Development Process and Design Guidelines

2018 Edition

Version 2.0

DOCUMENT REVISION HISTORY

Revision	Date (Y-M-D)	Description
1.10	2019-07-09	Section 19 revised with new roadway standard cross-sections. Subsection 12.2.5, 12.5.3, APPENDIX 12.A, and APPENDIX 12.B updated to reflect the new roadway cross-sections.
1.09	2019-07-09	Subsection 16.3 updated to not allow in-line tee sewer connections.
1.08	2019-07-09	Subsection 13.5.1 updated to state maximum water valve spacing.
1.07	2019-07-09	Subsection 12.5.12 updated to include optional upgraded street name signs. Drawing 12.45 “Upgraded Street Sign Options” added.
1.06	2019-07-09	Subsection 12.5.12 updated to require durable pavement markings.
1.05	2019-07-09	Subsection 12.5.7 added to require maintenance vehicle access to infrastructure. Following subsections renumbered.
1.04	2019-07-09	Subsection 12.5.1, 12.5.3, and 16.4 updated to require “CC” stamps in sidewalk or curbs.
1.03	2019-07-09	APPENDIX 11.A updated.
1.02	2019-07-09	Subsection 11.3.7 through 11.3.9 updated to require more design information labelled on the drawings.
1.01	2019-07-09	Subsection 5.5.1 updated to require digital GIS preliminary plans.

TABLE OF CONTENTS

1 GENERAL INFORMATION

1.1 INTRODUCTION

The Development Process and Design Guidelines (previously Design Guidelines) provide information regarding the Town of Sylvan Lake's standards governing new development design and servicing standards, the design and construction approval process and drawing submission requirements.

The primary focus of this document is to aid the Developer in following the proper development sequence and to aid the Consulting Engineer in the preparation of engineering drawings. It is the responsibility of the Developer/Consulting Engineer to ensure that the design conforms to all Town, Provincial, Federal and other regulatory requirements and to notify the Town if any deviations from these guidelines are being requested.

The purpose of the Town's review of engineering drawings is to ensure the development is designed and constructed in general conformance with the Town's standards, such that upon acceptance of the development by the Town, the future public responsibilities for maintenance fall within normal and reasonable levels.

These Development Process and Design Guidelines do not attempt to set rigid policies, but rather provide the Developer with a guide outlining the Town's requirements. Where unusual or complicated design situations arise, good engineering judgement shall prevail. The Town reserves the right to require a deviation from the Development Process and Design Guidelines where conditions warrant.

The Development Process and Design Guidelines are predominately for use in areas containing new development. Slight modifications may be required in existing (in-fill) areas. Developers shall be aware that other Town documents may apply (and supersede the Development Process and Design Guidelines) in existing areas.

The Town of Sylvan Lake reserves the right to update the Development Process and Design Guidelines from time to time.

1.2 DEFINITIONS

Except where the context otherwise requires, the following expressions or words, when used in this document, shall have the following meanings:

Area Re-Development Plan (ARP) shall mean a statutory document adopted pursuant to the Municipal Government Act that guides the re-development of an existing neighbourhood or area.

Area Structure Plan (ASP) shall mean a plan adopted pursuant to the Municipal Government Act that provides a framework that describes land uses, density of population, sequence of development, general location of major roadways, public utilities in the area and any additional requirements that Council may require. Generally, ASPs are created by the Town or by a consultant acting on behalf of the Town.

As-Constructed Drawings shall mean drawings showing the actual location, length, size, material, classification of material, gradient and year of construction of road works and underground municipal improvements constructed within the development area, as determined by field measurement.

Clearing, Stripping and Grading Permit shall mean a permit issued by the Town to the Developer that authorizes clearing of trees, grubbing, topsoil stripping and rough grading within the development area. The clearing, stripping and grading permit does not permit the Developer to perform any construction activities other than those indicated on the permit.

Consultant shall mean a professional providing expert planning and/or development advice, retained by the Developer. This can include, but is not limited to, Planning Consultants and Consulting Engineers.

Consulting Engineer shall mean a Professional Engineer licensed to practice in the Province of Alberta, who is an authorized officer of a consulting engineering firm, retained by the Developer, who has designed and authenticated the municipal improvements and/or supervised the installation of the same within the development area according to the approved engineering drawings and specifications.

Contractor shall mean any person, persons, firm or corporation retained by the Developer to construct the municipal improvements in accordance with the approved engineering drawings.

Developer shall mean the registered and equitable owner of the development lands including, but not restricted to, the consulting engineers, contractors, subcontractors and/or homebuilders acting for or on behalf of the owner.

Development Agreement shall be the document prepared by the Town specifying legal, administrative and technical requirements of the Developer.

Development Area shall mean the area to be serviced as per the development agreement or permit. Typically, the development area will represent one phase of construction of a neighbourhood or the construction of servicing, structures or municipal improvements on an existing bare lot.

Development Construction Specifications shall be the documents prepared by the Consulting Engineer specifying the legal, administrative and technical aspects of the municipal improvements, all of which shall conform to the minimum requirements as outlined in the Town's current Development Process and Design Guidelines and the Town's current General Construction Specifications.

Development Fees or **Fees** shall be the fees payable to the Town by the Developer associated with the development as defined in the applicable fee schedule(s), available upon request. Development fees shall include, but not be limited to, application, administration, processing and engineering review fees. Fee schedules may be amended by the Town from time to time.

Development Permit shall be the document prepared by the Town authorizing a development issued pursuant to the Town's Land Use Bylaw.

Engineering Drawings shall mean drawings prepared by the Consulting Engineer, including sketches, preliminary drawings, conceptual drawings, detailed design drawings and as-constructed drawings showing the details of the installation of the various municipal improvements within the development area. Engineering drawings shall use standard engineering symbols and shall conform to the Town's current Development Process and Design Guidelines.

General Construction Specifications shall be the document prepared by the Town specifying project delivery procedures, methods and materials that have been approved by the Town.

Municipal Development Plan (MDP) shall mean a statutory plan adopted by Council pursuant to the Municipal Government Act. The MDP outlines future land uses and development patterns for the Town.

Municipal Improvements shall mean all improvements for the benefit of the public to be located within the publically accessible areas of the development lands and all work to be done pursuant to the terms of any applicable subdivision or development approval, including but not limited to:

- Paved roadways, including pavement markings;
- Paved or gravel lanes;
- Sidewalk, curb and gutter;
- Water, sanitary and storm sewer mains;
- Water, sanitary and storm service connections;
- Shallow utilities, including electrical distribution (excluding service leads), street lighting, natural gas and communications;
- Landscaped berms, boulevards, medians, municipal reserves and public utility lots;
- Paved, concrete, gravel or mulched walkways;
- Parks and recreation amenities (e.g. playground equipment, benches, trees, etc.);
- Traffic control, street name and neighbourhood information signs; and
- Neighbourhood identification signs.

Notification shall mean written notification, including through electronic means, provided by one party identified in this document to another party, except where a different form of communication (verbal, in person, etc.) is specifically noted in this document.

Outline Plan shall mean a document prepared by the Developer that provides conceptual planning for future development of land. The outline plan is intended to address land use and servicing issues and to establish a framework for development.

Outline Plan Area shall mean all areas to be serviced and encompassed by a single outline plan. Typically, the outline plan area contains several development areas.

Re-Designation of Land shall mean changing the land use or zoning of a parcel of land to another land use or zoning. This process is also referred to as re-zoning or a land use amendment.

Servicing Study shall be the document prepared by the Developer/Consulting Engineer to show how the proposed servicing for the outline plan area will function without negatively impacting existing Town infrastructure and surrounding areas.

Shallow Utilities shall refer to utilities provided by an independent service provider, including power, street lighting, natural gas and communication (telephone, internet, fiber optic cable and cable television) services.

TAC shall refer to the Transportation Association of Canada.

Town shall mean the Corporation of the Town of Sylvan Lake in the Province of Alberta.

1.3 MUNICIPAL PLANNING DOCUMENTS

The following documents, or the latest published versions thereof, provide guidance for the planning and development of lands within the Town of Sylvan Lake. These documents provide land use and public infrastructure requirements.

- Town of Sylvan Lake/Red Deer County Intermunicipal Development Plan;
- Municipal Development Plan;
- Area Structure Plans;
- Area Re-Development Plans;
- Waterfront Urban Design Guidelines;
- 50th Street Urban Design Guidelines;
- Outline Plans;
- Land Use Bylaw;
- Growth Strategy;
- Municipal Sustainability Plan;
- Natural Areas Management Plan;
- Transportation Master Plan;
- Infrastructure Study; and
- Recreation, Parks and Open Space Master Plan.

END OF SECTION

2 DEVELOPMENT PROCESS

2.1 GENERAL

This section describes the processes and procedures in place for land development to ensure future growth is managed in a sustainable way and public infrastructure meets the Town's standards, for the benefit of current and future residents.

Town involvement, review, inspection and approval are required in all aspects of the development of land and construction of public infrastructure, as part of the Town's due diligence in providing safe and reliable services to residents.

A flow chart of the process and development procedures is displayed in APPENDIX 2.A. The key steps are briefly described in the following clauses.

2.2 PRE-APPLICATION MEETING

The Developer and Consultant(s) are required to have a pre-application meeting with the Town to discuss their proposal or land development interest. The purpose of the meeting is to identify issues of concern, development process requirements and general timing. The Town will highlight the statutory documents and key planning policies that apply to the property based on the type of development being considered.

2.3 OUTLINE PLAN

Following the pre-application meeting, the Developer and Consultant(s) prepare and submit the outline plan. The plan will address land use, transportation and servicing issues for the outline plan area. Detailed requirements for the preparation of outline plans are included in Section 3 of this document.

Applicable fees, a phase I environmental site assessment (ESA) report, biophysical assessment and conceptual servicing must be submitted with the outline plan. The outline plan will not be reviewed until these items are submitted as one package. A preliminary traffic impact assessment (TIA) report must be submitted before the outline plan will receive final approval.

2.4 RE-DESIGNATION OF LAND

Once the outline plan is approved, the Developer may apply for re-designation of land, in accordance with the approved outline plan. A Land Use Bylaw amendment is required to re-designate land.

2.5 SUBDIVISION

After land has been re-designated, the Developer may apply for subdivision in accordance with the Land Use Bylaw. Subdivisions may be conditionally approved by the Subdivision Authority. Detailed requirements for the application and approval of subdivision are included in Section 4 of this document.

2.6 SERVICING STUDY

The Developer and Consulting Engineer will prepare the servicing study for the entire outline plan area and determine servicing requirements for the staged development. Detailed requirements for the preparation of servicing studies are included in Section 5 of this document.

Applicable fees, a phase II ESA report (if applicable), a detailed TIA report, a geotechnical report, a stormwater management (SWM) report, conceptual landscaping plan(s) (if required) and conceptual engineering models, drawings and summary reports must be submitted with the servicing study. The servicing study will not be reviewed until all items are submitted as one package.

2.7 DETAILED DESIGN

Upon approval of the servicing study, the Developer may submit detailed design models, drawings and summary reports for a phase or the entirety of the development.

Applicable fees must be submitted with the detailed design submission for the submission to be reviewed.

Landscape design drawings may be submitted as a separate package, but they must be submitted and approved prior to finalization of the development agreement. All amenities such as community mailboxes and recreation facilities must be included in the landscape drawings.

2.8 DEVELOPMENT AGREEMENT

The Developer may apply for a development agreement once subdivision and the servicing study have been conditionally approved. Detailed requirements for the application and process of receiving a development agreement are included in Section 6 of this document.

The development agreement will not be executed until the detailed design drawings and landscape design drawings have been approved, the applicable fees have been paid and the erosion and sediment control (ESC) plan, proof of application for environmental approvals, proof of approved crossing and/or encroachment agreements, proof of other third party approvals, the construction cost estimate, the proposed construction schedule, financial security deposits and any other items deemed necessary by the Town have been submitted and approved. Shallow utility alignment approvals are not required for execution of the development agreement.

2.9 ENDORSED SUBDIVISION

Once all conditions of subdivision are met, the subdivision will receive final endorsement. Typically, execution of a development agreement is needed for subdivision final endorsement. The Developer shall ensure the endorsed subdivision plan is registered at land titles.

2.10 CONSTRUCTION

Clearing, topsoil stripping and rough grading of the development lands may occur once a clearing, stripping and grading permit has been granted by the Town. Clearing, stripping and grading permits will not be granted until subdivision has been conditionally approved and the ESC plan and any applicable fees have been submitted and approved. The Developer may choose not to apply for a clearing, stripping and grading permit. In this case, clearing, stripping and grading are not permitted until a notice to proceed has been granted by the Town.

The issuance of a clearing, stripping and grading permit does not authorize construction (excluding activities permitted by the clearing, stripping and grading permit) to occur until a notice to proceed has been granted by the Town. The notice to proceed will be granted after the development agreement has been executed, all financial securities have been collected, the environmental construction and operations (ECO) plan has been approved and copies of all environmental approvals have been submitted to the Town.

It is the Consulting Engineer's responsibility to perform regular inspections to ensure the municipal improvements are being constructed according to the approved engineering drawings and construction specifications. The Consulting Engineer must also ensure the minimum testing frequencies are met and submit the test results to the Town.

2.11 CONSTRUCTION COMPLETION CERTIFICATES (CCCS)

The Town will issue construction completion certificates (CCCs) once a CCC inspection has occurred, hard copy and digital as-constructed drawings have been submitted and accepted by the Town and the Town is satisfied that there are no remaining deficiencies or that any remaining deficiencies are inconsequential to issuance of the CCC. The Town must also receive all sewer inspection videos, test results (compaction, material, water, etc.) and all building grade certificates for the development area for which a CCC has been requested.

The Town may, at its sole discretion, issue a conditional CCC if there are outstanding deficiency items; the Town will prorate the release of financial securities accordingly. A conditional CCC shall have the same meaning and effect as a CCC.

Refer to Clause 10.7.1 of this document for further information regarding the issuance of CCCs.

2.12 DEVELOPMENT AND BUILDING PERMITS

The Developer may apply for development permits once the subdivision has been registered with land titles and underground, gravel surface, sidewalk and lane improvements have passed a CCC inspection.

The Developer may apply for building permits once applicable development permits are granted.

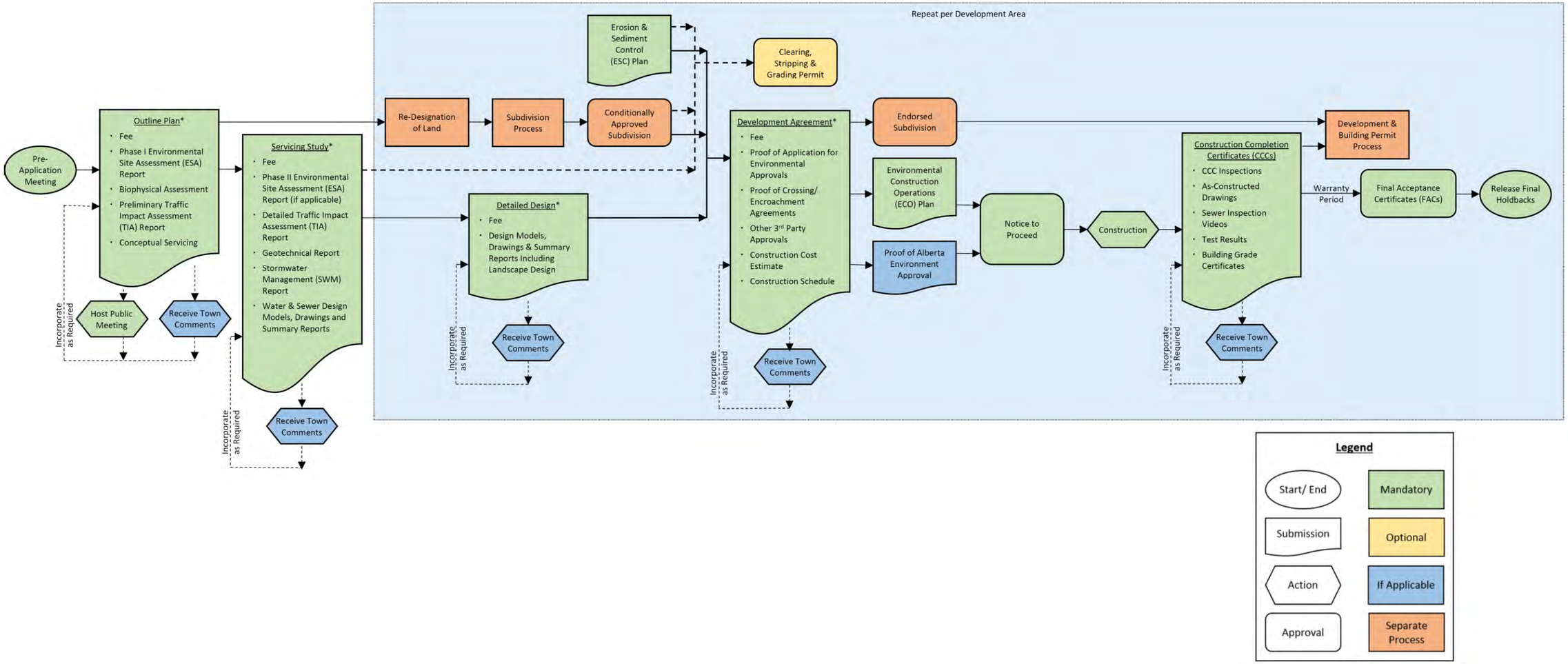
2.13 FINAL ACCEPTANCE CERTIFICATES (FACS)

Warranty periods will commence with the issuing of CCCs and terminate with the issuing of final acceptance certificates (FACs). The Town will issue FACs after completing a FAC inspection with no deficiencies found. Once FACs have been issued, the Town will begin releasing the remaining financial securities.

Refer to Clause 10.7.3 of this document for further information regarding the issuance of FACs.

END OF SECTION

APPENDIX 2.A DEVELOPMENT PROCESS FLOWCHART



*If at any time there is a revision to the approved outline plan, the servicing study must be updated before further detailed design drawings will be received and development agreements will be issued.

3 OUTLINE PLAN

3.1 GENERAL

As a pre-condition for the re-designation of land and/or subdivision of larger land areas into multiple lots, Developers are responsible for preparing an outline plan that conforms to the municipal development plan (MDP) and the applicable area structure plan/area re-development plan. If an area structure plan/area re-development plan does not exist for the outline plan area, the Developer may be required to create one.

The outline plan will address land use, transportation and servicing issues and establish a framework for the development. An outline plan is required for all proposed development unless deemed otherwise by the Town.

This section discusses the process for preparing and submitting an outline plan and discusses the studies and supporting documents that the Developer must submit with every outline plan.

3.2 PROCESS

3.2.1 Pre-Application Meeting

The Developer and Consultant(s) are required to have a pre-application meeting with the Town to discuss their proposal or interest in development of land. Issues of concern, as well as major steps and general timing will be discussed. The Town will highlight the statutory documents and key planning policies that apply to the property based on the type of development being considered.

3.2.2 Prepare and Submit Outline Plan

The Developer shall prepare the outline plan and all required information, listed below in Clause 3.3 through Clause 3.7. The Developer shall include participation from all landowners in the proposed outline plan area to ensure all parties' interests are taken into account.

The Developer shall submit the outline plan along with required studies, supporting documents and applicable fees to the Town. The Town will review the submission for thoroughness and ensure it complies with all existing policies and bylaws. The Town will compile comments from the Town, external agencies and adjacent land owners outlining any necessary changes and provide comments to the Developer.

The Developer shall make changes based on the comments and resubmit the outline plan for review until the proposal meets the Town's requirements.

Acceptance of an outline plan does not constitute the acceptance of a servicing study or any detailed designs or standards.

3.2.3 Public Meeting

The Developer shall hold a public meeting to describe the development and seek input. Town staff will attend to observe and assist with any questions the public may have regarding Town policy. Following the meeting, the Developer shall create a summary of the comments and submit to the Town.

3.2.4 Presentation of Outline Plan

Once the outline plan is completed, Town staff will prepare a report and present the proposed plan to the Municipal Planning Commission (MPC) for comment and then to Council for adoption. Both MPC and Council have the ability to request information to be added or changed during the process.

3.2.5 Re-Designation of Land

Re-designation of land occurs after outline plan approval and prior to subdivision approval.

If the Developer chooses, the associated phase one re-designation may proceed to Council for first reading at the time of outline plan adoption by Council.

3.3 SUBMISSION

The Town will not review the outline plan until applicable fees, an application form, a recent certificate of title, a phase I environmental site assessment (ESA), biophysical assessment and conceptual servicing are submitted as one package. A preliminary traffic impact assessment (TIA) report can be submitted separately, but must be submitted before the outline plan will receive final approval.

The Developer must address the following in the outline plan:

- Comply with all statutory planning documents and policies and identify any required amendments.
- Provide land ownership information.
- Identify the owners of all lands adjacent to the outline plan area.
- Define the outline plan area, including legal description, location in relation to the Town and a map clearly identifying the boundary.
- Identify all existing site conditions, including but not limited to:
    - Existing land uses within and adjacent to the site;
    - All relevant biophysical site information (as outlined in the biophysical assessment);
    - Contaminated soil or well sites including required setbacks;
    - Existing infrastructure including roads, railways, utilities, right-of-ways, etc.;
    - Existing utility boundaries, capacities and constraints; and

- Isolated land parcels neighboring the site which require “shadow planning” for possible future development, if applicable.

- List the gross area and net area for the development.
- Provide a detailed land use plan showing all proposed land uses by type and location, as listed in the Town’s current Land Use Bylaw.
- Provide a tabular summary of all land use statistics.
- Identify the location of required social care sites.
- Identify location of parks and open spaces and all proposed reserve land indicating the type of reserve.
- Identify and locate proposed enhanced/optional neighbourhood amenities including identification signs.
- Provide a proposed roadway system identifying road types, lanes, public utility lots, layouts and road widening, and identify proposed traffic calming measures.
- Provide proposed cross-sections of roadways, showing carriage way, sidewalks and street trees when variations from standard Town cross-sections are proposed.
- Address land use concepts adjacent to collector intersections to ensure that land is protected for roundabouts if a roundabout or all-directional control is dictated in the TIA.
- Identify location of sidewalks and pathways within the plan area as well as point of connection to the existing town pedestrian network.
- Provide a walkability plan showing both a 400 m and 800 m walking shed.
- Identify all proposed utility right-of-ways.
- Identify location of all proposed utility systems including water and sanitary servicing alignments, surface drainage, stormwater management facilities (SWMFs) and storm sewer.
- Provide a proposed development phasing plan. Base the proposed sequence of development on the logical extension of deep utilities, shallow utilities and roadway access. Avoid the need for construction traffic to travel through established development areas to access a new phase of development. Construction of temporary access roadways may be required for interim access to a proposed development.

3.4 PHASE I ENVIRONMENTAL SITE ASSESSMENT (ESA)

A complete phase I ESA report is required as an appendix to all outline plan submissions. A phase I ESA is a non-intrusive, historical evaluation of a site, intended to determine the potential of contamination on the site. This is required to be prepared in accordance with accepted guidelines, practices and procedures that include, but are not limited to, those outlined in the Canadian Standards Association’s publication titled “Phase 1 Environmental Site Assessment – Z768-01” and where applicable, those outlined in Alberta Environment and Parks publication No. T/573 titled “Phase I Environmental Site Assessment Guidelines for Upstream Oil and Gas Sites”.

A phase II ESA may be required as part of the servicing study. Refer to Section 5 of this document for more information.

3.5 BIOPHYSICAL ASSESSMENT

The Developer must prepare and submit a biophysical assessment with the outline plan. The biophysical assessment will be used to identify any environmentally significant areas and prioritize lands for environmental reserve (ER) and municipal reserve (MR) dedications. The following information shall be included in the biophysical assessment:

- Site context including location, climate, physiographic description, etc.;
- Approach and assessment methods;
- Applicable Federal and Provincial regulatory legislation;
- Assessment results of existing environment including, but not limited to: historical information, topography, geology, soils, hydrology, wetlands, vegetation, wildlife and aquatic resources;
- Impact assessment including cumulative effects in relation to the lands within the local and regional context; and
- Mitigation and conservation recommendations.

The results of the biophysical assessment shall be included as part of the outline plan documenting the existing conditions and current site constraints.

3.6 CONCEPTUAL SERVICING

The Developer is required to prepare and show conceptual servicing in the outline plan. The Developer shall include drawings and preliminary analyses in the report supporting the following:

- The routing of water, sanitary sewer and storm sewer mains;
- Location, conceptual geometry and approximate capacity of stormwater ponds;
- Major drainage routes; and
- Assessment of system capacities relative to the proposed development.

This conceptual servicing analysis is intended to demonstrate the viability of the proposed outline plan.

The Developer must include isolated land parcels neighboring the outline plan area in the conceptual servicing analysis. These parcels must be “shadow planned” to ensure they will have adequate servicing if they are developed in the future to a population density meeting the current Land Use Bylaw.

3.7 PRELIMINARY TRAFFIC IMPACT ASSESSMENT (TIA)

All proposed outline plans require the submission of a preliminary TIA. A detailed TIA must be submitted at a later time as part of the servicing study. Refer to Section 5 of this document for more information.

The objective of the preliminary TIA is to:

- Address the internal traffic flow patterns and volumes on collector and local roadways within the outline plan area;
- Address the anticipated impact of traffic volumes on adjacent arterial and collector roadways as a result of the proposed development;
- Recommend the access points, intersection/road geometry and internal road layout required to meet the demand of the proposed development while minimizing the impact of traffic and parking on adjacent developments and roadways; and
- Classify the road types of the proposed street system to establish the necessary right-of-way requirements.

The Consulting Engineer is responsible to obtain background information that may inform or supplement the preliminary or detailed TIA. Upon request, the Town will provide available traffic counts on adjacent collector and arterial roadways and/or any relevant studies completed by the Town or adjacent developers.

The Consulting Engineer shall include the following information in all preliminary TIA submissions:

- The development generated traffic volumes in terms of vehicles per day (VPD) using the Institute of Transportation Engineers' (ITE) Trip Generation Manual.
- A drawing showing the existing traffic volumes in terms of VPD on adjacent arterial and collector roadways, as well as at other impacted intersections and roadways up to and including the nearest arterial roadway intersection.
- A drawing showing internal and external road improvements anticipated to accommodate the projected traffic. At minimum, the drawing shall identify the following:
    - The internal street layout and intersection configuration;
    - The external access points and intersection locations;
    - The anticipated improvements required for each arterial and collector street intersection; and
    - The proposed addition, deletion or revision of any intersection traffic control device such as signs, intersection treatments or traffic signals.
- The year or development level that triggers the requirement for construction of any recommended improvements to external roadways or intersections.
- A roundabout analysis for all intersections where a collector roadway meets a highway, arterial or collector roadway.

3.8 NEIGHBOURHOOD AND STREET NAMING

3.8.1 General

The Developer is responsible for selecting a name for the neighbourhood, as well as all street names within the development area. The Developer shall name streets in accordance with the Town's current Street Naming and Civic Addressing Policy. The Town will not process subdivision endorsement until street naming is approved.

3.8.2 Name Selection

The neighbourhood and street naming shall follow a letter scheme approved by the Town. The Developer shall consult with the Town prior to selecting a letter scheme to determine available and acceptable letters and shall provide street names to the Town for review and approval.

3.8.3 Addressing

The Town will provide municipal addressing for the development area following receipt of registered subdivision plans.

3.8.4 Neighbourhood Identification Signs

Refer to the Town's current Land Use Bylaw and Section 17 of this document for neighbourhood identification sign design criteria.

END OF SECTION

4 SUBDIVISION

4.1 GENERAL

Proposed subdivisions must follow the Town's approved municipal development plan (MDP) and any relevant approved outline plan, area structure plan and/or area re-development plan as well as the Town's Land Use Bylaw. In the event that no plan exists for the subject parcel, the Developer may be required to complete a plan prior to the Town considering a subdivision application.

4.2 PROCESS

4.2.1 Prepare and Submit Subdivision Package

The Developer shall prepare and submit a complete application package for subdivision. The Town will review the submission for thoroughness and ensure it meets all Town requirements. The application will be referred to internal Town departments, external agencies and adjacent land owners for comment on the proposal. The Developer will be informed of any issues that result from the referral process.

4.2.2 Presentation of Subdivision

The Town will prepare a report and present the proposed subdivision plan to the Subdivision Authority, for decision.

4.2.3 Conditionally Approved Subdivision

The Subdivision Authority may approve or refuse an application. In the case of approval, the Subdivision Authority may impose conditions that must be fulfilled before the subdivision can be registered at the Land Titles Office. These conditions may include, but are not limited to:

- Compliance with all Town standards;
- Entering into agreement with the Town for the construction of roads, water, wastewater or stormwater infrastructure or other municipal improvements;
- Payment of off-site levies in accordance with the Town's current Off-Site Levy Bylaw;
- Payment of any outstanding taxes; and
- Dedication of reserve land or other arrangements in lieu of land.

4.2.4 Final Endorsement

The Developer must meet all conditions of the subdivision approval prior to final endorsement of the subdivision plan. The Developer shall submit a subdivision endorsement package including all applicable fees to the Town prior to being endorsed.

4.3 SUBMISSION

The Developer must submit the following information with the subdivision application:

- Original subdivision application form signed by the registered owner(s) of the land or a person authorized to apply on owner's behalf.
- Application fee.
- Location map showing the site in relation to the Town of Sylvan Lake. Submit one hard copy (8.5"x11") and one digital copy (PDF format).
- Tentative plan of subdivision drawn at a scale of 1:1000 or larger. If the drawing is unclear or otherwise unsuitable for circulation and review, the application will be returned as incomplete. Submit one hard copy (11"x17") and one digital copy (PDF format). If the plan is larger than 11"x17", applicants must provide one additional copy reduced to 11"x17". The drawing must show the following information:
    - Scale and north arrow;
    - Dimensions of the title area(s) and the sizes and dimensions of the proposed lots, including environmental reserves (ERs), municipal reserves (MRs) and public utility lots (PULs);
    - Location, use and dimensions of existing buildings and structures and their distances from property lines;
    - Location and dimensions of utility right-of-ways or easements on or adjacent to the property;
    - Location and name of existing roadways;
    - Location of proposed roadways, accesses and utility right-of-ways or easements;
    - Location of natural features within the site such as water features (including sloughs, rivers, creeks, etc.), wooded areas, muskeg areas, swamp areas and/or crests and toes of bank slopes to water bodies or valleys; and
    - Location of other features within the site such as constructed water bodies and ditches, oil and gas wells/pipelines, gravel workings and/or landfills.
- Results of an abandoned well search.
- Current copies (within the last 30 days) of each relevant certificate of title as well as any registered instruments on each of the certificates of title.

