRES.

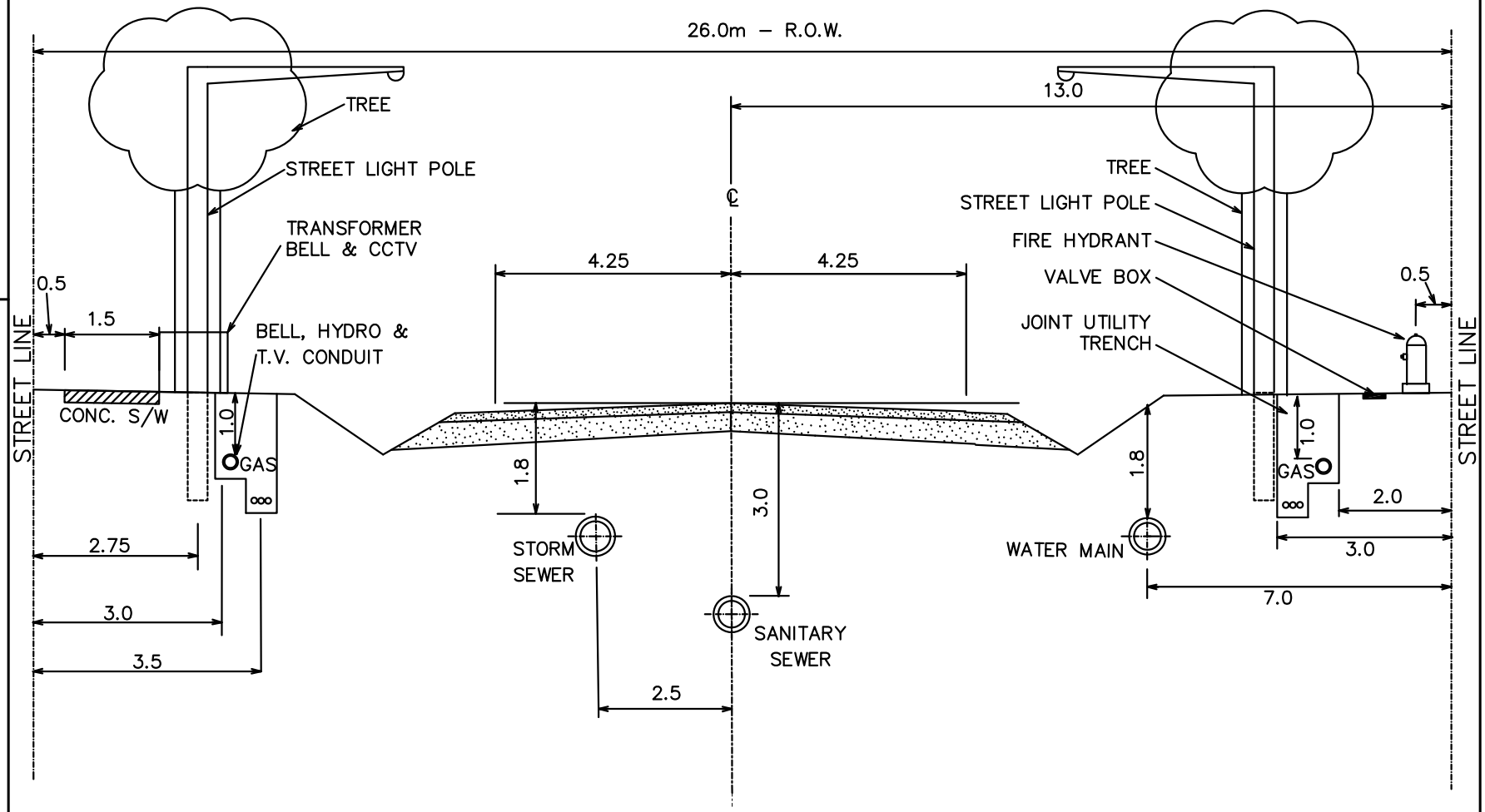
THE DISTRICT MUNICIPALITY OF MUSKOKA

TYPICAL ROADWAY CROSS SECTION CURB AND GUTTER 20.0m - R.O.W.

NOT TO SCALE	
DATE:	JUNE 2024
DMM-102	

THE DISTRICT MUNICIPALITY OF MUSKOKA

TYPICAL ROADWAY CROSS SECTION DITCHES 26.0m - R.O.W.



NOTES:

1. GAS, WATER MAIN, & FIRE HYDRANT TO BE LOCATED ON OPPOSITE SIDE OF ROADWAY TO SIDEWALK, TRANSFORMERS AND STREET LIGHTS WHERE POSSIBLE.
2. ALL DIMENSIONS ARE IN METRES.

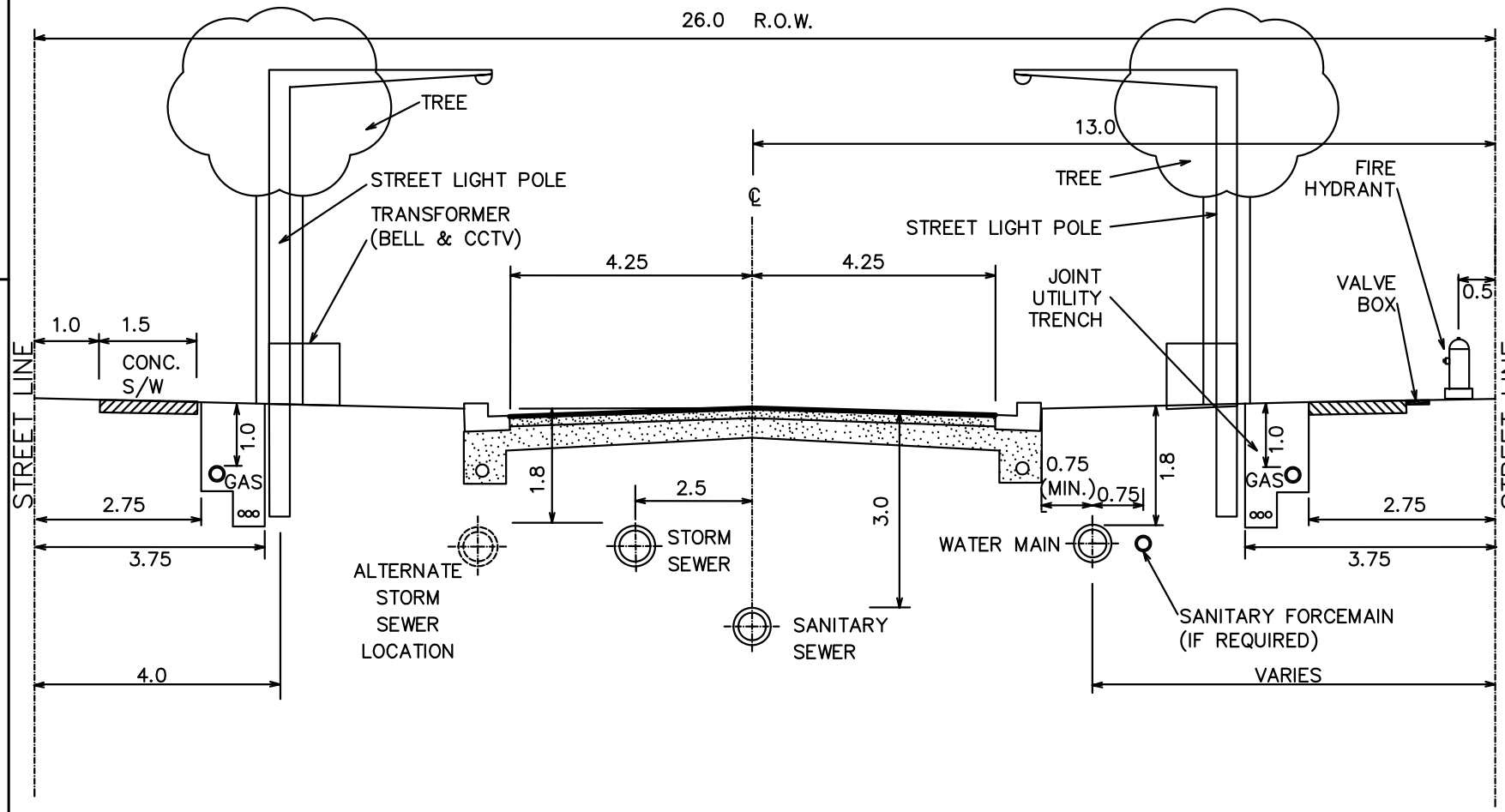
NOT TO SCALE

DATE: JUNE 2024

DMM-103

THE DISTRICT MUNICIPALITY OF MUSKOKA

TYPICAL ROADWAY CROSS SECTION CURB AND GUTTER 26.0m - R.O.W.



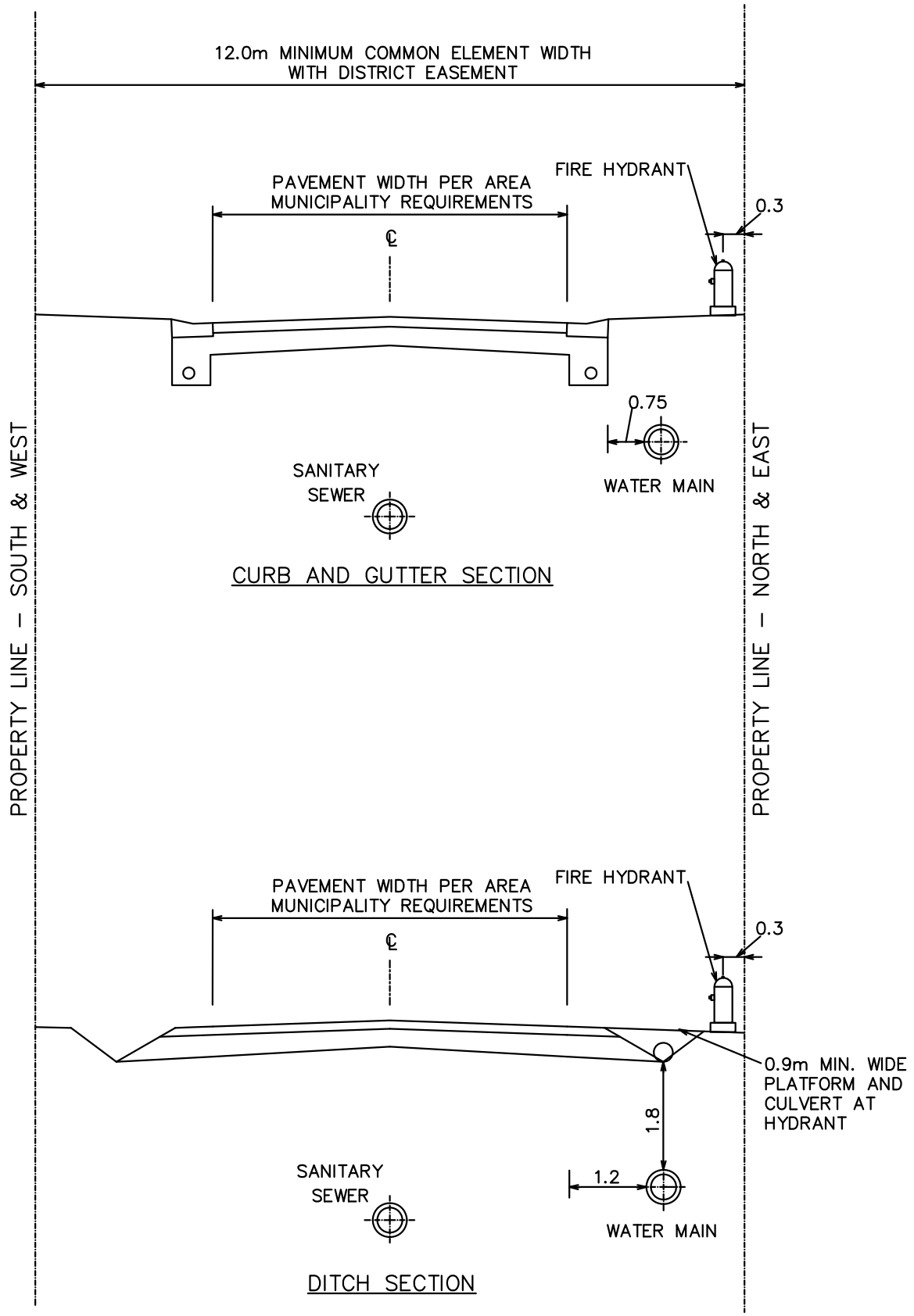
NOTES:

1. GAS, WATER MAIN, & FIRE HYDRANT TO BE LOCATED ON OPPOSITE SIDE OF ROADWAY TO SIDEWALK, TRANSFORMERS AND STREET LIGHTS WHERE POSSIBLE.
2. ALL DIMENSIONS ARE IN METRES.

NOT TO SCALE

DATE: JUNE 2024

DMM-104



NOTE:

1. ALL DIMENSIONS ARE IN METRES.

THE DISTRICT MUNICIPALITY OF MUSKOKA

DISTRICT SERVICE LOCATIONS IN CONDOMINIUM ROADWAYS

NOT TO SCALE

DATE: JUNE 2024

DMM-105

MINIMUM RADIUS		
ROAD TYPE	A	B
RESIDENTIAL	15.0m	20.75m
INDUSTRIAL	15.0m	20.75m

TYPE 'A'

TYPE 'B'

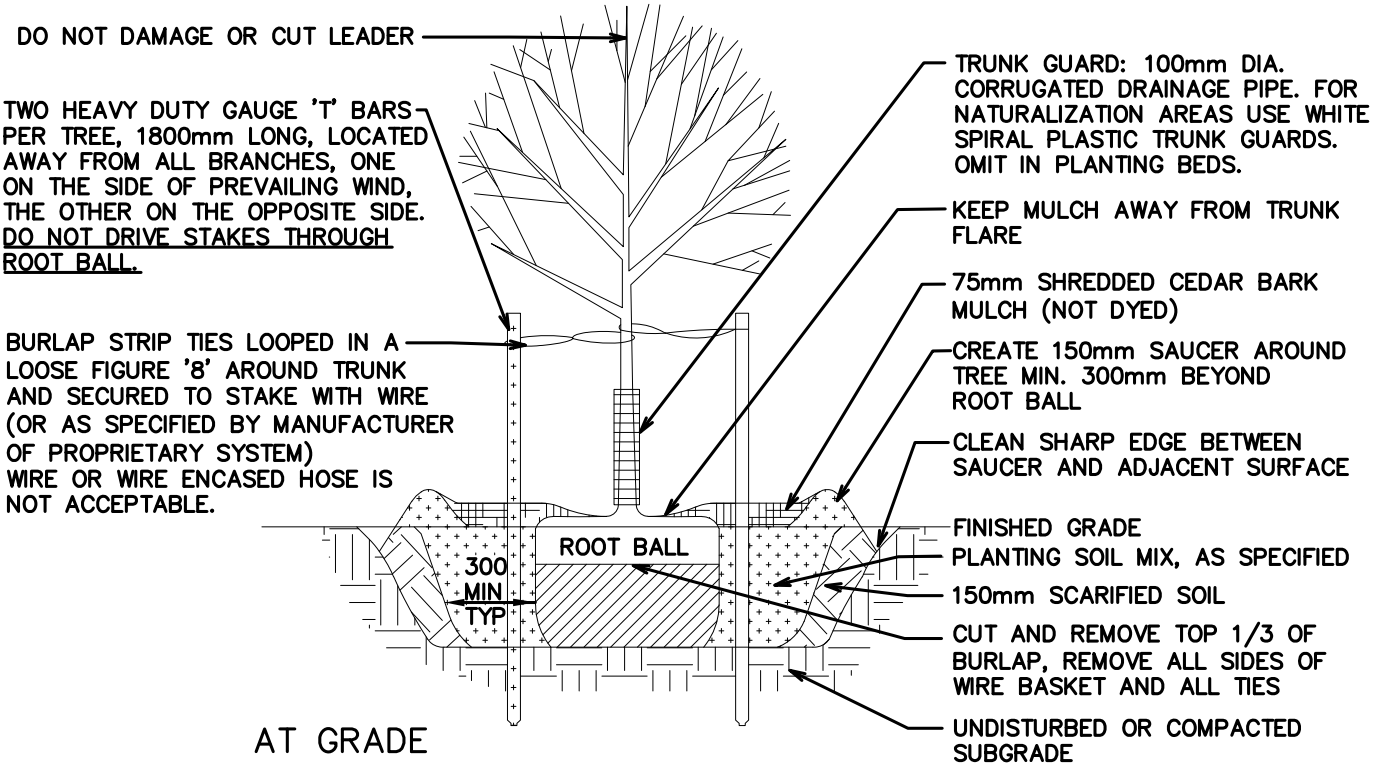
THE DISTRICT MUNICIPALITY OF MUSKOKA

PERMANENT CUL-DE-SAC

NOT TO SCALE

DATE: JUNE 2024

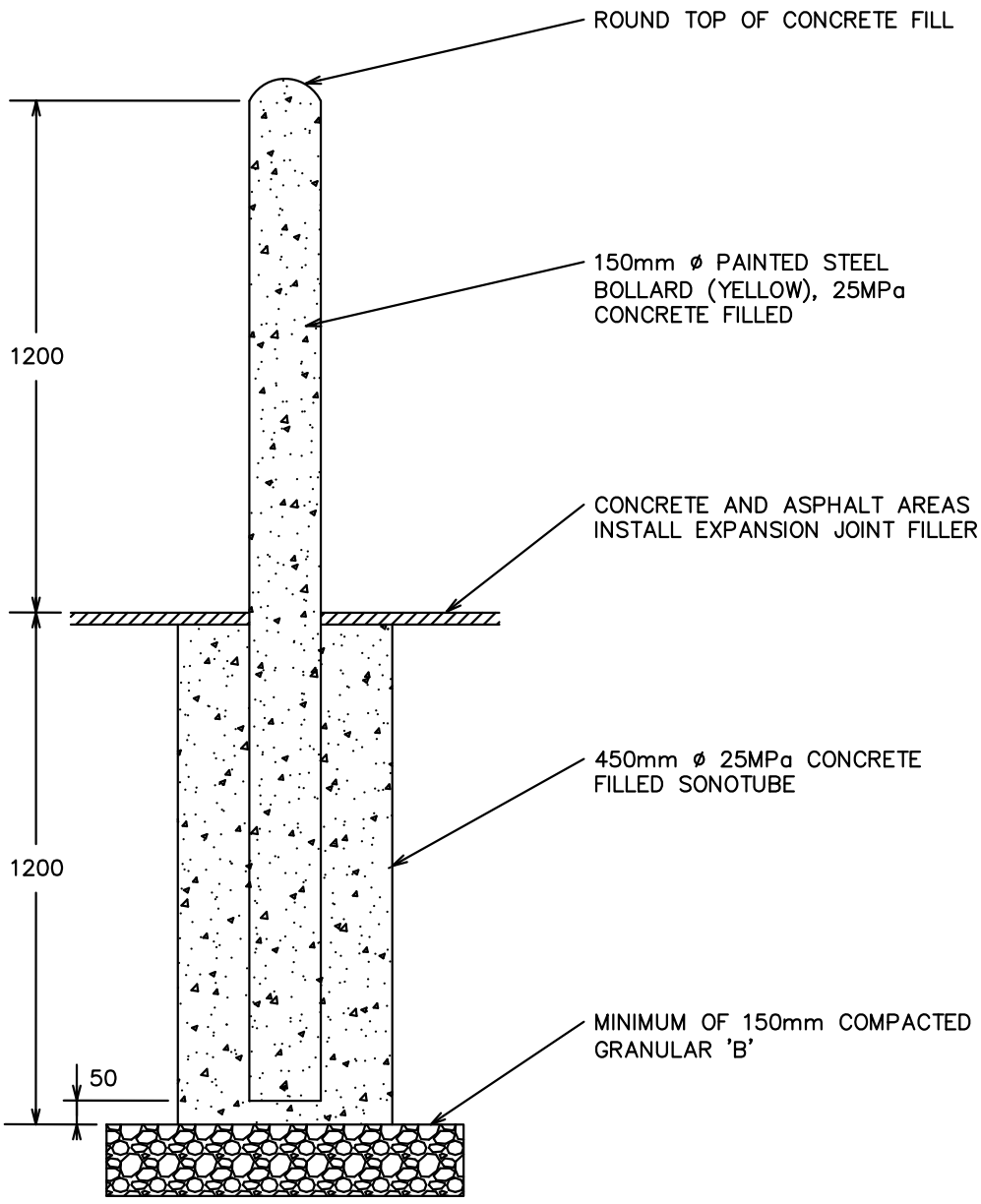
DMM-106



NOTES:

1. ALL MATERIALS SHALL CONFORM TO THE SPECIFICATIONS.
2. DO NOT ALLOW AIR POCKETS WHEN BACKFILLING.
3. POSITION CROWN OF ROOT BALL 75mm ABOVE FINISHED GRADE TO ALLOW FOR SETTLING.
4. DO CORRECTIVE PRUNING TO RETAIN NATURAL FORM OF TREE AS DIRECTED BY THE TOWN, INCLUDING REMOVAL OF DEAD, BROKEN, OR CROSSING BRANCHES. DO NOT REMOVE MORE THAN 20% OF LIVE CANOPY.
5. FOR TREES PLANTED WITHIN PLANTING OR SHRUB BEDS, DELETE SAUCER AROUND BASE OF TREE.
6. NO TREE PITS SHALL BE LEFT OPEN OVERNIGHT
7. STAKES AND TIES TO BE REMOVED ONE YEAR AFTER PLANTING.