Depending on the type and location of subdivision proposal, other information may be required to determine subdivision conditions as legislated by the Municipal Government Act. Costs associated with obtaining the required information will be borne by the subdivision applicant.

END OF SECTION

5 SERVICING STUDY

5.1 GENERAL

The Developer must submit a servicing study report for the outline plan area prior to submission of detailed design drawings or issuance of a clearing, stripping and grading permit.

The servicing study report shall establish the site development and servicing requirements for the staged development of the outline plan area. The report will ultimately form the basis for detailed design of each phase of development.

The report shall compile and summarize relevant information with respect to site grading, proposed water distribution, sanitary sewage collection, storm drainage system and public roadways. The report shall include discussion pertaining to the systems, such as:

- Existing conditions (e.g. vegetation, soils, groundwater, structures, contaminants, topographic features, etc.);
- Site grading and major drainage routing;
- Description and results of analyses and modelling completed; and
- Identification and description of issues/constraints related to capacity, depth, grade, operations or other unique conditions or features.

This section discusses the requirements for servicing study reports and the supplemental documents that must be submitted with servicing study reports.

5.2 PROCESS

After the outline plan has been approved, the Developer may submit the servicing study along with all supplemental reports and studies. The Town will not receive any detailed design drawings for a phase of construction nor issue any clearing, stripping and grading permits until the servicing study is approved.

Acceptance of a servicing study does not constitute the acceptance of any detailed designs or standards.

When the Developer proposes revisions to an approved outline plan (i.e. roadway realignment, land use revision, etc.), the Developer must revise the servicing study accordingly. The Town will not issue development agreements until the Developer has submitted and the Town has approved revised servicing study drawings and/or reports.

5.3 DESIGN CONSIDERATIONS

The servicing study must conform to the approved outline plan, conform to all Federal, Provincial and Municipal legislation and must meet the Town's minimum design requirements. Refer to the below sections of this document for more information on the Town's minimum design requirements.

- Section 12 – ROADWAY DESIGN
- Section 13 – WATER DESIGN
- Section 14 – SANITARY DESIGN
- Section 15 – STORMWATER DESIGN

The servicing study report must contain discussion pertaining to:

- The purpose and proposed outcome of the site grading (e.g. to balance cut and fill, to achieve walkout basements, etc.).
- Pre-development site conditions, including soil types, groundwater, structures, contaminants, topographic features, geotechnical information, etc.
- The identification and description of site issues/constraints found and their remediation through the design of the development.
- The basics of the proposed road layout and cross-sections, including an explanation of how it provides connectivity and mobility.
- The basics of the proposed utility infrastructure system as it relates to the Town's standards, the Town's planning documents, connectivity to future development and connectivity to existing developed areas.
- The basics of the proposed landscaping as it relates to the Town's standards, including a statement if the Town's minimum and maximum standards will be met. If Town standards are not met, conceptual drawings may be required to communicate landscaping intentions.
- The analyses from calculations and computer modelling for water, sanitary and storm infrastructure, including parameters used.
- Variances to the Town's current Development Process and Design Guidelines and General Construction Specifications, if applicable.
- Issues found and the recommendations from the supplemental studies/reports submitted with the servicing study as well as any other studies and/or reports for the outline plan area.

The servicing study must consider future growth areas beyond the limits of the outline plan area and provide a discussion of alternatives for service extensions to these areas (e.g. trunk main extension, oversize main through outline plan area, etc.).

5.4 SUBMISSION

The Developer shall submit the following as one complete servicing study package to the Town for review:

- Two (2) hard copies of the servicing study report;
- Two (2) hard copies of the supplemental studies/reports;
- Two (2) hard copies of the servicing study drawings printed on an approved paper size listed in Clause 11.2.2 of this document; and

- One (1) PDF copy of the servicing study report, supplemental studies/reports, servicing study drawings and computer modelling analysis.

The Developer shall also submit confirmation that the complete drawing sets have been sent to the following outside agencies for comment:

- Power distribution and gas companies;
- Communications (telephone, television, internet, etc.) companies; and
- Natural resource (pipeline) companies, if applicable.

The Town will not review the servicing study until the Developer submits applicable fees and all required information.

Clause 5.5 through Clause 5.10 below describe the supplemental information, studies and reports that the Developer must submit with and incorporate into the servicing study.

5.5 SERVICING STUDY DRAWINGS

5.5.1 General

The base plans for the servicing study shall be in the form of a tentative legal plan at a legible scale.

The Developer shall submit the following preliminary design plans as part of the servicing study report and show proposed phase boundaries and phasing on all plans.

- Site grading plan(s);
- Road system plan(s);
- Water distribution system plan(s);
- Sanitary sewer system plan(s);
- Major drainage system plan(s), including any stormwater management (SWM) features;
- Minor storm sewer system plan(s); and
- Conceptual landscaping plan(s), if applicable (bound separately).

Digital files of the preliminary plans shall also be submitted as a personal geodatabase (MDB), file geodatabase (GDB) or shape file (SHP). The Consulting Engineer shall contact the Town for a template personal geodatabase containing all features with their appropriate attribute data headings.

All servicing study drawings must conform to the general engineering drawing requirements stated in Clause 11.2 of this document and to the requirements listed in the below clauses. The Town may reject the servicing study submission if the Developer does not follow the required standards.

5.5.2 Site Grading Plan(s)

The site grading plan(s) shall provide a preliminary earth balance for the outline plan area, establish the major drainage routing and coordinate the utility and site grading designs with respect to depth of cover and grades.

The plan(s) shall:

- Show existing elevation contours of the site at a sufficient interval to determine drainage patterns.
- Show proposed final elevation contours of the site at a sufficient interval to determine drainage patterns.
- Locate and identify trees, shrubs, grass, water bodies, wetlands, streams and other natural features that are to be retained, removed and/or altered.
- Show geotechnical information, including test hole locations, boundaries of different soil types and areas within or near the proposed outline plan area with potential erosion or sedimentation problems.
- Identify existing and final drainage patterns with dividing lines and flow directions for the different drainage areas before and after development.
- Locate permanent storm drain inlets, outlets, pipes, ponds, oil/grit interceptors and lift stations.
- Show volume, depth, overflow rates and routes that overland flow will follow after over-topping the sediment basins.

5.5.3 Road System Plan(s)

The road system plan(s) shall provide roadway geometry, confirm the major drainage routing along streets, lanes and public utility lots and indicate the relationship between road grading and lot grading.

The plan(s) shall show the following:

- Proposed contours;
- Proposed road horizontal centerline geometry including curve information;
- Proposed road and lane centerline grades;
- Typical proposed roadway cross-sections;
- Proposed roadway cross-sections that differ from typical; and
- Location of any proposed neighbourhood identification signs.

5.5.4 Water Distribution System Plan(s)

The water distribution system plan(s) shall establish the water main sizes and confirm or update the conceptual water servicing layout from the outline plan to

ensure that the proposed water system conforms to the Town's water distribution network requirements.

The plan(s) shall show the following:

- Proposed tie-in location to the existing Town distribution network;
- Proposed main sizes and material types;
- Proposed hydrant locations and coverage;
- Location of high-demand areas (i.e. schools, commercial sites, industrial nodes, etc.); and
- Proposed locations of reservoirs, pump stations or other water distribution facilities.

5.5.5 Sanitary Sewer System Plan(s)

The sanitary sewer system plan(s) shall establish the contributory sanitary service area(s) and discharge points from the outline plan area to the existing sanitary system based on topographic considerations and downstream transmission capacities.

The plan(s) shall show the following:

- Proposed main sizes and material types;
- Manhole locations;
- Grades between manholes;
- Proposed manhole depths; and
- Lift station locations and design parameters.

5.5.6 Major Drainage System Plan(s)

The major drainage system plan(s) shall establish drainage routes during rainfall events that exceed the capacity of the minor storm sewer system.

The plan(s) shall:

- Show major drainage area boundaries;
- Show major drainage routes;
- Show stormwater management facility (SWMF) locations and shapes (e.g. volume, depth, area, elevations, etc.);
- Show the minor storm sewer system, including manhole locations;
- Show catchment areas for the minor system; and
- Identify any major drainage flows to be intercepted from areas beyond the outline plan area and show how this drainage is to be addressed.

5.5.7 Minor Storm Sewer System Plan(s)

Planning and design for the storm sewer system must always address provision of both the minor system of surface drainage, gutters, inlets and enclosed pipes and the major system. The purpose of the minor storm sewer system plan(s) is to establish the contributory storm service area(s) and discharge points for the outline plan area to the existing minor system based on topographic considerations and downstream transmission capacities. This may include analysis of the existing minor system in terms of planned and projected flows and assessment and monitoring of existing system capacities and flows.

The plan(s) shall show the following:

- Minor storm sewer system, including proposed main sizes and material types;
- Manhole locations;
- Proposed grades between manholes;
- Proposed manhole depths; and
- Lift station locations and details.

5.5.8 Conceptual Landscaping Plan(s)

The conceptual landscaping plan(s) are required if variations to the Town's standards are being proposed. The conceptual landscaping plan(s) shall illustrate proposed landscaping concepts within green spaces. These spaces include environmental reserves, municipal reserves, neighbourhood park sites and public utility lots as identified in the outline plan.

Refer to Clause 17.4.2 of this document for conceptual landscape plan(s) requirements. The conceptual landscape plan(s) must be submitted with the servicing study package and bound as a separate drawing set.

5.6 SERVICING STUDY MODELS

The Developer shall include a copy of all computer and/or rational method modelling analyses with the servicing study submission for the design of the water system, sanitary system and storm system.

The Developer must include analysis of the existing systems in terms of planned and projected flows/consumptions and assessment and monitoring of existing system capacities.

5.7 PHASE II ENVIRONMENTAL SITE ASSESSMENT (ESA)

A phase II environmental site assessment (ESA) may be required as part of the servicing study. A phase II ESA is required when any of the following conditions apply:

- The phase I ESA indicates contamination exists;

- There is a likelihood that contamination exists;
- There is insufficient information to determine the likelihood of contamination existing on-site;
- Historically, the site contained or had an oil or gas operation/infrastructure;
- Historically, the site contained or had an environmentally hazardous operation/ infrastructure (e.g. railway yard service area);
- The site currently operates or contains environmentally hazardous materials (e.g. gas station);
- The site contains high concentrations of substances which, due to the concentration, become harmful to the environment (e.g. salt storage);
- The phase I ESA indicates potential issues/impacts as a result of adjacent properties; and
- The Town has reason to suspect a potential environmental issue relating to the site or adjacent sites.

A phase II ESA is an intrusive assessment intended to determine and characterize potential site contamination and to compare the concentrations of the contaminants to current relevant regulatory guidelines. The Consulting Engineer shall prepare this report in accordance with accepted guidelines, best practices and procedures that include, but are not limited to, those outlined in the Canadian Standards Association Publication titled "Phase II Environmental Site Assessment - Z769-00". When a phase II ESA is required, the Consulting Engineer shall submit the assessment with the servicing study and shall incorporate the recommendations of the assessment into the servicing study report and plans.

Refer to Clause 3.4 of this document for information regarding a phase I ESA.

5.8 DETAILED TRAFFIC IMPACT ASSESSMENT (TIA)

5.8.1 General

All servicing study submissions require a detailed traffic impact assessment (TIA) to supplement the preliminary TIA previously submitted with the outline plan (refer to Clause 3.7 of this document). The Consulting Engineer shall incorporate the recommendations of the report into the servicing study report and plans.

This clause provides an outline of the requirements governing the preparation and submission of a detailed TIA. The Consulting Engineer must ensure the TIA is prepared using the latest information available.

The TIA shall identify and evaluate the potential impact the proposed development will have on the transportation network (both on-site and off-site). The TIA shall identify the transportation infrastructure and programs needed to mitigate transportation impacts to an acceptable level.

An approved TIA is valid for five (5) years. An updated TIA is required if no development has occurred within the five (5) year period or if significant changes to the development plan are proposed (e.g. land use assumptions).

5.8.2 Scope Document

The Consulting Engineer shall submit a scope document to the Town specific to the proposed development. This document is to include, at a minimum, the following:

- Site location;
- Proposed land uses;
- Development phasing and schedule (known or assumed);
- Proposed study area (including intersections to be analyzed);
- Future analysis horizon years; and
- Any proposed deviations from standard TIA requirements.

In an effort to expedite approval and reduce the possibility of re-work by the Consulting Engineer, the TIA's scope document may, at the Consulting Engineer's discretion, also include analysis assumptions or methodology, including:

- Trip generation rates;
- Trip distribution;
- Analysis software type and version; and
- Background growth rates.

The Consulting Engineer shall submit the proposed scope to the Town and allow two (2) weeks from the date of receipt for the Town to provide comments. Depending on the scale of the proposed development and factors specific to the time of submission (e.g. workloads), this review of scope may take longer than two (2) weeks. This scope document will serve as a tool to ensure that the Consulting Engineer and the Town are in agreement on key items. The Town reserves the right to modify the study area or other items in the scope document based on the findings in the TIA. The Town will not issue any formal acceptance or approval of the submitted scope.

In general, the study area shall contain the roadways, intersections and access points that would likely be affected from the proposed development.

For most developments, the following analysis horizons are required:

- Existing/base (represents conditions at the time of the TIA submission);
- Five (5) year; and
- Ultimate – twenty (20) year.

5.8.3 Turning Movement Counts (TMCs)

The Town will provide any existing turning movement count (TMC) information available, upon request. The Consulting Engineer may use TMC data that is up to two (2) years old. New TMC data is required if available information is older than two (2) years.

The Consulting Engineer shall conduct TMCs for pedestrians, bicycles and vehicles at intersections as determined in the study scope. The TMC data shall be collected for the weekday AM and PM peak hours. The Consulting Engineer shall not collect TMC data on a Monday, Friday, statutory holiday or days when traffic patterns/weather conditions are not normal (unless explicitly requested by the Town). Weekday mid-day peak and weekend peak hour TMC data may be required depending on the type and location of the proposed development at the discretion of the Town.

Signal timing data can be requested from the Town for existing signalized intersections.

5.8.4 Study Objective

The objective of the TIA is to:

- Document the existing and projected traffic flows on internal and/or adjacent arterial and/or collector roadways as a result of the proposed development.
- Recommend access points, intersection/road geometry, traffic controls and internal road layout required to meet the traffic demands of the proposed development.
- Minimize traffic and parking impact to the neighboring developments and roads.
- Address potential safety or operational issues and access management.
- Address any shortcutting traffic issues, parking requirements/restrictions, etc.
- Create a functional plan of required improvements complete with order of magnitude cost estimates.

5.8.5 Required Development and Volume Information

The TIA report shall:

Existing Conditions

- Present and discuss the existing site conditions and the existing transportation network, including lane configuration.

Background Volumes

- Present and discuss the background growth rate.
- Provide figures for the background AM and PM peak hour volumes for the analysis horizons stated above in Clause 5.8.2.
- Provide the assumed geometry of each background analysis horizon.

Development Information

- Provide development information such as site plan, proposed land use, site location and context within existing road network and other details of the proposed site conditions in accordance with the approved outline plan.
- Identify pedestrian walkway system and trail system connections to serve the outline plan area, including connections to adjacent developments and destination nodes.
- Clearly identify on-site and off-site improvements.

Development Volumes

- Provide and discuss trip generation rates and volumes that are estimated based on the trip generation rates in the Institute of Transportation Engineers' (ITE's) Trip Generation Manual.
- Provide mode split assumptions.
- Discuss adjustments to background volumes due to the development or proposed road network (such as shortcutting, road closures or new road and intersection movements).
- Provide a figure(s) of the development-generated AM and PM peak hour volumes for the five year and ultimate horizons.
- Provide a figure(s) for the total AM and PM peak hour volumes (background volume plus development volume) for the five year and ultimate horizons.

Trip Distribution and Assignment Assumptions

- Display the assumed trip distribution with percentage values on the figure(s). Trip distribution depends on location specific factors including surrounding land uses, growth areas, size and type of proposed improvements, existing traffic distribution, population distribution and employment distributions.
- Estimate traffic assignment either using an acceptable assignment algorithm or based on the existing traffic patterns in the area, proposed development and future road network using the most direct routes/connections or shortest path available.

- If necessary, adjust the trip assignment of the proposed development to account for pass-by trips, internal trips, diverted trips, etc. Assumptions for trip adjustment must be based on the most current version of the ITE Trip Generation Handbook.

5.8.6 Capacity Analysis

The Consulting Engineer shall complete a capacity analysis for the AM and PM peak hours for all intersections (excluding lane-lane and local-lane intersection) within the study area considering background volumes and total volumes for all analysis horizons.

The capacity analysis shall discuss intersection operational issues.

The report shall provide a summary of the performance thresholds for each movement and software printouts in the appendix of the report showing key inputs and outputs. Consulting Engineers are encouraged to minimize the size (e.g. combining pages) of this part of the appendices. Outputs shall be legible if printed on 8.5”x11” paper.

The report shall discuss movements exceeding performance thresholds and identify improvements if required.

The report shall provide summary tables for the completed capacity analysis in each study horizon that include, at a minimum, the following information for every individual lane at each intersection:

- Lane characteristics (i.e. number of lanes for that movement or if it is a shared movement);
- Traffic volume;
- Volume to capacity (V/C) ratio;
- Level of service (LOS);
- 95th percentile queue length (measured in m); and
- Available or proposed storage bay length (measured in m, as applicable).

5.8.7 Performance Thresholds

The TIA shall demonstrate compliance with the following performance thresholds:

- V/C ratio: maximum 0.85;
- LOS: maximum “D”; and
- 95th percentile queue lengths: contained within the existing/proposed storage bays (excluding taper).

The Town may adjust performance thresholds in cases where the existing/base scenario exceeds the thresholds or if other circumstances support the adjustment at the Town's discretion.

5.8.8 Intersection Traffic Control Hierarchy

In order to identify the appropriate type of intersection traffic control, the Consulting Engineer shall use the following traffic control hierarchy for both intersection analysis within the outline plan area, as well as for external intersection analysis (e.g. warrants converting un-signalized to signalized intersection, etc.).

- 1st consideration – Stop control
- 2nd consideration – Multi way stop control
- 3rd consideration – Roundabout
- 4th consideration – Traffic signals

Depending on constraints or existing conditions, the Town may choose to deviate from the above traffic control hierarchy.

5.8.9 Traffic Signal Warrant Analysis

The Consulting Engineer shall complete traffic signal warrant analysis for the non-signalized intersections within the study area for each study horizon. The analysis is to be based on the Transportation Association of Canada's Traffic Signal Warrant Matrix Procedure using six (6) hours of traffic information (i.e. AM, mid-day and PM peak hours). Actual six (6) hour traffic volumes are preferable in evaluating signal warrants; however, estimated mid-day peak hour traffic volumes is an acceptable alternative in absence of mid-day peak TMCs.

5.8.10 Safety and Operational Issues

The TIA shall address safety and operational issues including sight lines, review of crash data, weaving, traffic calming, on-site traffic circulation, queuing, parking issues, etc.

5.8.11 Functional Plan of Improvements

The TIA shall include scale drawing(s) showing the internal and external road improvements required to accommodate the projected traffic. Improvements identified on the drawing(s) must also be described in the text of the TIA. At a minimum, the drawing(s) shall identify the following:

- The internal arterial and/or collector street layout.
- The external access points and intersection locations.
- The number of lanes and the length of any turn bays required for each arterial and collector street intersection.

- The spacing of controlled accesses inside the outline plan area and around each major intersection.
- Any traffic control device addition, deletion or modification required. This includes parking, pavement markings, signs, traffic signals and/or phasing and timing revisions.
- Any proposed addition, deletion or modification to the pedestrian or trail networks.

5.8.12 Report Contents

It is mandatory that every submitted TIA report be stamped and signed by a Professional Engineer licensed to practice in the Province of Alberta, including the company's Permit to Practice number and authorized signature.

The report shall include conclusion and recommendation sections that clearly identify the on-site and off-site proposed improvements and a schedule of when proposed improvements are required.

The report shall include figure(s) identifying pedestrian/trail networks to serve the outline plan area, including connections to adjacent developments and destination nodes. On-site and off-site improvements shall be clearly identified.

The report shall include cost estimates for the recommended improvements.

At a minimum, the following information shall be included in the appendices of the report:

- Correspondence exchanged between the Consulting Engineer and the Town regarding the scope of work (including a copy of the final proposed scope of work), changes to scope as required by the project and any project related decisions.
- TMC summary sheets.
- Signal timing data provided by the Town for existing signalized intersections.
- Traffic modelling software outputs. Consulting Engineers are encouraged to minimize the size (e.g. combining pages) of this part of the appendices. Outputs are expected to be legible if printed on 8.5"x11" paper.
- Traffic signal warrant spreadsheets.
- Site plans.
- Excerpts of other supporting documentation, as appropriate.

5.8.13 Digital Submissions

The Consulting Engineer shall provide the following digital information electronically as part of the detailed TIA submission:

- Traffic counts – raw data and summary TMC spreadsheets;
- Trip generation/distribution/assignment files;
- Traffic modelling software files;
- Traffic signal warrant spreadsheets; and
- Complete PDF copy of the report, including Appendices.

5.9 GEOTECHNICAL REPORT

5.9.1 General

The Developer shall engage the services of a qualified geotechnical consulting firm to prepare a geotechnical report to be submitted with the servicing study and shall incorporate the recommendations of the report into the servicing study report and plans. The geotechnical report shall evaluate soil characteristics, slope stability and existing groundwater conditions and be signed by a Professional Engineer licensed to practice geotechnical engineering in the Province of Alberta.

The Consulting Engineer shall base the geotechnical report on test holes drilled at a maximum spacing of 150 m throughout the outline plan area. The test holes shall be of sufficient depth to indicate soil conditions for utility construction and building foundations. The Consulting Engineer shall install standard piezometers in each test hole to monitor groundwater levels.

5.9.2 Required Testing

The minimum number of tests required to supplement the recommendations in the geotechnical report are as follows:

- Soil moisture contents at 1 m intervals throughout each borehole;
- A sufficient number of soil sulphate tests to represent the various soil types throughout the outline plan area;
- A sufficient number of California bearing ratio (CBR) tests to represent the road subgrade soils throughout the outline plan area;
- Sieve analysis for each predominant soil type;
- Standard penetration tests for determination of in-situ relative soil density and consistency of the various soil strata; and
- Measurement of groundwater table and analysis of its influence with respect to the design of roadways, utility trenches and foundations. Provide groundwater readings on: completion of drilling, one (1) day after drilling, seven (7) days after drilling, fourteen (14) days after drilling, one (1) month after drilling and once a month thereafter for five (5) additional months.

5.9.3 Slope Stability

A slope stability analysis is required in the geotechnical report for all sites where – in the opinion of the Town or the Consulting Engineer – slope stability is a concern. Examples of slope stability concerns include, but are not limited to:

- Historical data suggesting slope stability issues in the area;
- High groundwater table combined with unconfined soils or slopes; and
- Steep slopes adjacent to buildings, roads, utilities or other infrastructure.

5.9.4 Final Report

The Developer shall submit two (2) copies of the geotechnical report to the Town as well as one (1) PDF copy, including the following information:

- Test hole location plan and soil logs for each test hole;
- Results of the tests noted in Clause 5.9.2 above;
- Water table contour map with seasonally adjusted water table shown at 0.50 m intervals;
- Recommendation on suitability of the site for the proposed development;
- Comments on the soil bearing capacity and recommended slope setbacks for various types of building foundations;
- Recommendations with regard to trench excavation and backfill specifications;
- Recommendations for road pavement structure; and
- Recommendations for subgrade stabilization, if required.

5.10 STORMWATER MANAGEMENT (SWM) REPORT

The Developer shall submit a SWM report with the servicing study and shall incorporate the recommendations of the report into the servicing study report and plans. The SWM report shall identify drainage areas and provide a mathematically-supported design of the SWM system, including the location, capacity and geometric footprint of SWM conveyance, storage and treatment facilities. The facility capacity sizing must meet or exceed the minimum design requirements in Section 15 of this document and all applicable Federal, Provincial and Municipal regulations.

Generally, the outline plan will only cover a portion of the watershed defined by natural topographic features. The watershed will, however, continue to act as a single integrated system during rainfall and snowmelt events. The Consulting Engineer shall incorporate urban drainage systems into the natural watershed in such a way as to account for flows from remaining undeveloped areas. Consequently, urban drainage design and modelling must be carried out on a total watershed basis.

Planning and design for major drainage systems must include the incorporation of surface drainage and overland flow routes, ponding areas, SWMFs and, where possible, escape routes to receiving watercourses.

New development must provide storm detention to suppress surcharging in the downstream storm sewer system and to contain the major drainage within the development area.

The SWM report shall also address the treatment of stormwater for quality requirements, including the removal or impoundment of sedimentation and pollutants, prior to discharge of stormwater from the outline plan area.

The Consulting Engineer shall include a SWMF Summary table for notable pond elevations and rainfall frequencies for each pond in the outline plan area. See Table 5-1 for an example SWMF Summary table.

Table 5-1: Example Stormwater Management Facility (SWMF) Summary Table

Design Parameter	Elevation	Water Surface Area (ha)	Pond Volume (m^3)	Outlet Discharge (L/s)	Notes
Original Ground	884.3	3.6	N/A	N/A	
Plugged Outlet (1:100)	882.2	2.8	42,000	0	L.T.F. Elevation
1:100	881.6	2.7	28,500	510*[1]	Weir crest regulated
1:50	881.2	2.1	27,300	490	Orifice flow regulated
1:25	881.1	2.0	18,600	420	Orifice flow regulated
1:10	880.8	1.8	12,400	380	Orifice flow regulated
1:5	880.2	1.6	7,500	350*[2]	Orifice flow regulated
Pond Bottom	880.1	1.2	500	250	Nominal pond bottom
Inlet Crest	880.0	0.001	0	245	
Invert By-pass pipe	878.0	0	0	0	

*[1] – equates to 0.01 L/s/ha
*[2] – equates to 0.001 L/s/ha

END OF SECTION

6 DEVELOPMENT AGREEMENT

6.1 GENERAL

The construction of municipal improvements within a development area is subject to the terms and conditions of a development agreement including all financial, construction, maintenance and security requirements of the Developer.

The Developer must have an approved development agreement in place before construction (excluding clearing, topsoil stripping and rough grading) of a development area may begin.

The Town shall determine financial security requirements in accordance with the terms and conditions of the development agreement.

This section discusses the process and requirements for the preparation and execution of a development agreement.

6.2 PROCESS

6.2.1 Draft

Once subdivision has been conditionally approved, the Developer may contact the Town to initiate a development agreement. The Developer shall indicate in writing the request for the commencement of the development agreement drafting. The Developer shall submit the development agreement fee along with their written request in order to initiate the process.

The Town will issue the final development agreement for signature once all requirements listed below in Clause 6.3 are met and all issues resolved.

6.2.2 Executed Development Agreement

The Town will send three (3) copies of the final development agreement to be signed, sealed and returned by the Developer. The Developer shall also complete the following when returning the signed and sealed development agreement:

- Provide an original irrevocable letter of credit in accordance with the development agreement; and
- Provide an original certificate of insurance in accordance with the development agreement.

Upon receipt of the above and upon removal or waiver of any conditions required by the Town to complete the development agreement, the Town will execute the development agreement and return two (2) copies to the Developer along with the notice to proceed.

6.2.3 Notice to Proceed

The Town will issue the notice to proceed once all parties have signed the development agreement and the following documents have been provided and approved:

- Environmental construction and operations (ECO) plan;
- Proof of Alberta Environment approvals (when applicable);
- Photocopies of the following Developer/Contractor documents for all construction contracts:
  - Labour and materials payment bond;
  - Performance bond; and
  - Certificate of insurance with the Town of Sylvan Lake named as certificate holder and additional insured.

The Developer is not permitted to commence construction prior to the issuance of a notice to proceed with the exception of clearing, topsoil stripping and rough grading work if the Town has issued a clearing, stripping and grading permit that approves those activities.

6.3 REQUIREMENTS

The Developer must satisfy the following before the Town will finalize the development agreement. It is preferred submissions are in one complete package.

- Provide land ownership information and certificate of title.
- Provide name of development and name of Developer, including all contact information.
- Provide gross area and net area for the development.
- Provide a copy of the conditionally approved subdivision plan.
- Provide a copy of the approved land use (zoning) plan.
- Receive approval for the detailed design drawings.
- Receive approval for the detailed landscape design drawings.
- Receive approval for the development construction specifications.
- Receive approval for the erosion and sediment control (ESC) plan.
- Provide construction cost estimate, including back-up documentation, for all municipal improvements.
- Provide cost estimate, including back-up documentation, for the construction of off-site municipal improvements.

- Provide cost estimates for future municipal improvement ("Endeavour to Assist") cost recoveries including area, boundary and/or oversize improvement costs, if applicable.
- Provide permanent water surface area, number of water fountains or other aeration equipment and source of make-up water for stormwater retention (wet) ponds. This will be used to calculate pond maintenance costs.
- Provide proposed construction schedule.
- Provide other information required in order to address any special conditions.
- Provide copies of the following Alberta Environmental Protection and Enhancement Act documents:
    - Copy of "Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System";
    - Copy of "Letter of Authorization for Storm Drainage Treatment Facilities"; and/or
    - A copy of "Amendment to The Town of Sylvan Lake's Wastewater and Storm Drainage Permit".
- Provide copies of applicable approved crossing, proximity, ground disturbance and/or encroachment agreements.

All cost estimates are to include allowances for engineering and contingencies. Release of the construction completion certificates (CCCs) will be based on the cost breakdown provided by the Developer and approved by the Town.

Cost recoveries for area, boundary and/or oversize improvements will be identified during the Town's review of the detailed design drawings.

6.4 ALBERTA ENVIRONMENT

6.4.1 Standards

Alberta Environment has published documents to provide standards and guidelines for municipal water supply, wastewater and stormwater drainage systems. Under the Alberta Environmental Protection and Enhancement Act, municipal water supply, wastewater and stormwater drainage systems must be designed to meet these standards.

The Developer shall conform to the current edition of the above noted standards. If Federal or Provincial regulations or standards differ from Town requirements, the more stringent requirement shall apply.

6.4.2 Approvals

Construction of water distribution systems, wastewater collection systems and storm drainage systems, including major components such as water pumping stations, water reservoirs, sewage lift stations, storm ponds, storm outfall structures,

etc. require approval from Alberta Environment. Notwithstanding any provisions of this document, the Developer must comply with all Federal and Provincial laws governing construction and protection of the environment.

The Town will not issue the notice to proceed until Alberta Environment has issued a permit to construct for the development area and the Town has received a copy.

6.5 CROSSING, PROXIMITY, GROUND DISTURBANCE AND/OR ENCROACHMENT AGREEMENTS

6.5.1 General

A crossing, proximity, ground disturbance and/or encroachment agreement may be required if the Developer's proposed work includes permanent or temporary crossings of and/or construction activity adjacent to the following:

- Oil or gas pipelines;
- Overhead or underground telecommunications lines;
- Overhead or underground power lines;
- Creeks and rivers;
- Streets or highways;
- Railways; and/or
- Other registered right-of-ways.

The Town will not issue the development agreement until the Town has received copies of all crossing, proximity, ground disturbance and/or encroachment agreements for the applicable phase of construction.

6.5.2 Application Preparation and Submission

The Developer is fully responsible for the preparation and submission of plans and applications for a permit to the owners and/or proper authorities to obtain the necessary permission to enter upon, cross over or construct under said facility or right-of-way.

The Developer is responsible for the payment of all application fees, advertising costs, extra costs, damage claims and/or insurance costs related to the noted agreements.

The Developer shall submit documentary evidence that such permits/approvals have been applied for when submitting a development agreement application to the Town.

The Developer shall prepare applications as specified by the various approving agencies and make the applications on behalf of the Town.

6.6 ENVIRONMENTAL CONSTRUCTION OPERATIONS (ECO) PLAN

6.6.1 General

The Developer shall prepare and submit to the Town an ECO plan that conforms to the requirements of the current ECO plan framework developed and published by Alberta Transportation, the City of Calgary and the City of Edmonton.

An ECO plan for the development area must be submitted to the Town before the notice to proceed will be issued.

6.6.2 Objectives

The objective of the ECO plan is to prevent and/or minimize environmental impacts. The design of the ECO plan will:

- Ensure environmental considerations are part of the development decision-making process;
- Ensure compliance with applicable regulatory requirements, bylaws and guidelines; and
- Demonstrate environmental commitment by the Developer to stakeholders and the public through a written plan and actions.

6.6.3 Content

The ECO plan shall consist of written procedures and drawings addressing the environmental mitigation and protection issues relevant to construction activities being performed on the development site. The ECO plan shall identify:

- The environmental setting of the development area;
- The on-site individual responsible for addressing environmental issues;
- Potential environmental issues on the development area;
- Permits, approvals, authorizations, notifications, guidelines, standards, policies and programs applicable to the development area;
- Mitigation measures to prevent or minimize environmental impacts;
- The process for implementing, monitoring, training, communicating and reviewing the ECO plan; and
- Environmental emergency response procedures.

6.6.4 Submission

The Developer shall submit the ECO plan to the Town a minimum of fourteen (14) days prior to the scheduled commencement of construction for the development area. No construction work may begin until the Town has reviewed the ECO plan and confirmed adherence to the requirements listed in the ECO plan framework.

The Town will not issue a notice to proceed until the ECO plan has been received and approved.

END OF SECTION

7 DEVELOPMENT PERMIT

7.1 GENERAL

Prior to issuance of a development permit, the Town must be satisfied that adequate services are provided to service the development. This section outlines the engineering requirements that are typical for the development of all commercial, industrial and multi-family developments or the re-development of existing lands within the Town. This includes developments where the ownership and maintenance of the infrastructure being constructed is privately retained or is to be owned and maintained by the Town.

The detailed process and standard requirements for obtaining a development permit are listed on the Town's website or by contacting the Town.

7.2 SUBMISSION

7.2.1 General

The Developer shall submit drawings in the form of a tentative legal plan at a scale of either 1:500 or 1:1000 which conform to the approved outline plan. The following plans and reports may be required prior to issuance of a development permit:

- Site grading plan(s);
- Access and parking lot plan(s);
- Deep utility (water, sanitary and storm) servicing plan(s);
- Stormwater management (SWM) plan(s);
- Shallow utility (power, gas and communications) plan(s);
- Conceptual landscaping plan(s);
- Geotechnical report and plan(s);
- Erosion and sediment control (ESC) report; and
- Other plans and/or reports to meet the requirements of the Town's current Land Use Bylaw.

7.2.2 Site Grading Plan(s)

The purpose of the site grading plan(s) is to provide design grades for the development area compared to surrounding lands and to establish the major drainage routing, both on and off-site. Refer to Section 19 of this document for a typical site grading plan.

A building grade certificate for an undeveloped lot provided by the original developer and on file with the Town will qualify as a site grading plan submission.

The Developer shall show the following site grading information on one or more drawings:

Existing Grades

- Show existing elevations of the site at each property corner, at the mid-point of each property line, at grade breaks (contours, elevation changes, etc.) within the property and at ditches, swales, lanes and roadways abutting the property.
- Show existing elevations of adjacent properties at the quarter-points of each property line, 3 to 5 m from the property line on the adjacent property.

Proposed Grades

- Show proposed elevations at property corners, at mid-points of each property line, at grade breaks and at points around building foundations.
- Grade the site away from buildings at a minimum 2% for a minimum distance of 2 m. Slopes between 10% and 33% may require the submission of a geotechnical report. Site grades in excess of 33% are not permitted.
- Submit a report signed by a Professional Engineer outlining compaction testing results for site grades that result in fills in excess of 1.2 m depth.

Driveways

- Show location and grade of driveways. Driveways shall have a minimum slope of 2% and a maximum slope of 10%, unless otherwise approved in writing by the Town.

Drainage Flow

- Use arrows to indicate the flow direction of surface drainage accompanied with grade indications (% gradient).

Natural Features

- Show the location and identity of trees, shrubs, grass, water bodies, streams and other natural features that are to be retained, removed and/or altered.

Stockpile Locations

- Show stockpile locations (if any) and material type. Consider proximity to homes, watercourses and escarpments when proposing a stockpile location.

Re-development of lots within the NE33 38-1-5 quarter section and the perimeter of Lakeshore Drive, 50 Avenue and 40 Street, commonly referred to as the “cabin

area" (see Figure 7-1), must conform to the Cabin Area Grading Plan provided by the Town. All grading plans within this area must be submitted with geodetic elevations.

Figure 7-1: Cabin Area Location

7.2.3 Access and Parking Lot Plan(s)

The access and parking lot plan(s) is required for all multi-family, commercial and industrial developments and shall confirm the location and layout of accesses and parking facilities proposed for the development area.

The plan(s) shall show the following:

- Proposed access locations and dimensions;
- Proposed parking stall locations and dimensions;
- Proposed grade break elevations;
- Proposed curb elevations and grades;
- Pavement structure cross-section(s); and
- Location and type of lighting.

Detailed parking requirements (including number of stalls and dimensions) are outlined in the Town's Land Use Bylaw.

For parking facilities that will be owned and maintained by the Town, the pavement structure must conform to the more stringent requirement of either the Town's local road standard or the recommendations in the geotechnical report.

The Developer shall provide access to buildings in conformance with the Town's current Development Process and Design Guidelines, the Alberta Building Code and the Alberta Fire Code. Accesses shall have a minimum grade of 0.5% and a maximum grade of 8%, with grade breaks no greater than 4% without a vertical curve. Generally, all buildings shall be accessible from a street, yard or roadway where:

- Street is defined as a public roadway at least 9 m in width; and
- Roadway is defined as an access at least 6 m in width that is connected to a public roadway and is finished with a surface material suitable for access in all weather conditions.

7.2.4 Deep Utility Servicing Plan(s)

The deep utility servicing plan(s) shall be used to demonstrate the types, sizes and locations of deep utility services (water, sanitary sewer and storm sewer) required for the development area.

The plan(s) shall show the following:

- Proposed service locations, pipe sizes and material types;
- Manhole locations, invert elevations and rim elevations;
- Hydrant locations;
- Location of water valves and fittings; and
- Location and dimensions of right-of-way or easements required for deep utilities.

For commercial, industrial and multi-family developments, the Consulting Engineer must submit a copy of the computer modelling analysis for all deep utility systems. A deep utility system modelling analysis already on file with the Town will be acceptable and further submission will not be required if the proposed site use has not varied from that proposed in the development agreement submissions.

The Consulting Engineer shall design the deep utility servicing within the development area to minimize conflicts with building layout. Deep utilities that pass within a building footprint but provide services to another building are not permitted as shown in Figure 7-2.

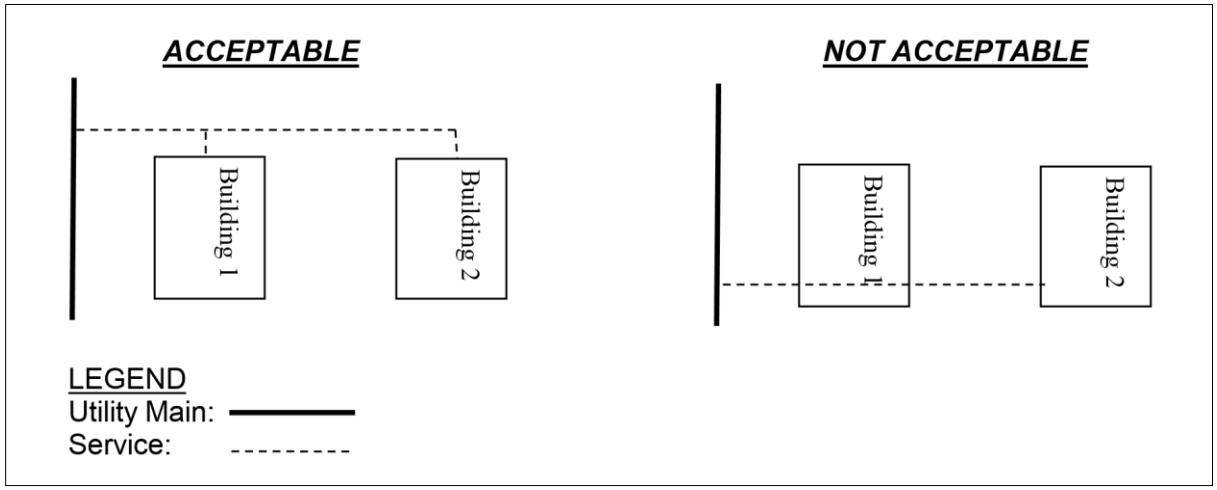


Figure 7-2: Deep Utility Servicing Layout

7.2.5 Stormwater Management (SWM) Plan(s)

Generally, the outline plan for residential developments will incorporate drainage and retention requirements for stormwater. For commercial, industrial and multi-family development sites, it may be necessary for the Developer to supplement the existing SWM system with on-site retention and/or treatment facilities.

Planning and design for SWM must incorporate surface drainage and overland flow routes, ponding areas, run-off storage facilities and, where possible, escape routes to receiving watercourses.

New development must provide stormwater detention to suppress surcharging in the downstream storm sewer system and to limit flow from the development site.

The SWM plan(s) shall show the following:

- Drainage area boundaries;
- Drainage routes;
- Detention pond locations and dimensions (e.g. volume, depth, area, elevations, etc.);
- Facility locations for the treatment or impoundment of stormwater; and
- Include a Stormwater Management Facility (SWMF) Summary table for notable pond elevations and rainfall frequencies for each pond, as shown in Table 7-1.

Table 7-1: Example Stormwater Management Facility (SWMF) Summary Table

Design Parameter	Elevation	Water Surface Area (ha)	Pond Volume (m^3)	Outlet Discharge (L/s)	Notes
Original Ground	884.3	3.6	N/A	N/A	
Plugged Outlet (1:100)	882.2	2.8	42,000	0	L.T.F. Elevation
1:100	881.6	2.7	28,500	510*[1]	Weir crest regulated
1:50	881.2	2.1	27,300	490	Orifice flow regulated
1:25	881.1	2.0	18,600	420	Orifice flow regulated
1:10	880.8	1.8	12,400	380	Orifice flow regulated
1:5	880.2	1.6	7,500	350*[2]	Orifice flow regulated
Pond Bottom	880.1	1.2	500	250	Nominal pond bottom
Inlet Crest	880.0	0.001	0	245	
Invert By-pass pipe	878.0	0	0	0	

*[1] – equates to 0.01 L/s/ha
*[2] – equates to 0.001 L/s/ha

The SWM plan submission shall include a copy of the computer modelling analysis.

Detailed SWM design criteria are included in Section 15 of this document.

7.2.6 Shallow Utility Plan(s)

The Developer shall provide a shallow utility plan(s) for all commercial, industrial and multi-family developments. The shallow utility plan shall show the locations and types of shallow utility service connections and permanent facilities, including poles, transformers, cubicles, risers and overhead versus underground lines. Temporary facilities, if required, shall be shown on the plan along with permanent facilities and be clearly labelled as temporary. The plan shall show the location and dimensions of any utility easements or right-of-ways required by the shallow utilities.

The Developer shall provide the shallow utility companies with a copy of the deep utility servicing plan, access and parking lot plan and building drawings to assist the shallow utility companies in locating surface features such as transformers and switching cabinets.

7.2.7 Geotechnical Plan(s)

A geotechnical report and plan is required for developments where slope stability, soil stabilization, soil retention or significant erosion potential is a concern. A

geotechnical report and plan are also required for developments where retaining wall heights exceed 1.0 m, fill depths exceed 1.2 m, design slopes exceed 10%, a parking facility exists which will be owned by the Town or otherwise at the discretion of the Town.

The geotechnical plan(s) shall summarize in graphical form the key concerns contained within the geotechnical report.

The plan(s) shall show the following:

- Test hole locations;
- Location of structures that require geotechnical engineering design such as retaining walls, slope stability measures or other soil stabilization installations; and
- Areas within or near the development area with potential for slope stability concerns, foundation concerns or serious erosion potential.

7.2.8 Erosion and Sediment Control (ESC) Plan

Erosion of exposed soils and associated transport of sediment off-site has significant negative environmental impacts. The Developer shall ensure that best management practices (BMPs) are employed to prevent the erosion of soil and to mitigate the effects of sedimentation. Refer to Section 8 of this document for more information regarding the design and requirements of ESCs.

For commercial, industrial and multi-family developments with a total disturbed lot area in excess of 1.0 ac or where soil will be left exposed for more than one construction season, the Developer shall submit an ESC plan which contains:

- Location, types and dimensions of all proposed temporary ESC measures;
- Location, types and dimensions of all permanent ESC measures;
- Details of dust control measures to mitigate wind erosion; and
- Details of mud control measures to prevent mud tracking onto public streets.

All surface drainage must be filtered or run through sediment control features before leaving the site. Release of sediment from a site to the Town's storm sewer system or watercourses constitutes a reportable event under the Alberta Environmental Protection and Enhancement Act and may contravene other Federal or Provincial legislation or regulations.

The duty to report a release of sediment falls upon the Developer. Releases can be reported by contacting the **Energy & Environmental Response Center** hotline at **1-800-222-6514** (24 hours).

END OF SECTION

8 EROSION AND SEDIMENT CONTROL (ESC) MEASURES

8.1 GENERAL

This section describes the purpose of erosion and sediment control (ESC), considerations for preparing and submitting an ESC plan and construction practices to be followed for effective ESC.

8.2 EROSION AND SEDIMENT CONTROL (ESC) OBJECTIVES

Soil erosion is the removal and loss of soil by the actions of wind, rainfall and run-off. In construction activities, soil erosion is caused by the force of falling and flowing water, resulting in the detachment and transport of soil particles. Erosion is a temporary phenomenon that has the potential to carry significant amounts of sediment into storm sewers and watercourses during and immediately after rainstorm events.

Sedimentation is the settling out process of soil particles transported by water. Sedimentation can occur in slower moving, quiescent water bodies or in treatment facilities such as stormwater ponds.

The main objective of ESC is to prevent sediment pollution in the various watercourses. Secondarily, it is to prevent nuisance airborne dust or tracked-on dirt to Town roadways and surrounding neighbourhoods. The majority of these concerns related to urban development are a result of construction activities. An ESC plan must be approved by the Town prior to the start of any site clearing and grading.

ESC techniques are part of best management practices (BMPs). BMPs operate by trapping stormwater run-off and detaining it until unwanted pollutants such as sediment, phosphorous and other harmful contaminants are allowed to settle out or be filtered through underlying soils. The trapped pollutants are then removed by the Developer through regularly scheduled maintenance.

Any preventative measures that will reduce erosion and sedimentation are beneficial.

8.3 REGULATORY REQUIREMENTS

There are a number of Federal and Provincial acts and regulations governing activities that cause or can cause harm to the environment, including construction projects that result in erosion and/or sedimentation. Regulatory agencies also publish codes of practice, guidelines and standards that set out requirements for undertaking certain types of activities. Most legislation and other types of regulatory tools make reference to preventing the release of harmful or deleterious substances, including silt, to the environment.

The Developer must comply with all relevant Federal, Provincial and Municipal environmental legislation. The Developer is solely responsible for any penalties resulting from un-compliance, including failure to report a release. Prior to the issuance of a development agreement, the Developer must submit a letter to the Town stating which Federal and Provincial environmental approvals have been applied for. Prior to the start of construction, the Developer must submit all copies of Federal and Provincial environmental

approvals to the Town. The Developer must provide copies to the Town of all environmental reports submitted during the course of construction.

The duty to report a release of sediment falls upon the Developer. Releases can be reported by contacting the **Energy & Environmental Response Center** hotline at **1-800-222-6514** (24 hours).

8.4 EROSION AND SEDIMENT CONCERNS AND PRACTICES

There are many erosion and sedimentation concerns that arise due to construction activities. These include, but are not limited to the following:

- Mud tracking from construction sites onto adjacent properties and roadways;
- Silt and debris washed into existing storm sewer (drainage) system;
- Silt and debris transported to receiving watercourse by surface run-off and the storm sewer system; and
- Windblown dust.

The following good maintenance practices will help to minimize erosion and sediment concerns. The Developer shall consider them when preparing the construction schedule. While some may be impractical under certain conditions, others shall be considered based on suitability, practicality and cost effectiveness.

- Locate stockpiles away from watercourses, environmentally sensitive areas, drainage courses and existing adjacent developments. Stabilize the stockpiles against erosion immediately following stripping operations. Stabilization can include, but is not limited to, establishment of a cover crop or hydro seed matrix consisting of seed, fiber bond and tackifier.
- All construction traffic shall leave the site at a designated point or points. Gravelling or paving (where practical) of frequently used access roads will help ensure that minimal material such as mud is tracked off-site. The access road shall consist of a bed of non-erodible material (i.e. gravel) of sufficient length to ensure that a minimum of material (mud) is tracked off-site onto adjacent municipal roadways. Internal haul roads and/or track packs can also be designated and maintained to help reduce off-site tracking.
- When storm sewers have been installed or are existing, undertake measures to ensure sediment and debris does not get into the municipal storm sewer system. Protect both catch basins and manholes. This may be accomplished by sealing the openings, setting up sumps or weirs inside the structure or by providing appropriate inlet protection (filter fences, sediment traps, etc.). Use a temporary drainage system with appropriate velocity controls and temporary storage areas for sediment control. This will ensure that sediment and debris do not get into the municipal storm sewer system and into the downstream waterways. Diligent efforts must be taken to ensure that the temporary drainage system does not flood adjacent properties.

- Where on-site or downstream detention facilities are provided, a quality control facility (through placing temporary weirs or check dams) can be used for sediment control during construction. All temporary and permanent detention facilities must be constructed prior to the installation of any services to the site or the commencement of earth moving operations.
- Implement dust control measures to prevent wind transport of dust from disturbed soil surfaces. This may be accomplished by:
    - Vegetate, hydro seed or mulch areas that will not receive vehicular traffic;
    - Construct windbreaks or screens;
    - Site may be sprinkled with water or a chemical dust suppressant to control dust (care must be taken to prevent tracking of mud that may result); and/or
    - A combination of the above noted methods.

The Developer shall remove all accumulated sediment and debris as required. Once construction activities are complete, all related materials and temporary structures must be removed and properly disposed of by the Developer.

8.5 BEST MANAGEMENT PRACTICES (BMP) FOR EROSION AND SEDIMENTATION CONTROL (ESC)

BMPs for ESC are various methods that have been proven to work on past construction sites when they are properly planned and constructed.

Erosion control BMPs reduce erosion potential by stabilizing exposed soil or reducing surface run-off flow velocity. There are generally two types of erosion control BMPs that can be used in conjunction with the minimum requirements of an ESC plan. They are:

- Source control BMPs for the protection of exposed surfaces; and
- Conveyance BMPs for control of run-off.

Sedimentation control BMPs reduce off-site sedimentation potential by promoting sedimentation before surface water flows leave the construction site. There are generally two types of sedimentation control BMPs that can be used in conjunction with the minimum requirements of an ESC plan. They are:

- Filtering and entrapment BMPs; and
- Impoundment BMPs.

Refer to Alberta Transportation – Erosion and Sediment Control Manual for a list of acceptable BMPs to incorporate into the ESC plan.

It is the Consulting Engineer's responsibility to ensure that BMPs are appropriate for the site conditions.

8.6 SEDIMENT (GRIT) SEPARATION STORMWATER TREATMENT UNITS

Sediment separators are a variation of traditional settling tanks. They are designed to capture sediment suspended in stormwater run-off as the run-off is conveyed through a storm sewer system. The separator is a below ground structure that takes the place of a conventional manhole or catch basin in a storm sewer system. The separator uses a permanent pool of water in the removal of sediment from stormwater run-off before discharging into the receiving water body.

The Consulting Engineer shall design sediment separators to follow Alberta Environment and Parks guidelines.

8.7 EROSION AND SEDIMENT CONTROL (ESC) PLANS

8.7.1 General

The main objective of ESC is to protect our watercourses from pollution, primarily sediment pollution.

ESC is the responsibility of the Developer.

The Developer must submit an ESC plan for the development area to the Town before a clearing, stripping and grading permit and/or development agreement will be granted.

The ESC plan shall address the requirements for temporary and permanent ESC which are defined as follows:

- Temporary ESC is the measures required to adequately protect the development site from erosion until such time as hard infrastructure has been installed or landscaping has been allowed to establish and limit the potential for further erosion.
- Permanent ESC is the measures required to permanently protect land within the development area from erosion that may occur after the completion of hard infrastructure and the establishment of landscaping. Examples include armouring or turf reinforcement for slopes or channels or protection of areas with soils indicated as having a high erosive potential. Maintenance of permanent ESC measures, similar to landscaping and infrastructure, will become the responsibility of the Town upon expiration of the warranty period.

8.7.2 Elements of an Effective ESC Plan

The Developer shall consider the following elements in the preparation of an effective ESC plan:

Minimize Needless Clearing and Grading

- Never clear or grade areas of a development site such as stream buffers, forest conservation areas, wetlands, springs, highly erodible soils, steep slopes and environmental areas. If clearing or grading must occur, restrict these activities as much as possible.

Protect Waterways and Stabilize Drainage Ways

- Streams and waterways are particularly susceptible to sedimentation. Clearing adjacent to a waterway is not permitted, and a silt fence must be installed along the perimeter of the buffer. Identify existing drainage ways, as these will likely be the major routes that eroded sediments will take to reach streams, rivers and storm sewers. Drainage ways are also prone to erosion due to the high velocity of run-off. Erosion must be minimized.

Phase Construction to Limit Soil Exposure

- Avoid grading large areas since this maximizes erosion potential. Construction phasing, where only a portion of the site is disturbed at one time, minimizes sediment load potential.

Stabilize Exposed Soils Immediately

- To provide soil stabilization, it is important to establish ground cover over the denuded area within a short period of time with the soils being exposed. Use covers such as grass, mulch, erosion control blankets, hydro seeding and/or plastic sheeting to achieve this.

Protect Steep Slopes and Cuts

- Steep slopes are the most highly erodible surfaces within construction sites. Steep slopes are generally defined as 6H:1V or greater. Where possible, avoid clearing and grading of steep slopes. Otherwise, use special techniques such as uphill flow diversion and silt fencing to prevent uphill run-off from flowing down the slopes.

Install Perimeter Controls to Filter Sediment

- Implement perimeter controls at the edge of the construction site to retain or filter run-off before it leaves the site. Silt fences and earth dikes or diversion are two of the more common control methods.

Employ Advanced Sediment Settling Controls

- Even when the best ESC measures are employed, high concentrations of sediments may be discharged during larger storms. Therefore, the ESC plan shall include some sediment traps or basins to allow captured sediments to settle out. To improve the trapping efficiency,

design these basins to incorporate such features as larger storage volumes, use of baffles, skimmers and other outlet devices and multi-cell construction. Regular inspection and maintenance are also critical to the operation of these practices.

Ensure Contractors are Trained on ESC Plan Implementation, Inspection, Maintenance and Repairs

- The most important element in the implementation of an ESC plan is the training and experience of the contractors, as they are usually responsible for the installation and maintenance of the practices. Training and education is important for everyone, from the Developer to the Homebuilder. Everyone is working towards the same goal of protecting our waterways.

Adjust ESC Plan at Construction Site

- For an effective ESC plan to be effective, it may have to be modified due to discrepancies between planned and as-constructed grades, weather conditions, altered drainage and unforeseen requirements. The Developer needs to perform regular inspections to ensure that the ESC controls are working properly. Conduct inspections every seven days and following heavy rainstorms or snowmelt events.

Assess ESC Practices after Rainstorms or Snow Melt Events

- After a rainstorm or snow melt, it is usually clear whether an ESC plan worked or not. If the event was unusually large or intense, it is likely that many of the controls will require repair, clean out or reinforcement. Therefore, a quick response to assess and correct damages of the control is required.

8.7.3 Design Considerations

An ESC plan must be prepared for all construction projects. The Consulting Engineer shall indicate BMPs on the engineering drawings.

The Consulting Engineer shall consider the following general principles when designing an ESC plan:

- Prevent pollutant release. Select source control BMPs as the first line of defense.
- Select ESC measures or other BMPs based on the site characteristics and the construction plan.
- Review site drainage and soil conditions to determine the most significant factors for the site and planned construction.
- Divert run-off away from exposed areas where possible.

- Preserve existing vegetation where possible.
- Limit the extent of clearing and phased construction.
- Incorporate natural drainage features when possible. Use adequate buffers to protect areas where flows enter the drainage system. Keep clean water clean.
- Minimize slope length and steepness.
- Reduce run-off velocities to prevent channel erosion.
- Prevent tracking of sediment off-site.
- Select appropriate control measures for the control of pollutants other than sediment.

8.7.4 Submission

The ESC plan shall include the following information:

Location and Site Characteristics

- Describe the location of the proposed development area, including a legal description of the site and a reference to adjacent properties and landmarks.
- Describe the following existing land characteristics:
  - General topography (slope and slope lengths within the site);
  - Vegetation;
  - Soil types (particle sizes, erosive potential, etc.); and
  - Drainage patterns.
- Describe the extent and nature of development.
- Identify critical areas within the proposed development site that have the potential for serious erosion or sediment problems.
- Identify neighbouring areas such as streams, lakes, residential, commercial and/or industrial areas, environmental and/or municipal reserves, escarpments and/or roads that may be affected by the land disturbance.

Proposed Development

- Provide a general description of the proposed development with a brief description of the land disturbing activity.
- Indicate the area and the amount of grading for each phase of development.
- Describe the permanent stormwater management facilities (SWMFs) and the use of these facilities during the construction period.

Erosion and Sediment Controls (ESCs)

- Determine run-off (snowmelt and rainfall) quantities from within the development area and from the upstream watershed area.
- Provide a description of the methods that will be used to control erosion and sediment transport on the site. Provide detailed design information and calculations as required.
- Identify permanent and temporary control methods for each phase of development.
- Determine the impact on the receiving water bodies if the ESCs are breached or fail.
- Indicate good "housekeeping" practices.
- Show the location, height and volume of stockpiles. Indicate erosion control measures to prevent all types of erosion and sediment transport from the stockpiles.
- Indicate the types and scheduling of individual erosion control measures, including interim or short-term measures.
- Clearly indicate the measures to control sediment export from the development site.
- Describe how the site will be stabilized after construction is completed.

Inspection and Maintenance

- Establish a schedule of regular inspections and expected repairs of ESC devices. Inspections shall occur at least weekly and after every run-off event.
- Record changes to the ESC plan due to changing conditions, revised phase boundaries, etc.

END OF SECTION

9 SITE CLEARING, STRIPPING AND GRADING

9.1 GENERAL

This section describes the restrictions and requirements for clearing, stripping and grading activities.

All clearing, stripping and grading work must follow the erosion and sediment control (ESC) plan and comply with all Federal, Provincial and Municipal legislation.

Fieldwork, including site clearing, stripping and/or grading cannot occur prior to the issuance of a clearing, stripping and grading permit or prior to execution of a development agreement that includes clearing and grading construction activities. Clearing, stripping and grading permits will not be issued until subdivision is conditionally approved and the servicing study and ESC plan are approved. Site clearing, stripping and grading must correspond with the conditionally approved area of subdivision.

All site contractors shall obtain and have on-site copies of the following documents:

- Approved clearing and grading plan(s);
- Approved ESC plan; and
- Alberta Transportation – Field Guide for Erosion and Sediment Control.

9.2 SUBMISSIONS

Before the Town will issue a development agreement or clearing, stripping and grading permit, the Developer shall submit the following to the Town for approval:

- Identify the owners of all lands adjacent to the clearing and grading area that may be affected by the clearing and grading operations due to back sloping, drainage, etc. The Developer must provide written documentation (letters and/or agreements) to the Town from the affected property owners giving permission to access such lands, including Town owned lands.
- Cross-sections may be required to provide more information on the impact of the proposed clearing, stripping and grading on adjacent properties. The cross-section(s) shall show the existing grade of the site, proposed grade for the site, grade of adjacent sites and grade of adjacent Town, County and/or Provincial roads. Datum points are required to ensure accuracy.
- Provide written authorization from utility agencies if any clearing, stripping or grading work is to occur within a utility and/or road right-of-way, including work under overhead utility lines or work over underground utilities.
- Provide correspondence from Alberta Environment and Parks stating a Water Act approval has been granted for the development area, if applicable.
- Provide a copy of the Alberta Environmental Protection Act approval, if a stormwater management facility (SWMF) is to be constructed as part of the clearing, stripping and grading work.

A deep fills report, completed by a Professional Engineer, must be submitted following construction when the constructed depth of fill is greater than or equal to 1.2 m. The report shall make general recommendations for different types of building foundations. Development permits will not be issued until the deep fills report is received and approved by the Town.

9.3 SPECIAL CONDITIONS

9.3.1 Restriction, Notices and Site Preparation

Prior to the commencement of site clearing and grading, the Developer shall:

- Notify the Town two (2) business days in advance and arrange a site meeting with the Consulting Engineer, Contractor and Town representative present;
- Erect fencing and provide other measures to ensure that the clearing and grading operation does not encroach into environmental reserves and other restricted areas;
- Erect “Private Property” and “No Trespassing” signs on the perimeter of the Lands, stating the Developer’s name and the telephone number of a representative; and
- Apply for and receive approval from the Town where a haul route is proposed to cross an existing roadway.