THE DISTRICT MUNICIPALITY OF MUSKOKA	**DECIDUOUS TREE PLANTING**	NOT TO SCALE DATE: JUNE 2024 **DMM-107**



NOTE:

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT WHERE NOTED.

THE DISTRICT MUNICIPALITY OF MUSKOKA	**CONCRETE BOLLARD**	NOT TO SCALE DATE: JUNE 2024 **DMM-108**

MINIMUM RESTRAINING LENGTH ON EACH SIDE OF FITTING PVC DR 18 WATERMAIN

BENDS

HORIZONTAL BENDS, DEAD ENDS AND INLINE VALVES	150mm ø PIPE SIZE (m)	200mm ø PIPE SIZE (m)	250mm ø PIPE SIZE (m)	300mm ø PIPE SIZE (m)
11.25°	0.6	0.6	0.6	0.9
22.5°	0.9	1.2	1.5	1.5
45°	1.80	2.4	2.7	3.4
VALVES OR END CAPS	9.1	12.2	14.4	17.0

REDUCERS

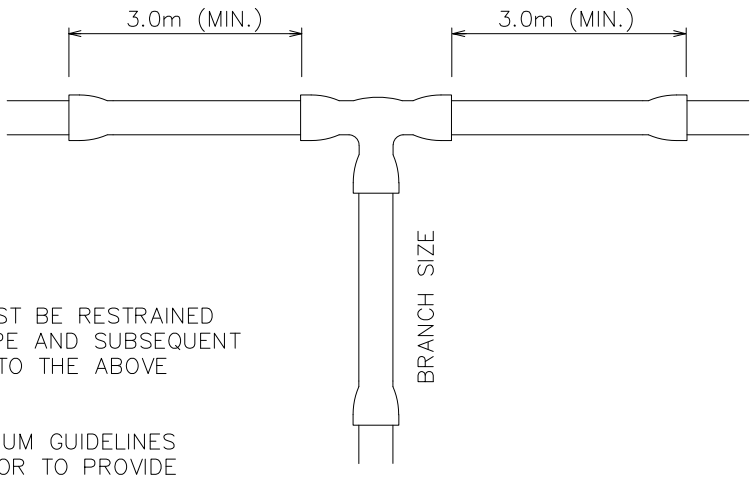
	150mm ø PIPE SIZE (m)	200mm ø PIPE SIZE (m)	250mm ø PIPE SIZE (m)	300mm ø PIPE SIZE (m)
ONE PIPE SIZE SMALLER	6.7 (100x150mm)	6.4 (150x200mm)	5.7 (200x250mm)	5.7 (250x300mm)

TEES (RUN SIZE)

BRANCH SIZE	150mm ø PIPE SIZE (m)	200mm ø PIPE SIZE (m)	250mm ø PIPE SIZE (m)	300mm ø PIPE SIZE (m)
150mm	0.3	0.3	0.3	0.3
200mm	3.6	0.9	0.3	0.3
250mm	7.6	5.8	3.4	1.2
300mm	11.5	9.8	7.9	6.1

MINIMUM RESTRAINED LENGTH

TEE



NOTE:

1. ALL FITTINGS MUST BE RESTRAINED TO ADJACENT PIPE AND SUBSEQUENT PIPES, SUBJECT TO THE ABOVE TABLES.
2. THESE ARE MINIMUM GUIDELINES ONLY. CONTRACTOR TO PROVIDE RESTRAINT PLAN BASED ON SITE CONDITIONS AND MANUFACTURER'S SPECIFICATIONS .

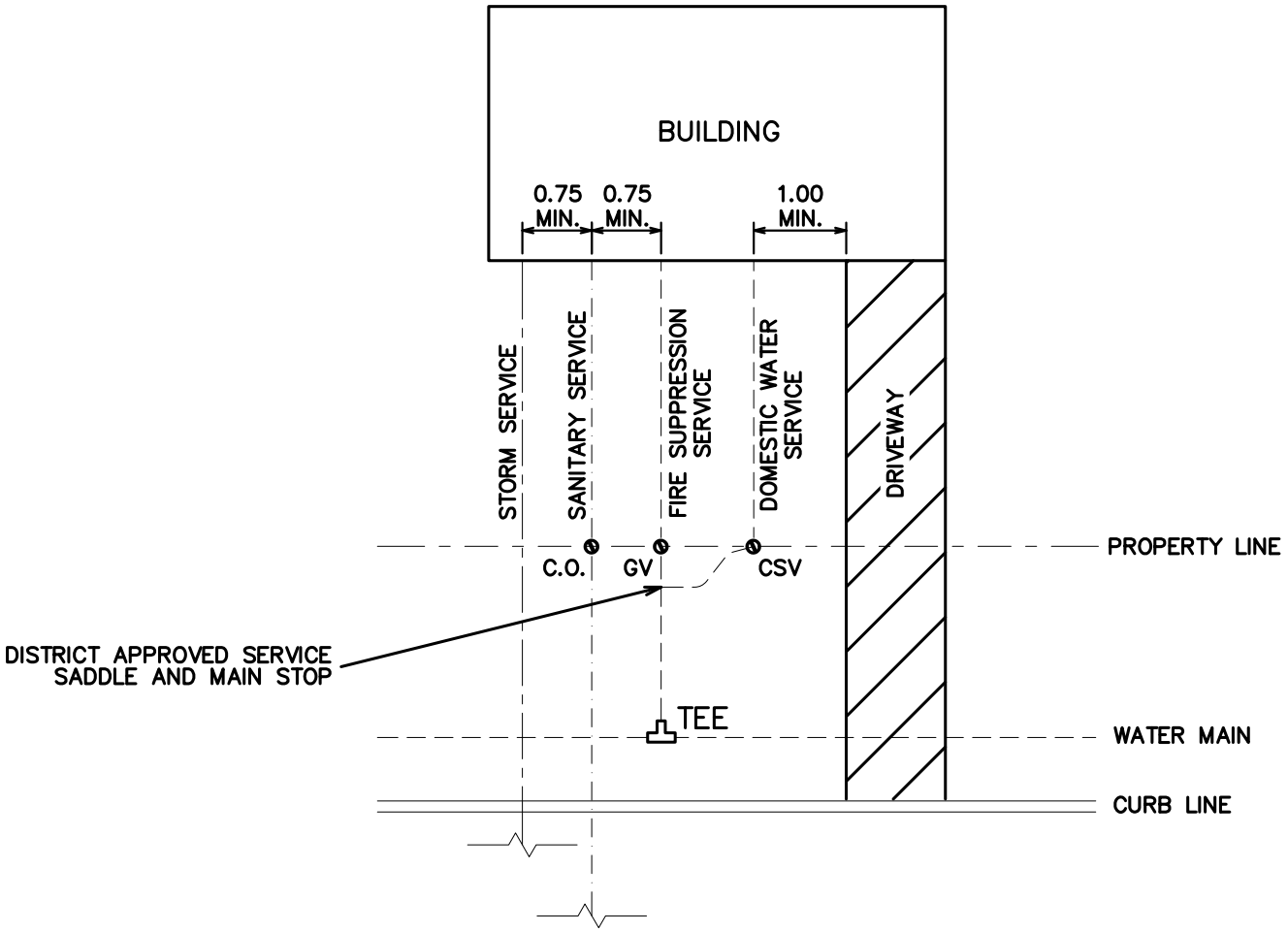
THE DISTRICT MUNICIPALITY OF MUSKOKA

WATER MAIN THRUST RESTRAINT AT FITTINGS

NOT TO SCALE

DATE: JUNE 2024

DMM-201



NOTES:

1. CURB STOPS AND CLEANOUTS TO BE LOCATED OUT OF DRIVEWAY, AT PROPERTY LINE.
2. WATER AND SANITARY SERVICE TO BE ON SIDE OF LOT OPPOSITE TO DRIVEWAY, WATER SERVICE NEAREST TO DRIVEWAY.

THE DISTRICT MUNICIPALITY OF MUSKOKA

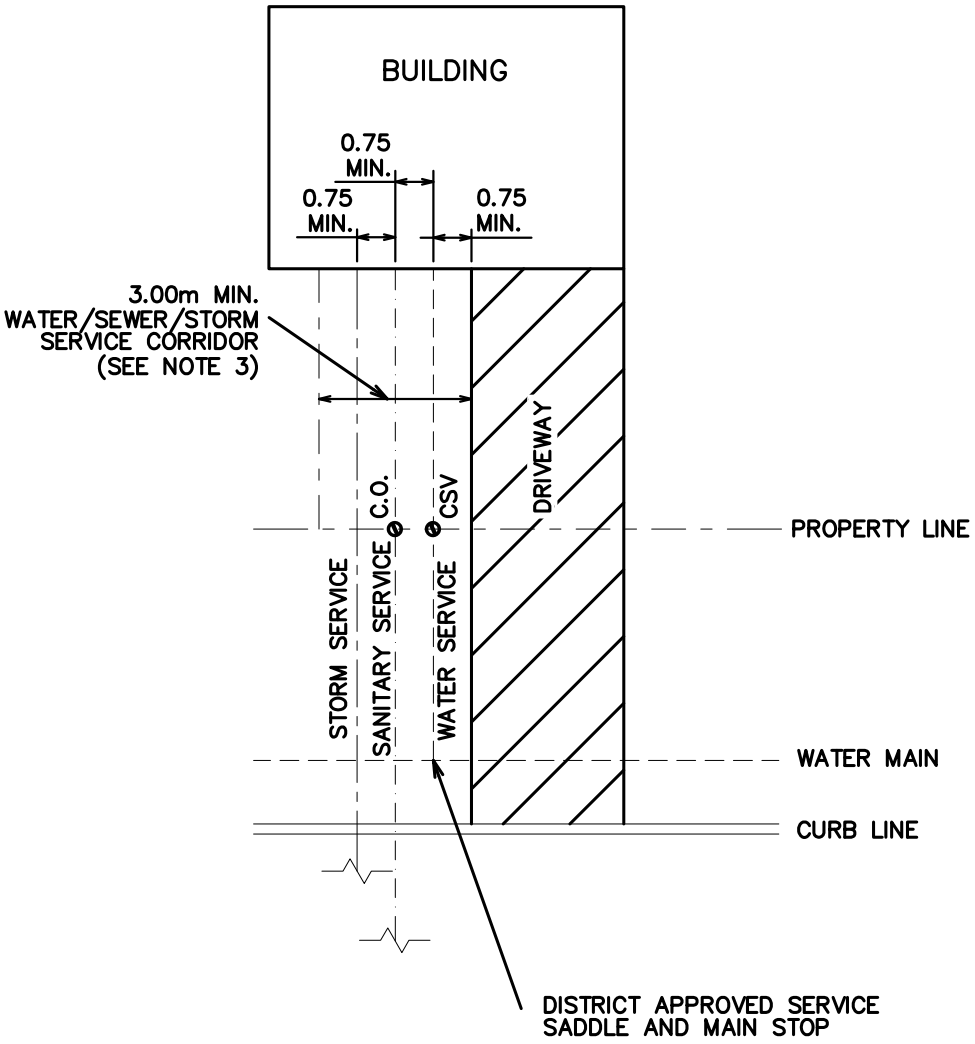
LOT SERVICE LOCATIONS

MULTI-UNIT RESIDENTIAL OR COMMERCIAL BUILDING

NOT TO SCALE

DATE: JUNE 2024

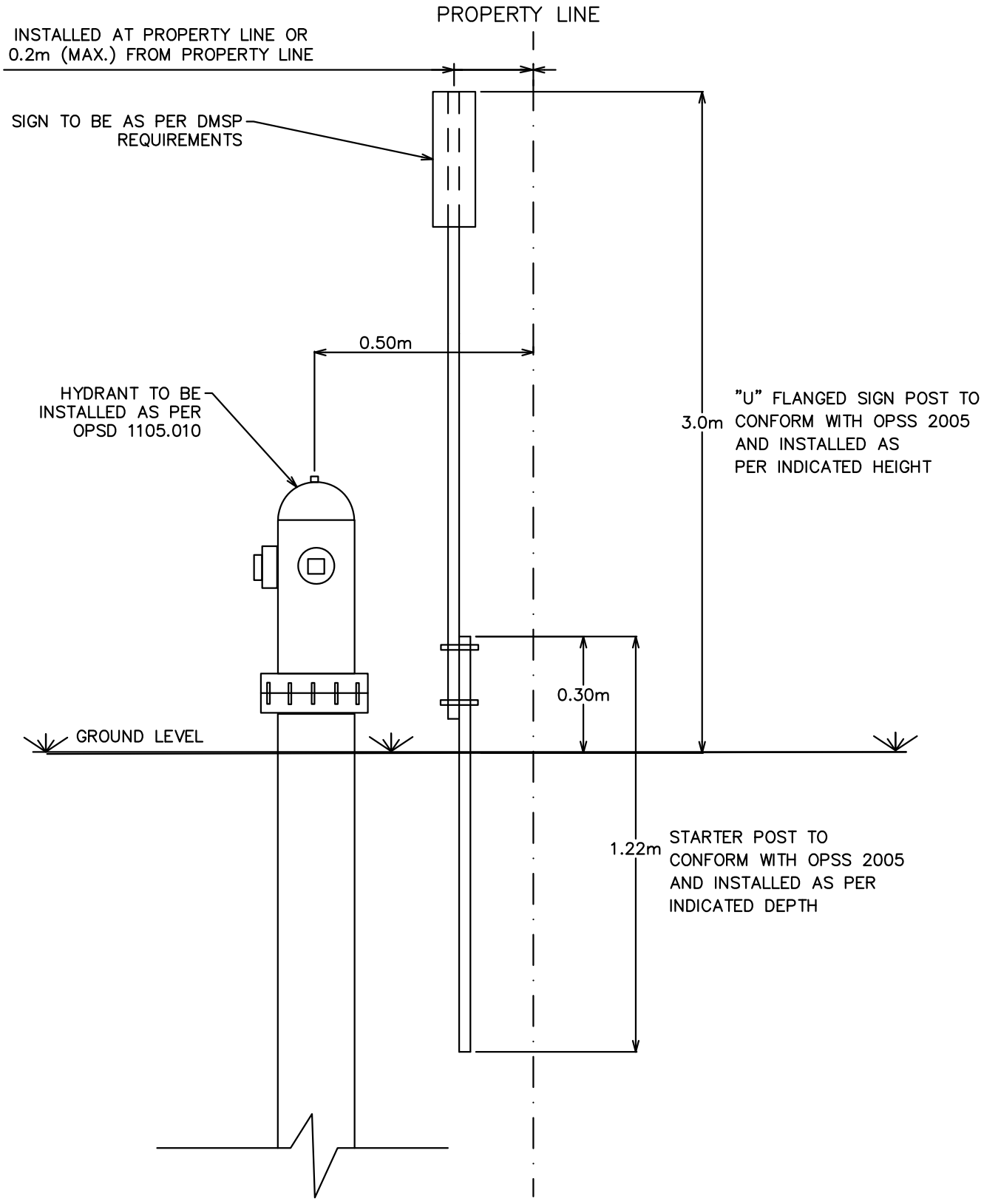
DMM-202



NOTES:

1. CURB STOPS AND CLEANOUTS TO BE LOCATED OUT OF DRIVEWAY, AT PROPERTY LINE.
2. WATER AND SEWER SERVICES TO BE ON SIDE OF LOT OPPOSITE TO DRIVEWAY, WATER SERVICE NEAREST TO DRIVEWAY.
3. NO UTILITIES IN SERVICE CORRIDOR.