9.3.2 Environment Protection

The Developer must complete all clearing and grading work in accordance with the ESC plan, the Town’s current General Construction Specifications, the Town’s current Development Process and Design Guidelines and all Federal, Provincial, and Municipal legislation. It is the Developer’s responsibility to immediately report any breach of the above to the Town and all applicable authorities should a breach occur.

9.3.3 Plant Protection

The Developer shall protect trees and plants on site and on adjacent properties where indicated on the engineering drawings. The Developer shall complete all clearing work in accordance with the Town’s current General Construction Specifications and all Federal, Provincial and Municipal legislation.

9.3.4 Weed and Vegetative Growth Control

The Developer is responsible for controlling/prohibiting noxious weeds and excessive vegetative growth within the clearing and grading area in accordance with Federal, Provincial and Municipal legislation.

9.4 EROSION AND SEDIMENT CONTROL (ESC) MEASURES

The Developer shall prepare and execute the ESC plan as in accordance with Section 8 of this document. Failure to implement and comply with the ESC plan can result in legal action as outlined in the Navigable Water Protection Act, Fisheries Act, Environmental Protection and Enhancement Act and the Water Act.

The Developer shall employ appropriate measures to control dust, particularly in the vicinity of existing roadways and dwellings, to ensure traffic safety and to minimize dust nuisance complaints from the public.

The Developer shall submit any modifications to the drainage plan(s) and the ESC plan that may be necessary from time to time for various reasons, but not limited to: portions of the development area becoming developed, adjacent lands becoming developed or drainage and erosion control facilities that may require rerouting or redesigning.

9.5 TOPSOIL STOCKPILES AND DISPOSAL

The Developer shall strip and stockpile topsoil within the development area as necessary to facilitate development of the lands.

Where a development area is located adjacent to a highway and/or arterial roadway, the Developer shall construct or complete the construction of the sound attenuation berm to the design cross-sections illustrated in Section 19 of this document, utilizing waste excavation material, surplus topsoil and/or clay.

The Developer shall appropriately dispose of all topsoil that is surplus to the requirements of the development area.

The following conditions apply to stockpiles within the development area:

- The amount of topsoil stockpiled on municipal reserve parcels is restricted to the quantity required to complete the topsoil replacement on the park site(s), any other municipal reserve parcels within the development area and the adjacent arterial roadway berms. Maximum permissible stockpile side slope grade is 3H:1V for safety purposes and to allow for weed control.
- All topsoil that is set aside for later use on residential lots shall be stockpiled on a non-reserve parcel elsewhere in the development area as approved by the Town.
- Do not stockpile surplus topsoil within undeveloped road right-of-ways.
- Stockpile stripped loam in approved locations as shown on the engineering drawings. The stockpiles shall be neat in appearance, free from any hazardous conditions, treated to prevent erosion from wind and rainfall and shall be posted against dumping and designated “Private Property”, “No Trespassing” and “No Unauthorized Personnel Beyond This Point”.
- Remove the loam pile(s) as development progresses. All loam piles, with the exception of the loam pile on the neighbourhood school/park and/or neighbourhood

park site(s), must be removed prior to FAC issuing of the last phase of development of the outline plan area.

9.6 STORMWATER MANAGEMENT FACILITIES (SWMF)

Construction of SWMF (detention ponds, retention ponds and/or constructed wetlands), including any storm sewer mains required to drain the SWMF, require Alberta Environmental Protection Act approvals. If a SWMF is to be constructed as part of the clearing, stripping and grading work, the Developer must submit the Alberta Environmental Protection Act approval to the Town prior to any grading work proceeding. The approved servicing study drawings can be used for the submission to Alberta Environment for the permit application.

The Developer shall, at no expense to the Town, before, during and after the clearing and grading of the area, implement the drainage control measures for the control and disposal of all stormwater (rainwater or snow melt) in and from the lands which may be cut off from its natural drainage route by the development, but not limited to, inlet protection to any adjacent storm sewer system.

9.7 REHABILITATION OF ADJACENT LANDS

The Developer shall not do any work on adjacent lands without express written permission from adjacent landowners. Where clearing and grading operations have encroached on adjacent lands, the Developer, at its sole expense and to the satisfaction of the Town, shall rehabilitate in a timely manner, any off-site areas or operations, stormwater run-off, soil erosion, soil instability, sedimentation, dust or other problems which may arise from the clearing and grading operation.

9.8 CONSTRUCTION COMPLETION AND FINAL ACCEPTANCE

Issuance of construction completion certificates (CCCs) and final acceptance certificates (FACs) are subject to the following maintenance conditions being met:

- The Developer shall promptly correct, at its own expense, all defects, damages and deficiencies in the ESC measures, whether related to materials, workmanship, operation, vandalism or otherwise.
- The Developer shall maintain temporary ESC measures as per the approved ESC plan until the graded area is fully serviced and developed. CCCs and FACs will not be issued for temporary ESC measures.
- The Developer shall maintain permanent ESC measures for a period of at least two (2) years after the issuance of the CCC and until a FAC is issued by the Town.

END OF SECTION

10 ENGINEERING SERVICES

10.1 GENERAL

This section describes the engineering services to be provided by a Consulting Engineer relative to the design, construction, installation and inspection of municipal improvements as listed in a development agreement for private development projects and in an engineering agreement for Town projects.

The Consulting Engineer shall provide a professional level of inspection services culminating with the signing of the certification statement in the construction completion certificate (CCC) and final acceptance certificate (FAC).

It is the Consulting Engineer's responsibility to determine if inspections and/or testing in excess of the levels specified in the Town's current Development Process and Design Guidelines and the Town's current General Construction Specifications are necessary and to so advise the Developer and the Town.

10.2 CONSULTING ENGINEER

10.2.1 Private Developments

There is no direct contractual relationship between the Consulting Engineer and the Town for private development projects. However, as the Consulting Engineer is deemed to be an authorized representative of the Developer, the Town has the right to request through the Consulting Engineer that the Developer correct deficiencies as the Town observes them. It is understood and agreed that the Developer is and shall remain responsible to the Town for full and proper performance of all obligations and work included in the development agreement.

The Town may, as specified in the development agreement and as authorized in Town bylaws, stop the construction and installation of the work.

Should the Developer for any reason not fulfill the obligations of the development agreement, abandon the project, not complete the works or elect not to correct the deficiencies identified by the Town or the Consulting Engineer, the Consulting Engineer will not be held responsible to complete the project. In order to complete the obligations of the development agreement in the case of default by the Developer, the Town recognizes the advantages of utilizing the same Consulting Engineer and may, at its option, give priority to the Consulting Engineer where practical.

10.2.2 Town Projects

For Town projects, there is a direct contractual relationship between the Consulting Engineer and the Town as defined in an engineering agreement.

Any directions to the Consulting Engineer shall be as specified in the engineering agreement.

10.3 DOCUMENTS AND SCHEDULES

The Consulting Engineer, prior to commencement of construction, shall be completely familiar with:

- The Town of Sylvan Lake Development Process and Design Guidelines;
- The Town of Sylvan Lake General Construction Specifications;
- The development agreement for the project; and
- The engineering agreement (for Town projects).

The Consulting Engineer shall notify the Town when and where all work, construction and maintenance on underground utilities, overland drainage facilities, parks and other surface improvements are to be performed and shall advise the Town of all changes to the work schedule.

The Consulting Engineer shall provide notification in writing at least two business days prior to commencing construction (re-notification is required after two business days of construction inactivity), excluding Saturdays, Sundays and holidays. The notification shall include the following information:

- Name of Developer;
- Development name and phase number;
- Type of construction (utility, subgrade, concrete structures, gravel placement, parks development, landscaping, etc.);
- Start-up date and time; and
- Contractor's name, Superintendent's name and contact information.

10.4 PRE-CONSTRUCTION AND SITE MEETINGS

The Consulting Engineer shall schedule and attend a pre-construction site meeting with the Contractor(s). The meeting shall address work progress, schedule, coordination items and safety issues as applicable.

The Consulting Engineer shall schedule regular site meetings with the Contractor(s) as the work is in progress to address ongoing coordination items as applicable and shall maintain recorded minutes of these meetings.

10.5 DOCUMENTATION

10.5.1 Reporting of Deficiencies by the Town

The Town will notify the Consulting Engineer of any deficiencies observed by the Town during construction as soon as possible after observation. The Consulting Engineer shall notify the Town when the deficiency is to be corrected.

10.5.2 Materials Compliance

All materials supplied and installed shall comply in all respects to the Town's current General Construction Specifications.

If the Contractor proposes to use materials not approved in the Town's current General Construction Specifications, the Developer shall retain the services of an accredited testing company to conduct material compliance testing.

The Consulting Engineer shall obtain the certified results of material compliance tests and shall submit the test results to the Town with a request for approval. The Town will review all requests for alternative materials and will issue notice of the Town's decision to the Consulting Engineer.

The Contractor is not permitted to install any material not approved by the Town.

10.5.3 Testing Frequencies

Table 10-1 provides a summary of the minimum required testing frequencies for all construction projects in the Town. Section 12 of this document contains modified testing frequencies for specific types of road construction.

Table 10-1: Minimum Required Testing Frequencies

Test	Minimum Test Frequency
Backfill Soil	
Standard Proctor	1 per material type
Field Densities - Trench	2 tests per 600 mm of depth per 100m of trench
Road Base/Subbase/Subgrade	
Standard Proctor/Sieve for Granular	1 per material type
Standard Proctor – Subbase and Base	1 per material type
Field Densities - Grading Fill	1 test per 250 m^3
Field Densities - Subgrade Preparation	1 test per 1000 m^2
Field Densities - Subbase	1 test per 3000 m^2
Field Densities - Base	1 test per 1000 m^2
Asphalt	
Field Marshall	1 test per 1000 t
Cores	1 core per 1000 t

10.6 CONSTRUCTION INSPECTION

The Consulting Engineer shall carry out inspections to ensure conformance with the Town's current General Construction Specifications and the engineering drawings.

Inspections are required at key times before and during the project. The Consulting Engineer shall determine the site supervision and inspection requirements and the method of performing the required inspections.

The Consulting Engineer shall provide the Town with a minimum notice of two business days when requesting a joint inspection with the Consulting Engineer and/or Contractor.

The Town may require the Developer to expose all work for an inspection at the Developer's sole expense if the Consulting Engineer fails to notify the Town as required.

10.7 POST CONSTRUCTION SERVICES

10.7.1 Issuance of a Construction Completion Certificate (CCC)

The Consulting Engineer shall arrange for a joint inspection with the Contractor, Consulting Engineer and Town representatives present.

The Consulting Engineer shall schedule inspections if atmospheric and site conditions permit the inspection to occur. The Town may delay/cancel an inspection if the following conditions apply:

- Snow cover on the ground hampering visual inspection of surface works;
- Ambient air temperature below 5°C;
- Rain or fog that impairs visual or mechanical inspection; and/or
- Other atmospheric or site conditions that would reasonably pose a safety hazard to inspection personnel.

The Consulting Engineer shall submit an inspection request to the Town at least two business days in advance of the inspection date.

Failure to schedule the inspection as indicated may result in delays in processing of the CCC or performance of the inspection.

The Consulting Engineer shall prepare a list of any deficiencies noted and provide the list to the Town for approval.

The Town must approve correction of all deficiencies or approve their deferral prior to submission of CCCs for approval.

The CCC applications shall be accompanied by the following documentation:

Underground Utilities

- Test report that documents completion of successful water pressure testing, flushing and disinfections (including copy of bacteriological water sample report).
- As-constructed drawing(s) that meet the requirements of Section 11 of this document.
- Summary report of differences between the approved engineering drawings and the as-constructed drawings.

- Copy of video and inspection log(s) that report deficiencies and corrective action(s) taken.
- Letter of compliance covering compaction and materials testing, including all test results for trench fill material.

Surface Improvements

- As-constructed drawing(s) that meet the requirements of Section 11 of this document.
- Summary report of differences between the approved engineering drawings and the as-constructed drawings.
- Letter of compliance covering compaction and materials testing including all test results for:
  - Grading fill material;
  - Subgrade material;
  - Base material; and
  - Asphalt material.
- Documentation of any deficiencies which will have payment reductions as per the Town's current General Construction Specifications.

Landscaping Improvements

- As-constructed drawing(s) that meet the requirements of Section 11 and Section 17 of this document.
- Summary report of differences between the approved landscaping drawings and the as-constructed drawings.
- Progress inspection reports included as an attachment.

The Consulting Engineer shall request a re-inspection once the Developer completes deficiencies noted on the deficiency list.

When all items have been repaired to the Town's standards, the Consulting Engineer shall submit three (3) copies of the CCC to the Town for approval. Refer to APPENDIX 10.A for a sample CCC. Template CCCs are available from the Town upon request.

The Town will approve the CCCs and will return two (2) copies to the Consulting Engineer and retain one (1) copy in the development file to accompany the processing of security reduction.

10.7.2 Activity Subsequent to Issuance of a Construction Completion Certificate (CCC)

The Consulting Engineer shall conduct periodic checks of the completed works during the maintenance period and shall respond to any complaint calls or service requests forwarded by the Town.

10.7.3 Issuance of a Final Acceptance Certificate (FAC)

The Consulting Engineer shall arrange a joint inspection with the Contractor, Consulting Engineer and Town representatives present. The inspection shall cover the municipal improvements referred to in the development agreement and shall be performed at most 60 days prior to the end of the maintenance period.

The Consulting Engineer shall schedule inspections if atmospheric and site conditions permit the inspection to occur. The Town may delay/cancel an inspection if the following conditions apply:

- Snow cover on the ground hampering visual inspection of surface works;
- Ambient air temperature below 5°C;
- Rain or fog that impairs visual or mechanical inspection; and/or
- Other atmospheric or site conditions that would reasonably pose a safety hazard to inspection personnel.

The Consulting Engineer shall submit an inspection request to the Town at least two business days in advance of the inspection date.

Failure to schedule the inspection as indicated may result in delays in processing of the FAC or performance of the inspection.

The Consulting Engineer shall prepare a list of any deficiencies noted and provide the list to the Town for approval.

The Consulting Engineer shall request a re-inspection of the listed deficient items once the Developer completes deficiencies noted on the deficiency list.

When all items have been repaired to the Town's standards, the Consulting Engineer shall submit three (3) copies of the FAC to the Town for approval. Refer to APPENDIX 10.B for a sample FAC. Template FACs are available from the Town upon request.

The Town will approve the FAC(s) and will return two (2) copies to the Consulting Engineer and retain one (1) copy in the development file to accompany the processing of security reduction.

END OF SECTION

APPENDIX 10.A SAMPLE CONSTRUCTION COMPLETION CERTIFCATE (CCC)

Sylvan Lake

DEVELOPMENT AGREEMENT
CONSTRUCTION COMPLETION CERTIFICATE

Date of Application: MM/DD/YYYY Development Agreement Number: _____

Name of Development/Phase: _____

Developer: _____ Contractor: _____

Municipal Improvements: _____

_____

_____

_____

_____

I, _____ of the Firm _____

"Consulting Engineers", hereby certify that the Municipal Improvements noted herein are complete as defined by the Development Agreement, and constructed as far as can be practically ascertained in accordance with the Town of Sylvan Lake's Development Process and Design Guidelines (2018) and the General Construction Specifications (January 2014).

I hereby recommend the Town of Sylvan Lake accept the Municipal Improvement noted herein and issue this Construction Completion Certificate.

_____ MM/DD/YYYY
Project Engineer (Consulting Engineer) Date

STAMP

_____ MM/DD/YYYY
Authorized Town Inspector Date

Date Maintenance Period to Start: MM/DD/YYYY

Date Maintenance Period to Expire: MM/DD/YYYY

Approved: _____ MM/DD/YYYY
Authorized Director Date

Remarks: _____

_____

APPENDIX 10.B SAMPLE FINAL ACCEPTANCE CERTIFICATE (FAC)

Sylvan Lake

DEVELOPMENT AGREEMENT
FINAL ACCEPTANCE CERTIFICATE

Date of Application: MM/DD/YYYY Development Agreement Number: _____

Name of Development/Phase: _____

Developer: _____ Contractor: _____

Municipal Improvements: _____

_____

_____

_____

_____

I, _____ of the Firm _____

"Consulting Engineers", hereby certify that as of the above date, the Municipal Improvements noted herein meet all of the requirements for final acceptance as specified by the Town of Sylvan Lake Development Agreement, and I hereby recommend these Municipal Improvements for final acceptance by the Town of Sylvan Lake.

_____ MM/DD/YYYY
Project Engineer (Consulting Engineer) Date

STAMP

_____ MM/DD/YYYY
Authorized Town Inspector Date

Approved: _____ MM/DD/YYYY
Authorized Director Date

Remarks: _____

_____

_____

_____

_____

11 ENGINEERING DRAWINGS

11.1 GENERAL

This section lists the requirements for the preparation and submission of detailed design drawings, as-constructed drawings and digital versions of applicable drawings. Refer to Section 5 of this document for servicing study drawing requirements and Section 17 of this document for landscape drawing requirements.

Development submissions may be rejected if these standards are not followed.

11.2 GENERAL ENGINEERING DRAWING REQUIREMENTS

11.2.1 General

The Consulting Engineer shall prepare individual plan drawings for each municipal improvement being constructed with the “Limits of Construction” shown on all drawings.

Street names shall be labelled on all drawings for reference purposes.

11.2.2 Sheet Size

The Consulting Engineer shall submit drawings on one of the following sheet sizes:

- 560 mm x 864 mm (A1) preferred
- 610 mm x 914 mm acceptable
- 707 mm x 1000 mm (B1) acceptable

11.2.3 Title Block

The Consulting Engineer shall place the title block along the right side or bottom of the sheet.

11.2.4 North Arrow

The Consulting Engineer shall place the north arrow in the upper right-hand corner of the sheet and shall orientate the drawing such that north faces the top or right edge of the sheet.

11.2.5 Dimensions

All dimensions on plans and profiles are to be in metric units.

11.2.6 Lettering and Line Weight

Lettering is to be an engineering style font. Vertical lettering shall represent existing information and slanted lettering shall represent proposed information. The Consulting Engineer shall use discretion in the selection of lettering size and line

weight. Plotted lettering size shall be readable at a scale of 1:1000. Line weight shall differentiate between existing and proposed construction.

11.2.7 Drawing Scale

The Consulting Engineer shall use the following scales for the preparation of engineering drawings. Exceptions will be noted for specific drawings.

- A drawing scale of 1:1000 shall be used for all plan drawings.
- A drawing scale of 1:500 shall be used for all plan/profile drawings.

11.2.8 Cover Sheet(s)

The following information shall be included on the cover sheet(s):

- Name of development or project;
- Names of Developer and Consulting Engineer (logos optional);
- Town map showing project location; scale 1:25,000; and
- List of drawings.

11.3 DETAILED DESIGN DRAWING REQUIREMENTS

11.3.1 Plan of Subdivision

The plan of subdivision shall show:

- Property line work;
- Lot and block numbers;
- Lot dimensions;
- Right-of-way widths;
- Easement line work;
- Easement dimensions; and
- Existing roadway names.

11.3.2 Clearing and Grading Drawing(s)

Clearing and grading drawing(s) shall:

- Identity any unusual site conditions;
- Identify the owners of all lands within the clearing and grading area;
- Show the limits of proposed clearing, stripping and grading;
- Identify intended clearing and grading on adjacent lands, including details of edge conditions, back sloping requirements and areas where topsoil is to be placed and/or seeded until natural conditions are restored;

- Show location of all existing utilities (e.g. water, sanitary sewers, storm sewers, gas, electrical, etc.);
- Show existing utility right-of-ways (easements) and identify the owners of the right-of-ways;
- Show existing ground contours;
- Show proposed ground contours;
- Identify test hole locations and original ground elevations at test hole location;
- Identify natural features that are to be preserved and/or removed;
- Show details of topsoil stockpiles; include height, width, length and volumes;
- Show the means by which all stormwater in and from the subject lands will be controlled and disposed of, including:
  - How drainage from its natural route(s) will be controlled; and
  - What erosion and sediment control (ESC) measures are to be installed.
- Show the cross-section of swales and/or channels, including depth of flow;
- Show depth of cut or fill using a recommended grid spacing of 15 m x 15 m, maximum grid is 20 m x 20 m; and
- Highlight areas with fills greater than 1.2 m.

11.3.3 Roads, Lanes and Walkways Drawing(s)

Roads, lanes and walkways drawing(s) shall identify:

- Street and/or lane name (e.g. Lane “A”);
- Cross-section designation;
- Centerline and face-of-curb (FOC) curve data (radius, length of curve, tangent length and deflection angle);
- Carriageway widths (FOC to FOC);
- Sidewalk and/or curb type and width;
- Boulevard widths;
- Direction of water flow along roadways;
- Vertical curve information (length and mid-ordinate (M) difference in elevation);
- Roadway point of vertical intersection (PVI) elevations;
- Roadway centerline distance and grade between PVIs;
- FOC radii for all curb returns (general note acceptable);

- Lane and public utility lot PVI elevations;
- Lane and public utility lot distance and property line grade between PVIs;
- Direction of water flow along lanes and utility lots;
- Catch basin manholes and catch basins, including type and identification number;
- Erosion and sedimentation control measures;
- Reinforced lane and/or driveway crossings;
- Paraplegic ramps;
- Berms complete with top of berm grades;
- Temporary access roads and/or turnarounds;
- Walkways, including bollard locations; and
- Typical cross-sections for all roadway designations.

11.3.4 Traffic Control and Signage Drawing(s)

Traffic control and signage drawing(s) shall identify:

- Traffic signs;
- Pavement markings;
- Detention pond warning signs, if applicable; and
- Any non-standard street name identification sign locations, if applicable.

11.3.5 Water Distribution Drawing(s)

Water distribution drawing(s) shall identify:

- Invert elevation at all points of intersection (PIs);
- Distance, pipe size, pipe material (general note acceptable) and grade between PIs;
- Main alignments;
- Hydrants and hydrant identification numbers;
- Valves and valve identification numbers;
- Fittings;
- Insulated sections of main, if applicable; and
- Temporary air release/flushing chamber.

11.3.6 Water Distribution Disinfection and Flushing Drawing(s)

Water distribution disinfection and flushing drawing(s) shall:

- Label all valves, hydrants, and flushing points;
- Show proposed sequence of flushing, including valve opening and closing sequence; and
- Show receiving sanitary sewer manholes.

11.3.7 Sanitary Sewer Drawing(s)

Sanitary sewer drawing(s) shall identify:

- Invert elevation at all manholes;
- Distance, pipe size, pipe material and grade between manholes;
- Main alignments;
- Direction of pipe flow;
- Manholes and manhole identification numbers;
- Drop manholes (interior/exterior);
- Design flow in pipes;
- Design capacity of pipes;
- Design velocity in pipes; and
- Location of stormwater trapped lows, including accurate extents of water ponding area and ponding depth.

11.3.8 Storm Sewer Major System Drawing(s)

The Consulting Engineer shall prepare major storm sewer system drawing(s) at a scale of no greater than 1:2000 and show the entire drainage area, not just the immediate development phase.

The drawing(s) shall also identify:

- Major drainage routes;
- Location of trapped lows, including accurate extents of water ponding area and ponding depth;
- Minor drainage catchment areas;
- Minor drainage main alignments;
- Direction of minor drainage pipe flow;
- Overland flow design information;
- Minor storm sewer design information;
- Detention pond warning signs, if applicable; and
- If applicable, a Stormwater Management Facility (SWMF) Summary table (refer to Table 5-1 of this document for an example table).

11.3.9 Storm Sewer Minor System Drawing(s)

Minor storm sewer system drawing(s) shall identify:

- Invert elevation at all manholes;
- Distance, pipe size, pipe material and grade between manholes;
- Main alignments;
- Direction of pipe flow;
- Manholes, catch basin manholes and manhole identification numbers;
- Catch basin type and identification numbers;
- Catch basin leads;
- Design flow in pipes;
- Design capacity of pipes;
- Design velocity in pipes;
- SMWFs, including contours, perimeter drainage facilities, outline of playing field (if applicable), etc.; and
- Erosion and sedimentation control measures.

11.3.10 Building Grade Drawing(s)

The building grade drawing(s) shall be drawn at a scale of 1:500 or 1:750 to better illustrate all of the requested information. The drawing(s) shall identify:

- Legal description (lot and block number) for each parcel of land;
- Civic (municipal) address;
- Back-of-walk (BOW) elevations at lot lines;
- Lane/public utility lot elevations at lot lines;
- Service locations and invert elevations;
- Recommended lowest top of footing elevation;
- Recommended ground (landscape) elevation at house;
- Location of power, gas and communications;
- Location of hydrants and streetlights;
- Neighbourhood identification signs; and
- Areas where depth of fill exceeds 1.2 m (bearing certificates required).

11.3.11 Top Plan View(s) – Surface Improvements

The top plan view(s) shall illustrate the following surface improvement information:

- Street and/or lane name (e.g. Lane “A”);
- Cross-section designation;
- Centerline and FOC curve data (radius, length of curve, tangent length and deflection angle);
- Carriageway widths (FOC to FOC);
- Sidewalk and/or curb type and width;
- Boulevard widths;
- Direction of water flow along roadways;
- Vertical curve information (length and M difference in elevation);
- Roadway PVI elevations;
- Roadway centerline distance and grade between PVIs;
- FOC radii for all curb returns;
- Lip-of-gutter (LOG)/edge-of-pavement (EOP) at the following locations:
  - PIs;
  - Beginning of vertical curves (BVC) and end of vertical curves (EVC);
  - Beginning of horizontal curves (BHC), point of curve to curve (PCC) and end of horizontal curves (EHC);
  - BVC, mid-point (MP) and EVC for all curb returns; and
  - Location and rim elevation of any catch basins.
- LOG grades for all curves;
- Curb return grades;
- Lane and public utility lot PVI elevations;
- Lane and public utility lot distance and property line grade between PVIs;
- Direction of water flow along lanes and utility lots;
- Catch basin manholes and catch basins, including type and identification number;
- Erosion and sedimentation control measures;
- Reinforced lane and/or driveway crossings;
- Paraplegic ramps;
- Berms complete with top of berm grades;
- Temporary access roads and/or turnarounds;
- Walkways, including bollard locations; and
- Reference drawing number(s) for adjacent sheets.

11.3.12 Bottom Plan View(s) – Underground Utilities

The bottom plan view(s) shall illustrate the following underground utility information:

- Property lines;
- Main sizes, lengths and alignments;
- Hydrant locations and identification numbers;
- Valve locations and identification numbers;
- Fitting sizes and locations;
- Manhole and catch basin locations and identification numbers;
- Catch basin lead sizes, lengths and alignment;
- Direction of flow for storm and sanitary mains; and
- Insulation, if applicable.

11.3.13 Profile View(s)

The profile view(s) shall illustrate the following road and utility information:

- Stationing for road, lane and/or utility lot centerlines;
- PVI and PI elevations for utility mains and surface improvements;
- Length and grade between PVIs and PIs for utility mains and surface improvements;
- Vertical curve information, if applicable;
- Vertical alignments of manholes, valves and hydrants;
- Hydrant flange elevations;
- Manhole rim and invert elevations;
- Utility main lengths, sizes, materials and gradients; and
- Insulation, if applicable.

11.3.14 Landscape Drawing(s)

Refer to Clause 17.4.3 of this document for detailed landscape drawing requirements.

11.4 SUBMISSION OF PROPOSED DETAILED DESIGN DRAWINGS

The Consulting Engineer shall submit two (2) complete hard copy sets and one (1) complete PDF set of detailed design drawings marked “Issued for Approval” to the Town for review and approval. Landscape drawing(s) may be submitted as a separate package at a later date.

The Town will not review the detailed design drawings until the fee has been received and the servicing study and all its associated reports are submitted and approved by the Town.

Upon receiving approval of the detailed design drawings, the Consulting Engineer shall submit two (2) hard copy sets and one (1) PDF set of detailed design drawings marked "Issued for Construction" which are corrected as per the Town's comments and are professionally stamped, signed and dated.

11.5 CHANGES (REVISIONS) TO APPROVED DETAILED DESIGN DRAWINGS

The approved detailed design drawings form an integral part of the development agreement between the Developer and the Town.

The Consulting Engineer shall submit two (2) hard copy sets and one (1) PDF set of revised detailed design drawings if significant design changes are made following approval and submission of the "Issued for Construction" detailed design drawings and execution of the development agreement. Changes include revisions to drainage boundaries, pipe sizes, pipe or roadway grades, roadway cross-sections, pavement structures and/or other significant changes. The Consulting Engineer shall identify all changes on the original approved detailed design drawings by crossing out the original information and adding the revised information (similar to the method used for preparing as-constructed drawings). A new drawing may be submitted if significant changes are being made.

The Town must approve any significant changes to the approved detailed design drawings.

11.6 AS-CONSTRUCTED DRAWING REQUIREMENTS

11.6.1 General

The Consulting Engineer shall submit hard copy, digital and PDF as-constructed drawings and information as outlined in this clause. Each digital submission must be accompanied by a transmittal form containing the project name, Consulting Engineer's name, contract number, graphic file format and list of files submitted.

With each construction completion certificate (CCC) application, the Consulting Engineer shall submit one (1) hard copy drawing set, one (1) PDF drawing set and one (1) digital drawing set of the applicable as-constructed drawings. The categories of major CCC applications are:

- Utilities (water, sanitary and storm);
- Surface roadways (concrete curb, gutter and sidewalk and gravel/paved roadways, lanes, etc.); and
- Landscaping.

The Consulting Engineer shall professionally stamp, sign and date hardcopy drawings to indicate as-constructed information. The Consulting Engineer shall cross out the original information, and write the as-constructed data adjacent to the original information (red lining).

All plan drawings for underground utilities and surface improvements shall show the month and year of completion of construction.

11.6.2 Clearing and Grading Drawing(s)

Clearing and grading as-constructed drawing(s) shall identify:

- Extent of encroachment into adjacent lands for back sloping or other purposes, if applicable;
- Existing ground contours prior to topsoil stripping;
- As-constructed ground contours;
- Test hole locations and original ground elevations;
- Details of topsoil stockpiles, including location, height, width, length and volumes;
- Cut/fill as-constructed elevations and depth of cut or fill; and
- Areas with fills greater than 1.2 m.

11.6.3 Roads, Lanes and Walkways Drawing(s)

The Consulting Engineer shall submit roads, lanes and walkways as-constructed drawing(s) on completion of all concrete work. The drawing(s) shall conform to the following requirements:

- Provide as-constructed elevations at the LOG / EOP at the following locations and show on the plan/profile as-constructed drawings to confirm the as-constructed centerline grade as shown on the plan drawings:
  - PVI (the as-constructed elevation at a PVI on a vertical curve is to be the existing pavement elevation plus or minus M distance to theoretical PVI);
  - BVC and EVC;
  - BHC, PCC and EHC;
  - BVC, MP and EVC for all curb returns; and
  - Location and rim elevation of any catch basins.
- Complete spot elevation checks following paving to verify grades, PVI elevations and slope.
- Complete spot elevation checks of all lanes and public utility lots to verify grades, PVI elevations and slope.
- Note grade and elevation changes if the difference from design to as-constructed is greater than 10 mm.
- Confirm centerline and FOC radii.
- Note revisions to the type of sidewalk and/or curb and gutter installed.

- Note revisions to pavement cross-section and locations of filter fabric.
- Note revisions to pavement markings.

CCCs for gravel roads will not be issued until all concrete work is complete.

11.6.4 Utility Drawing(s)

The utility as-constructed drawing(s) shall conform to the following requirements:

- Note revisions to lengths, grades, invert elevations, alignments and locations of PVI for sanitary, storm and water mains.
- Note and dimension (in two directions) all hydrants, valves, fittings, manholes, catch basins and other appurtenances. Also note rim and invert elevations of manholes and catch basins and flange elevations of hydrants.
- Provide as-constructed invert elevations for water, sanitary and storm service stubs at property/easement line.
- Note and dimension (in two directions) location of water, sanitary and storm services and curb stops.

11.6.5 Building Grade Certificates(s)

The following information shall be shown on the building grade certificate(s):

- Top of footing elevation;
- Water, sanitary and storm service locations and inverts;
- Power and communication service location;
- Sidewalk and boulevard widths;
- Utility right-of-ways (easements);
- Lot corner surface elevations;
- Landscape elevation at front and rear of house;
- Lot drainage pattern; and
- Streetlights, hydrants, transformers, communications pedestals, community mailboxes and any other surface improvements located on the lot.

The Developer shall provide this information in the format shown in Section 19 of this document.

11.6.6 Neighbourhood Identification Signs

The Consulting Engineer shall provide detailed as-constructed drawings of the neighbourhood identification sign(s) to the Town. These drawing will be used for the future maintenance and repair of the identification signs.

The Consulting Engineer shall show the footprint of the neighbourhood identification sign(s) on all as-constructed plan drawings to identify any conflicts with underground utilities and roadway sight triangles.

11.7 DIGITAL AS-CONSTRUCTED DRAWING REQUIREMENTS

11.7.1 General

The Town has developed an Asset Management System (AMS) to manage the recording and distribution of road, traffic, water, sanitary and storm information. The AMS is comprised of digital record drawings, associated database records and custom routines to automate the input and extraction of data.

Digital files of as-constructed plan view drawings must be submitted as a personal geodatabase (MDB), file geodatabase (GDB) or shape file (SHP). The Consulting Engineer shall contact the Town for a template personal geodatabase containing all features with their appropriate attribute data headings.

11.7.2 Submitting Files

The following illustrates the basic steps the Consulting Engineer shall follow for preparing an as-constructed file for submission:

- Request the most current as-built template from the Town.
- Place the as-constructed data into separate features for each improvement (sanitary, storm, water and curb edge). Each file can only contain as-constructed information. Note any changes to the existing infrastructure (i.e. hydrant removed, main replaced, internal drop installed in manhole, etc.) in a separate annotation feature.
- The underground utilities require the attachment of attribute data to various features. The attribute fields must be defined and contain the required values with no units for the various features as specified in APPENDIX 11.A.
- Submit a transmittal form that shows the following:
  - Project name;
  - Consulting Engineer's name;
  - Contract number; and
  - Projection (NAD83 3TM -114).

11.7.3 Drawing Standards

In order to ensure a smooth integration of the as-constructed data into the AMS, the Consulting Engineer must follow the below standards. Failure to do so will result in the rejection of the file(s) and will require the Consulting Engineer to resubmit the digital as-constructed data. APPENDIX 11.A contains the digital as-constructed drawing standards that specify the attribute name and attribute type information for

each improvement (sanitary, storm, water and curb edge). The submitted attribute names and types must match APPENDIX 11.A exactly and the values should follow those listed in the table when possible. This information is also contained in the Town's as-built template file, available upon request.

The following specifications must be used for the preparation of digital as-constructed drawings:

- Each improvement is to be drawn as a single continuous element from feature to feature (i.e. manhole to manhole) in the direction of flow. Simple line or line strings are preferred. Multiple pipes at a manhole shall all connect to the center point of the manhole.
- Place valves on top of the water pipe. Break the water pipe at the insertion point of the valve.
- Attribute data must contain only the required values with no units (i.e. 35.0 not 35.0 m; 200 not 200 mm; 0.45 not 0.45%).
- All dimensions are to be metric units and to two decimal units. APPENDIX 11.A specifies the units to be used for each feature type.

11.7.4 Attribute Data

The underground utilities require the attachment of attribute data to various features.

The required field names for each attribute are shown in APPENDIX 11.A for each feature type. The Consulting Engineer shall only enter the required values with no units into the appropriate fields, as specified in APPENDIX 11.A.

Example: A storm main installed in the year 2016 having a description of "45.23 – 200mm PVC-DR 35 @ 0.15%," would have the tag or attribute set shown in Table 11-1:

Table 11-1: Example Tag and Attribute Data Set

Field Name	Value
Install Date	01/01/2017*
Material	PVC – DR 35
Diameter	200
Pipe Length	45.23
Invert	880.15
Outvert	880.05
Grade	0.15

*Actual install date is preferred, but the first of the month or first of the year installed may be used if the actual install date is unknown.

END OF SECTION

APPENDIX 11.A DIGITAL AS-CONSTRUCTED DRAWING STANDARDS

Feature Name	Feature Type	Attribute Name	Attribute Type	Permissible Value(s)
sanForcemain	Line	InstallDate	Date	mm/dd/yyyy
		Material	Short Text	
		Diameter	Double	(mm)
		PipeLength	Double	(m)
		Invert1	Double	(elevation)
		Invert2	Double	(elevation)
sanGravityMain	Line	InstallDate	Date	mm/dd/yyyy
		Material	Short Text	
		Diameter	Double	(mm)
		PipeLength	Double	(m)
		Invert	Double	(elevation)
		Outvert	Double	(elevation)
		Grade	Double	(%)
sanLateral	Line	InstallDate	Date	mm/dd/yyyy
		Type	Short Text	Residential Commercial
		Material	Short Text	
		Diameter	Double	(mm)
		Length	Double	(m)
		InvertProperty	Double	(elevation)
sanManhole	Point	InstallDate	Date	mm/dd/yyyy
		ManholeInside Diameter	Double	(mm)
		Rim	Double	(elevation)
		Invert1	Double	(elevation)
		Direction1	Short Text	
		Invert2	Double	(elevation)
		Direction2	Short Text	
		Invert3	Double	(elevation)
		Direction3	Short Text	
		Invert4	Double	(elevation)
		Direction4	Short Text	
Sanitary LiftStatioin	Point	InstallDate	Date	mm/dd/yyyy
		Street	Short Text	
		Type	Short Text	Wet Dry
		StationType	Short Text	Single Duplex Triplex Quadplex
stmForcemain	Line	InstallDate	Date	mm/dd/yyyy

Feature Name	Feature Type	Attribute Name	Attribute Type	Permissible Value(s)
		Material	Short Text	
		Diameter	Double	(mm)
		PipeLength	Double	(m)
		Invert1	Double	(elevation)
		Invert2	Double	(elevation)
stmGravityMain	Line	InstallDate	Date	mm/dd/yyyy
		Material	Short Text	
		Diameter	Double	(mm)
		PipeLength	Double	(m)
		Invert	Double	(elevation)
		Outvert	Double	(elevation)
		Grade	Double	(%)
stmLateral	Line	InstallDate	Date	mm/dd/yyyy
		Type	Short Text	Residential Commercial
		Material	Short Text	
		Diameter	Double	(mm)
		PipeLength	Double	(m)
		InvertProperty	Double	(elevation)
stmManhole	Point	InstallDate	Date	mm/dd/yyyy
		ManholeInside Diameter	Double	(mm)
		Rim	Double	(elevation)
		Invert1	Double	(elevation)
		Direction1	Short Text	
		Invert2	Double	(elevation)
		Direction2	Short Text	
		Invert3	Double	(elevation)
		Direction3	Short Text	
		Invert4	Double	(elevation)
		Direction4	Short Text	
		CBManhole	Short Text	Yes No
		SumpDepth	Double	(mm)
stmCatchBasin	Point	InstallDate	Date	mm/dd/yyyy
		GrateType	Short Text	F-33 F-39 F-49 F-51 K-7 DK-7
		GrateElevation	Double	(elevation)
		LeadInvert	Double	(elevation)

Feature Name	Feature Type	Attribute Name	Attribute Type	Permissible Value(s)
		SumpDepth	Double	(mm)
stmCulvert	Line	InstallDate	Date	mm/dd/yyyy
		Material	Short Text	
		Diameter	Double	(mm)
		Invert	Double	(elevation)
		Outvert	Double	(elevation)
		Grade	Double	(%)
stmChannel	Line	DownstreamElev	Double	(elevation)
		UpstreamElev	Double	(elevation)
		BottomType	Short Text	Concrete Grass
stmStructure	Point	InstallDate	Date	mm/dd/yyyy
		StructureType	Short Text	Inlet Outlet
		StormStructure EndType	Short Text	Concrete RipRap
		SafetyGrate	Short Text	Yes No
		Diameter	Double	(mm)
		LeadInvert	Double	(elevation)
StormLiftStation	Point	InstallDate	Date	mm/dd/yyyy
		Street	Short Text	
		Type	Short Text	Wet Dry
		StationType	Short Text	Single Duplex Triplex Quadplex
StormPond	Polygon	Type	Short Text	Wet Dry
		FullServiceVolume	Double	(L)
		BermElevation	Double	(elevation)
		BottomElevation	Double	(elevation)
		InvertElevation	Double	(elevation)
		OutvertElevation	Double	(elevation)
		OverflowElevation	Double	(elevation)
wPressurizedMain	Line	InstallDate	Date	mm/dd/yyyy
		Subtype	Short Text	Distribution Supply Transmission
		Material	Short Text	
		Diameter	Double	(mm)
		Length	Double	(m)

Feature Name	Feature Type	Attribute Name	Attribute Type	Permissible Value(s)
		Invert1	Double	(elevation)
		Invert2	Double	(elevation)
wLateral	Line	InstallDate	Date	mm/dd/yyyy
		LateralType	Short Text	Domestic Hydrant
		Material	Short Text	
		Diameter	Double	(mm)
		Length	Double	(m)
		InvertProperyline	Double	(elevation)
wHydrant	Point	InstallDate	Date	mm/dd/yyyy
		DrainageType	Short Text	SelfDraining Non-SelfDraining
		Make	Short Text	
		Model	Short Text	
		TopOfFlang	Double	(elevation)
wValve	Point	InstallDate	Date	mm/dd/yyyy
		ValveType	Short Text	Curb Stop Gate Valve Hydrant Valve
		Make	Short Text	
		Model	Short Text	
		Diameter	Double	(mm)
		Chamber	Short Text	Yes No
WaterPressure ReducingValve	Point	InstallDate	Date	mm/dd/yyyy
		Make	Short Text	
		Model	Short Text	
		InletPressure	Double	(kPa)
		OutletPressure	Double	(kPa)
wFitting	Point	InstallDate	Date	mm/dd/yyyy
		Subtype	Short Text	Wye Bend Cap Cross Reducer Service Saddle Tee
		Material	Short Text	
		Diameter1	Double	(mm)
		Diameter2	Double	(mm)
		Diameter3	Double	(mm)
		Diameter4	Double	(mm)
Sidewalk	Line	InstallDate	Date	mm/dd/yyyy

Feature Name	Feature Type	Attribute Name	Attribute Type	Permissible Value(s)
		SurfType	Short Text	Asphalt Concrete
		SdwkType	Short Text	Mono Seperate
		Width	Double	(mm)
RoadEdge	Line	InstallDate	Date	mm/dd/yyyy
		CurbType	Short Text	Rolled Flat
		Gutter	Short Text	True False
		Sidewalk	Short Text	True False
		RoadEdge	Short Text	Curb Asphalt
PavementMarking	Point	InstallDate	Date	mm/dd/yyyy
		Type	Short Text	Speed Limit
		Comment	Short Text	30km
		Material	Short Text	Durable Paint
		Colour	Short Text	White
CrossWalk	Line	InstallDate	Date	mm/dd/yyyy
		Material	Short Text	Durable Paint
		Colour	Short Text	White
		StyleType	Short Text	SolidLine Bar
Sign	Point	InstallDate	Date	mm/dd/yyyy
		Code	Short Text	
		Name	Short Text	

12 ROADWAY DESIGN

12.1 GENERAL

The design of the road system shall conform to the following materials and as amended by these standards and guidelines:

- Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads;
- TAC Urban Supplement;
- TAC Manual of Uniform Traffic Control Devices for Canada; and
- American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets and as amended by these standards and guidelines.

This section provides a summary of the design standards and guidelines for roadways in the Town of Sylvan Lake. All roadways constructed or upgraded in conjunction with a development must adhere to these standards and guidelines.

12.2 DESIGN FACTORS

12.2.1 Design Vehicle

The Consulting Engineer shall consider the following design vehicles (as defined by TAC-Geometric Design Guide for Canadian Roads) for local and collector roadway design:

- Passenger cars (P);
- Single-unit trucks (SU9);
- Tractor semitrailers (WB17);
- Large tractor semitrailers (WB21) for roads within or adjacent to industrial areas; and
- Intercity buses (I-BUS).

The Consulting Engineer shall consider the following design vehicles (as defined by TAC-Geometric Design Guide for Canadian Roads) for arterial roadway design:

- Passenger cars (P);
- Single-unit trucks (SU9);
- Tractor semitrailers (WB17);
- Large tractor semitrailers (WB21);
- A-train doubles (WB23);
- B-train doubles (WB28); and

- Intercity buses (I-BUS).

12.2.2 Design Speed

Table 12-1 below summarizes the design speeds for each roadway classification.

Table 12-1: Design Speed

Road Classification	Design Speed	Posted Speed
Arterial	70 km/hr	60 km/hr
Collector	50 km/hr	40 km/hr
Local	40 km/hr	30 – 35 km/hr

12.2.3 Standard Road Cross-Sections

Standard roadway cross-section drawings are included in Section 19 of this document.

12.2.4 Minimum Road Structure

The minimum road structure permitted for each road classification is outlined in Table 12-2 below and in Section 19 of this document.

Table 12-2: Minimum Road Structure

Road Classification	20 Year Design Traffic (80 kN axles)	Asphaltic Concrete Depth (mm)	Granular Base Depth (mm)	Granular Subbase Depth (mm)	Total Depth (mm)	Provided Structural Number
Arterial	4×10^6	125	200	350	675	113
Industrial Collector	2×10^6	100	200	300	600	98
Residential Collector	1×10^6	100	150	300	550	91
Industrial Local	8×10^5	90	150	300	540	87
Residential Local	9×10^4	90	100	250	440	75
Paved Lanes	1×10^3	75	100	200	375	64
Gravel Lanes	5×10^2	-	100	200	300	34

The pavement structures shown in Table 12-2 provide minimum allowable thicknesses and the provided structural number for asphalt, granular base and granular subbase assuming that the prepared subgrade has a California bearing ratio (CBR) of at least 4.0 in a soaked condition, the granular base has a CBR of at least 80 and the granular subbase has a CBR of at least 20.

The Consulting Geotechnical Engineer may propose alternative pavement structures for acceptance by the Town. The structural number provided must meet or exceed that shown in Table 12-2 and shall account for increases required by decreased subgrade support strength.

Paved lanes are required adjacent to commercial and multi-family lots. They are also required where the longitudinal design slope exceeds 6%.

Refer to Clause 12.6.2 of this document for more information regarding minimum required subbase thickness.

12.2.5 Minimum Grades

Roadways

The minimum longitudinal surface grade for all roads is 1.0%. Refer to APPENDIX 12.B of this document for more information.

For curved roadways, cul-de-sacs and expanded bulb corners, the Consulting Engineer shall increase centerline grades to ensure a minimum gutter grade of 0.50%.

Roadway crossfall shall be 2.0%.

Lanes and Public Utility Lots

The minimum longitudinal surface grade for gravel lanes, paved lanes and public utility lots in new developments is 0.8%.

Crossfall shall be 3.0% for crowned and cross-sloped lanes and 2.0% for reverse-crowned lanes.

Gravel lanes shall be crowned and asphalt lanes shall be reverse-crowned.

12.2.6 Horizontal Layout

Centerline

In all new development scenarios, the Developer shall align roadway centerlines with the center of the right-of-way, unless otherwise approved by the Town. For in-fill or re-development scenarios, the Developer shall endeavor to construct roadway centerlines as close to the center of right-of-way as practical.

Grid Road Systems

The Developer shall implement a grid road system for all arterial roadways and for collector roadways that connect outside of the outline plan area. Grid road networks provide shorter travel distances and increased route options, which

enhances connection to regional roadway systems and accessibility for emergency services.

Curvilinear Road Systems

The Developer shall use curvilinear designs to integrate the street infrastructure with the existing topography and other features to promote slower traffic speeds, discourage shortcutting and enhance aesthetics.

For collector roadways that encompass multiple outline plan areas, a combination of a grid and curvilinear road system may be used.

Horizontal Curves

The horizontal alignment of streets typically consists of a series of tangents and circular curves (simple, compound and reverse curves). The Developer shall incorporate transition or spiral curves where the design speed exceeds 60 km/hr.

Minimum Curve Radius

Minimum curve radii are listed in TAC-Geometric Design Guide for Canadian Roads and APPENDIX 12.A of this document. Where the minimum curve radius differs, the more stringent requirement applies.

Broken Back Curves

The Developer shall not use broken back curves (two curves in the same direction connected by a short tangent) in a curvilinear design unless the distance (measured in m) from the end of one curve to the beginning of the next curve is greater than four times (4x) the design speed (measured in km/hr).

Curved Lanes and Public Utility Lots

Curved lanes and public utility lots are not permitted. The Developer shall replace curves with a series of chords to allow property owners to construct straight fences rather than curved fences.

Intersection Angle

The preferred intersection angle is 90°; angles less than 75° are not acceptable.

12.2.7 Vertical Curves

The Developer shall provide vertical curves when a grade change takes place. The Consulting Engineer shall calculate the properties of the vertical curve as per the TAC-Geometric Design Guide for Canadian Roads manual.

12.2.8 Superelevation/Transition Spirals for Arterial Roadways

Superelevation is normally rotated about the centerline of the median; however, other rotation points may be used if the Consulting Engineer deems it is necessary to improve the rideability.

The Consulting Engineer shall calculate the tangent run-out length as per as per the TAC-Geometric Design Guide for Canadian Roads manual.

12.2.9 Roadside Safety

Roadside safety is accommodated through the design of the area between the outer edge of the roadway and the right-of-way limits. There are many reasons why a vehicle will leave the pavement and encroach on the roadside. Regardless of the reason for the vehicle leaving the roadway, a roadside environment free of fixed objects with stable, flattened slopes enhances the opportunity for vehicle recovery and a reduction of crash severity.

Design options for reducing roadside obstacles, in order of preference, are as follows:

- Remove the obstacle;
- Redesign the obstacle so it can be safely traversed;
- Relocate the obstacle to a point where it is less likely to be struck;
- Use appropriate break-away devices to reduce impact severities;
- Shield the object with longitudinal traffic barrier designed for redirection or use a crash cushion; and/or
- Delineate the obstacle if the above alternates are not appropriate.

Design features such as horizontal and vertical curvature, lane and shoulder widths, signage, pavement markings, etc. play an important role in keeping the motorist on the traveled way.

The term “clear zone” means the un-obstructed, relatively flat area provided beyond the edge of the travelled way for the recovery of errant vehicles. The clear zone includes any shoulders or auxiliary lanes. Establishing a traversable and un-obstructed clear zone, particularly on high-volume, high speed roadways, will help prevent collisions with fixed objects.

The edge of travelled way is generally determined as follows:

- Arterial roadways – measured from face-of-curb (FOC) or the shoulder (edge) line;
- Divided collector and local roadways – measured from FOC; and
- Undivided collector and local roadways – measured from the edge of the parking lane (generally 2.5m from FOC).

Trees with a trunk diameter of 150 mm or greater, when mature, are considered to be fixed objects that shall be planted outside of the established clear zone.

12.2.10 Pedestrian Accessibility and Safety

The Developer shall design pedestrian environments to be safe, functional, attractive and accessible to all persons.

12.2.11 Traffic Calming

The Institute of Transportation Engineers (ITE) defines traffic calming as "…the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users".

Traffic calming measures shall be determined on a case-by-case basis and follow the recommendations of the Town's current transportation master plan. The Developer must identify proposed traffic calming measures in the outline plan.

The Developer shall consider the following factors in the design of traffic calming measures:

- Weather, particularly winter conditions;
- Topography;
- Existing roadway design standards, especially widths;
- On-street parking conditions;
- Driveway locations near intersections;
- Transit, truck, service and emergency vehicle requirements;
- Designated cycling routes;
- Classification and characteristics of vehicles travelling in the community; and
- Legislation and legal precedents.

Typical traffic calming measures are illustrated in the Canadian Guide to Neighbourhood Traffic Calming Manual.

12.2.12 Auxiliary Lanes on Divided Arterial Roadways

The Developer may consider an auxiliary lane providing right turn in/out access to adjacent properties as an alternative to a frontage road, subject to the Town's approval. The auxiliary lane must have a minimum lane width of 3.5 m.

12.3 ROADWAY CLASSIFICATION

12.3.1 General

This clause describes each type of roadway classification and provides design criteria specific to each classification. Refer to Section 19 of this document for a visual representation of the different classifications.

12.3.2 Highways

Highways are the highest roadway network classification carrying high traffic volumes, typically at high speeds. Since highways are intended for regional traffic movement, direct access from parcels is generally limited. Highways are managed under the jurisdiction of the Province of Alberta and development connecting to a highway requires approval from both the Town and the Province.

12.3.3 Arterial Roadways

Arterial roadways carry large volumes of all types of traffic moving at medium to high speeds. These roadways serve the major traffic flows between the principal areas of traffic generation and connect to collector roads and highways.

Direct access to parcels in adjacent developments from arterial roads is normally prohibited. The Developer shall confine such access to collector roads, local roads, frontage roads and/or auxiliary lanes.

The desirable intersection spacing along arterial roadways is 400 m to 800 m. The Developer shall align intersections that cross arterial roadways to minimize the number of connections.

12.3.4 Collector Roadways

Collector roadways carry traffic between local and arterial roadways. Full access to adjacent parcels is typically allowed on undivided collectors. A collector roadway may connect to areas outside of the outline plan area but must remain within the context of an area structure plan.

Residential collector roadways are generally not permitted to collect traffic from more than 600 dwelling units before connecting to an arterial roadway.

Industrial collector roadways provide both traffic service and land service. Access to adjacent properties is permitted subject to approval of all access locations and widths by the Town.

The minimum distance between opposing intersections along collector roadways in residential neighbourhoods is 80 m, measured from center to center of the respective intersections. Where a collector roadway meets a highway or arterial with intersection controls, the design shall address intersection stacking requirements, which may increase the minimum spacing requirement.

A roundabout analysis is required as part of the traffic impact assessment (TIA) where a collector roadway meets a highway, arterial or collector roadway. The outline plan shall address land use concepts adjacent to collector intersections to ensure that land is protected for roundabouts if a roundabout or all-directional control is dictated in the TIA.

12.3.5 Local Roadways

Local roadways provide land access and connections to collector roadways. Local roadways primarily carry traffic with an origin or destination along its length. They are not intended to carry through traffic. Direct access is normally allowed to all abutting properties. A local roadway shall not connect to areas outside of the outline plan area.

Undivided residential local roadways are generally not permitted to collect traffic from more than 100 dwelling units before connecting to a collector roadway.

The minimum distance between opposing intersections along local roadways in residential neighbourhoods is 45 m, measured from center to center of the respective intersections. The Developer shall avoid intersection spacing of less than 80 m. The Developer shall avoid cross-style (four-legged) intersections at the junction of two local roadways.

12.3.6 Lanes

Lanes provide access to the side or rear yard of residential, commercial and/or industrial lots. Lanes are not intended to carry through traffic. The maximum length of lane before it must connect to a street is 350 m. The Developer shall design the lane layout to discourage shortcutting between streets.

The minimum offset distance from a lane to a street intersection along collector or local roadways in residential or industrial developments is 45 m, measured from center to center of the respective intersections.

Cross-style lane to lane intersections are not permitted. Cross-style lane to street intersections are permitted on local roads where lanes form the opposing cross members. Cross-style lane to street intersections are not permitted where a lane and a street form the opposing cross members. Lanes shall not intersect a street at the bulb end of a cul-de-sac or within the radius of a curve less than 100 m.

12.4 LOCAL AND LANE ROADWAY TYPES

12.4.1 General

This clause describes several types of local and lane roadways and provides design criteria specific to each type.

12.4.2 Cul-De-Sacs

A cul-de-sac is a dead-end road with a turnaround bulb at the termination point.

The maximum length of a cul-de-sac is 200 m measured along the road centerline from the property line of the intersecting roadway to the end of the bulb. A maximum of 40 dwelling units may be developed on a cul-de-sac.

An emergency access is required within 90 m of the bulb end of the cul-de-sac if the lots within the cul-de-sac are serviced from the street, as there is a higher probability of road closure due to utility repairs in this situation.

Lane access is not allowed from the bulb of the cul-de-sac.

Expanded bulb corners, as illustrated in Section 19 of this document, may be used on local roadways in lieu of the minimum radius of curvature noted above in Clause 12.2.6.

12.4.3 P-Loops

A p-loop is a local road with one access that forms the general shape of the letter "P" in its configuration. The p-loop entrance road is the portion of road from the access point to the point where the p-loop splits into the looped section. The maximum allowable length of the p-loop entrance road is 200 m.

The maximum length of a p-loop with an undivided entrance road is 850 m measured along the road centerline and including the length of the entrance and all internal roadways. No more than 85 dwelling units may be developed on a p-loop with an undivided entrance roadway.

The maximum length of a p-loop with a divided entrance road is 1200 m, measured along the road centerline and including the length of the entrance and all internal roadways. No more than 150 dwelling units may be developed on a p-loop with a divided entrance roadway. The entrance roadway must comply with the divided collector roadway standard cross-section.

An emergency access or lane connection must be provided within the loop section if the p-loop entrance road is undivided or if there are deep utilities routed along the entrance road.

12.4.4 Crescents

A crescent is a looped local roadway with two connection points to a collector road.

The maximum length of a crescent or any other local roadway with two entrance roads is 1200 m measured along the road centerline and including the length of all contributing roadways. No more than 180 dwelling units may be developed on a crescent or other local roadway with only two collector access points.

12.4.5 Dead-End Lanes

The Developer shall keep dead-end lanes to a minimum and only use them when a looped lane design is not possible. The Developer shall terminate dead-end lanes

with a turnaround designed to accommodate a SU-9 vehicle. Standard details are illustrated in Section 19 of this document.

12.5 OTHER FEATURES

12.5.1 Curb and Gutter

All roadways require curb and gutter except roadways constructed to a rural cross-section. The Developer shall provide a 0.5 m wide concrete gutter on arterial roadways. The Developer shall provide a 0.25 m wide concrete gutter on all other road classifications.

Reverse gutter may be used where the road crossfall slopes away from the curb (i.e. superelevation, median curbs, etc.).

Standard curb without gutter may be used for medians and islands where the pavement cross-section directs drainage away from the median/island curb along its full length.

The Developer shall use standard curb and gutter on arterial roadway medians, urban industrial roadways, frontage roads, adjacent to school and park areas and along divided sections of residential roadways unless otherwise required by the Town.

The Developer shall use mountable and semi-mountable curb and gutter along arterial roadways as outlined in TAC-Geometric Design Guide for Canadian Roads.

When sidewalk is not proposed adjacent to a lot, the top face of curb shall be stamped with the letters “CC” to indicate all curb stop and standpipe locations.

12.5.2 Medians

Medians may be used on collector and local roadways to separate or delineate traffic streams where required such as arterial intersections, large p-loop entries, etc. Use of medians to create entry features is permitted, but shall be done at a minimum.

The minimum median width is 1.5 m, and medians shall be predominantly hard surfaced to reduce maintenance requirements.

The minimum median width where tree planting is to be included is 5 m (see Sections 17 and 19 of this document).

Front driveways are prohibited in areas where lots front onto divided sections of local or collector roadways. The Developer must provide rear access to lots along divided roadways.

12.5.3 Sidewalks

Requirements for sidewalks along the various road classifications are as follows and must be in accordance with the Town's current transportation master plan. Specific requirements are subject to review by the Town.

The top face of sidewalk shall be stamped with the letters "CC" to indicate all curb stop and standpipe locations. The text shall be orientated to be read when standing on the sidewalk facing the property. If no sidewalk is proposed adjacent to a property, then the top of curb shall be stamped.

Arterial Roadways

The Developer shall construct a minimum 2.5 m wide separate sidewalk on both sides of the roadway to form part of the Town trail system.

Residential Collector Roadways

At a minimum, the Developer shall construct a 2.5 m wide separate sidewalk along one side of the roadway and a 1.5 m separate sidewalk along the other side of the roadway; however, it is preferred that both sides of the roadway have a 2.5 m separate sidewalk for the intent of providing positive connection as part of the Town trail system.

If the Developer chooses to only meet the minimum standard, the 2.5 m sidewalk shall be placed on the side of the roadway that provides the best connectivity to the adjacent existing pedestrian and trail system.

Residential Local Roadways

At a minimum, the Developer shall construct a 1.5 m sidewalk on one side of residential local roadways. It is preferred that the sidewalk is separate sidewalk, but the Developer may propose to interchange a monolithic sidewalk on one side of the roadway at the approval of the Town.

If the Developer chooses to only meet the minimum standard, the sidewalk shall be placed on the side of the roadway that provides the best connectivity.

Industrial, Commercial and Institutional Roadways

The Developer shall construct a 2.5 m separate sidewalk on one side of industrial, commercial and institutional roadways. The Developer shall give consideration to the adjacent land use and connectivity to the existing pedestrian and trail systems when selecting the side of the road on which to place the 2.5 m sidewalk.

12.5.4 Paraplegic Ramps

The Developer shall place paraplegic ramps at the mid-point of the curb return at all intersections involving existing, new or future sidewalk crossings.