THE DISTRICT MUNICIPALITY OF MUSKOKA	**LOT SERVICE LOCATIONS** **SINGLE FAMILY AND TOWNHOUSE RESIDENTIAL**	NOT TO SCALE DATE: JUNE 2024 **DMM-203**



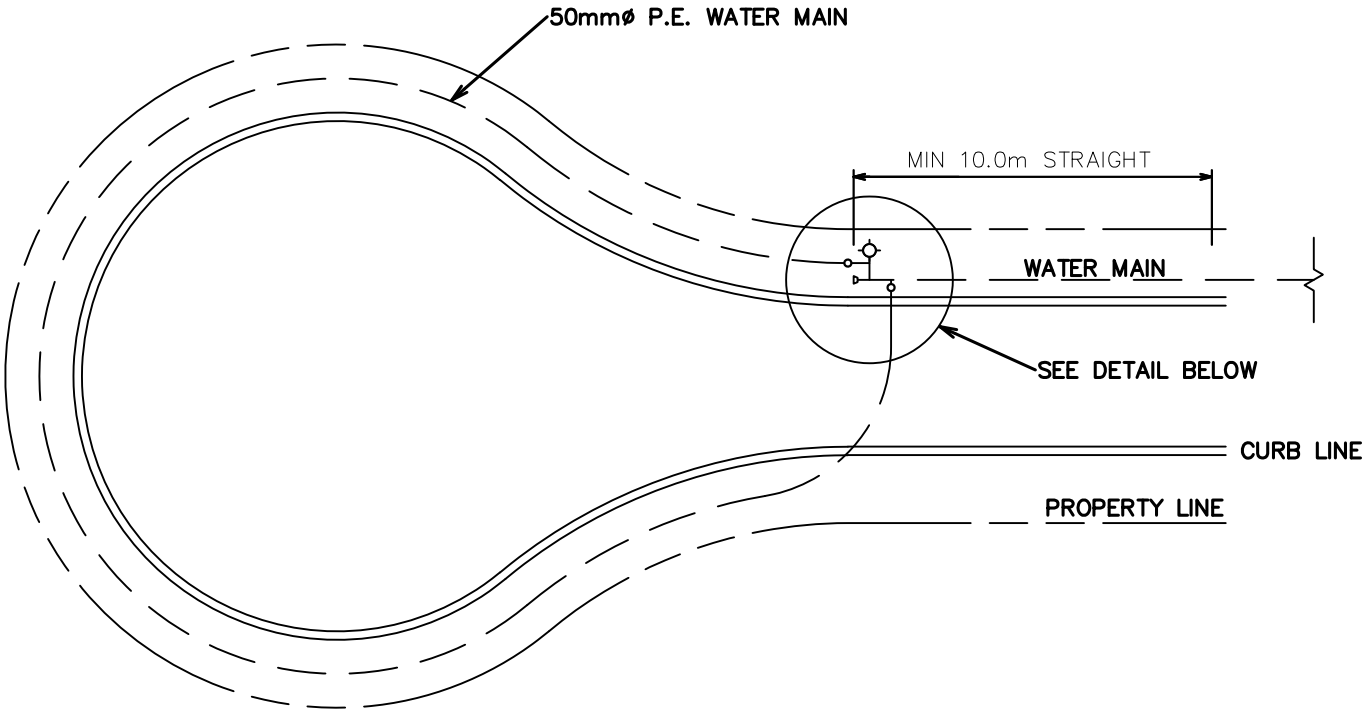
THE DISTRICT MUNICIPALITY OF MUSKOKA

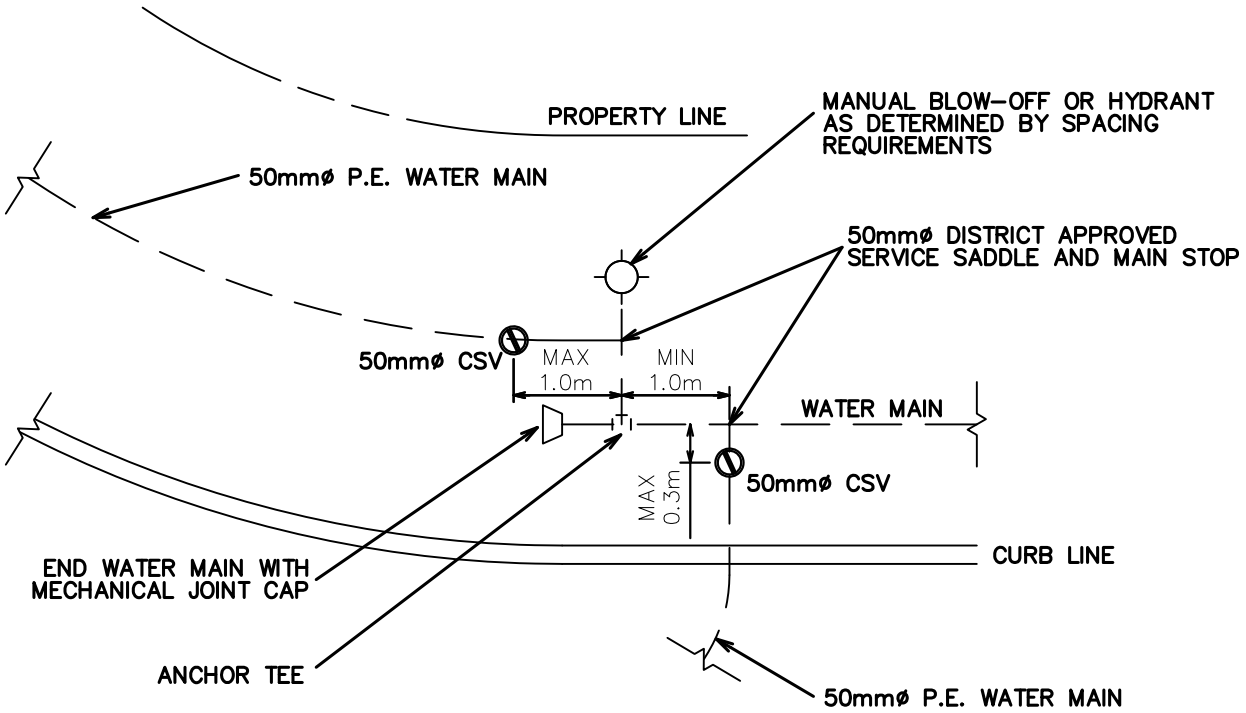
FIRE HYDRANT MARKER INSTALLATION

NOT TO SCALE

DATE: JUNE 2024

DMM-204



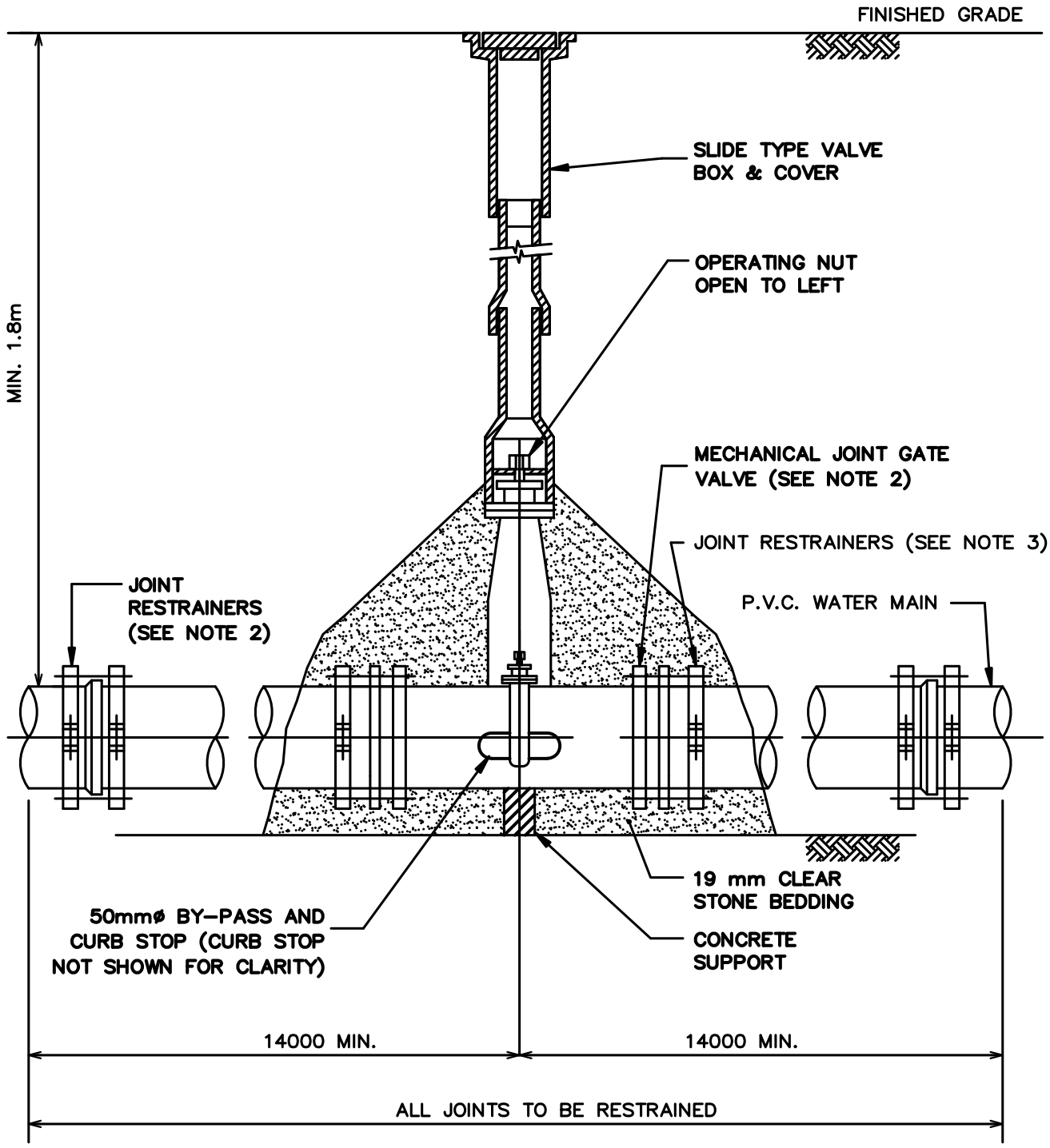


THE DISTRICT MUNICIPALITY OF MUSKOKA

TYPICAL CUL-DE-SAC WATER MAIN DESIGN

50mmØ P.E. LOOPING

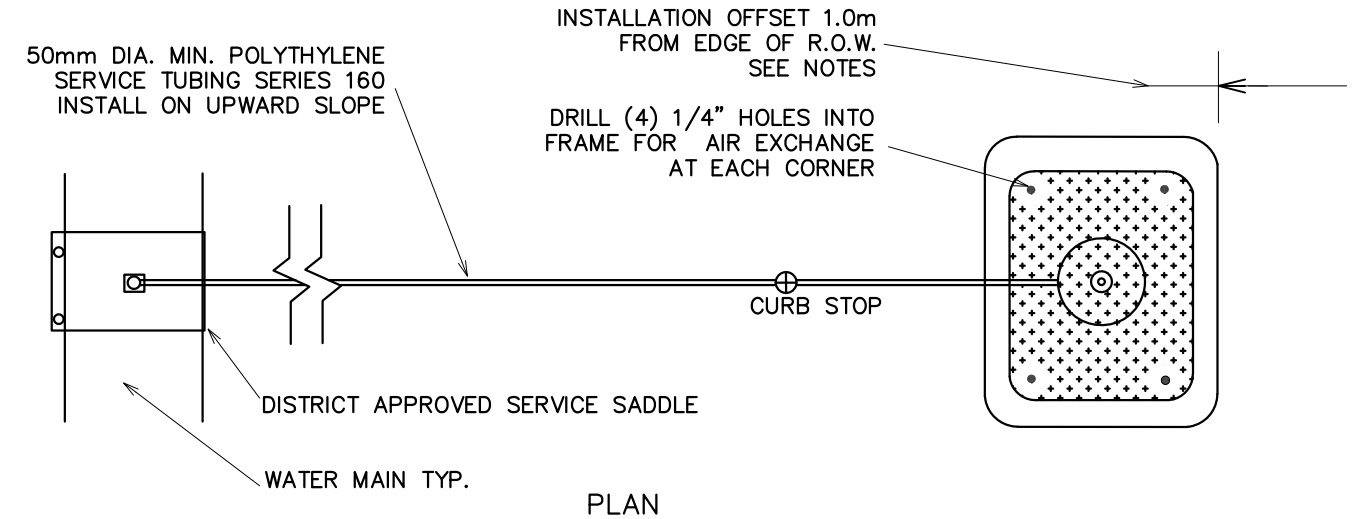
NOT TO SCALE	
DATE:	JUNE 2024
DMM-205	



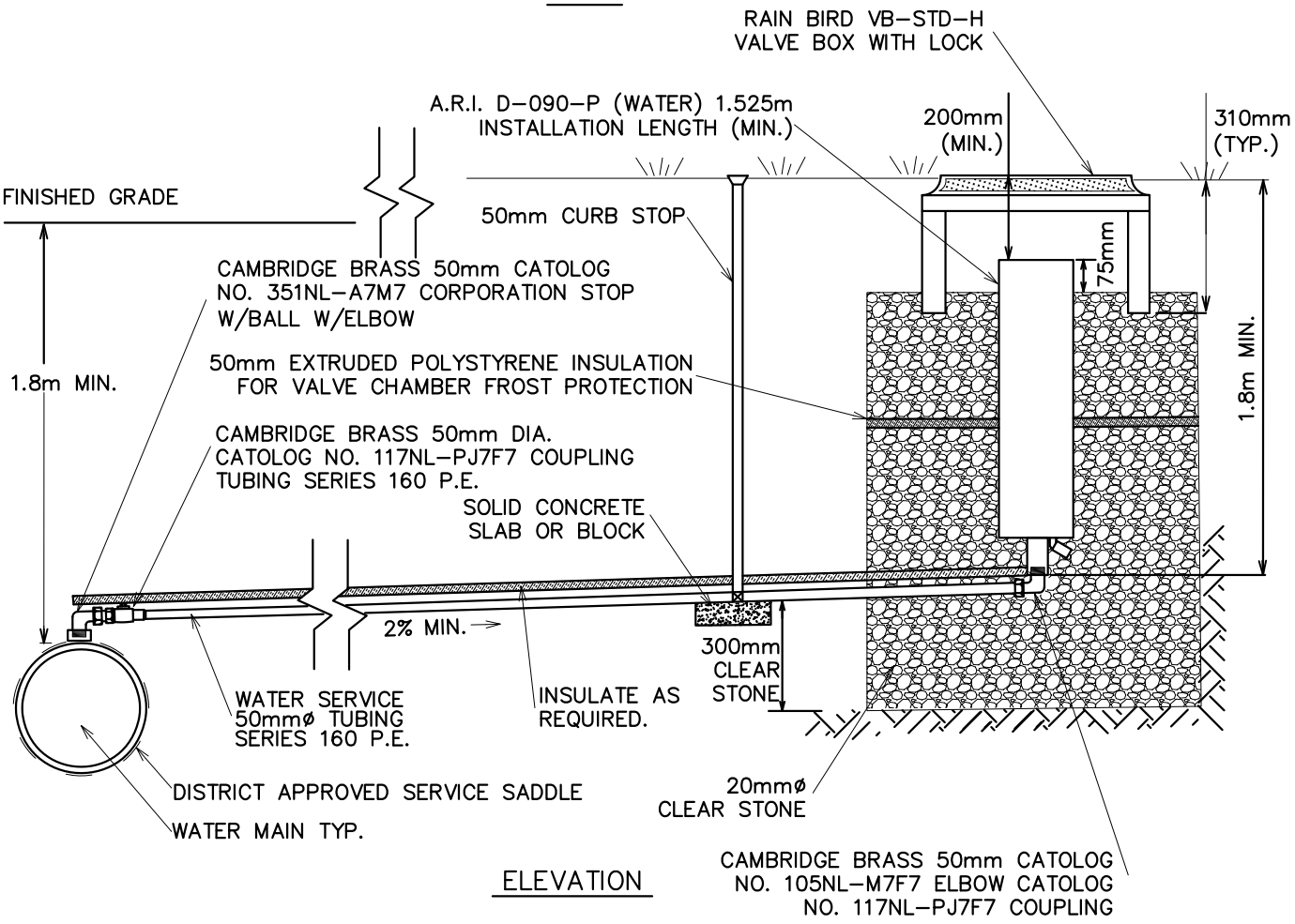
NOTES:

1. DUCTILE IRON VALVE & FITTINGS TO BE EPOXY COATED.
2. JOINT RESTRAINERS AND VALVES TO BE PER APPROVED PRODUCT LIST.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE DISTRICT MUNICIPALITY OF MUSKOKA	**400mm GATE VALVE AND LARGER AND VALVE BOX ON PVC WATER MAINS**	NOT TO SCALE DATE: JUNE 2024 **DMM-206**



PLAN



ELEVATION

NOTES:

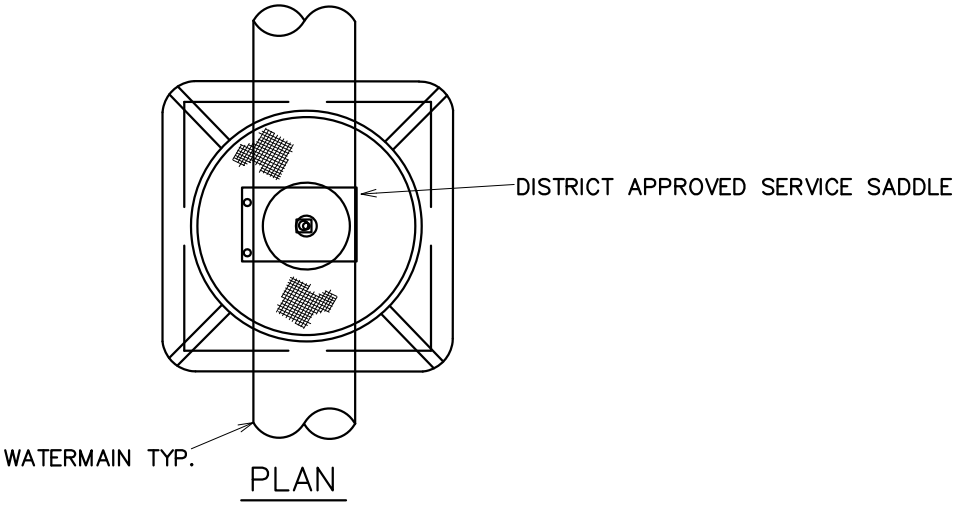
1. LOCATION OF AIR RELIEF VALVE AND CURB STOP MAY VARY BASED ON EXISTING CONDITIONS.
2. 50mm EXTRUDED POLYSTYRENE INSULATION REQUIRED FOR ANY DEPTH OF COVER LESS THAN 1.8m.
3. WATER MAIN PROFILE DESIGN SHALL ENSURE A.R.V. IS LOCATED AT HIGH POINT OF WATER MAIN PROFILE.
4. ACTUAL TUBING VALVE AND FITTING SIZE TO MATCH H.D.P.E. SERIES 160mm WATER MAIN.
5. FOR SIZES LARGER THAN ABOVE, SUBMIT SHOP DRAWINGS FOR APPROVAL.
6. STAINLESS STEEL INSERT STIFFENERS SHALL BE USED WITH COMPRESSION FITTINGS.
7. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT WHERE NOTED.

THE DISTRICT MUNICIPALITY OF MUSKOKA

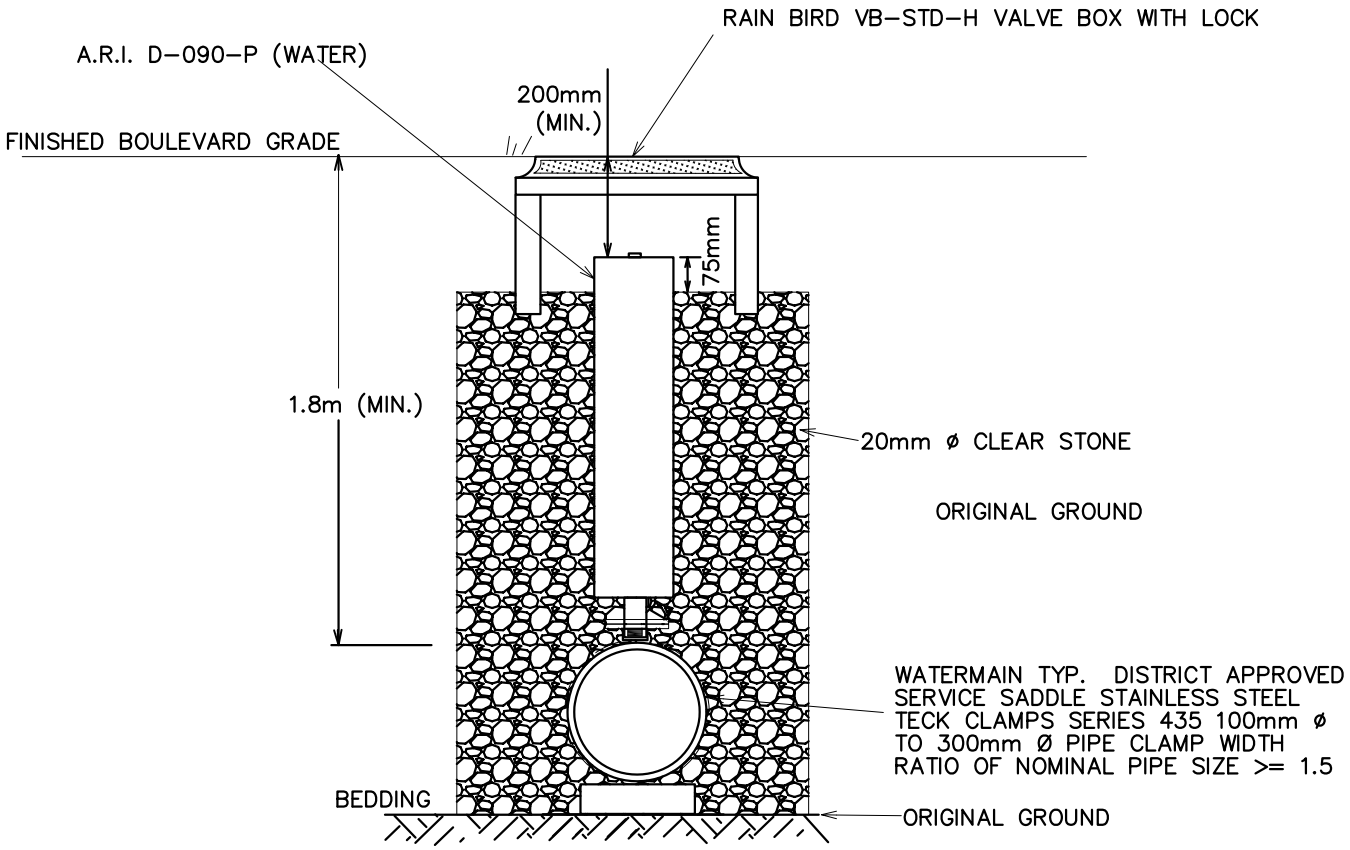
AIR RELIEF VALVE BOULEVARD INSTALLATION

WATER

NOT TO SCALE	
DATE:	JUNE 2024
DMM-207	



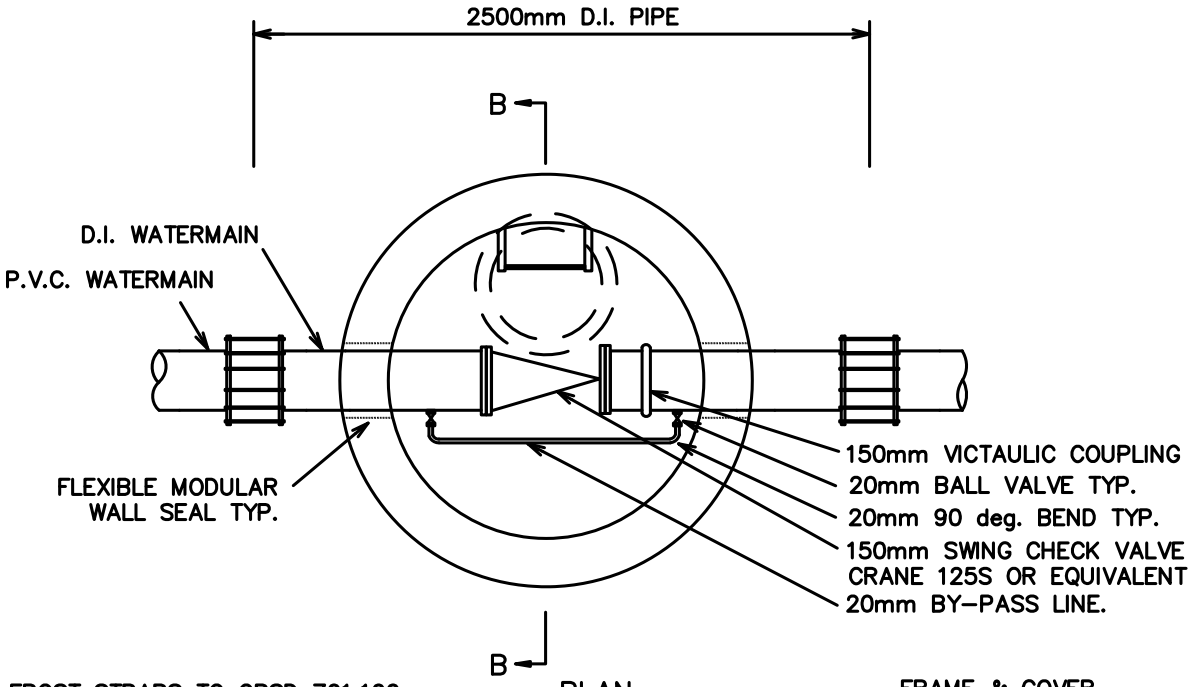
PLAN



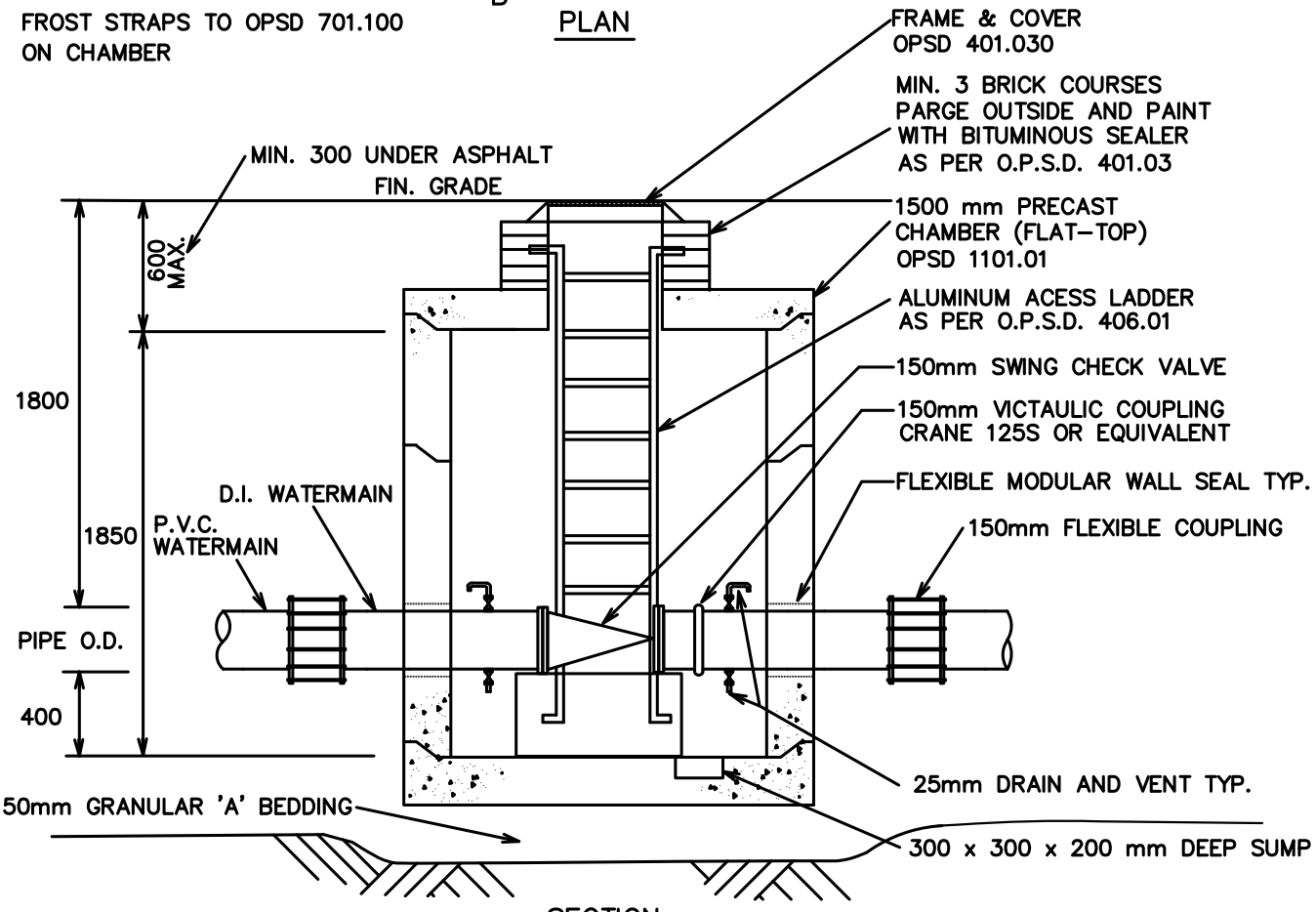
ELEVATION

NOTE:
ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT WHERE NOTED.

THE DISTRICT MUNICIPALITY OF MUSKOKA	**AIR RELIEF VALVE & CHAMBER INSTALLATION - WATER MAIN IN BOULEVARD**	NOT TO SCALE DATE: JUNE 2024 **DMM-208**



PLAN

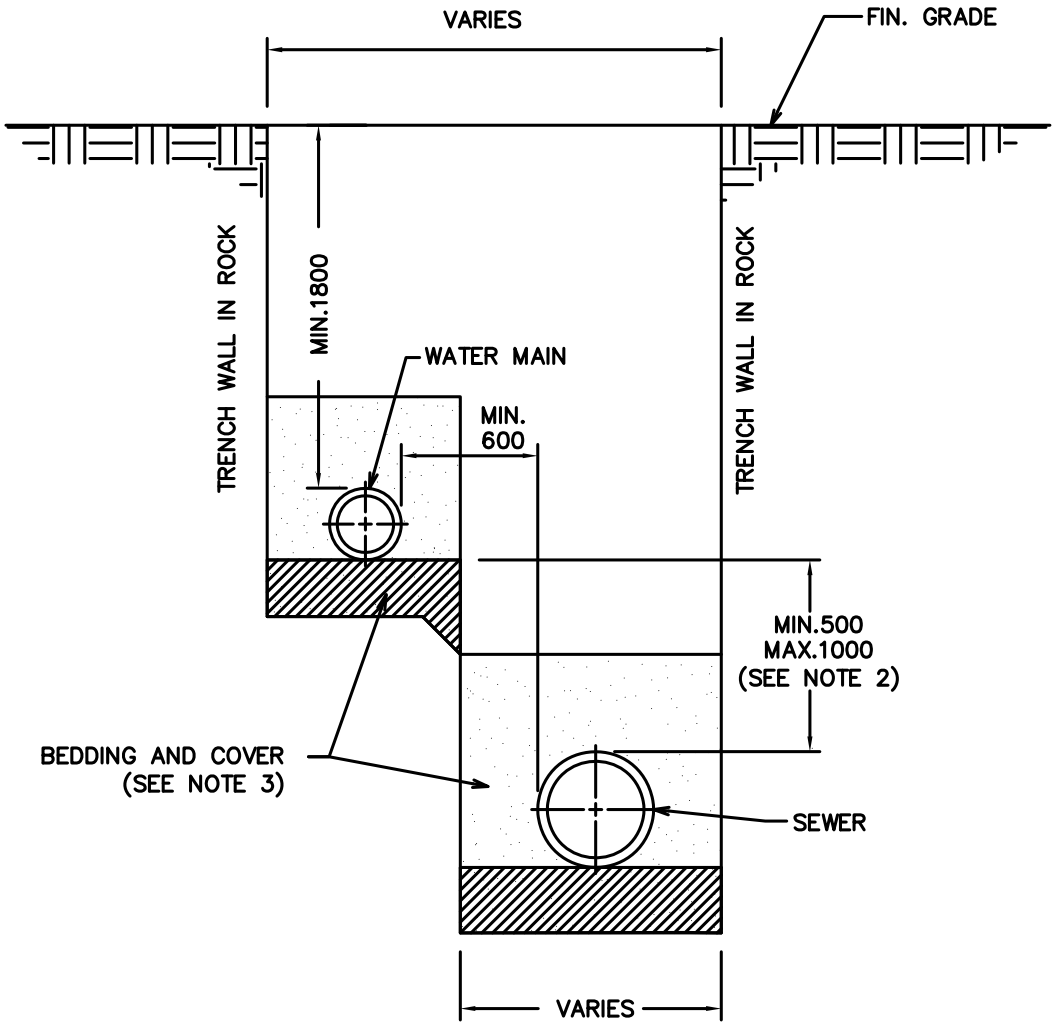


SECTION

NOTE:

1. ALL METALLIC VALVE FITTINGS TO BE EPOXY COATED.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

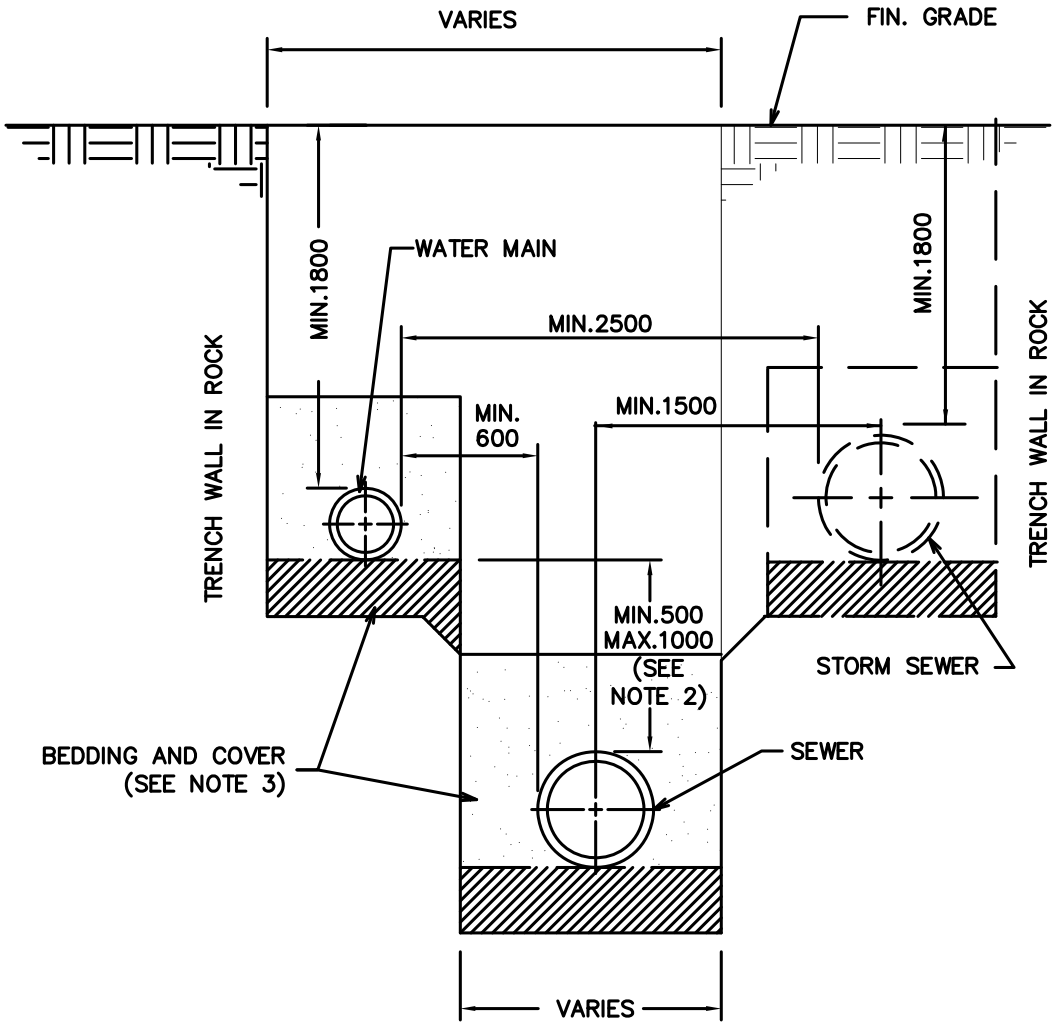
THE DISTRICT MUNICIPALITY OF MUSKOKA	**150mm CHECK VALVE CHAMBER**	NOT TO SCALE DATE: JUNE 2024 **DMM-209**



NOTES:

1. A COMMON TRENCH WILL ONLY BE PERMITTED IN THOSE AREAS WHERE IT IS ANTICIPATED THAT A SIGNIFICANT PORTION OF THE CONSTRUCTION WILL BE IN ROCK.
2. FOR ELEVATION DIFFERENCES GREATER THAN 1.0m, SEPARATE TRENCHES ARE REQUIRED.
3. BEDDING AND COVER MATERIAL AS PER OPSD 802.033 AND OPSD 802.013.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

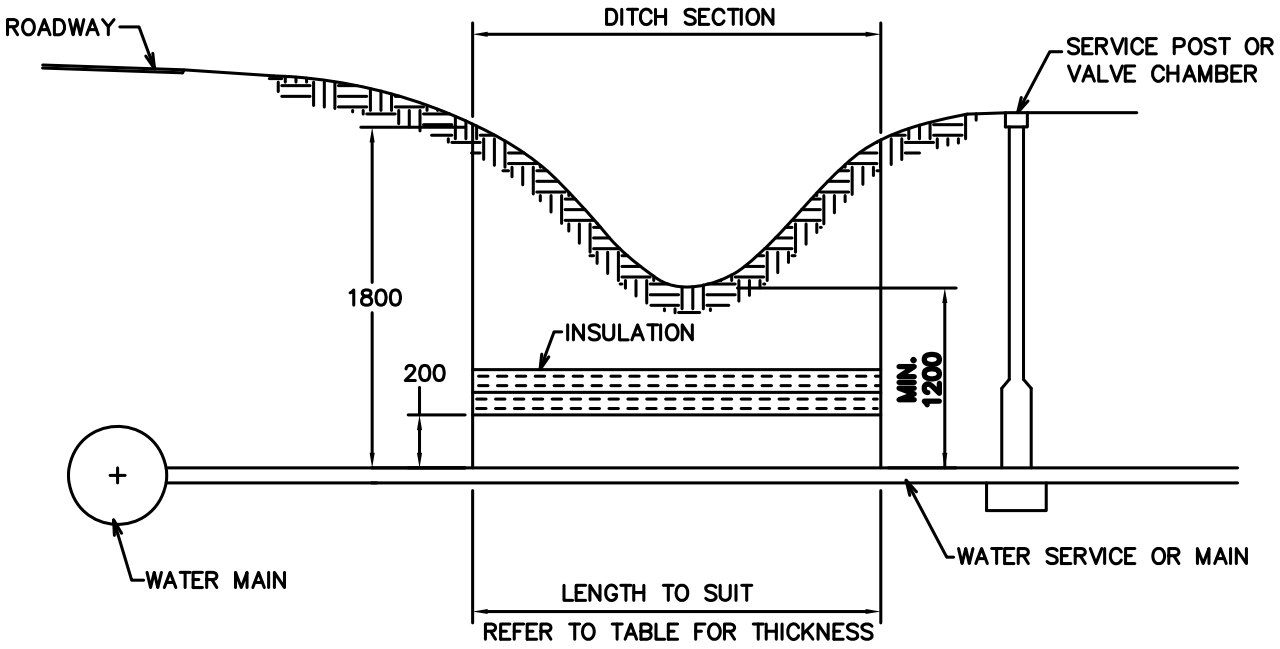
THE DISTRICT MUNICIPALITY OF MUSKOKA	**WATER MAIN AND SEWER COMMON TRENCH DETAIL**	NOT TO SCALE DATE: JUNE 2024 **DMM-210**



NOTES:

1. A COMMON TRENCH WILL ONLY BE PERMITTED IN THOSE AREAS WHERE IT IS ANTICIPATED THAT A SIGNIFICANT PORTION OF THE CONSTRUCTION WILL BE IN ROCK.
2. FOR ELEVATION DIFFERENCES GREATER THAN 1.0m, SEPARATE TRENCHES ARE REQUIRED.
3. BEDDING AND COVER MATERIAL AS PER OPSD 802.033 AND OPSD 802.013.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

THE DISTRICT MUNICIPALITY OF MUSKOKA	**WATER MAIN AND TWO SEWERS COMMON TRENCH DETAIL**	NOT TO SCALE DATE: JUNE 2024 **DMM-211**



INSULATION REFERENCE TABLE	
EFFECTIVE EARTH COVER	STYROFOAM SM HI–35 REQUIRED THICKNESS
1800 TO 1250mm	50mm
1250 TO 900mm	75mm