12.5.5 Utility Corridors

To facilitate development servicing, corridors outside of standard lane or roadway right-of-ways may be required for routing of utility mains, secondary emergency accesses, walkways and/or major drainage.

Where the utility corridor is to be used for access other than a roadway, lane, walkway and/or major drainage, a public utility lot (PUL) shall be provided. The PUL shall be a minimum 6.0 m wide with a 2.0 m easement on each side for a total minimum right-of-way width of 10.0 m.

Where the utility corridor is only required for routing one utility main (such as to allow for looping of a water distribution system), the PUL shall be a minimum 3.0 m wide with easements on one or both sides to provide a total minimum right-of-way width of 7.0 m.

The following conditions will apply to any easement adjacent to a PUL that contains deep utilities:

- The property owner is not permitted to use the easement area for any purpose other than for lawn and/or garden;
- The property owner is not permitted to place, erect or build any concrete or asphalt driveways, pads or paths, rock gardens, buildings or structures whatsoever within the boundaries of the easement;
- The property owner is not permitted to plant any tree, hedge or other vegetation which in any way prevents or hinders the Town in its rights to maintain all utilities under such lands; and
- The property owner is permitted to park private cars, trucks or recreation vehicles upon such land.

The Developer must register the preceding conditions as caveats on all affected land titles and shall disclose all conditions to the prospective lot purchaser.

12.5.6 Emergency Access

The minimum clear un-obstructed width of an emergency access right-of-way is 6.0 m with a 4.5 m driving surface. The driving surface may be concrete, asphalt, paving stone or turf stone on a properly constructed base.

The Consulting Engineer must structurally and geometrically design the emergency access (e.g. width, turning radii, structure, etc.) to safely carry firefighting equipment loading to a connecting street or lane.

The Developer shall not place emergency accesses in line with a road segment, so that it does not appear to be an extension of the road.

The minimum allowable overhead clearance through an emergency access is 5.0 m.

The Developer must install “Emergency Access” signs at each emergency access and street/lane intersection. The Consulting Engineer shall design the signs to meet the intent of the Alberta Fire Code.

The Developer shall install swing gate or break-away bollards at each street or lane intersection to limit access to traffic other than emergency vehicles. The Developer shall install reflectorized tape on the bollards so they are visible to cyclists and pedestrians at night.

12.5.7 Maintenance Vehicle Access

Critical Infrastructure

Critical infrastructure such as sewer lift stations and pressure reducing valves shall be no more than 5 m from an adjacent roadway. A 4.0 m wide gravel maintenance vehicle access road shall be provided if there is no adjacent roadway within 5 m of the infrastructure. The access road’s minimum road structure shall meet the requirements of a gravel lane as stated in Section 12.2.4 of this document. The access road shall be designed with a 8.0 m turning radius. A pedestrian trail will not be accepted as a maintenance vehicle access for critical infrastructure.

Other Infrastructure

Other infrastructure that requires maintenance, including but not limited to: water hydrants, storm pond inlets and outlets, storm pond control structures, and sewer manholes shall be no more than 20 m from an adjacent roadway. A 3.0 m wide hard surfaced access road shall be provided if there is no adjacent roadway within 20 m of the infrastructure. The access road’s minimum road structure shall meet the requirements of a gravel lane as stated in Section 12.2.4 of this document. The access road shall be designed with a 8.0 m turning radius. A pedestrian trail meeting the above minimum standards is an acceptable maintenance vehicle access road for non-critical infrastructure.

12.5.8 Temporary Access

Where phasing of a development does not allow full build-out of the roadway network, temporary access roads may be considered; however developers are encouraged to phase development to minimize or eliminate the need for temporary accesses.

For temporary dead-end streets serving up to 85 dwelling units, the Developer shall provide a turnaround suitable for SU-9 vehicles at the end of the street. The Developer shall provide interim secondary accesses on temporary dead-end streets serving more than 85 dwelling units or as otherwise required by the Town.

If the temporary turnaround/access will be in use for two (2) years or more, the Developer shall construct it with the same surface material as the street or lane through which they are accessed.

12.5.9 Residential Rear Access

In residential areas where the primary access to a residence is from a back lane or road and the front (access) of the residence faces a green space, the Developer must provide a multi-use trail along the lot frontage (in the green space) to accommodate access. This trail may form part of a larger trail system or connect to a nearby roadway sidewalk. This trail becomes the equivalent of the front sidewalk in a typical residential area. As part of the lot development, the Builder or Lot Owner shall provide a pedestrian connection from the house to the trail. If this connection creates surface disturbance that is adverse to the Developer's interests, the Developer is responsible to negotiate a resolution to the Town's satisfaction.

12.5.10 Driveways

Direct access from private property to arterial roadways is not permitted without provision of an auxiliary deceleration/acceleration lane and the approval of the Town.

The Developer shall set back driveways entering onto collector roadways from intersections in accordance with TAC standards. Front driveways will not be permitted on divided sections of collector and local roadways. The Developer must provide rear access for these lots.

The minimum setback from the nearest FOC in the intersection to the nearest edge of an access to a multi-family, commercial or industrial parcel is 30 m or otherwise in accordance with TAC standards.

12.5.11 Roundabouts and Signalization

The Developer shall identify intersections that require all-directional control, both within the development area and external to the development area, in the TIA. The Developer shall address land use adjacent to these intersections in the outline plan to protect land required for future signalization and/or roundabout construction.

The Developer may wish to construct a roundabout at intersections not deemed to require all-directional control. The development of roundabouts is subject to the approval of the Town.

Consulting Engineers are encouraged to follow the approaches to roundabout design outlined in "Roundabouts: An Informational Guide, Second Edition" (NCHRP Report 672, Dec 2010).

12.5.12 Pavement Marking, Traffic Control Signs and Street Name Signs

Pavement marking, traffic control signs and street name signs shall conform to the Manual of Uniform Traffic Control Devices and must be approved by the Town. The Developer shall submit proposed pavement marking and traffic control sign plans at the time of detailed design submission.

The Developer may choose to upgrade street name signs for an outline plan area. The following conditions apply to upgraded street name signs:

- Sign shape must conform to Section 19 of this document.
- Sign background colour must be green, black, white or blue.
- Sign lettering, border and logo colour must be black or silver.
- Upgraded signs must be consistent for an entire outline plan area.
- Upgraded sign design must be submitted with Phase 1 detailed design drawings for an outline plan area.
- Street name signs adjacent to arterial roadways shall follow the classic design or the arterial road's existing upgraded design.
- Upgraded sign design, including colour, must be to the satisfaction of the Town.

The Developer shall install all pavement markings. Pavement markings must be durable on all collector and arterial roadways.

The Town will order and install all traffic control and street name signs. The Developer shall reimburse the Town for all costs including the supply of signs, mounting hardware and sign posts.

12.5.13 Post and Cable Fencing

The Developer may be required to install post and cable fencing along lanes adjacent to public utility lots, municipal reserves, environmental reserves and public open space areas as specified by the Town.

Post and cable fence shall comply with the requirements detailed in Section 17 of this document.

12.5.14 Roadway Landscaping

The Developer is responsible for landscaping the entire road right-of-way excluding the portion of boulevard between the back-of-walk (BOW) and the property line. Roadway landscaping shall comply with the requirements detailed in Section 17 and Section 19 of this document.

12.6 ROADWAY CONSTRUCTION

12.6.1 Geotechnical Investigation

For each phase of development, after pre-grading and prior to initiating roadway construction, the Consulting Engineer shall complete a separate geotechnical investigation to confirm the pavement structure design assumptions contained within the original geotechnical report. This geotechnical investigation will verify the subgrade support strength that the in-situ soils will provide for proposed road sections.

The Consulting Engineer shall determine in-situ moisture contents and soaked CBR values on soil samples taken from test pits and/or boreholes advanced to a depth representative of the upper 1.0 m of the proposed roadway's subgrade. The minimum frequency of the test pit and/or borehole locations is one test per 200 m along proposed roadway alignments.

The Consulting Engineer shall state the findings of the geotechnical investigation in a geotechnical report. The geotechnical report shall verify the original pavement design assumptions and, based on the findings of the above mentioned field sampling and testing requirements, substantiate the proposed pavement structure design. The report shall include in-situ moisture contents and the soaked CBR values for subgrade soils from all test pits. The report is to be approved by the Town before roadway construction proceeds.

12.6.2 Subgrade Preparation and Improvement

While the suggested pavement structure thicknesses listed in Table 12-2 are based on a CBR value of 4.0, the level of subgrade support available in Sylvan Lake soils after site grading and intermixing of surficial soils is expected to be equivalent to a soaked CBR value ranging from 2 to 5. Local soil conditions dictate that subgrade support will typically be slightly below the design levels. In areas where the water levels are close to the existing surface grades, there will be the potential for groundwater to be pumped up into the subgrade soils by surface vibrations from construction traffic. This rise in groundwater and subgrade moisture content will be accompanied by a significant loss of strength in the subgrade soils.

Typical local practice for road base construction for sensitive subgrades is to thicken the granular sub-base layer of the pavement section (i.e. construct a working platform of free-draining coarse gravel). Placement of this thickened granular subbase will support construction traffic and will improve the level of subgrade support for the design pavement section. The required thickness of the sub-base gravel will vary across the site depending on actual subgrade conditions. The Developer shall contact a geotechnical firm to determine acceptable depths of granular subbase required to provide the necessary support.

The Developer shall follow construction procedures designed to minimize disturbance to the sensitive subgrades and to protect the integrity of the granular working mats. If the subgrade has failed during construction, the Developer may have to sub-cut and replace the weakened material with an approved fill material on top of a filter fabric.

Required granular thickness, initial lift thickness and the need for any special construction procedures are best determined by a qualified geotechnical engineer based on observations at the time of construction.

Where seasonally high groundwater has been identified within 1.0 m of the proposed finished roadway elevation, either through a geotechnical report or field conditions, the Developer shall install wick drains to promote subgrade drainage, particularly at sag points in the roadway.

12.6.3 Front Street/Primary Access Servicing

In residential neighbourhoods where deep utility services are proposed from the street or primary access laneway of the lot, the following design changes and construction practices are required:

- To ensure a uniform subgrade condition is achieved to minimize the potential for adverse impacts on the roadway surface due to differential settlements between trench (i.e. main and services) backfill and non-trenched areas within the roadway, the Developer shall excavate the existing material to a depth of 1.5 m below finished grade and thoroughly mix and replace in the roadway to create a homogenous subgrade condition below the finished roadway elevation for the full width of the roadway. Full width of the roadway is defined as being from 300 mm behind the back of concrete to 300 mm behind back of concrete. Back of concrete is considered to be back of monolithic walk or separate sidewalk for the relevant road cross-section. The Town will consider alternative proposals from a Professional Geotechnical Engineer to use special materials or methods that will achieve long term stability of the trench backfill.
- The minimum finished depth of asphaltic concrete on local roads and primary access lanes with deep utility services is 90 mm.
- The Developer may place the initial lift of asphalt with a 3% crown to reduce the impact of potential settlement.
- The Consulting Engineer must perform field testing as per Table 12-3 below, which is modified from the general testing frequencies listed in Section 10 of this document.

Table 12-3: Minimum Test Frequencies for Front Street/Primary Access Servicing Construction

Test	Minimum Test Frequency
Backfill Soil	
Standard Proctor	1 per material type
Field Densities - Trench	2 tests per 600 mm of depth per **50m** of trench
Road Base/Subbase/Subgrade	
Standard Proctor/Sieve for Granular	1 per material type
Standard Proctor - Subbase and Base	1 per material type
Field Densities - Grading Fill	1 test per **125 m^3**
Field Densities - Subgrade Preparation	1 test per **500 m^3**
Field Densities - Subbase	1 test per **1500 m^2**
Field Densities - Base	1 test per **500 m^2**
Asphalt	
Field Marshall	1 test per **1000 t**
Cores	1 core per **1000 t**

A geotechnical technician, overseen by the Consulting Engineer, must provide full time inspection during trench (main and service) backfilling operations. Written

certification of compliant backfill material placement and compaction, stamped and sealed by a Professional Engineer licensed to practice in the Province of Alberta, is to be provided to the Town at the time of application for the CCC for the deep underground utilities.

12.6.4 Asphalt Placement

The maximum allowable depth of a single lift of asphalt is 75 mm. The minimum initial depth of asphalt is 50 mm, with the exception of paved lanes which may have an initial lift of 75 mm. The minimum depth of successive lifts including levelling course is 40 mm.

Prior to placing top lift asphalt, the Developer shall rectify deviations in the first lift of asphalt in excess of specified vertical tolerance by milling and/or overlaying the bottom lift asphalt such that the top lift can be placed at a uniform depth.

The Developer shall delay the final lift of asphalt paving a minimum of one (1) year following the initial lift of asphalt.

END OF SECTION

APPENDIX 12.A ROADWAY GEOMETRIC DESIGN PARAMETERS

Roadway Designation	Design Parameters								
	TAC Design Classification	Daily Service Volume (vpd)	Right Of Way Width (minimum)	Horizontal Alignment Minimum Radius of Curvature	Minimum Intersection Angle (degrees)	Intersections Curb Return Radii (m)			
						Arterial Roadway	Collector Roadway	Local Roadway	Lanes
Arterial	UAU 70	<20,000	32 m	250 m	75	30 x 30	10 x 10	N/A	N/A
Residential Collector*	UCU 60	<10,000	21 m	185 m NC 135 m RC	75	10 x 10	5 x 5	5 x 5	N/A
Residential Local*	ULU 50	<3,000	17 m	115 m	75	N/A	5 x 5	5 x 5	N/A
Rural Industrial Collector	RCU 60	<10,000	24 m	185 m	75	10 x 10	10 x 10	10 x 10	N/A
Urban Industrial Collector	UCU 60	<10,000	20 m	185 m	75	10 x 10	10 x 10	10 x 10	N/A
Rural Industrial Local	RLU 50	<3,000	24 m	115 m	75	N/A	10 x 10	10 x 10	N/A
Urban Industrial Local	ULU 50	<3,000	20 m	115 m	75	N/A	10 x 10	10 x 10	N/A
Lanes (one or fewer deep utilities)	20	<500	6 m	Not Permitted	75	N/A	N/A	N/A	5 x 5
Lanes (two or more deep utilities)	20	<500	7 m	Not Permitted	75	N/A	N/A	N/A	5 x 5

* Environmental capacity of collector and local roadways within residential areas is 5,000 vpd and 1,000 vpd respectively.

APPENDIX 12.B MINIMUM ROADWAY DESIGN STANDARDS

Roadway Designation	Minimum Design Standards								
	TAC Design Classification	Horizontal Alignment		Vertical Alignment			Intersections		
		Rate of Superelevation (as per TAC)		Road Gradient (%)			Curb Return Radii (m)		
		Desirable Rate (m/m)	Maximum Rate (m/m)	Maximum Grade	Desired Maximum Grade	Minimum Grade	Arterial Roadway	Collector Roadway	Local Roadway
Arterial	UAD 70	0.04	0.06	6.00	3.00	1.00	See Section 19 of this document	15	N/A
Residential Collector	UCD 60	Normal Crown 0.20	Reverse Crown 0.20	9.00	6.00	1.00	15	8	8
Residential Local	ULU 50	Normal Crown 0.20	Normal Crown 0.20	9.00	6.00	1.00	N/A	8	8
Rural Industrial Collector	RCU 60	Normal Crown 0.20	Reverse Crown 0.20	6.00	6.00	1.00	See Section 19 of this document.		
Urban Industrial Collector	UCU 60	Normal Crown 0.20	Normal Crown 0.20	6.00	6.00	1.00			
Rural Industrial Local	RLU 50	Normal Crown 0.20	Normal Crown 0.20	6.00	6.00	1.00	N/A	See Section 19 of this document.	
Urban Industrial Local	ULU 50	Normal Crown 0.20	Normal Crown 0.20	6.00	6.00	1.00	N/A		
Gravel Lanes	20	N/A	N/A	9.00	6.00	0.80	N/A	N/A	N/A
Paved Lanes	20	N/A	N/A	9.00	6.00	0.80	N/A	N/A	N/A

13 WATER DESIGN

13.1 GENERAL

The water system consists of the groundwater supply wells, reservoirs, booster stations, trunk water mains, distribution mains and appurtenances.

The design of the water system shall conform to the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems as published by Alberta Environment and Parks and as amended by these standards and guidelines.

This section provides a summary of the design standards and guidelines for water systems in the Town of Sylvan Lake.

13.2 DESIGN FACTORS

13.2.1 Pressure Zones

The water system is divided into three pressure zones as illustrated in Section 19 of this document. The Consulting Engineer must design the distribution system with consideration to the current pressure zones.

13.2.2 Hydraulic Analysis Requirements

The Consulting Engineer shall perform a hydraulic network analysis using a method acceptable to the Town for all developments to ensure both domestic and fire flow requirements are met. The Consulting Engineer shall submit a report outlining the results of the analysis to the Town with the detailed design drawings. It is preferable that the Consulting Engineer completes a WaterCad model for their development area with the boundary information supplied by the Town upon request.

13.2.3 Design Parameters

The Consulting Engineer shall use the following parameters in the design or evaluation of the water distribution system:

Hazen-Williams Coefficient (C)

The Hazen-Williams coefficient (C) shall be as follows:

- Polyvinyl chloride (PVC) = 140
- Asbestos cement (AC) = 130
- Ductile iron (DI) or cast iron (CI) = 80 to 100
- High-density polyethylene (HDPE) = 150

Distribution Main Sizes

The permitted minimum size of distribution mains are:

- Residential = 150 mm diameter
- Industrial = 200 mm diameter

Where two hydrants are installed on an un-looped distribution main, the permitted minimum size of the main is 200 mm diameter.

Residential per Capita Consumption Rates

For residential developments, demand is:

- Average Day Demand: 271 litres per capita per day.
- Maximum Day Demand: 750 litres per capita per day.
- Peak Hour Demand: 1500 litres per capita per day.

Non-Residential Consumption Rates

For non-residential developments, the minimum water consumption rate is 0.2 L/s/ha. Calculate the applied peaking factor as per Equation 13-1 below. In addition, evaluate water demand for large developments based on site specific service requirements as well as fire flow requirements.

Equation 13-1

$$P_F = 10 \times Q^{-0.45}, but\ not\ less\ than\ 2.5\ nor\ greater\ than\ 25$$

Where:

- P_F = peaking factor
- Q = flow rate (L/s)

Design Population

The design population is the ultimate population in the outline plan area based on the approved outline plan.

Fire Flow Requirements

Fire flow requirements are in accordance with the recommendations of the Fire Underwriters Survey for type of development being considered. The minimum fire flow used for single family residential neighbourhoods is 4,500 L/min.

Pressure

Minimum residual line pressure under maximum day plus fire flow conditions is 150 kPa at ground level of any point in the system. Minimum residual line pressure under peak hour flow conditions is 300 kPa.

Minor pressure losses through valves and fittings must be accounted for.

Velocity

Main line flow velocities shall not exceed 1.5 m/s during peak hour flow conditions and 2.5 m/s during maximum day plus fire flow conditions.

13.3 WATER DISTRIBUTION MAINS

13.3.1 General

The grid mains must coincide with those in adjacent developments to maintain the continuity of main sizes between developments. The Developer shall design continuous (looped) distribution mains wherever possible. No more than 30 dwelling units are permitted service on an un-looped (dead-end) section of water main.

The Developer must analyze water demands in industrial, commercial and high-density areas to determine the grid and main sizes required.

The Developer shall place an air release valve or hydrant at significant high points in the water main profile to allow for purging of stale water or air.

The Developer shall install a hydrant at the end of all dead-end water mains to facilitate flushing and disinfection of the main.

13.3.2 Alignments

The Developer shall locate water mains on the standard alignments shown in Section 19 of this document and shall use consistent alignments along the entire length of a street, lane or public utility lot. The Developer shall provide a minimum separation of 3.0 m from sanitary and storm sewers in all instances, unless approved otherwise by the Town.

13.3.3 Depth of Cover

The Developer shall install water mains with a minimum depth of cover of 2.7 m from the road, lane or utility lot surface grade to the top of the main. When the depth of bury is less than 2.7 m, the Developer shall insulate the main/service as specified in the Town's current General Construction Specifications.

13.4 HYDRANTS

13.4.1 Spacing

The maximum spacing between hydrants measured along the centerline of the right-of-way is 150 m in residential areas and 120 m in multi-family residential, school and industrial/commercial areas. The maximum distance between a hydrant and the primary entrance of any building is 90 m as measured along the line of the emergency vehicle access.

13.4.2 Alignment and Placement

Hydrants shall be placed at street intersections where possible to improve their visibility to emergency vehicles, particularly at cul-de-sac entrances. The Developer shall locate fire hydrants at an alignment of 1.45 m back of face-of-curb (FOC). The Developer shall install hydrants at the beginning or end of the curb return when a hydrant is installed at the corner of an intersection.

13.4.3 Hydrant Type

Hydrants shall have plugged drain holes and be manufactured by an approved hydrant manufacturer listed in the Town's current General Construction Specifications.

13.4.4 Depth of Bury

The depth of bury is defined as the distance from the invert of the suction elbow to the underside of the grade line flange. Minimum depth of bury is 2.65 m. The Developer shall set the underside of the grade line flange at an elevation of 100 mm above the finished back-of-walk (BOW) elevation.

13.5 VALVES AND FITTINGS

13.5.1 Alignment and Placement

The Developer shall locate main valves such that a maximum of thirty (30) single family lots and one (1) hydrant are involved in a shut down and a maximum of four (4) valves are required to shut down any section of line. Valve spacing measured along the water main shall not exceed the distances listed in Table 13-1:

Table 13-1: Maximum Valve Spacing for Water Pipes

Pipe Diameter	Maximum Spacing
75 mm	60 m
100 mm to 150 mm	150 m
200 mm and larger	250 m

The design standard is two (2) valves at a tee and three (3) valves at a cross, unless approved otherwise by the Town. The Developer shall install a valve and one length of pipe at interim limits of construction.

The Developer shall align valves at standard locations in accordance with Section 19 of this document.

13.5.2 Protection

Where required by the Town or as indicated by soils testing, the Developer shall wrap all cast iron valves and fittings with Denso Anti-Corrosion Product or approved equivalent to prevent corrosion.

13.5.3 Operation of Boundary Valves during Construction

The Developer shall clearly identify boundary valves on the engineering drawings. Basic procedures for operating existing valves during construction are outlined in the Town's current General Construction Specifications.

13.6 WATER MAIN FLUSHING AND DISINFECTION PROCEDURES

The Developer shall submit proposed disinfection/flushing procedures to the Town for review with the detailed design drawings.

The standards outlined in AWWA C651 current edition, "Disinfecting Water Mains" and the Town's current General Construction Specifications must be met when installing water mains connected to the Town's water distribution system. The Developer must collect all necessary water samples.

Water supply for public consumption will not be turned on until the Town has approved flushing drawing(s), received clean water sample(s) results and the mains have been cleared of flushing water.

END OF SECTION

14 SANITARY DESIGN

14.1 GENERAL

The sanitary system must be designed with consideration for the service area boundaries established by the Town for each sanitary trunk system.

The design of the sanitary system shall conform to the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems as published by Alberta Environment and Parks and as amended by these standards and guidelines.

This section provides a summary of the design standards and guidelines for sanitary systems in the Town of Sylvan Lake.

14.2 DESIGN FACTORS

14.2.1 Residential (Population Generated) Flows

The Consulting Engineer shall calculate residential dry weather flows according to Equation 14-1 through Equation 14-3:

Equation 14-1

$$Q_{PDW} = \frac{(G \times P \times Pf)}{86.4}$$

Equation 14-2

$$P = \frac{\text{Population per Hectare} \times \text{Contributing Area}}{1000}$$

Equation 14-3

$$Pf = 1 + \frac{14}{4 + P^{0.5}}$$

Where:

- Q_{PDW} = the peak dry weather design flow rate (L/s)
- G = 320 L/day/person
- P = the design contributing population in thousands
- PF = Harmon's Peaking Factor

14.2.2 Non-Residential Flows

For detailed system design, the Consulting Engineer shall estimate the average wastewater flow from non-residential land use areas according to the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems.

The Consulting Engineer shall evaluate large non-residential developments based on site specific service requirements.

The lower limit for average dry weather flow is:

- Q_{AVG} = 0.20 L/s/ha

The Consulting Engineer shall determine peak dry weather flows according to Equation 14-4 and Equation 14-5.

Equation 14-4

$$Q_{PDW} = PF \times Q_{AVG}$$

Equation 14-5

$$PF = 10\left(Q_{AVG}{}^{-0.45}\right), but\ not\ less\ than\ 2.5\ nor\ greater\ than\ 25$$

14.2.3 Extraneous Flow Allowances - All Land Uses

The Consulting Engineer shall apply a general allowance of 0.20 L/s/ha, irrespective of land use classification, to account for wet weather inflow to manholes and for infiltration into pipes and manholes.

The Consulting Engineer shall locate sanitary manholes away from roadway sag points whenever possible.

14.3 SANITARY SEWER MAINS

14.3.1 General

The Consulting Engineer shall design sanitary sewers for gravity flow unless approved otherwise by the Town.

14.3.2 Flow Capacity

The Consulting Engineer shall calculate sewer hydraulics using Manning's equation. All sewers in a straight alignment shall be sized using a Manning's ‘n’ value of 0.013 for all smooth-wall pipe. For curved sewers, the Consulting Engineer shall increase the ‘n’ value as approved by the Town.

14.3.3 Minimum Sizes

Sanitary sewer mains must be 200 mm inside diameter or larger.

14.3.4 Minimum Slope

The Consulting Engineer shall lay sanitary mains in a straight alignment between manholes meeting the minimum grades listed in Table 14-1:

Table 14-1: Minimum Grades for Sanitary Mains

Pipe Diameter	Minimum Grade
200 mm	0.40 %
250 mm	0.28 %
300 mm	0.22 %
375 mm	0.15 %
450 mm	0.12 %
525 mm	0.10 %
600 mm and larger	0.10 %

The Consulting Engineer shall base the hydraulic capacity of a gravity sanitary sewer on such factors as projected in-service roughness coefficient, slope, pipe material and actual in-service flows. The Consulting Engineer shall choose sewers larger than the minimum size required so that the minimum velocity at the peak dry weather flow is greater than 0.6 m/s for self-cleaning purposes. For the upstream reaches of the sanitary system, where it is not feasible to obtain a 0.6 m/s flow velocity, the Consulting Engineer shall maximize the pipe slope within the limits dictated by the system depth constraints. The Consulting Engineer shall optimize the use of the available elevation differences to provide extra slope in the reaches of the sewer system where design flows are minimal.

14.3.5 Pipe Strength

The strength of the pipe must be sufficient to carry the loads due to trench backfill and all live loads. The Consulting Engineer shall calculate the strength of pipe on the basis of the external loads, trench conditions and class of bedding provided. Class B sand bedding is the minimum bedding requirement.

14.3.6 Alignment

The Consulting Engineer shall locate sanitary mains on the standard alignments shown in Section 19 of this document and shall use consistent alignments along the entire length of a street, lane or public utility lot. The Consulting Engineer shall provide a minimum separation of 3.0 m from water mains in all instances, unless approved otherwise by the Town.

14.3.7 Depth of Cover

The Developer shall install sanitary sewers at a minimum depth to satisfy the conditions of Section 16 of this document but not shallower than 2.7 m, unless approved otherwise by the Town. When the depth of bury is less than 2.7 m, the Developer shall insulate the main/service as specified in the Town's current General Construction Specifications.

14.3.8 Curved Sewer

It is recommended that sanitary sewers be laid with straight alignments between manholes. However, curved sewers are permitted in accordance with the following restrictions:

- Lay the sewer as a simple curve with a radius equal to or greater than that recommended by the pipe manufacturer. The minimum allowable radius is 60 m.
- The curve shall run parallel to the centerline of the right-of-way.
- The minimum grades shall meet the requirements of Table 14-2 below.

Table 14-2: Minimum Grades for Curved Sanitary Mains

Pipe Diameter	Minimum Grade
200 mm	0.40 %
250 mm	0.31 %
300 mm	0.25 %
375 mm	0.18 %
450 mm	0.15 %
525 mm	0.13 %
600 mm and larger	0.10 %

14.4 MANHOLES

The Developer shall install manholes at the end of each line, at all changes in sewer size, grade or alignment, at all junctions and at maximum intervals of 150 m along the length of the sewer. The Developer shall not locate manholes in areas subject to ponding during rainstorm and snowmelt events. Cleanouts may only be used for special conditions and must be approved by the Town. The Developer may not substitute cleanouts for manholes and shall not install cleanouts at the end of laterals greater than 50 m in length.

To maintain a continuous energy gradient through manholes, the upstream pipe obverts (crowns) must be equal to or above the obvert of the downstream pipe. Where the upstream and downstream pipe sizes are equal, the Developer shall install the downstream pipe invert at least 30 mm below the upstream pipe invert. Where a change in pipe alignment occurs in a manhole, the Developer shall install the downstream pipe invert at least 50 mm below the lowest upstream pipe invert.

Sanitary sewers shall extend 1.5 m past the last house service lead, with the exception of sanitary mains in cul-de-sacs where service leads may connect directly to the manhole provided the lead enters the manhole a maximum of 0.60 m above the obvert of the main. A maximum of five (5) services are allowed to enter a dead-end manhole and a maximum of four (4) services are allowed to enter a flow through manhole within a cul-de-sac.

The flow channel through manholes shall conform to the shape and slope of the sewer pipe. The minimum flow channel depth is half (1/2) the diameter of the downstream sewer.

The Developer shall use an interior drop manhole where inlet and outlet sewers invert elevations differ by more than 750 mm.

The Developer shall install standard 1200 mm diameter pre-cast manholes on mains with a diameter of 750 mm or less and install pre-cast manhole vaults or an oversized manhole barrel on mains with a diameter of 900 mm or greater. A "T-Riser" manhole may be used on mains 1200 mm in diameter and larger, provided there is no deflection in alignment or grade.

Manhole bases shall be pre-cast complete with flow channel, benching and pipe stubs. See manhole details in the Town's current General Construction Specifications.

END OF SECTION

15 STORMWATER DESIGN

15.1 GENERAL

The storm system must be designed with consideration for the existing drainage area boundaries established by the Town for each storm trunk system. The Consulting Engineer shall discuss all pertinent data regarding the development with the Town prior to proceeding with the design.

The design of the storm system shall conform to the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems as published by Alberta Environment and Parks and as amended by these standards and guidelines.

This section provides a summary of the design standards and guidelines for storm systems in the Town of Sylvan Lake.

15.2 DESIGN FACTORS

15.2.1 Major and Minor Systems

The Consulting Engineer shall design the storm drainage system using a dual drainage concept consisting of a minor system and a major system.