NOTES:

1. THE INSULATION SHALL BE MINIMUM 1200 WIDE AND SHALL BE CENTERED OVER THE PIPE.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

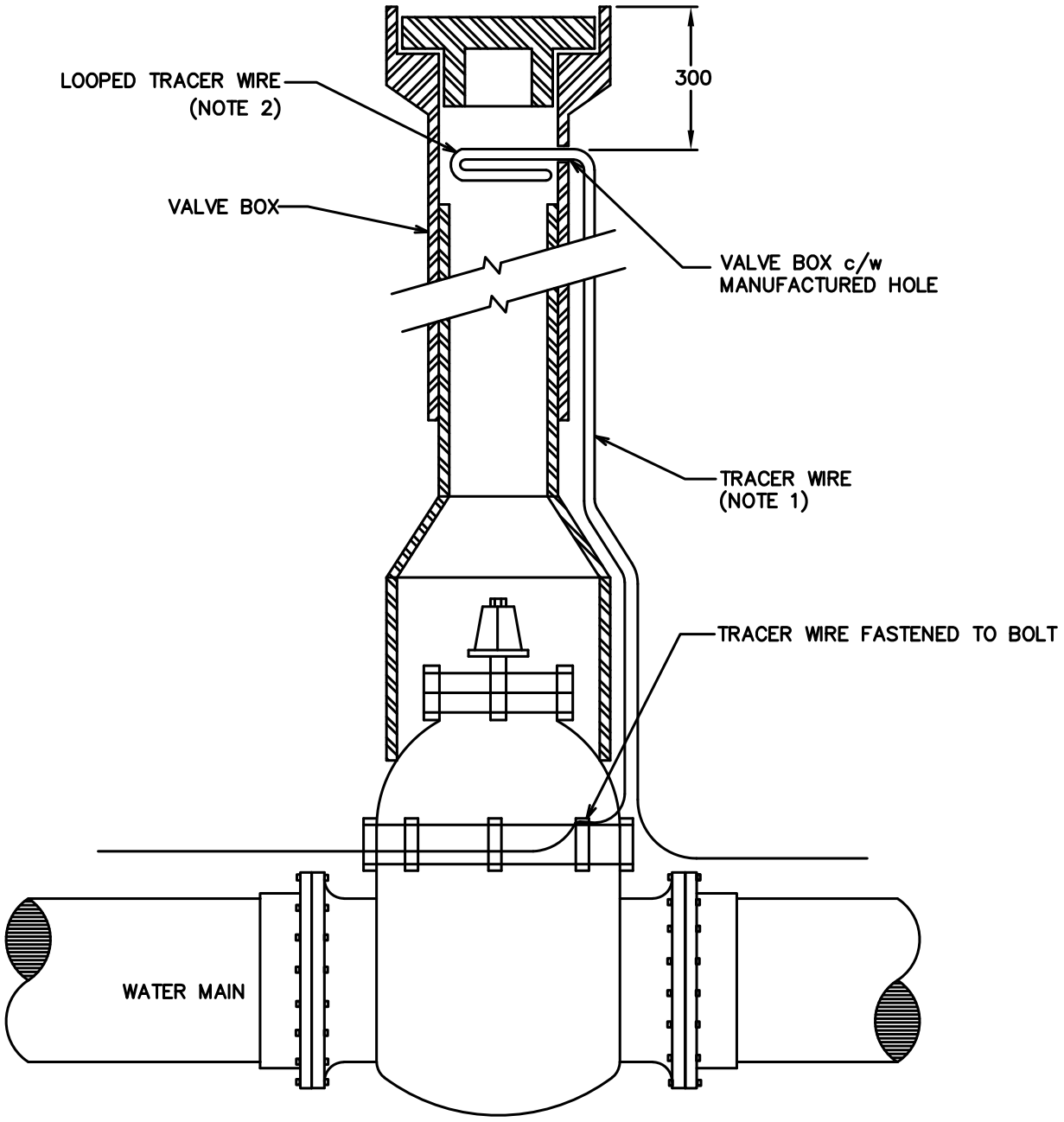
THE DISTRICT MUNICIPALITY OF MUSKOKA

WATER MAIN INSULATION IN DITCHED AREAS

NOT TO SCALE

DATE: JUNE 2024

DMM-212



NOTES:

1. TRACER WIRE – #12 A.W.G. , TYPE T.W.U. 75–660 VOLT INSULATED STRANDED COPPER.
2. TRACER WIRE TO BE INSTALLED OUTSIDE OF VALVE BOX AND BE BROUGHT INTO TOP OF UPPER SECTION THROUGH HOLE AND LOOPED. LENGTH OF LOOP TO BE MIN. 450mm.
3. CONNECTIONS USED FOR SPLICING TRACER WIRE SHALL BE WATERPROOF AND CORROSION PROOF CONNECTOR PER APPROVED DRAWING LIST.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

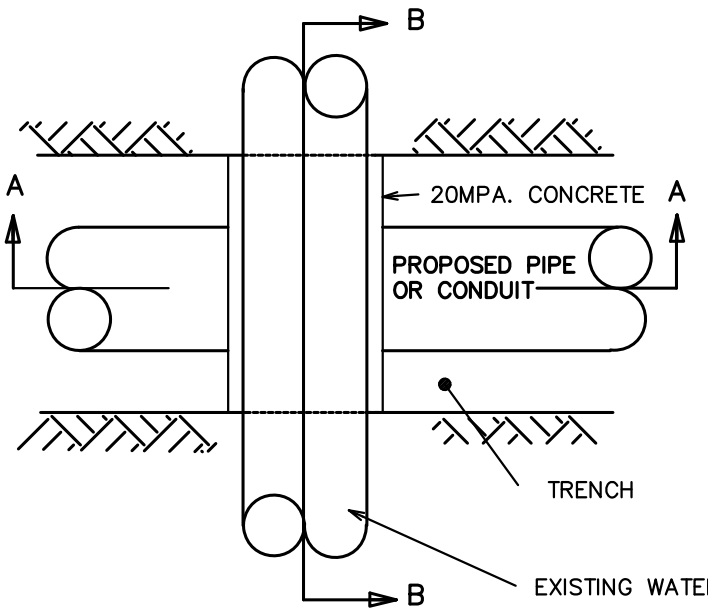
THE DISTRICT MUNICIPALITY OF MUSKOKA

TRACER WIRE ARRANGEMENT AT VALVE BOX FOR WATER MAIN

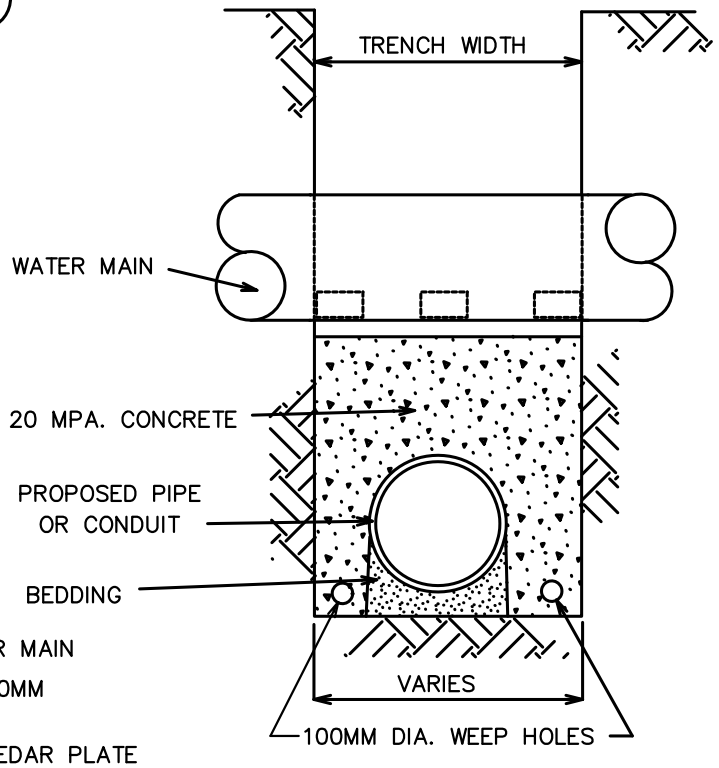
NOT TO SCALE

DATE: JUNE 2024

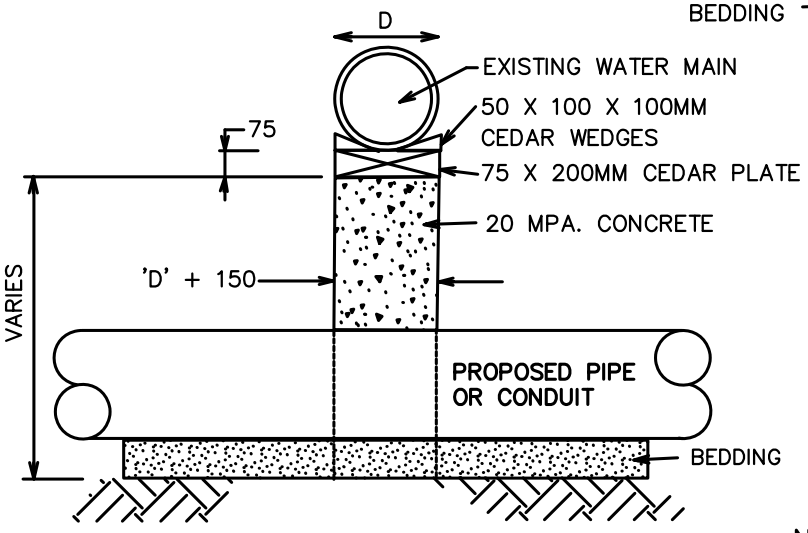
DMM-213



PLAN



SECTION B–B



SECTION A–A

NOTES:

1. CONCRETE ENCASED STEEL MAINS SHALL BE SUPPORTED WITH CONCRETE TO UNDERSIDE OF MAIN. BOND BREAKERS IS TO BE USED BETWEEN THE TWO CONCRETE SURFACES.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

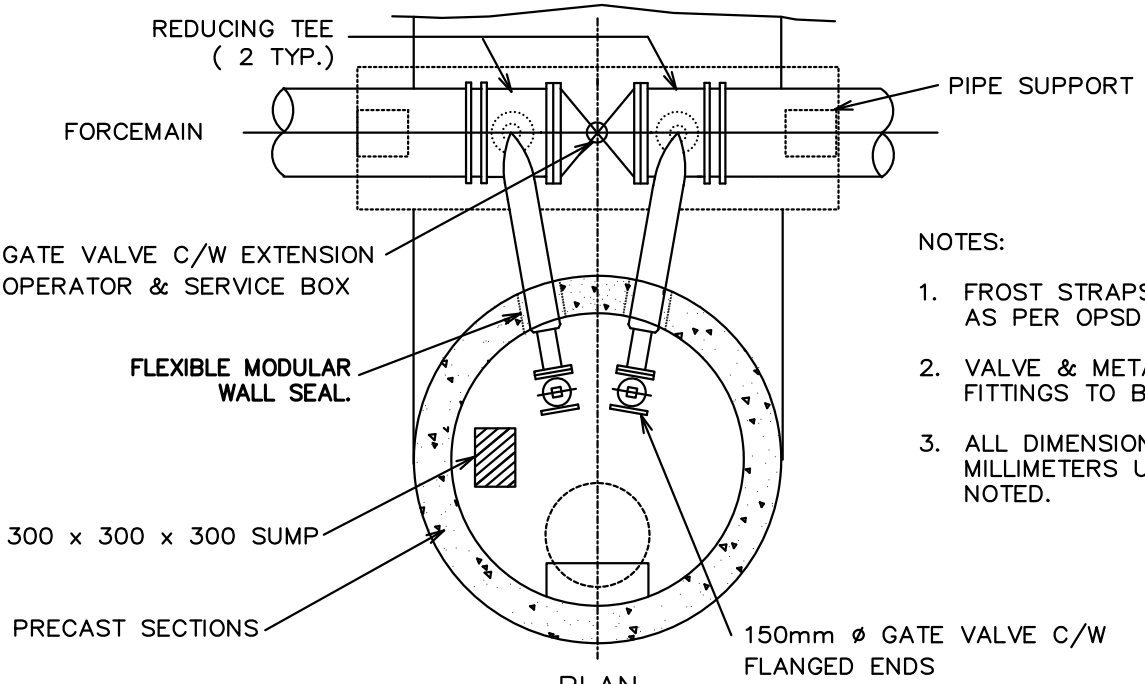
THE DISTRICT MUNICIPALITY OF MUSKOKA

DETAILS OF SUPPORT FOR WATER MAIN LARGER THAN 300mm Ø

NOT TO SCALE

DATE: JUNE 2024

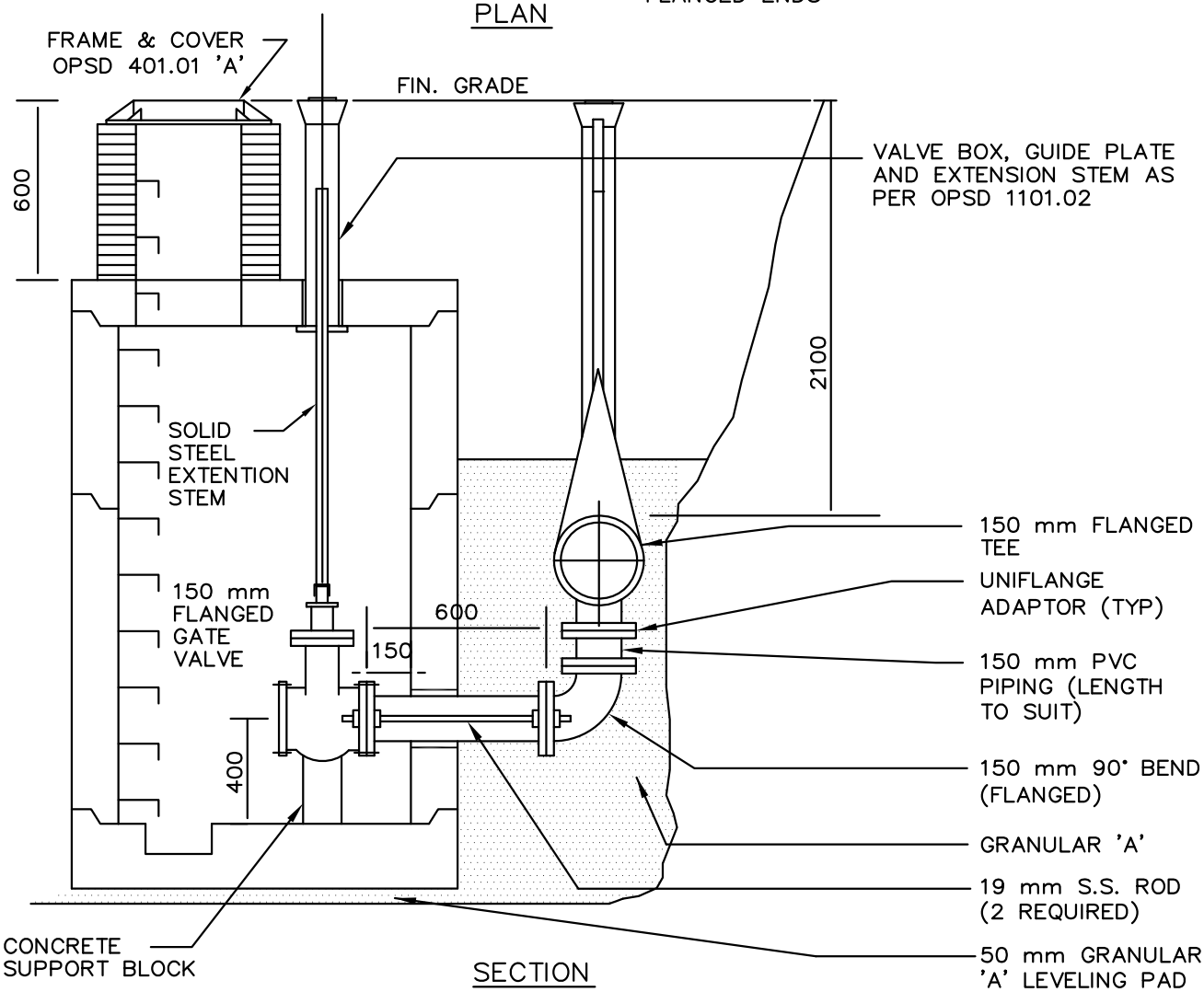
DMM-214



PLAN

NOTES:

1. FROST STRAPS TO BE INSTALLED AS PER OPSD 701.100.
2. VALVE & METALLIC FITTINGS TO BE EPOXY COATED.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



SECTION

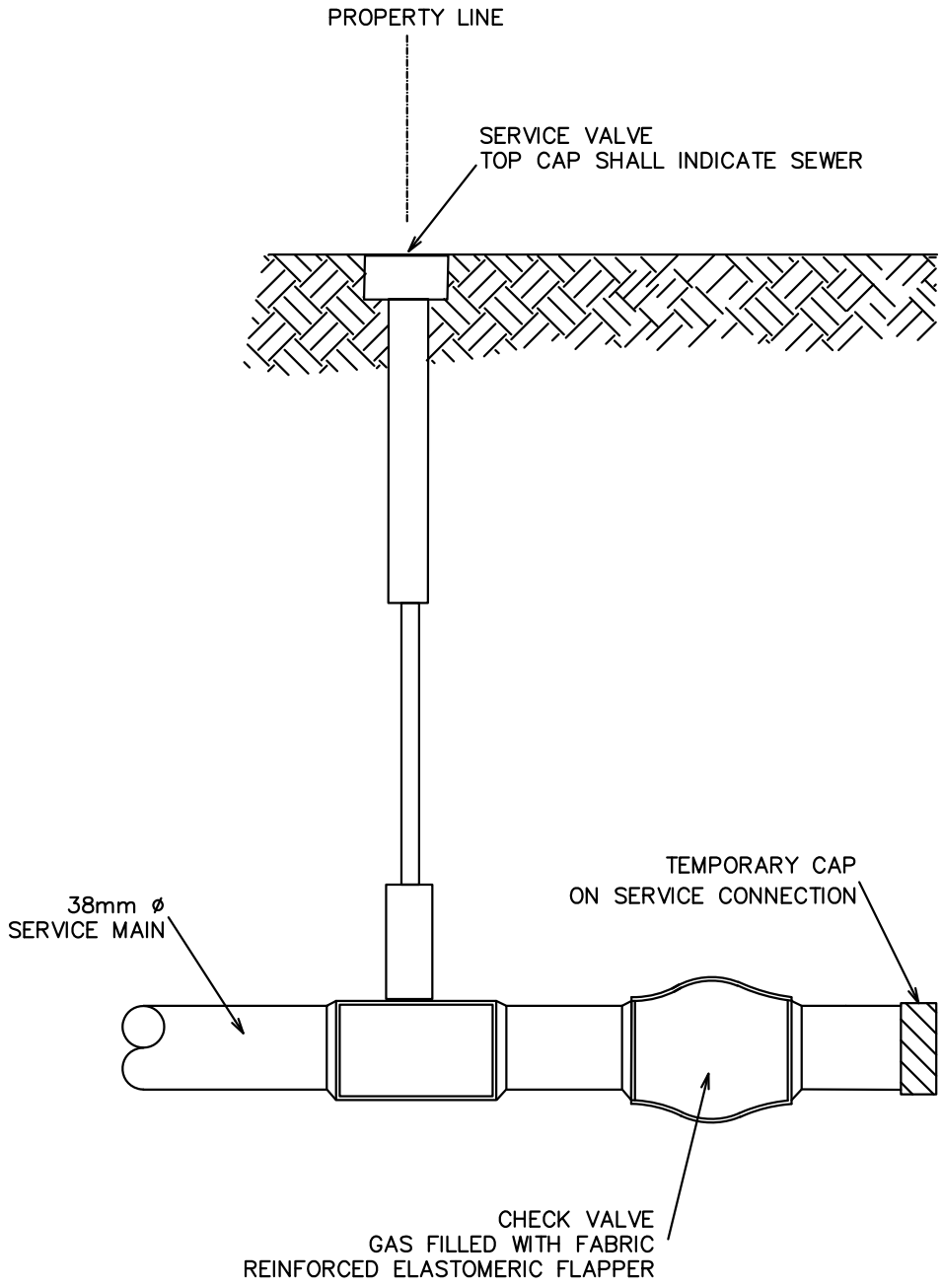
THE DISTRICT MUNICIPALITY OF MUSKOKA

SANITARY FORCEMAIN LINE VALVE/ DRAIN VALVE CHAMBER

NOT TO SCALE

DATE: JUNE 2024

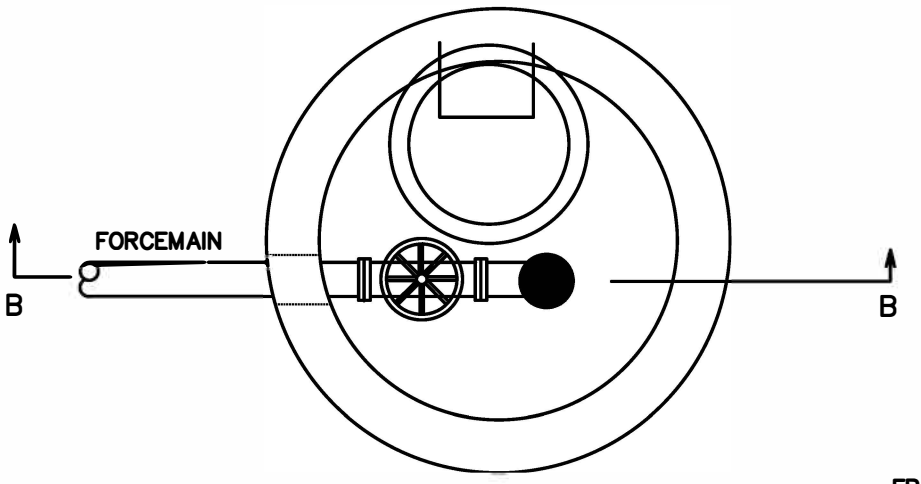
DMM-301



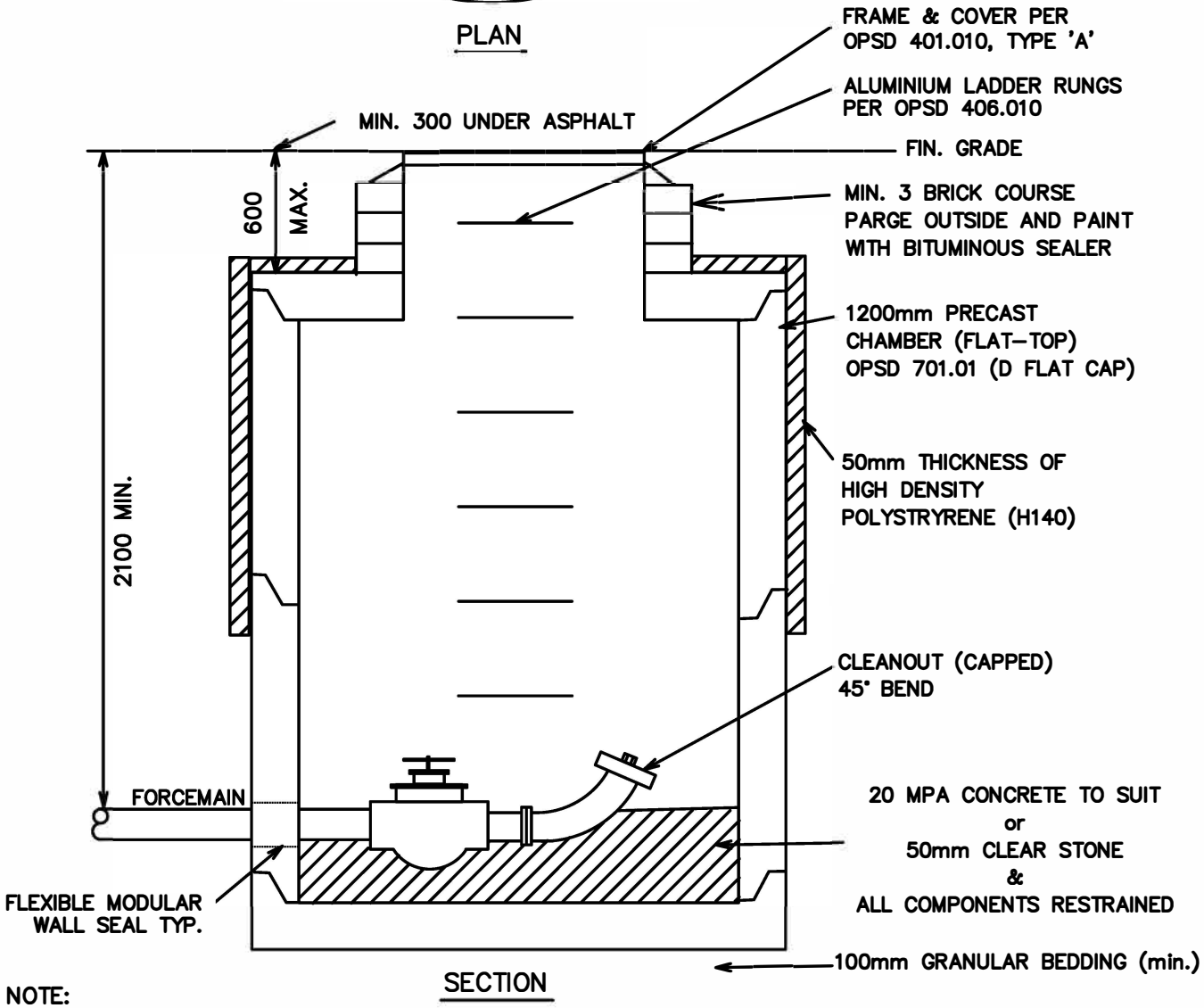
NOTES:

1. BEDDING SHALL BE GRANULAR 'A' AS PER OPSD 802.010
2. ALL DIMENSIONS IN MILLIMETRES EXCEPT WHERE NOTED.

THE DISTRICT MUNICIPALITY OF MUSKOKA	**LOW PRESSURE FORCEMAIN DETAIL AT PROPERTY LINE**	NOT TO SCALE DATE: JUNE 2024 **DMM-302**



PLAN

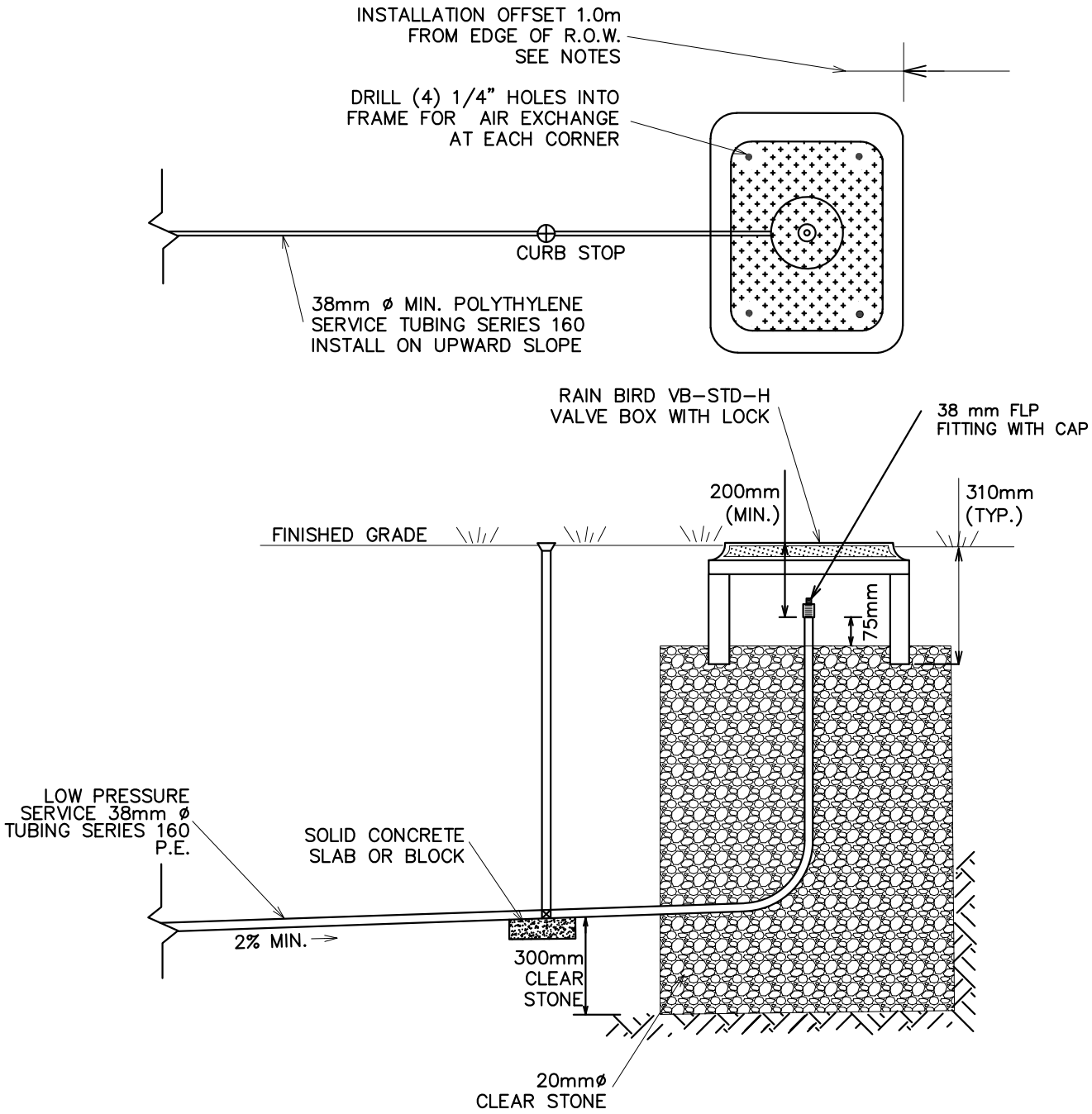


SECTION

NOTE:

1. ALL METALLIC VALVE FITTINGS TO BE EPOXY COATED.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

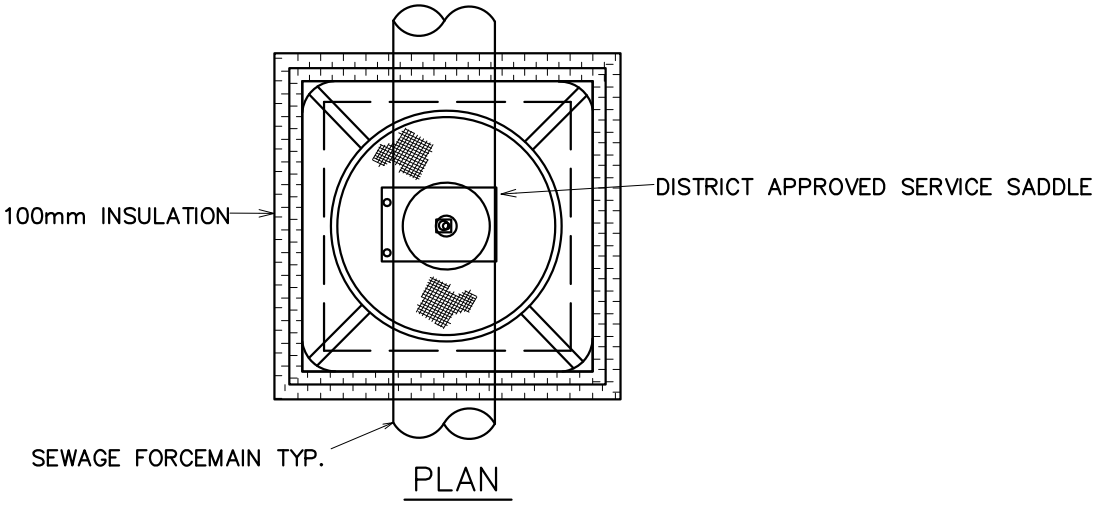
THE DISTRICT MUNICIPALITY OF MUSKOKA	**SANITARY FORCEMAIN TERMINAL CLEANOUT CHAMBER - IN ROAD**	NOT TO SCALE DATE: JUNE 2024 **DMM-303**



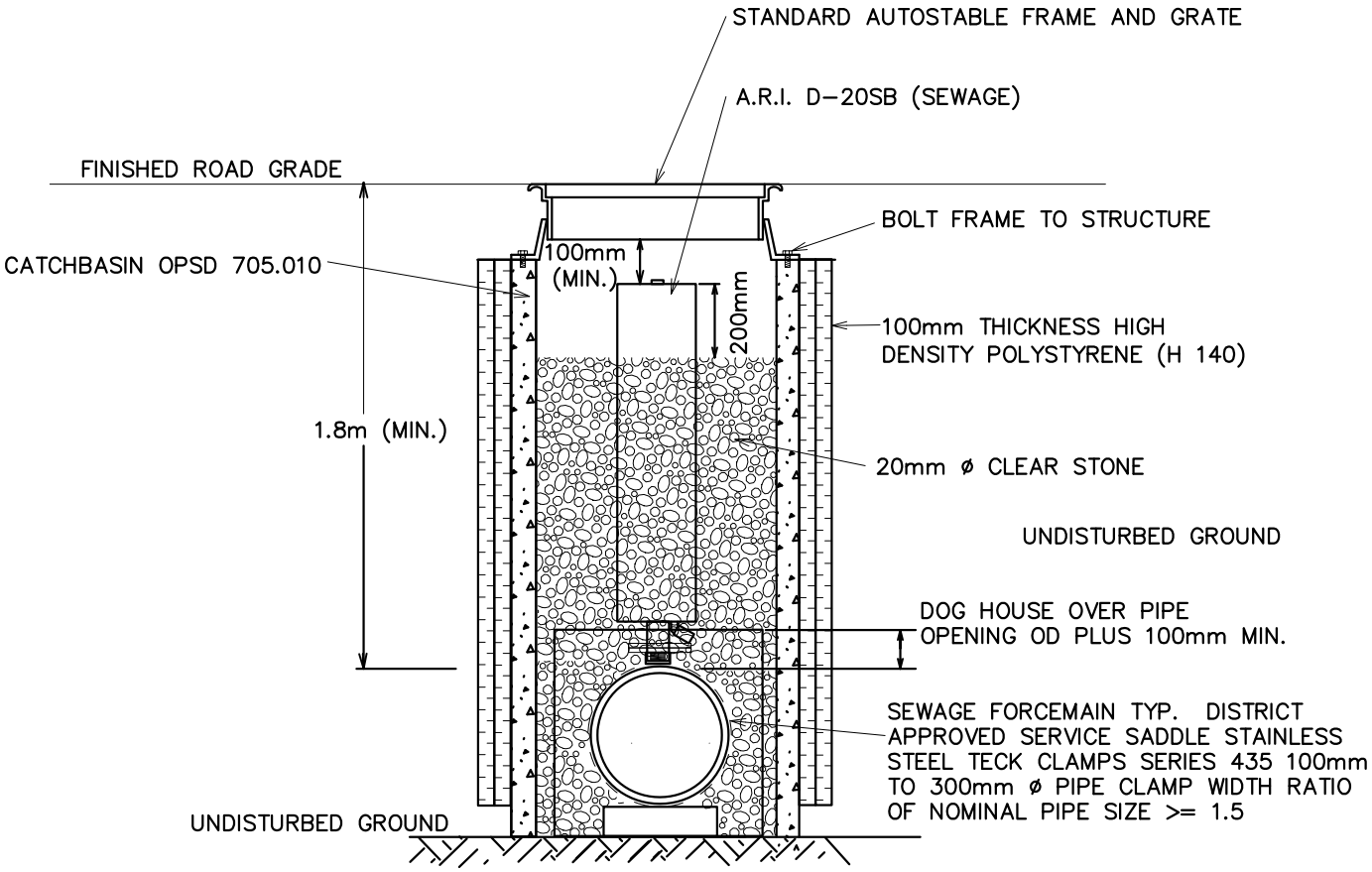
NOTES:

1. LOCATION OF CLEANOUT AND CURB STOP MAY VARY BASED ON EXISTING CONDITIONS.
2. 50mm EXTRUDED POLYSTYRENE INSULATION REQUIRED FOR ANY DEPTH OF COVER LESS THAN 1.8m.
3. ACTUAL TUBING VALVE AND FITTING SIZE TO MATCH H.D.P.E. SERIES 160mm FORCEMAIN.
4. FOR SIZES LARGER THAN ABOVE, SUBMIT SHOP DRAWINGS FOR APPROVAL.
5. STAINLESS STEEL INSERT STIFFENERS SHALL BE USED WITH COMPRESSION FITTINGS.
6. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT WHERE NOTED.

THE DISTRICT MUNICIPALITY OF MUSKOKA	**LOW PRESSURE SEWER TERMINAL CLEANOUT IN BOULEVARD**	NOT TO SCALE DATE: JUNE 2024 **DMM-304**



PLAN



ELEVATION

NOTE:
ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT WHERE NOTED.