The minor system, comprised of pipes, manholes, catch basins, stormwater management facilities (SWMFs) and outfall structures, shall convey run-off from snowmelt and rainfall events to an adequate receiving stream or pond without sustaining any surface ponding or excessive surface flows for events up to a 1:5 year return period, where reasonably attainable in the opinion of the Town.

The major system comprises the street system, SWMF, parkland and any other routes required to convey run-off during rainfall events up to a 1:100 year return period to the receiving water body. The Consulting Engineer shall design the major system to ensure no flooding that may cause significant property damage (e.g. flooding of buildings) occurs during the 1:100 year storm event, where reasonably attainable in the opinion of the Town. Development sites within the Town of Sylvan Lake require the construction of SWMF or pond storage on each site developed. The Developer shall construct the SWMF so outlet flow rates do not exceed a pre-development release rate of 2.10 L/s/ha. Any large industrial or similar development must provide additional barrier or treatment for industrial run-off constituent removal as necessary and/or required.

15.2.2 Rainfall Intensity-Duration-Frequency (IDF)

The formulas in Table 15-1 define the intensity-duration-frequency (IDF) curves used by the Town. The formulas have been developed from the precipitation data from Atmospheric Environment Services of Environment Canada taken at Red Deer Airport from 1959 to 2012 (data published 2014).

Table 15-1: Extrapolated IDF Formulas

Frequency	Interpolated Intensity (mm/hr)
1:2 year	$15.3/t^{0.674}$
1:5 year	$21.6/t^{0.697}$
1:10 year	$25.7/t^{0.706}$
1:25 year	$30.9/t^{0.715}$
1:50 year	$34.8/t^{0.719}$
1:100 year	$38.6/t^{0.723}$

Where:

- t = storm duration in hours

15.2.3 Rational Method Design

The Consulting Engineer shall use the Rational Method of analysis to determine design flows for piped storm sewer systems of predominantly residential, commercial and/or industrial land up to 65 ha (160 ac) in area. Alternatively, computer modelling may be used (see Clause 15.2.4 below). The Rational Method formula is defined in Equation 15-1.

Equation 15-1

$$Q = \frac{CiA}{360}$$

Where:

- Q = the design peak flow rate (m^3/s)
- C = the run-off coefficient
- i = the rainfall intensity (mm/hr) corresponding to the time of concentration
- A = the area of contributing run-off surface (ha)

The Consulting Engineer shall use the following parameters in the design or evaluation of the storm system:

Run-Off Coefficient (C)

Minimum recommended run-off coefficient (C) values to be used in the Rational Method are defined in Table 15-2.

Table 15-2: Minimum Recommended Run-Off Coefficients (C)

Land Use or Surface Characteristics	Storm Frequency	
	5 Year	100 Year
Residential	0.35	0.60
Apartments	0.70	0.80
Downtown Commercial	0.85	0.90
Neighbourhood Commercial	0.65	0.80
Lawns, Parks, Playgrounds	0.20	0.30
Undeveloped Land (Farmland)	0.10	0.20
Paved Streets	0.90	0.95
Gravel Streets	0.25	0.65

In development areas where a mixture of land uses or surface characteristics are proposed, the Consulting Engineer shall use the weighted average of pervious and impervious area run-off coefficients.

Storm Duration

To determine the rainfall intensity for the Rational Method, the Consulting Engineer shall use a storm duration equal to the time of concentration for the catchment (which equals the inlet time plus the time of travel in the sewer). The inlet time is the time for run-off from the furthest reach of the catchment to flow overland to the first inlet and normally shall not exceed ten (10) minutes. The time of travel is the time for flow from the furthest inlet to reach the point of design, based on full flow pipe velocities.

15.2.4 Computer Modelling

The Consulting Engineer shall use computer modelling in the instances described below:

- Use computer models to determine design flow conditions in sewer systems with drainage areas larger than 65 ha (160 ac). Computer models may be used for smaller systems as an alternative to the Rational Method.
- Use computer models to determine design flows and the sizing of systems that contain non-pipe SWMF (e.g. ponds) or systems that include a significant amount of undeveloped land.
- Use computer models to simulate both major and minor systems when large parcels (quarter section or larger) are being developed and will connect to the existing SWMF. As a general rule, this model will have sub-basins no larger than 5 ha. Use software that is input/output compatible with XP-SWMM.

The Consulting Engineer shall select an appropriate computer model based on an understanding of their principles, assumptions and limitations in relation to the system being designed. Acceptable computer models are USEPA SWMM, OTTSWM, XP-SWMM, EXTRAN and OTTHYMO.

Wherever possible, the Consulting Engineer must calibrate the computer model. In all analyses, the Consulting Engineer shall submit an overall drawing to the Town that clearly identifies the parameters used, the drainage boundaries, the pipe network and its connectivity along with computer model input and output and a design summary report.

The storm duration used for modelling simulations will depend on the type of system being analyzed. Depending on basin characteristics and outlet rates, short duration storms (1 to 4 hours) will generally govern the design of the storm sewer systems and the longer duration storms (6 to 24 hours) will generally govern the design of SWMF and major system components. Therefore, the Consulting Engineer shall evaluate several design storms to determine the worst run-off result for the system being designed.

The Consulting Engineer may route historical continuous rainfall data in one hour increments over the past 25 or more years through the storm run-off model to provide statistical frequency analysis of various flow and storage characteristics of the catchment in question.

The Consulting Engineer shall use the Chicago Method to develop the design storm hyetograph, unless otherwise approved by the Town.

15.2.5 Service Connections

The Developer must not discharge effluent from sanitary sewers or surface drainage from industrial, agricultural or commercial operations that has potential for contamination to the storm sewer.

The Developer shall not connect roof leaders to the storm sewer system. Roof drainage from residential housing units, apartments, commercial and industrial buildings shall discharge to grassed or pervious areas except where building density makes this impractical (e.g. central business district) and is approved in writing by the Town.

The Developer shall provide weeping tile connections to the storm sewer for all buildings. Where the storm sewer service will be higher than the footing elevation, the Developer shall make the connection using a sump pump.

Site Drainage and Storm Sewer Service Restrictions

All developments require detailed site grading drawing(s) identifying storm drainage patterns, on-site detention, storm sewers, manholes and catch basins.

Where a storm sewer exists adjacent to a property and the site is larger than 0.2 ha (0.5 acres) in size, on-site catch basins and connection to the Town's storm sewer system is generally required.

If the site is between 0.2 ha and 0.4 ha and a large portion of the site is landscaped, on-site catch basins and storm sewer connections may not be required at the discretion of the Town.

The Consulting Engineer must provide calculations for storm sewer and detention sizing for sites containing an on-site storm sewer system.

Re-Development Areas Design Criteria

Where the new service is connected to an existing main, the Consulting Engineer shall calculate the allowable capacity for the development using Equation 15-2.

Equation 15-2

$$Allowable\ Capacity = \frac{Development\ Area \times Capacity\ of\ Main}{Upstream\ Catchment\ Area}$$

The calculated capacity of the service will likely be less than a 1:5 year storm discharge, but the maximum allowable discharge is the 1:5 year discharge as calculated for new development areas.

New Development Areas Design Criteria

Where the new service is connected to a new main, the Consulting Engineer shall use the 1:5 year rainfall IDF curve and the appropriate run-off coefficient to determine the allowable capacity for the development.

Major Drainage Ponding

The 1:25 year storm shall be detained on site, and the Consulting Engineer shall provide an emergency drainage route for the 1:100 year event. If an emergency route cannot be provided, the 1:100 year storm shall be detained on site.

15.2.6 Length of Run

The maximum length of run for surface water originating in a street is 150 m until it must be intercepted by a catch basin.

The maximum length of run for surface water originating in a lane/swale is 200 m until it must be intercepted by a catch basin.

15.3 LOT GRADING

15.3.1 General

Lot grading plans are a critical component of the major drainage system and are required to establish the drainage relationship between streets, adjacent lots, surrounding developments and existing topography. This clause provides the

design requirements for grading of land, whether it relates to an outline plan area, a large site (e.g. industrial, commercial, multi-family or open space) or an individual residential lot.

15.3.2 Lot Grading

The Consulting Engineer shall design residential lot grading in accordance with Section 19 of this document and the following criteria:

- Grade each lot to drain to public right-of-ways. Stormwater discharge to adjacent private property is not permitted.
- Grade the site away from buildings at minimum 2% for a minimum 2 m perimeter.
- Lots lower than adjacent roadways are not permitted.
- Lowest top of footings shall be above the major storm systems hydraulic grade line for a 100 year storm event.

For multi-family developments of three or more units where surface drainage for individual lots cannot drain directly to a public right-of-way, cross lot surface drainage will be required. The Consulting Engineer shall clearly define the cross lot drainage swale required to convey surface drainage to a public right-of-way or internal storm system on the building grade plan(s).

15.3.3 Back of Lot Drainage

The following applies to back of lot drainage in lane-less developments:

- For back-to-back lots, the Developer shall construct a concrete swale along the rear property lines within a Town easement to direct overland drainage to a street. The Developer shall construct concrete swales with continuous grade lines with a minimum 0.8% slope to convey rear lot drainage to a catch basin located in a street or utility right-of-way.
- For lots backing onto a park, public utility lot or reserve area, the Developer shall construct a grass swale within the park, public utility lot or reserve area adjacent to the rear lot line. The Developer shall construct grass swales with continuous grade lines with a minimum 0.8% slope to convey rear lot drainage to a catch basin located in a street or utility right-of-way.

In order to prevent ice build-up and dirt accumulation on sidewalks, flow from rear lot swales is prohibited to cross sidewalks. A catch basin may be required at back-of-walk (BOW) to intercept these flows.

15.3.4 Public Utility Lots

The minimum longitudinal surface grade for a grassed public utility lot in new developments is 2%. Where a hard surface is to be used to convey the overland

drainage, the longitudinal grade may be reduced to 0.8% subject to the approval of the Town.

The boulevard is defined as the area from BOW or curb to the edge of right-of-way. The Developer shall grade boulevards at a minimum slope of 2% to provide positive drainage to the street.

15.3.5 Open/Green Spaces

Drainage is not permitted to run from public open spaces or the right-of-way onto or through private property. If private property abuts a public open space or right-of-way, the Developer shall provide a swale on the public open space/right-of-way to direct drainage and convey it to the storm sewer system.

15.4 STORM SEWER MAINS

15.4.1 General

The Consulting Engineer shall design storm sewer mains for gravity flow unless approved otherwise by the Town.

15.4.2 Flow Capacity

The Consulting Engineer shall calculate sewer hydraulics using Manning's equation. All sewers in a straight alignment shall be sized using a Manning's ‘n’ value of 0.013 for all smooth-wall pipe. For curved sewers, the Consulting Engineer shall increase the ‘n’ value as approved by the Town.

15.4.3 Minimum Sizes

Storm sewer mains must be 300 mm inside diameter or larger. Service pipes installed for weeping tile connections only must be 200 mm inside diameter or larger with a minimum grade of 0.40%.

15.4.4 Minimum Slopes

The Consulting Engineer shall lay storm mains in a straight alignment between manholes meeting the minimum grades listed in Table 15-3:

Table 15-3: Minimum Grades for Storm Mains

Pipe Diameter	Minimum Grade
200 mm (foundation connections only)	0.40 %
250 mm (foundation connections only)	0.28 %
300 mm	0.22 %
375 mm	0.15 %
450 mm	0.12 %
525 mm	0.10 %
600 mm and larger	0.10 %

When flowing full, minimum storm sewer velocity is 0.60 m/s. Flow velocities less than 0.9 m/s are not recommended. When the flow velocity exceeds 3.0 m/s, the Consulting Engineer shall give special consideration to the design of junctions and bends in the system. Refer to Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems published by Alberta Environment and Parks.

15.4.5 Pipe Strength

The strength of the pipe must be sufficient to carry the loads due to trench backfill and all live loads. The Consulting Engineer shall calculate the strength of pipe on the basis of the external loads, trench conditions and class of bedding provided. Class B sand bedding is the minimum bedding requirement.

15.4.6 Alignment

The Consulting Engineer shall locate storm mains on the standard alignments shown in Section 19 of this document and shall use consistent alignments along the entire length of a street, lane or public utility lot. The Consulting Engineer shall provide a minimum separation of 3.0 m from water mains in all instances, unless approved otherwise by the Town.

15.4.7 Depth of Cover

The Developer shall install storm sewers at a minimum depth to satisfy the conditions of Section 16 of this document but not shallower than 1.5 m, unless otherwise approved by the Town. When the depth of bury is less than 2.7 m, the Developer shall insulate the main/service as specified in the Town's current General Construction Specifications.

15.4.8 Curved Sewers

It is recommended that storm sewers be laid with straight alignments between manholes. However, curved sewers are permitted in accordance with the following restrictions:

- Lay the sewer as a simple curve with a radius equal to or greater than that recommended by the pipe manufacturer. The minimum allowable radius is 60 m.
- The curve shall run parallel to the centerline of the right-of-way.
- The minimum grades shall meet the requirements of Table 15-4 below.

Table 15-4: Minimum Grades for Curved Storm Mains

Pipe Diameter	Minimum Grade
200 mm (foundation connections only)	0.40 %
250 mm (foundation connections only)	0.31 %
300 mm	0.25 %
375 mm	0.18 %
450 mm	0.15 %
525 mm	0.13 %
600 mm and larger	0.10 %

15.5 MANHOLES

The Developer shall install manholes at the end of each line, at all changes in sewer size, grade or alignment, at all junctions and at maximum intervals of 150 m along the length of the sewer. The Developer shall not locate manholes in areas subject to ponding during rainstorm and snowmelt events. Cleanouts may only be used for special conditions and must be approved by the Town. The Developer may not substitute cleanouts for manholes and shall not install cleanouts at the end of laterals greater than 50 m in length.

To maintain a continuous energy gradient through manholes, the upstream pipe obverts (crowns) must be equal to or above the obvert of the downstream pipe. Where the upstream and downstream pipe sizes are equal, the Developer shall install the downstream pipe invert at least 30 mm below the upstream pipe invert. Where a change in pipe alignment occurs in a manhole, the Developer shall install the downstream pipe invert at least 50 mm below the lowest upstream pipe invert.

Storm sewers shall extend 1.5 m past the last house service lead, with the exception of storm mains in cul-de-sacs where service leads may connect directly to the manhole provided the lead enters the manhole a maximum of 0.60 m above the obvert of the main. A maximum of five (5) services are allowed to enter a dead-end manhole and a maximum of four (4) services are allowed to enter a flow through manhole within a cul-de-sac.

The flow channel through manholes shall conform to the shape and slope of the sewer pipe. The minimum flow channel depth is half (1/2) the diameter of the downstream sewer.

The Developer shall install standard 1200 mm diameter pre-cast manholes on mains with a diameter of 750 mm or less and install pre-cast manhole vaults or an oversized manhole barrel on mains with a diameter of 900 mm or greater. A "T-Riser" manhole may be used

on mains 1200 mm in diameter and larger, provided there is no deflection in alignment or grade.

Manhole bases shall be pre-cast complete with flow channel, benching and pipe stubs. See manhole details in the Town's current General Construction Specifications.

15.6 CATCH BASINS AND CATCH BASIN MANHOLES

15.6.1 General

Normally, the Developer shall locate catch basins at street intersections at beginning or end of the curb return. Catch basins shall not be located within the limits of a paraplegic ramp.

Invert crossings of streets (swales) are not permitted.

15.6.2 Catch Basin Leads

The Developer shall connect catch basin leads directly to a manhole. If a twin catch basin is required to drain an area, the twinned unit shall consist of a catch basin and a catch basin manhole interconnected by means of 250 mm pipe. The lead from the catch basin manhole to main line manhole shall be a 300 mm pipe. Single catch basins require a minimum 250 mm diameter lead. All leads shall have a minimum grade of 2.0%.

The maximum permissible length of catch basin lead is 30 m. If a lead must extend beyond 30 m, the Developer shall install catch basin manholes as required.

15.6.3 Design Capacity

For design purposes, approximate catch basin capacities in L/s are shown in Table 15-5.

Table 15-5: Approximate Catch Basin Capacities

Norwood Model	Sump Condition*	Continuous Slope**	
		Capture	Overflow
F-51 (with side inlet)	190	30	95
F-51 (grate only)	155	35	85
F-33	75	10	30
F-39	80	15	40
F-49	105	20	50

* based on 100 mm depth of ponding
** based on 50 mm depth on 1% slope

15.6.4 Types of Catch Basins and Catch Basin Manholes

The Developer shall construct catch basins with a 900 mm diameter barrel and shall construct catch basin manholes with a 1200 mm diameter barrel. The Developer shall construct catch basins and catch basin manholes with a 250 mm deep sump.

15.7 MAJOR DRAINAGE SYSTEM

The Developer shall assess the grading of streets and the layout of the major drainage system relative to the following guidelines, during the 1:100 year storm event:

- No building shall be inundated at its ground line.
- Maintain continuity of the overland flow routes between adjacent developments.
- Maximum permissible depth of water at curb side is 300 mm for all roadways.
- The velocities and depths of flow in the major drainage system shall not exceed the values in Table 15-6.
- Implement trapped low storage to offset peak flows where necessary to keep water velocities and depths below those noted in Table 15-6. Overland flow capacities of typical local and collector street cross-sections and a typical trap low storage area are illustrated in Section 19 of this document.

Table 15-6: Major Drainage Depth of Flow and Maximum Velocity

Depth of Flow (m)	Maximum Water Velocity (m/s)
0.8	0.5
0.3	1.0
0.2	2.0
0.1	3.0

The Developer shall recommend a building elevation to the lot purchaser that is above trapped low ponding elevations and designed to drain surface run-off to the street, lane or utility right-of-way.

15.8 STORMWATER MANAGEMENT FACILITIES (SWMF)

15.8.1 General

Construction of a SWMF including any storm sewer mains required to drain the SWMF, require Alberta Environment and Parks approval. Receiving approval is the responsibility of the Developer.

New development sites within the Town require the construction of SWMF on each site developed to provide a temporary receiving area for peak major drainage flows. The Consulting Engineer shall identify the approximate location and size of the SWMF at the time of the outline plan approval to avoid conflicts with adjacent land uses. The Consulting Engineer shall consider the effects of the maximum pond water levels in the design of the minor system and lot grading. If possible, the Consulting Engineer shall design the first upstream manhole pipe obvert elevations at or above the maximum pond level during the 1:5 year storm event.

The Consulting Engineer shall prepare and submit a stormwater management (SWM) report with the servicing study submission.

15.8.2 Geotechnical Considerations

The Consulting Engineer shall perform soil investigations specific to the SWMF to determine the soil's permeability and salinity (or other potential contaminants) and the height of the groundwater table. Where the facility is sited above a shallow aquifer, the Consulting Engineer shall design the facility to minimize the potential for groundwater contamination. Where the bottom of a dry pond is below the water table, the Developer may need to install weeping tile systems to keep the pond bottom dry enough to support grass growth and maintenance equipment traffic.

15.8.3 Minimum Stormwater Quality Standards

The Consulting Engineer shall incorporate stormwater treatment measures in the design of any SWMF to achieve water quality in accordance with Federal and Provincial legislation.

15.8.4 Erosion and Sediment Control (ESC)

An erosion and sediment control (ESC) plan, as detailed in Section 8 of this document, is required as part of the SWM plan to define measures which must be undertaken for the control of sediment into the SWMF and into the receiving stream.

15.8.5 Storage Alternatives

As part of the review of the SWM alternatives for application to a specific area, the Consulting Engineer shall consider the following storage methods:

- Dry pond storage
- Wet pond storage
- Constructed wetlands

15.8.6 Outflow Control

The outlet from a SWMF must incorporate appropriate means for the control of outflow and to limit the rate of discharge. Preliminary release rates have been determined for the various drainage areas in the Town. The Consulting Engineer shall confirm proposed release rate by detailed modelling of the existing storm sewer system and base on any proposed changes in the release rate to the receiving water body and revisions to the basin boundaries.

15.8.7 Emergency Spillway Provisions

The Consulting Engineer shall evaluate the feasibility of an emergency overflow spillway for each SWMF design, and where feasible, incorporate such provisions in the SWMF design.

As part of the SWMF design process, the Consulting Engineer shall determine the probable frequency of operation of the spillway. Where it is not possible to provide

an emergency spillway route, the design shall include an analysis of the impact of over-topping the SWMF and a significant freeboard above the 1:100 year level.

The functional requirements of the spillway and the impact analysis for the absence of one are to consider the possible consequences of blockage of the system outlet or overloading due to the run-off events, such that the storage capacity of the facility may be partially or completely unavailable at the beginning of a run-off event.

15.8.8 Landscaping Requirements

SWMF landscaping shall comply with the requirements detailed in Section 17 of this document.

15.8.9 Development Costs

Costs for the design and construction of new SWMF required by a development are the responsibility of the Developer. Costs associated with upgrades to existing SWMF located off-site may be incurred directly by the Developer or recovered through the Town's Off-Site Levy Bylaw.

15.8.10 Safety Signage

The Developer shall install public warning signs near the boundary of any stormwater pond site. The signs shall warn of anticipated water level fluctuations and indicate where the public may obtain information related to the pond operation.

The Developer shall include warning sign design and locations on the SWMF detailed design drawings for approval by the Town. The Developer shall purchase and install all warning signs.

15.9 DRY DETENTION PONDS

15.9.1 General

Dry pond (detention) storage is the SWM method where the storm run-off is collected and the excess run-off is temporarily detained for a short period of time and released after the storm run-off from the contributing area has ended. Generally, low flows do not enter the pond. A mechanical treatment unit is required for this method of storm detainment in order to achieve required water quality treatment before releasing the detained stormwater into the storm sewer system.

Dry ponds shall have gentle side slopes and be aesthetically contoured and landscaped to provide an attractive feature for the neighbourhood. Where possible, the Developer shall associate dry ponds with municipal reserve areas to take advantage of the joint use ability of the facilities (e.g. extension of sports fields into the detention pond). The Developer shall not locate active park uses adjacent to the inlet/outlet facilities nor in areas that flood frequently (more than twice per year on average). The Town will provide input on the design of dry pond detention facilities from the concept stage through to detailed design and construction.

15.9.2 Design Parameters

The Consulting Engineer shall design dry ponds in accordance with Section 19 of this document and the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems as published by Alberta Environment and Parks. Additional design parameters the Consulting Engineer shall consider are:

- Provision of an emergency overland flow route. If an emergency overland flow route cannot be provided, raise the minimum freeboard in accordance with the high water level generated by the 1:100 year storm under a plugged outlet scenario.
- Minimum freeboard depth of 0.6 m (a greater freeboard may be required if an emergency overflow route cannot be provided).
- House footings must be above the maximum water level.
- Determine detention time based on downstream capacity. Recommended maximum detention time is 24 hours.
- Provide low flow by-pass for flows from minor events.
- Provide subsurface drains within pond bottom where water table is near pond bottom.
- Address all safety issues (particularly during operation).
- Provide access for maintenance and emergency equipment.
- Dimensions must be acceptable to the Town when the bottom of the pond is to be used for recreation facilities.

15.10 WET RETENTION PONDS

15.10.1 General

Wet pond (retention) storage is the SWM method where the storm run-off is collected and the excess run-off is detained and released after the storm run-off from the contributing area has ended. A portion of the stormwater is permanently retained.

15.10.2 Design Parameters

The Consulting Engineer shall design wet ponds in accordance with the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems as published by Alberta Environment and Parks. Additional design parameters the Consulting Engineer shall consider are:

- Provision of an emergency overland flow route. If an emergency overland route cannot be provided, raise the minimum freeboard in accordance with the high water level generated by the 1:100 year storm under a plugged outlet scenario.

- Minimum freeboard depth of 0.6 m (a greater freeboard may be required if an emergency overflow route cannot be provided).
- House footing must be above the maximum water level.
- Determine detention time based on downstream capacity. Recommended maximum detention time is 24 hours.
- Provide access for maintenance and emergency equipment.
- Sediment forebays required at each inlet.
- Water recirculation and make-up system, if applicable.
- Design of outlet control structure to be capable of maintaining permanent pool depth.
- When possible, preserve existing wetlands by incorporating them into the SWM plan.
- Synthetic liners are generally not permitted within residential developments. Proposed synthetic liners require prior written approval of the Town, and their design must include additional safety provisions.

15.11 CONSTRUCTED WETLANDS

15.11.1 General

Constructed wetlands are treatment systems that are beneficial to both humans and wildlife. They capture stormwater for a prolonged period of time and use natural processes involving wetland vegetation, soils and their associated microbial assemblages to improve water quality.

15.11.2 Design Parameters

The Consulting Engineer shall design constructed wetlands in accordance with the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems as published by Alberta Environment and Parks.

15.12 MISCELLANEOUS DESIGN CONCERNS

15.12.1 Outfalls

The Developer shall construct obverts of outfall pipes above the 1:5 year flood level in the receiving stream. The Developer shall construct inverts of outfall pipes above winter ice level. The Developer shall locate outfalls to avoid damage from moving ice during break-up. Drop structures and energy dissipaters shall be used where necessary to prevent erosion. The Developer shall install grates to prevent entry or access by children.

Inlet/outlet structures in ponds shall be low maintenance, aesthetically blended into the landscape design, include adequate erosion protection and have grates to

prevent unauthorized access. Refer to Section 19 of this document. The Consulting Engineer shall keep outlet velocities below those noted in this section.

15.12.2 Safety Provisions at Inlets and Outlets

The Developer shall provide grates over all inlet and outlet openings to restrict access and prevent entry into the sewers by unauthorized persons. Clear bar space shall not exceed 100 mm for grates.

The Consulting Engineer shall design grated outlet structures with a hydraulic capacity of at least twice (2x) the required capacity to allow for possible plugging. Further, the maximum permissible velocity of flow passing through the grate is 1.0 m/s. The Developer shall provide appropriate fencing and guardrails to restrict access and reduce the hazard presented by the structure head and wing walls.

15.12.3 Temporary Drainage System

The Developer shall provide temporary drainage systems adjacent to new development to intercept drainage and snowmelt from off-site. The temporary system may involve berming and/or ditching to detain or redirect the run-off to the storm system.

15.12.4 Receiving Waters

The Developer shall incorporate measures such as SWMF in new developments to prevent any increase in the amount of erosion and downstream flooding to existing receiving streams. Where erosion control or bank stability work must be done, the Developer must consider preservation of watercourse aesthetics and wildlife habitat.

15.12.5 Culverts and Bridges

The Developer shall consider backwater effects over a range of flows for culvert and bridge design. The design of a hydraulic structure requires assessment of both its nominal design "capacity" and its performance during the 1:100 year storm event as well as the 1:100 year ice level and break-up.

The Developer shall include culvert design in the SWM report. The Developer shall install culverts as per the Town's current General Construction Specifications.

END OF SECTION

16 SERVICE CONNECTION DESIGN

16.1 GENERAL

This section pertains to the portion of the service connection installed from the main to the property/easement line.

16.2 SERVICE SIZES AND LOCATIONS

Minimum service sizes for single family and duplex developments are shown in Table 16-1.

Table 16-1: Minimum Service Size

Service	Minimum Size
Water	25 mm
Sanitary	150 mm
Storm	100 m

The Developer shall install a 150 mm – 100 mm reducer and plug at the service end of the sanitary service to allow for 100 mm private connections. The Developer shall install a plug at the service end of the storm service.

The Developer shall install services larger than those indicated where, in the opinion of the Town, the lengths of service pipe or other conditions warrant.

The Developer shall locate services for residential lots as shown in Section 19 of this document.

The sizes and locations of services to multi-family residential and non-residential buildings are subject to the approval of the Town.

16.3 SANITARY AND STORM SEWER CONNECTIONS TO MAINS

The Developer shall connect sanitary and storm sewer services to the main using service saddles.

16.4 ALIGNMENT

The Developer shall install the sanitary, water and storm services in a single trench. When facing the lot being serviced, the Developer shall lay the water service along the center of the service alignment, the sanitary service 0.30 m to the left of the water service and the storm service 0.30 m to the right of the water service. The services shall intersect the property line at an angle as near to 90° as possible, unless otherwise approved by the Town.

The Developer shall locate the curb stop and standpipe within the easement and 0.3 m from the easement line furthest from the right-of-way. If an easement does not exist, the Developer shall locate the curb stop and standpipe within the right-of-way and 0.3 m from the property line.

To aid in locating the service, the Developer shall install temporary markers at the end of the service stub as shown in the Town's current General Construction Specifications. The Developer shall also stamp the top face of sidewalks—or the top face of curbs when no sidewalk is proposed—with the letters "CC" to indicate all curb stop and standpipe locations. The text shall be orientated to be read when standing on the sidewalk facing the property.

16.5 DEPTH OF BURY

The minimum allowable depth of water service inverts at property/easement line is 2.7 m below finished grade. The maximum allowable depth is 3.5 m.

The minimum allowable depth of sanitary and storm service inverts at property/easement line is 2.7 m below finished grade. The Developer shall set the services at the same elevation as each other and deep enough so they can extend below the anticipated building footing elevation. The maximum allowable depth of sanitary and storm service inverts is 3.5 m unless approved otherwise by the Town. Refer to Section 19 of this document.

When the depth of bury is less than 2.7 m, the Developer shall insulate the main/service as specified in the Town's current General Construction Specifications.

16.6 WATER CURB STOP AND SERVICE BOX

The Developer shall install the service box at the time of service installation. The Developer shall extend the service 3 m past the easement line into the lot. The Developer shall install the sanitary sewer reducer at the end of the service stub.

16.7 RISERS

The Developer shall not use vertical risers unless otherwise approved by the Town. The service shall be installed on a continuous grade from the main to the service stub at property/easement line. The Developer shall install a vertical long radius bend immediately prior to the reduction fitting/plug to reduce the pipe slope to approximately 2%. Alternatively, the riser section may be placed at a 45° angle (1:1 slope), with the vertical long radius bend installed in an appropriate location between the main and property/easement line.

16.8 SERVICE CONNECTION RESTRICTIONS

The Developer shall install a manhole at the main for sanitary and storm service connections larger than 150 mm in diameter.

16.9 BENDS

Horizontal bends are not permitted on sanitary and storm service connections. A maximum of two (2) vertical bends are permitted; one at the main and one at the property/easement line.

16.10 INSPECTION MANHOLES/CHAMBERS

The Developer shall install an inspection manhole or chamber on the sanitary sewer service connection for all commercial, industrial, multi-family and institutional developments.

Where possible, the Developer shall connect the service to an existing or proposed manhole constructed on the sanitary sewer main alignment. Where a direct connection is made to the sanitary sewer main, the Developer shall locate the inspection manhole or chamber at the property line or easement line on the sanitary service.