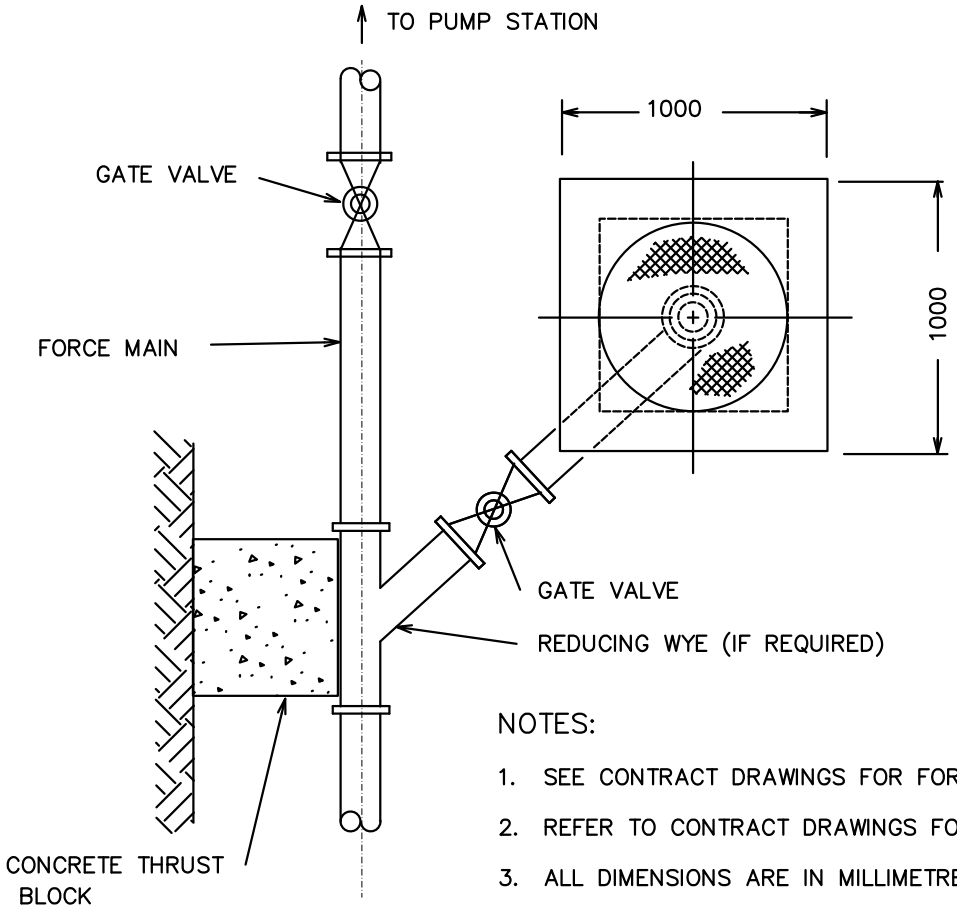
THE DISTRICT MUNICIPALITY OF MUSKOKA

AIR RELIEF VALVE & CHAMBER INSTALLATION - SEWAGE (IN ROAD)

NOT TO SCALE

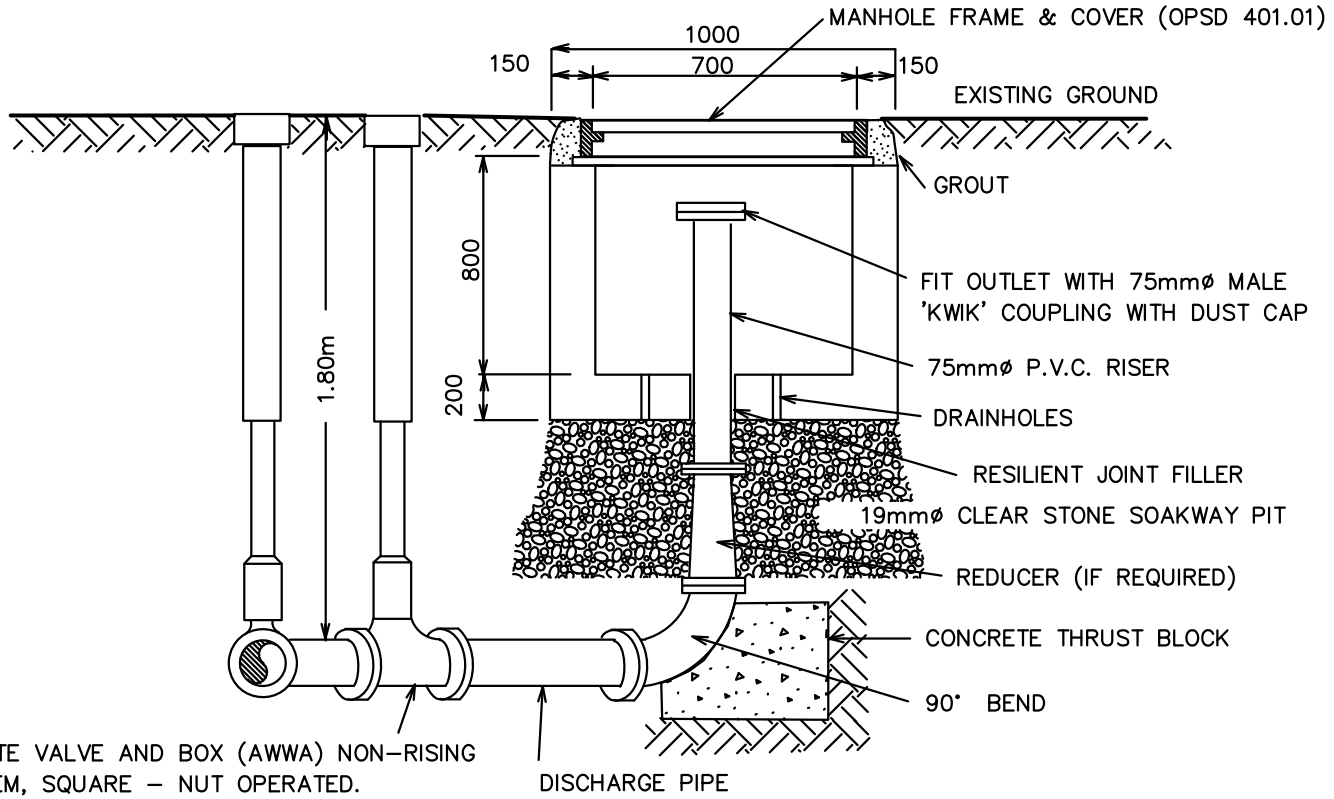
DATE: JUNE 2024

DMM-305



NOTES:

1. SEE CONTRACT DRAWINGS FOR FORCE MAIN AND GATE VALVE SIZES.
2. REFER TO CONTRACT DRAWINGS FOR LAYOUT DETAILS.
3. ALL DIMENSIONS ARE IN MILLIMETRES.



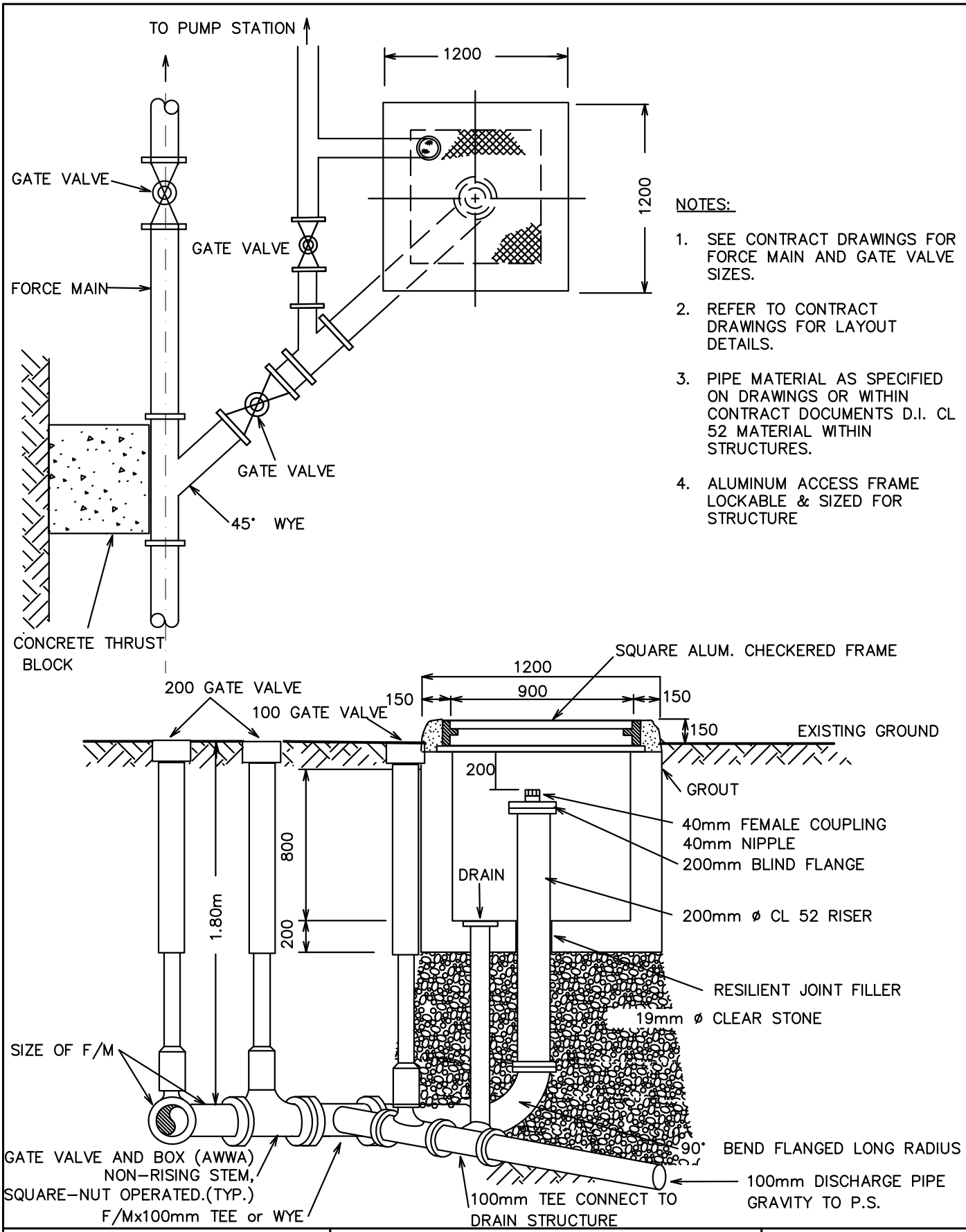
THE DISTRICT MUNICIPALITY OF MUSKOKA

TYPICAL SEWAGE PUMPING STATION FORCEMAIN BY-PASS CONNECTION

NOT TO SCALE

DATE: JUNE 2024

DMM-306



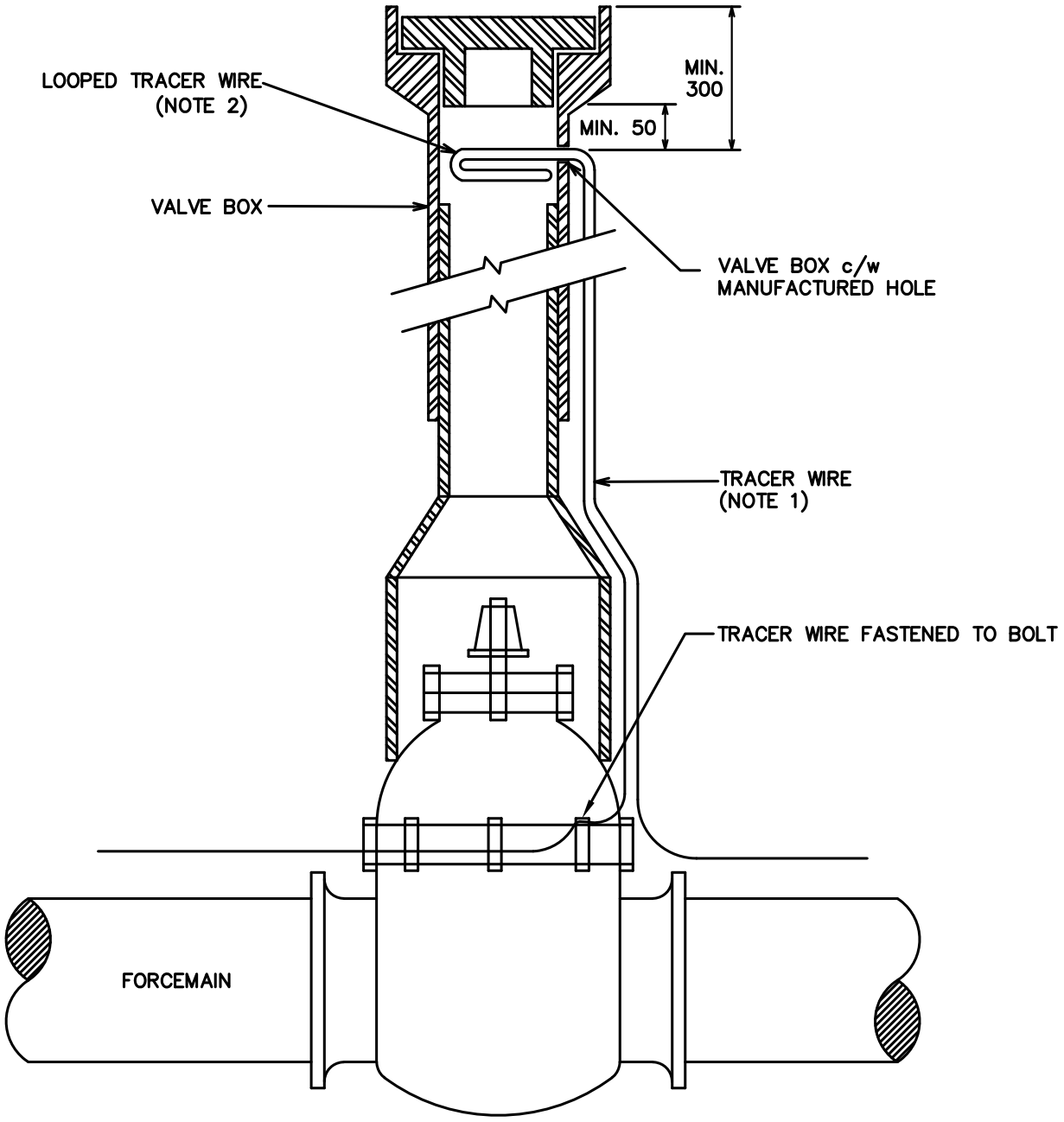
THE DISTRICT MUNICIPALITY OF MUSKOKA

TYPICAL SWAB LAUNCHER FORCEMAIN SEWAGE PUMPING STATION

NOT TO SCALE

DATE: JUNE 2024

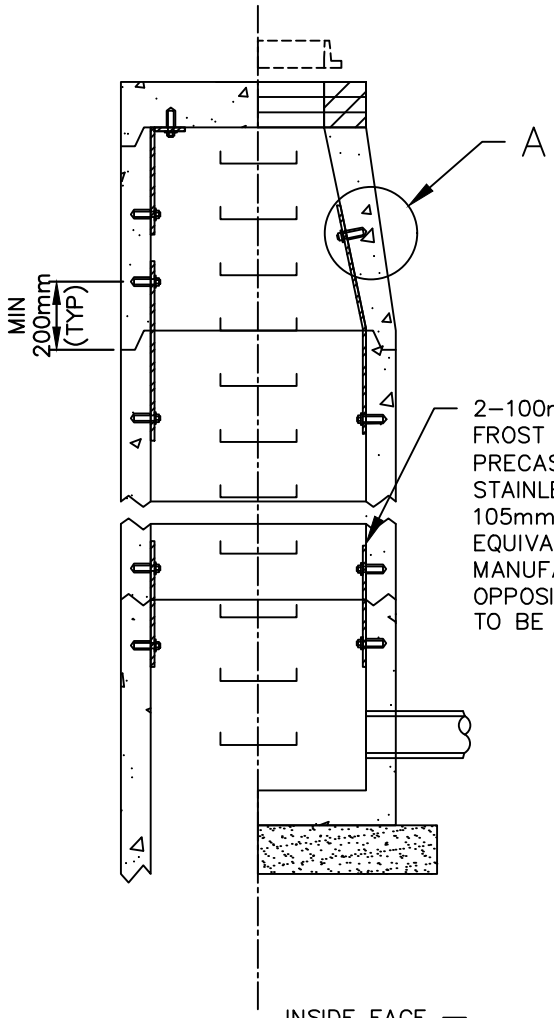
DMM-307

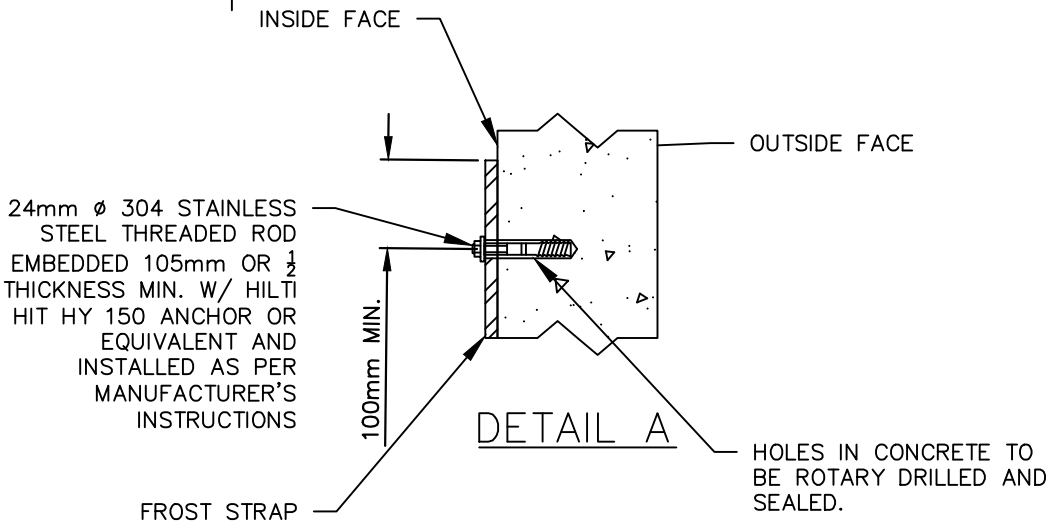


NOTES:

1. TRACER WIRE – #12 A.W.G. , TYPE T.W.U. 75 –660 VOLT INSULATED STRANDED COPPER.
2. TRACER WIRE TO BE INSTALLED OUTSIDE OF VALVE BOX AND BE BROUGHT INTO TOP OF UPPER SECTION THROUGH HOLE AND LOOPED. LENGTH OF LOOP TO BE MIN. 450mm.
3. CONNECTIONS USED FOR SPLICING TRACER WIRE SHALL BE WATERPROOF AND CORROSION PROOF CONNECTOR PER APPROVED DRAWING LIST.
4. ALL DIMENSIONS IN MILLIMETRES EXCEPT WHERE NOTED.

THE DISTRICT MUNICIPALITY OF MUSKOKA	**TRACER WIRE ARRANGEMENT AT VALVE BOX FOR SEWAGE FORCEMAIN**	NOT TO SCALE DATE: JUNE 2024 **DMM-308**





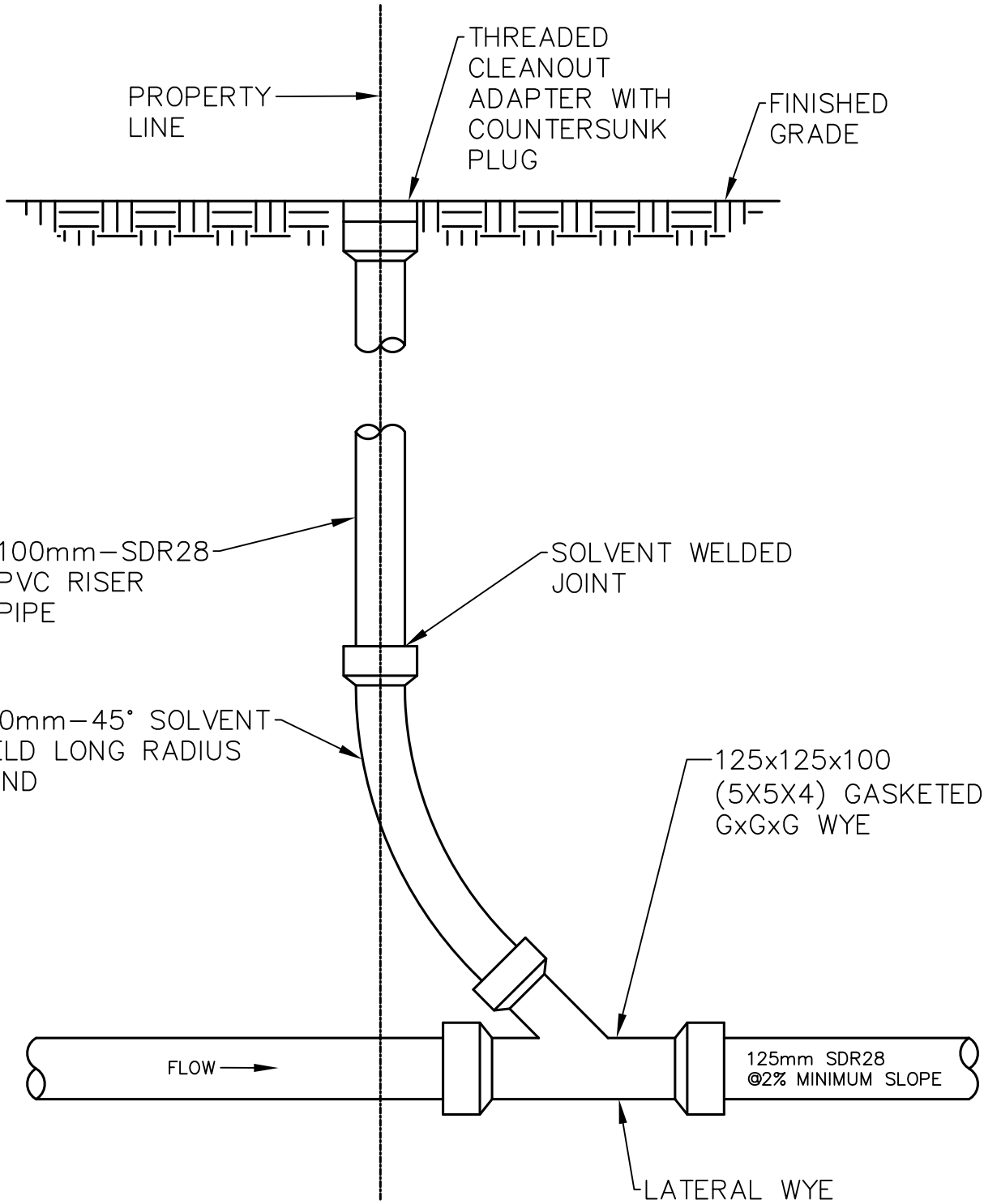
NOTES:

1. FROST STRAPS SHALL BE INSTALLED AT EACH JOINT, CENTERED ON EACH JOINT.
2. FROST STRAPS SHALL BE PLACED SO THEY DO NOT INTERFERE W/ SEWER PIPE OPENINGS AND THE STEPS.
3. FROST STRAPS SHALL BE PLACED ON ALL MAINTENANCE HOLES.
4. GALVANIZING SHALL BE ACCORDING TO CAN/CSA G164.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN
6. EACH SET OF STRAPS TO BE VERTICAL OFFSET FROM PREVIOUS JOINT.

THE DISTRICT MUNICIPALITY OF MUSKOKA

FROST STRAP INSTALLATION - MONOLITHIC BASE

NOT TO SCALE	
DATE:	JUNE 2024
DMM-309	



NOTES:

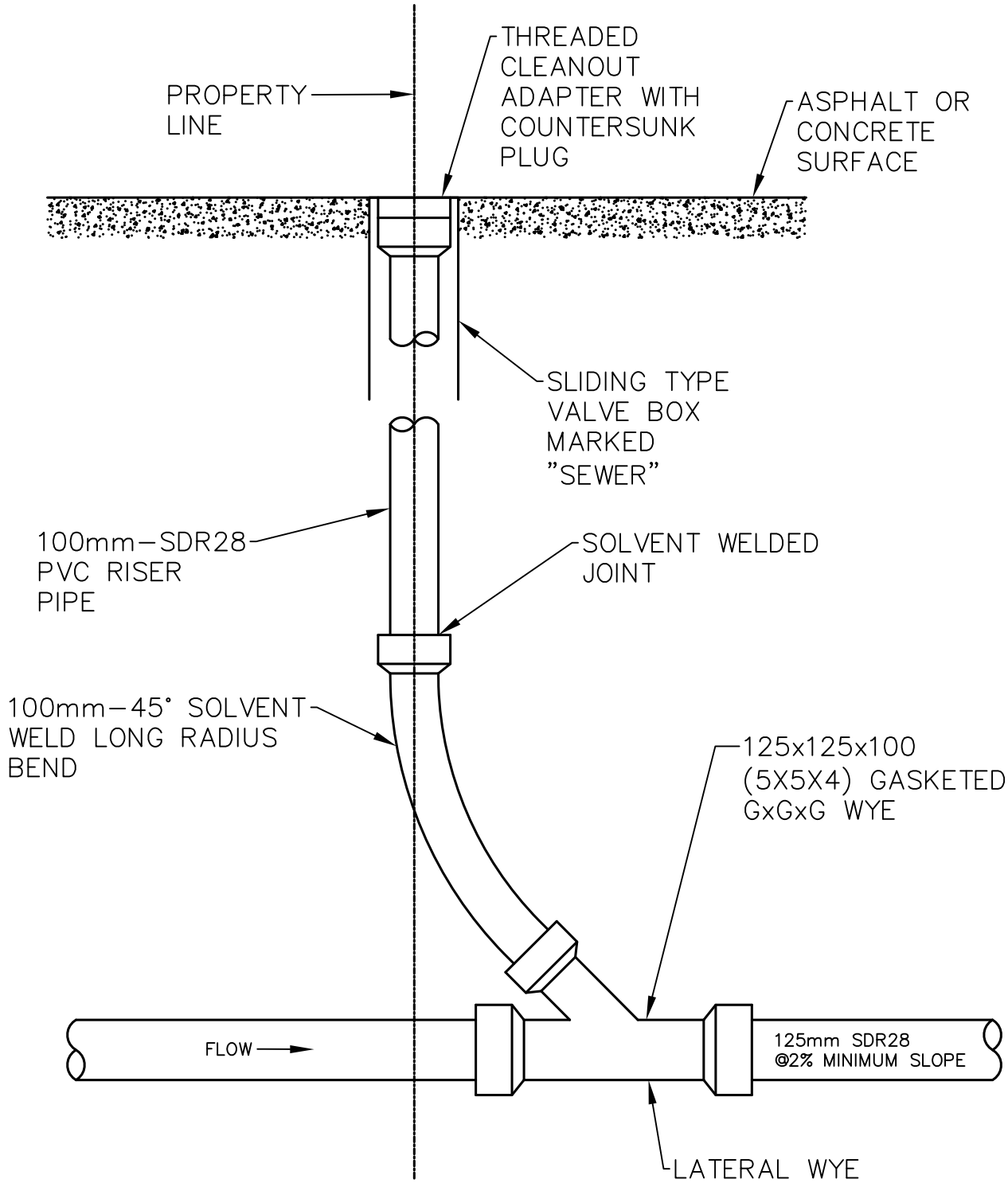
1) CLEAN–OUT TO BE IN ACCORDANCE WITH DISTRICT MUNICIPALITY OF MUSKOKA STANDARDS AND GUIDELINES.
2) CLEANOUT TO BE PROVIDED ON ALL SERVICES.
3) SEWER PIPE TO BE P.V.C SDR 28
4) BEDDING SHALL BE 19mm CLEAR STONE
5) ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

THE DISTRICT MUNICIPALITY OF MUSKOKA

SEWER CLEANOUT

NOT TO SCALE	
DATE:	JUNE 2024

DMM-310A



NOTES:

1) CLEAN–OUT TO BE IN ACCORDANCE WITH DISTRICT MUNICIPALITY OF MUSKOKA STANDARDS AND GUIDELINES.
2) CLEANOUT TO BE PROVIDED ON ALL SERVICES.
3) SEWER PIPE TO BE P.V.C SDR 28
4) BEDDING SHALL BE 19mm CLEAR STONE
5) ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

THE DISTRICT MUNICIPALITY OF MUSKOKA

SEWER CLEANOUT - HARD SURFACE

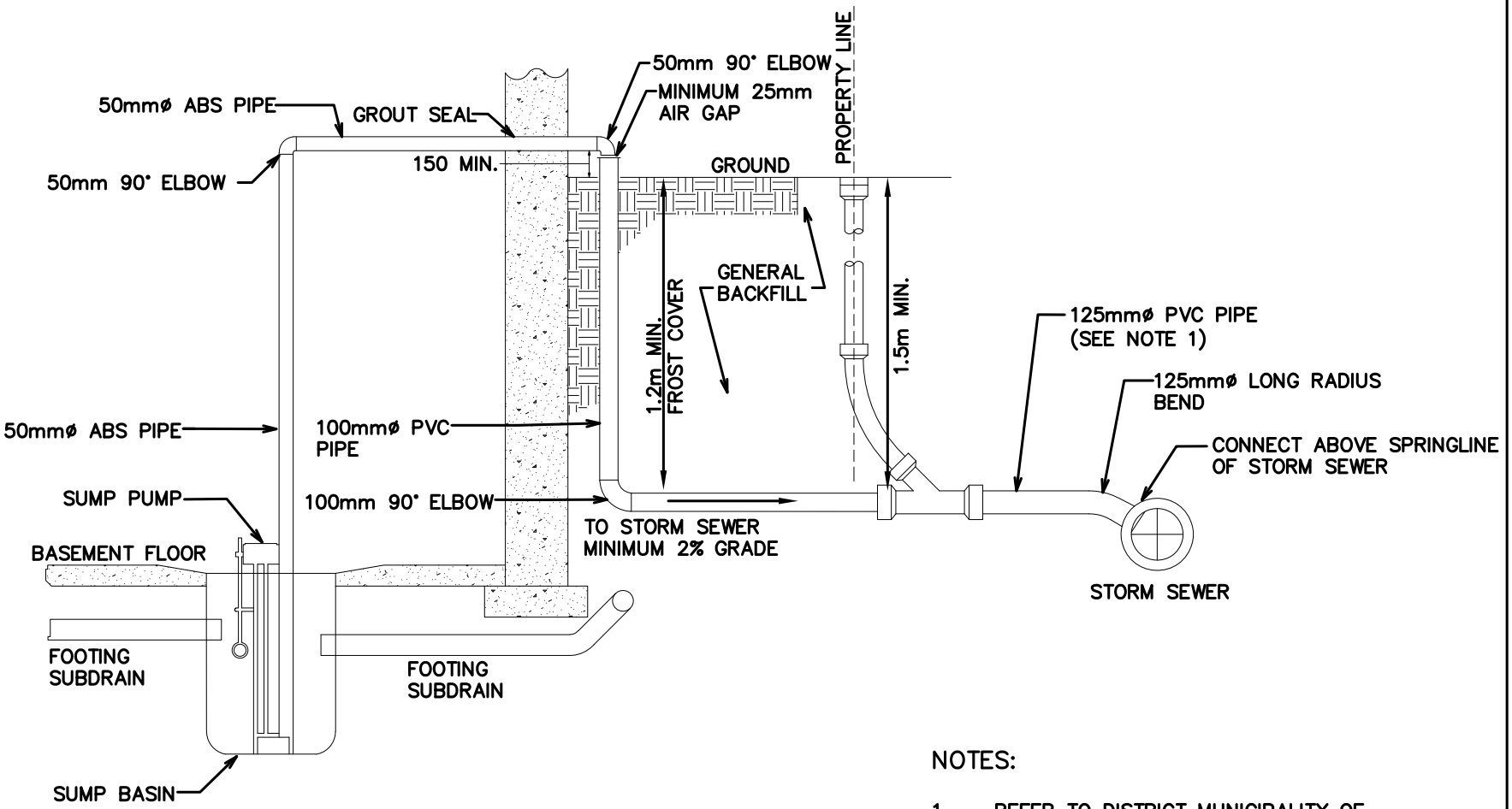
NOT TO SCALE

DATE: JUNE 2024

DMM-310B

THE DISTRICT MUNICIPALITY OF MUSKOKA

SUMP PUMP DISCHARGE CONNECTION TO STORM SEWER



NOTES:

1. REFER TO DISTRICT MUNICIPALITY OF MUSKOKA DESIGN STANDARDS FOR APPROVED MATERIALS.
2. CLEANOUT AS PER DMM–310A OR DMM–310B
3. GENERAL BACKFILL TO BE SELECT NATIVE BACKFILL MATERIAL.

NOT TO SCALE

DATE: JUNE 2024

DMM-401

THE DISTRICT MUNICIPALITY OF MUSKOKA

CHECK ONE ONLY

- ☐ CURB STOP
- ☐ VALVE (WATER)
- ☐ FIRE HYDRANT
- ☐ SAN. LATERAL
- ☐ SAN. MANHOLE
- ☐ VALVE (SEWAGE)
- ☐ OTHER (SEE REMARKS)

LOCATION SHEET

CONTRACT No: _____ TOWN _____

STREET _____ HOUSE / BUILDING No. _____

SERVICE DETAILS (IF APPLICABLE) _____

LOT No. _____ INV. ELEV. _____ m APPROX. DEPTH AT STREET LINE _____ m

INDICATE NORTH

STREET LINE (SERVICES ONLY)

RES. INSPECTOR

PRINT FULL NAME OF OWNER

DATE

SIGNATURE OF OWNER

DMM–501

THE DISTRICT MUNICIPALITY OF MUSKOKA

Manhole ID

MANHOLE INSPECTION SHEET

Rating (1 Good - 5 Bad)

TOWN _____

LOCATION / ADDRESS _____

CATCHMENT _____

INSPECTION DATE _____

OBSERVATION AND COMMENTS

OVERALL CONDITION OF STRUCTURE	Good		Satisfactory		Poor		
BENCHING CONDITION	Good		Satisfactory		Poor		
FRAME & GRATE CONDITION	Good		Satisfactory		Poor		
LIFT RINGS (LR) or BRICKWORK (B)	LR		BR		OTHER		
LR / BRICK CONDITION	Good		Satisfactory		Poor		
DROP STRUCTURE	Yes		No		Elevation		m
LADDER RUNGS CONDITION	Good		Satisfactory		Poor		
ASPHALT CONDITION AROUND MH	Good		Satisfactory		Poor		

INFILTRATION	Yes		No		Location	
DEBRIS	Yes		No		What Type	

GENERAL OBSERVATIONS _____

DMM-502

THE DISTRICT MUNICIPALITY OF MUSKOKA

MAINTENANCE HOLE INSPECTION DIAGRAM

DMM-503

DATE: JUNE 2024

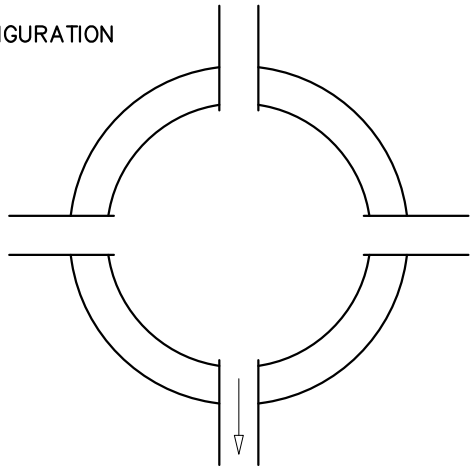
NOT TO SCALE

FOR SQUARE STRUCTURES

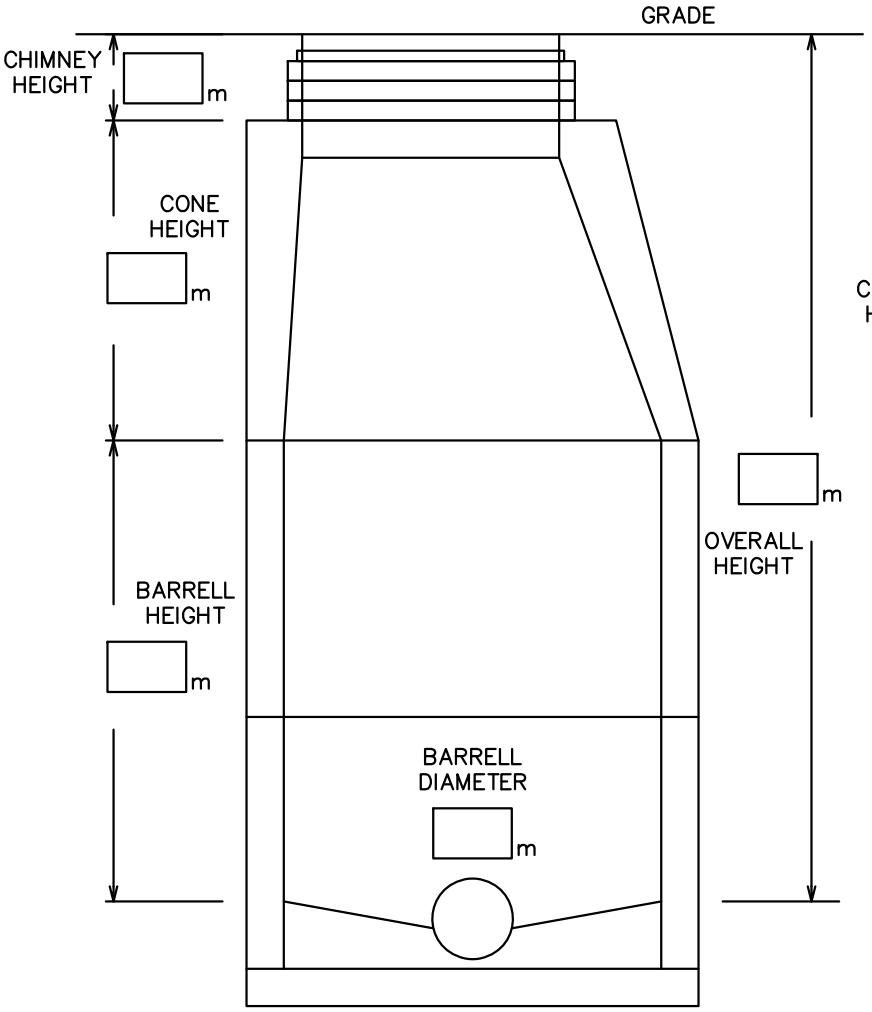
BARREL W_____m X H_____m

CHIMNEY W_____m X H_____m

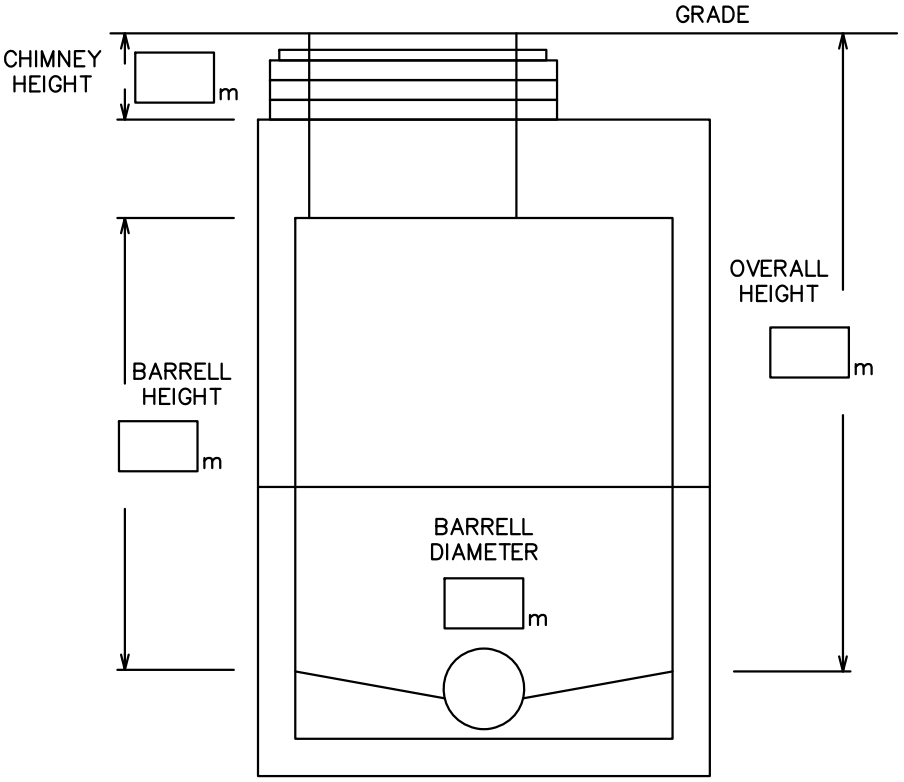
FLOW CONFIGURATION



MANHOLE ID



TYPICAL ROUND MANHOLE WITH CONE



TYPICAL ROUND MANHOLE WITH FLAT TOP