END OF SECTION

17 LANDSCAPE DESIGN

17.1 GENERAL

This section describes the process, drawing requirements and design standards for all landscaping developments within the Town.

The Developer must engage a qualified Landscape Architect to undertake conceptual design, detailed design, construction inspection and as-built records for the landscaping of all public open spaces in accordance with guidelines, specifications and details as outlined in the Town's current Development Process and Design Guidelines and the Town's current General Construction Specifications.

Landscape design within the Town must consider and incorporate the following aspects. The Town will review the acceptability of the design based on, but not limited to, these factors:

- Safety and security of the general public;
- Accessibility to the general public by being barrier free and handicapped accessible;
- Protection and preservation of the natural environment;
- Enhancement of the site ecosystem through increased bio-diversity and quality of habitats;
- Functional relationship to existing and proposed utilities, land uses, flood patterns, drainage patterns, and vehicular and pedestrian circulation systems;
- Horticultural and bioengineering qualities considering such factors as micro-climate, soil conditions, hydrology, slope stabilization, erosion control, successive plant growth, wind buffering, visual screening and pedestrian movement control;
- Amount and level of maintenance required to maintain the design and its suitability to the site; and
- Accessibility for maintenance crews and equipment.

17.2 LANDSCAPING LEVELS

17.2.1 Level One Landscaping

Level one landscaping is all works included in preparing the site to specified grades, placing and leveling topsoil, seeding the grass and establishing turf; all in accordance with the Town's current Development Process and Design Guidelines, the Town's current General Construction Specifications and the approved engineering and landscape drawings and construction specifications.

17.2.2 Level Two Landscaping

Level two landscaping is all works included in planting trees and shrubs in designated areas; all in accordance with the Town's current Development Process

and Design Guidelines, the Town's current General Construction Specifications and the approved engineering and landscape drawings and construction specifications.

17.2.3 Level Three Landscaping

Level three landscaping is all works included in supplying and installing various park amenities (trails, trail directional signage, playground equipment, bollards, post and rope fence, site furnishings, etc.) in designated areas; all in accordance with the Town's current Development Process and Design Guidelines, the Town's current General Construction Specifications and the approved engineering and landscape drawings and construction specifications.

17.2.4 Level Four Landscaping

Level four landscaping is all works included in supplying and installing optional / enhanced amenities (ornamental structures, sculptures, feature walls, water features, spray pools, etc.). Level four landscaping will be at the discretion of the Town and will only be considered if arrangements for long-term maintenance by the Developer are agreed to at the detailed design stage. These maintenance agreements must be established prior to development agreement approval. The Developer is responsible for all associated costs of permitted enhanced amenities.

17.3 PROCESS

17.3.1 Conceptual Landscape Design

The Developer states the intentions of the landscape design in the servicing study report. If the Developer proposes variations to the Town's standards, conceptual landscape drawings for the entire outline plan area must be submitted with the servicing study. The Developer is encouraged to contact the Town for preliminary input on concept designs before preparing the drawings. Refer to Clause 17.4.2 of this document for submission requirements of the conceptual landscape drawings. Refer to Section 5 of this document for more information regarding the servicing study.

The Town will review the conceptual landscape drawings for compliance with Town standards and provide comments. Acceptance of a conceptual landscape design does not constitute the acceptance of any detailed landscape designs or standards.

17.3.2 Detailed Landscape Design

Upon approval of the servicing study, the Developer may submit detailed landscape drawings for a phase or the entirety of the development. Detailed landscape drawings may be submitted separately from the engineering drawings, but the detailed landscape drawings must be approved by the Town before a development agreement will be issued. Refer to Clause 17.4.3 of this document for submission requirements of the detailed landscape drawings.

If the scope of work includes landscaping of a railway, high-pressure pipeline crossing or other major utility corridors, the Developer must submit the detailed landscape drawings to the Utility Authority for approval. The Town must receive proof of the Utility Authority's approval and proof of an executed crossing agreement before the development agreement will be issued.

17.3.3 Construction

Once a notice to proceed has been issued and prior to commencing landscape construction, the Developer must arrange a start-up meeting with the Town, Consultant and Contractor. The purpose of the meeting is to ensure there is a clear understanding of the Town's requirements and to establish a landscape construction start date, progress schedule and inspection stages.

The Developer shall provide all labour, supervision, technical skills, materials, tools and equipment required to perform all site improvements. The Developer is obligated to follow all regulations, ordinances and codes governing the type of work on the job site. Any permits that are needed for the installation or construction of any work shall be obtained and paid for by the Developer. The Town may stop work at any time if it is deemed unsafe or does not follow the above procedures.

The Developer is responsible for the protection of existing trees and natural features which are to remain on site.

The Developer may request one (1) interim progress inspection during the construction stage in order to identify deficiencies early on when it is most economical to correct them. The Developer must have an approved set of detailed landscaping drawings and construction specifications available on site for the inspection. The Town will provide a progress inspection report including a list of deficiencies approximately ten (10) business days following the interim progress inspection. The Town will only perform one progress inspection for each phase of development. If additional progress inspections are requested, the Developer will be charged a fee per inspection.

17.3.4 Cleanup

Throughout construction, the Developer must immediately clean spilled soil, debris and litter from pavement, concrete, adjacent properties, natural areas and waterways. If there is release of sediment or material into a waterway, the duty to report the release falls upon the Developer. Releases can be reported by contacting the **Energy & Environmental Response Center** hotline at **1-800-222-6514** (24 hours).

The Developer is prohibited from burying refuse or foreign material of any kind on site. The Developer must immediately excavate and remove from site all soil contaminated by oil, gasoline, diesel fuels or other substances harmful to the natural environment and dispose of at appropriate landfill sites.

By the end of construction, the Developer must remove all work materials, stones, roots, equipment and excess excavated materials from the site.

17.3.5 Construction Completion Certificate (CCC)

Once all landscaping works for a phase of construction are complete, the Developer shall request a construction completion inspection. Inspection requests must be submitted to the Town at least two business days in advance of the inspection. The Developer must have an approved set of detailed landscaping drawings and construction specifications available on site for the inspection. The Developer shall schedule inspections if atmospheric and site conditions permit the inspection to occur. The Town may delay/cancel an inspection if the following conditions apply:

- Snow cover on the ground hampering visual inspection of surface works;
- Ambient air temperature below 5°C;
- Rain or fog that impairs visual or mechanical inspection; and/or
- Other atmospheric or site conditions that would reasonably pose a safety hazard to inspection personnel.

Failure to schedule the inspection as indicated may result in delays in processing of the construction completion certificate (CCC) or performance of the inspection.

Plant material must be true to name and species, structurally sound, well branched, healthy and vigorous and free from disease, insect infestation, rodent damage, sun scald, frost cracks and other untreated abrasions to the bark. Pruning wounds must show vigorous callus growth on all edges and all parts must show live and green cambium tissue when cut.

Refer to Clause 10.7.1 of this document for further information regarding the issuance of CCCs.

17.3.6 Warranty / Maintenance Period

Warranty periods will commence with the issuing of CCCs and terminate with the issuing of final acceptance certificates (FACs). The Developer must maintain all plant material from the time of planting until the issuance of the FAC.

Warranty periods for landscaping improvements outside of road right-of-ways are one (1) year in duration, unless stated otherwise in the development agreement. Warranty periods for all amenities (park benches, playground equipment, garbage/recycling receptacles, etc.) are one (1) year in duration. The Developer is responsible for emptying receptacles during the warranty period.

Warranty periods for landscaping improvements within road right-of-ways are two (2) years in duration, unless stated otherwise in the development agreement.

17.3.7 Final Acceptance Certificate (FAC)

Once the warranty period is within 30 days of expiration, the Developer shall request a final acceptance inspection. Inspection requests must be submitted to the Town at least two business days in advance of the inspection. The Developer must have an approved set of detailed landscaping drawings and construction specifications available on site for the inspection. The Developer shall schedule FAC inspections if atmospheric and site conditions permit the inspection to occur. The Town may delay/cancel an inspection if the following conditions apply:

- The first hard frost of the season has occurred (hard frost being four consecutive hours below 4°C);
- Plants are still dormant from the previous winter;
- Snow cover on the ground hampering visual inspection of surface works;
- Ambient air temperature below 5°C;
- Rain or fog that impairs visual or mechanical inspection; and/or
- Other atmospheric or site conditions that would reasonably pose a safety hazard to inspection personnel.

Failure to schedule the inspection as indicated may result in delays in processing of the FAC or performance of the inspection.

Plant material must be true to name and species, structurally sound, well branched, healthy and vigorous and free from disease, insect infestation, rodent damage, sun scald, frost cracks and other untreated abrasions to the bark. Pruning wounds must show vigorous callus growth on all edges and all parts must show live and green cambium tissue when cut. All plant material must be in a healthy, vigorous growth condition. Non-mulched beds and tree pits must be freshly cultivated and free of weeds, rubbish and debris. Mulched beds must be free of weeds, rubbish and debris.

If no deficiencies are found during the inspection, the Town will issue the FAC within approximately ten (10) business days of the inspection or at the end of the warranty period, whichever is later.

Refer to Clause 10.7.3 of this document for further information regarding the issuance of FACs.

17.4 LANDSCAPE DRAWINGS

17.4.1 General Landscape Drawing Requirements

The Landscape Architect shall coordinate all base plan preparations with other consultants to ensure all utility, survey and base plan detailing is consistent with other engineering and architectural drawings.

For each of the below drawing submissions, the Developer shall submit three (3) hard copies printed on an approved paper size listed in Clause 11.2.2 of this document and one (1) PDF copy. The drawings shall be drawn at a sufficient scale to show all required detail. Submissions may be rejected if this standard and the standards listed in the below clauses are not followed.

17.4.2 Conceptual Landscape Drawing Requirements

Conceptual landscape plan(s) are required if the Developer proposes variations to the Town's landscaping standards. The conceptual landscaping plan(s) shall illustrate proposed landscaping concepts within green spaces for the entire outline plan area. These spaces include environmental reserves, municipal reserves, neighbourhood park sites and public utility lots as identified in the outline plan.

The plan(s) shall show the following:

- Areas of existing wetlands, trees and vegetation that are to be removed or retained;
- Topographic features (e.g. ravines) that will be removed or incorporated into the landscaping design;
- Proposed trail system, including connection to the trail system in adjacent lands;
- Existing and proposed easements;
- Layout of park sites where enhanced amenities are proposed, including corner elevations, center elevation and general overall dimensions; and
- Proposed plantings that exceed the basic landscaping requirements described in this section.

Minor landscaping details such as plantings within the basic requirements, park benches, post and cable fences and bollards are not required on the conceptual landscaping plan.

17.4.3 Detailed Landscape Drawing Requirements

The Developer must submit detailed landscape drawings to the Town for review and approval, prior to the issuance of a development agreement. At a minimum, the detailed landscape drawing submission shall include a landscape plan, planting plan and plant list.

Plant material graphic symbols shall represent mature spread of shrubs and trees.

The Developer shall include the following information in the drawings:

- Total landscape area.
- Proposed locations for trees, shrubs, perennials and ground covers, clearly labeled and cross-referenced to the plant list.

- Existing trees, shrubs, shrub beds, natural areas to be preserved and proposed relocations of existing trees. Existing plantings used to meet quantity requirements must be cross-referenced to the plant list.
- Notes detailing all seed and sod mixes being specified, including seeding rates.
- Existing and proposed utilities including water, sanitary and storm pipes, hydrants, manholes, roadways, sidewalks, pathways, crosswalks and power and communication lines.
- Proposed site developments relating to landscape design, including but not limited to: parking areas, curbs, retaining walls, noise walls, screen and uniform fencing, site furnishings, site amenities such as road islands, entry features, gazebos, sculptures, fountains, structures, bridges, playgrounds, signage and elevated planters.
- Typical construction details such as furniture anchor pads, standard furniture, park lighting, uniform and solid fences, sidewalks, curbs, etc.
- Community mailbox locations as approved by Canada Post.

17.4.4 As-Constructed Landscape Drawing Requirements

The Developer shall submit hard copy, PDF and digital as-constructed drawings to the Town for review and approval at the time of CCC application. The Landscape Architect shall sign the hard copy drawings as having complied with the Town's standards and specifications.

As-constructed drawings shall identify the following:

- Changes in planting, grading, staking or construction detailing;
- Changes to specifications;
- Important sub-grade features not shown on detailed landscape drawings and were identified through construction; and
- Major site utility conflicts identified during planting installations.

The Landscape Architect shall submit digital as-constructed files as a personal geodatabase (MDB), file geodatabase (GDB) or shape file (SHP). The following illustrates the basic steps the Landscape Architect shall follow for preparing an as-constructed file for submission:

- Request the most current as-built template from the Town.
- Place as-constructed data into separate features for each improvement (trees, receptacles, etc.) Each feature can only contain as-constructed information. Note any changes to existing amenities (i.e. re-located bench, removed tree, etc.) in a separate annotation feature.

- Attach attribute data to all features. The attribute fields must be defined and contain the required values with no units for the various features as specified in APPENDIX 17.A.

17.5 TRAILS

17.5.1 Trail Types

Multi-Use Trails

Multi-use trails are vital to the Town's trail system. The trail network facilitates non-motorized movements for recreational and transportation purposes. Multi-use trails are hard surface paths 2.5 m to 3.0 m in width designed to connect residents and visitors throughout the Town to various Town parks and amenities.

Side Path Trails

Side path trails provide links between residential areas and community destinations. These trails are typically concrete sidewalks or asphalt trails 2.0 m to 2.5 m in width. They are physically separated from the road by a landscaped boulevard.

Connector Trails

Connector trails link neighbourhoods and parks to other destinations such as the downtown, the lakefront and major recreational facilities. This type of trial is typically concrete sidewalks or asphalt trails 2.0 m to 2.5 m in width and perform an auxiliary role to the multi-use and side path trails by directing users to the primary routes.

Nature Trails

Nature trails may be developed in and around natural areas within the Town as a low impact and low cost trail. These trails are primarily used for walking and are 2.0 m to 2.5 m wide. These trails can be surfaced with wood chips, gravel or asphalt.

17.5.2 Standards

Refer to Section 19 of this document for a typical trail cross-section. The Developer shall design and construct trails according to the following standards:

- Physically separate trails from streets and sidewalks.
- Trail-street intersections shall be at an angle of 90 degrees. Each intersection shall have a curb cut ramp and crosswalk striping across the street.
- Trail-trail intersections shall be widened to a radius of 4.0 m.

- Sight lines from trails with intersections to streets, back alleys, sidewalks and other trails shall have no obstruction of visibility within 5.0 m of the junction. Obstacles may be trees, shrubs, utility boxes, fences or signs.
- Install road fabric beneath the trail base to prevent growth of weeds and trees through the trail.
- Base material shall be a minimum 150 mm deep and consist of compacted 20 mm crushed gravel.
- Surface material for multi-use, side path and connector trails shall be hard surfaced and a minimum 75 mm deep.
- Longitudinal grades shall not exceed 8%. Grades exceeding 8% require switchbacks or stairs.
- Grade adjacent to the trail to allow drainage off the trail.
- If an area of the trail cannot be graded to prevent water pooling, provide another means of stormwater control such as a culvert.
- Seed adjacent soil. If conditions such as steep slopes exist which will prevent seed germination, sod must be used at the discretion of the Town.
- Provide bollards or other types of physical deterrents at street intersections to prevent unauthorized vehicular use.
- Provide safety and directional signage at trail intersections.
- Provide trail map signage at major trail destinations.
- Provide trail amenities such as benches, trash/recycling receptacles and cultural/historical nodes.
- Grade and seed/sod areas damaged during trail construction.

17.6 PARKS

17.6.1 Community Parks and Facilities

Community parks and facilities are designated sites that provide for the active recreational, social and cultural needs of all residents as well as those living in the surrounding rural areas and Summer Villages. Community parks and facilities are intended for more intense recreational activities such as structured sports as well as unstructured sports, relaxation and community events.

The Developer shall locate community parks and facilities on a collector road and shall link the park to the trail network. The site may be located on a joint-use site and combined with a school, recreation facility or cultural facility.

17.6.2 Neighbourhood Parks

Neighbourhood parks are generally passive in nature with the main activities including relaxation, socializing and childrens' play. The Developer shall include a

play structure on the site designed to meet the activity requirements outlined for the neighbourhood.

The Developer shall locate neighbourhood parks on local roads, open to the street for safety, security and public access. The Developer shall construct collector trails as required to link the park with the trail network. The Developer shall ensure the site is a minimum 0.3 ha, has continuous street frontage of at least 25% of the total perimeter and is fenced along all private property lines.

17.6.3 Tot Lots

Tot lots are additional playground facilities that may be designated by the Developer and agreed to by the Town. The Developer shall include a play structure on the site designed to meet the activity requirements outlined for the neighbourhood.

The Developer shall locate tot lots on local roads, open to the street for safety, security and public access. The Developer shall construct collector trails as required to link the park with the trail network. The Developer shall ensure the site has continuous street frontage of at least 25% of the total perimeter and is fenced along all private property.

17.7 PLANTINGS

17.7.1 General

This clause applies to all areas of landscaping such as parks, playgrounds, boulevards, public utility lots and all other green spaces. Refer to APPENDIX 17.B for the minimum and maximum quantities for plantings.

The recommended plantings list has been designed to assist residents and future developers in choosing plant species and minimum sizes that typically grow well in the Town, with the goal of creating a lasting, green community. Refer to APPENDIX 17.C of this document for the recommended plantings list.

All plant material shall be nursery grown under proper cultural practices as recommended by the Canadian Nursery Trades Association or as described for naturalization planting.

17.7.2 Sod

The Contractor must have prior work experience and be able to supply proof of their experience through one of the following methods to the satisfaction of the Town: pictures, portfolio, tour of work sites, past client references, etc.

Sod must meet the following specifications. The Town may reject any sod that does not conform to these conditions. The Developer must remove rejected materials from site immediately.

- Mix to be 80% certified Kentucky Blue Grass and 20% Creeping Red Fescue or approved equivalent;

- Strong and fibrous root system;
- Cut 25 mm to 38 mm thick;
- Remove mesh from large sod rolls prior to installation; and
- No signs of deterioration, bare spots, stones, tears, rips or burns from lack of moisture.

Prior to installation of sod, the Developer shall make available all materials including but not limited to soil, fertilizer and sod for inspection by the Town at the Supplier's yard and/or at site. The Developer shall submit inspection requests to the Town at least two business days in advance of the inspection. The Developer must have an approved set of detailed landscaping drawings and construction specifications available for the inspection.

All sod areas are to have a surface free of weeds, debris, roots and stones. Soil shall be firm with a loose top layer. Surfaces shall be at a smooth, even grade to elevations indicated on the engineering drawings within a tolerance of plus or minus 25 mm so that surfaces drain naturally. All slopes with a grade in excess of 20% must include stabilization matting approved by the Town. Grading and topsoil surfaces must be approved by the Town before sod may be delivered and installed.

The Contractor shall place sod as per the following conditions:

- Install during favorable conditions and seasons as recommended by the Supplier. Additionally, sod must be installed from May 1st to September 15th, and road-way sod must be installed before July 20th.
- Apply fertilizer as recommended by the Supplier and the Town. Only use granular fertilizer with slow release nitrogen, moisture protective containers and visible and readable labels.
- Lay with tight, non-overlapping joints. Cover and contour edges with topsoil.
- Cut in accordance with the recommendations of the Canadian Nursery Landscape Association (CNLA).
- Install flush with adjacent structures such as sidewalks, manholes, hardscape items, curbs and/or roadways.
- Use pegs on slopes greater than 3H:1V. Pegs must be on each row spaced at 600 mm or less and installed flush with the ground.
- Within swales, lay perpendicular to the direction of flow.
- Following installation, water adequately such that water soaks into the top 100 mm of underlying topsoil. After sod dries, roll sod to ensure stabilization.

The Developer is responsible for maintaining turf for the duration of the maintenance period as per the following conditions:

- Water sod and protect from damage.
- Maintain all sod areas in a healthy, vigorous growing condition.
- Mow the grass to maintain a constant 60 mm to 75 mm height. Change mowing direction each mow to avoid compaction and wear. If clippings/mulch is heavy, remove clippings using a bag system when mowing.
- Eliminate weeds, preferably through non-chemical applications.
- Remove and replace sod showing signs of deterioration, browning or poor health (weeds). The Developer is responsible for all associated removal and replacement costs.

17.7.3 Seeding

The Contractor must have prior work experience and be able to supply proof of their experience through one of the following methods to the satisfaction of the Town: pictures, portfolio, tour of work sites, past client references, etc.

For high traffic areas such as sports fields, Centennial Park, Sylvan Lake Park, Lakefront Park, etc., seed mixtures shall be 40% Boreal Creeping Red Fescue, 35% Five Star Blend Kentucky Bluegrass, 20% Fairway Crested Wheatgrass and 5% Annual Ryegrass. For all other areas such as roadways, parks, green spaces, etc., seed mixtures shall be 55% Boreal Creeping Red Fescue, 40% Five Star Blend Kentucky Bluegrass and 5% Annual Ryegrass. The Town may reject any seed that does not conform to these conditions. The Developer shall remove rejected materials from site immediately.

Prior to seeding, the Developer shall make available all materials including but not limited to soil, fertilizer and seed for inspection by the Town at the Supplier's yard and/or at site. The Developer shall submit inspection requests to the Town at least two business days in advance of the inspection. The Developer must have an approved set of detailed landscaping drawings and construction specifications available for the inspection.

All seeding areas are to have a surface free of weeds, debris, roots and stones. Soil shall be firm with a loose top layer. Surfaces shall be at a smooth, even grade to elevations indicated on the engineering drawings within a tolerance of plus or minus 25 mm so that surfaces drain naturally. Grading and topsoil surfaces must be approved by the Town before seed may be delivered and installed.

The Contractor shall seed as per the following conditions:

- Install during favorable conditions and seasons from May 1st to September 15th. Road-ways must be seeded before July 20th to establish adequate root growth.
- Apply fertilizer as recommended by the Supplier and the Town. Only use granular fertilizer with slow release nitrogen, moisture protective containers and visible and readable labels.

- Install by hydro seeding or mechanical and drill seeding. Hand broad cast seeding is prohibited.
- Slopes greater than 3H:1V must use hydro seeding.
- Install flush with adjacent structures such as sidewalks, manholes, hardscape items, curbs and/or roadways.

The Developer is responsible for maintaining turf for the duration of the maintenance period as per the following conditions:

- Water seed and protect from damage.
- Maintain all seeded areas in a healthy, vigorous growing condition.
- Mow the grass to maintain a constant 60 mm to 75 mm height. Change mowing direction each mow to avoid compaction and wear. If clippings/mulch is heavy, remove clippings using a bag system when mowing.
- Eliminate weeds, preferably through non-chemical applications.
- Repair seeded areas showing signs of non-germination, browning or poor health (weeds). The Developer is responsible for all associated removal and replacement costs.

17.7.4 Trees and Shrubs

The Developer shall identify all proposed tree and shrub species on the detailed landscape drawing(s). Refer to APPENDIX 17.C of this document for a list of recommended plantings as well as the minimum size requirements for trees and shrubs. If proposed trees are less than the minimum caliper, additional plant material may be required at the discretion of the Town. Plants can only be substituted with written approval of the Town.

Disease and drought have negatively affected certain tree species. The Town encourages designs that use a variety of tree species hardy to the area to reduce the spread of pests and disease. Xeriscaping or native drought resistant plant materials are encouraged where possible.

Trees in boulevards or along trails and sidewalks shall have an ultimate branching height of 2.5 m. A minimum branching height of 1.5 m will be accepted at the time of planting. The Developer shall plant trees within the right-of-way, including boulevards adjacent to all municipal reserve parcels in a straight line parallel to the property line.

In road right-of-ways, the Developer shall plant a minimum of one (1) tree on each side of the road for each 8 m to 12 m length of road, or as required by the Town based on tree species.

Within municipal reserves, the Developer may substitute shrubs for trees at a rate of five (5) shrubs per one (1) tree, with written approval from the Town.

In park spaces, a minimum of one-third (1/3) of the required trees and shrubs shall be coniferous.

The Developer shall contain all shrub and coniferous tree material within a planting bed, with a minimum 500 mm width mulched area between the mature shrub/coniferous tree and the edge of the shrub bed.

The Developer shall setback shrub beds a minimum 3.0 m from play spaces. The design preference is naturalized plantings.

The Developer shall design planting bed locations to accommodate large turf maintenance equipment. The Developer shall provide a minimum 2.5 m clearance between the edge of a bed and obstructions such as fencing, furniture, buildings, individual trees, etc.

Perennials in planting beds will be reviewed on an individual basis and accepted at the discretion of the Town. Only low maintenance, non-invasive and hardy perennials are permitted. Annual plantings are not permitted in planting beds that are to be maintained by the Town.

Tree Protection Plan

When disturbance to a public tree(s) may occur, the Developer shall submit a tree protection plan to the Town for review and approval with the detailed landscaping drawing submission. The Developer shall include the following information on the plan(s):

- Provide an inventory of all trees within 6 m of ground disturbances and access routes;
- Identify the tree protection zone and where activities will be restricted; and
- Identify trees and shrubs that are to be moved, removed and/or protected.

Depending on the level of disturbance to public trees within the tree protection zone, the Developer is required to do the following as requested by the Town:

- Provide standard signage posted on tree protection fences to inform the public and contractors of the importance to the tree protection zone;
- Provide free floating or anchored barriers with T-bars;
- Implement plywood barriers when fill is stored near the protection zone;
- Receive approval for fencing prior to its installation;
- After installation, only alter protection barriers with prior approval from the Town;
- Identify whether tree pruning is required to provide clearance; and

- Only prune trees with prior approval from the Town.

Tree Replacement and Compensation

If the Town approves removal of tree(s) from public lands and there are plans for replacement, the Developer must pay the Town the difference (if applicable) between the cost of the replacement and the value of the tree(s) to be removed as determined by the Town using the International Society of Arboriculture (ISA) formula.

Tree Setbacks

The Developer shall setback trees from utilities by the minimum distances shown in Table 17-1 below. Deep rooting trees shall not be planted within 8 m of any utility line, roadway or lane. Setback distances are measured from the center of tree trunk. These minimum distances may be increased by the utility owner. Setback requirements for overhead power utilities shall be established by the Utility Authority.

Table 17-1: Tree Setback from Utilities and Property Lines

Utility or Property Line Type	Minimum Setback Distance
Light Standard / Power Hardware	3.5 m
Fire Hydrant	3.5 m
Stop Sign	3.5 m
Yield Sign	3.5 m
Transit Zone	3.5 m*
Other Signs	2.0 m
Private Property on Walkway right-of-way	1.0 m
Private Property on Open Parkland	3.0 m
Private Property on Boulevards	1.0 m
Shallow Underground Utilities	1.0 m
Gas or Oil right-of-ways	Contact Utility
Deep Underground Utilities	1.5 m
Sanitary and Storm Sewers	1.8 m
Sanitary and Storm Manholes	2.0 m
Water Main	2.5 m

*Ensure trees do not create sight line obstructions for vehicles approaching transit zones.

The Developer shall setback trees from walkways and roadways by the minimum distances shown in Table 17-2 below. Deep rooting trees shall not be planted within 8 m of any roadway or lane. Setback distances are measured from the center of tree trunk. These minimum distances apply to both boulevards and medians.

Table 17-2: Tree Setbacks from Walkways and Roadways

Walkway or Roadway Type	Minimum Setback Distance
Local Residential Roadways	
Face-of-Curb	1.25 m
Face-of-Curb - boulevard without sidewalk	2.0 m
Collector Residential or Local Industrial Roadways (<14 m roadway width)	
Face-of-Curb (20 m right-of-way)	1.25 m
Face-of-Curb (>20 m right-of-way)	1.65 m
Collector Residential or Local Industrial Roadways (14.5 m roadway width)	
Face-of-Curb	1.65 m
Arterial Roadway	
Face-of-Curb	2.0 m*
Hard Surfaces	
Edge of Commercial or Industrial Accesses	1.5 m
Edge of Residential Driveways	1.0 m
Edge of Sidewalk	1.0 m

*Distances less than indicated above, are at the discretion of the Town.

17.7.5 Naturalization

Naturalization is encouraged when it provides ecosystem function (water filtration, water retention, slope stability, wildlife habitat/corridors, etc.), when there are no conflicts with other uses, when aesthetically appropriate and when maintenance concerns are addressed. Naturalization may be required where natural tree stands or natural open areas are removed or impacted during construction or other activities.

The Developer shall setback naturalized areas 10 m from playgrounds. The Developer shall clean and check all natural sites for hazards such as old wire fences, abandoned structures and other objects that may be hazardous to citizens. If the landscape drawings include naturalized grasses, these areas must be vigorous, healthy and naturalized to receive FAC approval.

17.7.6 Weed Control

The Developer shall control noxious weeds in accordance with the Provincial Weed Control Act. Developers must keep landscaped areas free of weeds from construction commencement to issuance of the FAC. Failure to do so will result in all associated repair costs being charged to the Developer.

The Developer must notify the Town prior to commencing pesticide use. Weed control chemicals must follow the Environmental Protection and Enhancement Act.

The Developer shall post signs in the treatment area 24 hr in advance of pesticide applications.

17.7.7 Planting Materials

Soil Mix

Topsoil supplied by the Developer shall be a fine friable medium loam, neither heavy clay nor of a very light sandy nature. The topsoil shall be capable of sustaining good agricultural growth.

The Developer shall ensure the soil mix for passive open spaces (berms, ditches, boulevards, etc.) and active open spaces (sports fields, baseball diamond outfields, parks, etc.) must:

- Contain minimum 4% organic matter for clay loams;
- Have acidity between pH of 5.5 to 7.0;
- Be free from subsoil, roots, vegetation, weed seeds, stones larger than 20 mm (40 mm for passive spaces) or any other extraneous materials; and
- Be free from noxious weeds.

The Developer shall prepare the soil mix for trees, shrubs and ground covers by mixing three (3) parts topsoil with one (1) part compost and one (1) part sharp sand. The Developer shall incorporate bone meal into the planting soil at a rate of 0.6 kg/m^3 of prepared soil mixture.

Mulch

The following are acceptable mulch materials:

- Wood chips obtained from hardwood trees free of bark, small branches and leaves, varying in size from 35 mm to 75 mm wide and 5 mm to 20 mm thick.
- Bark chips from the bark of coniferous trees, varying in size from 25 mm to 50 mm wide.
- Recycled rubber mulch.

Water

The Developer must supply water for planting and the maintenance period. The water must be free of impurities that would inhibit germination and/or growth.

17.8 PUBLIC AREAS

17.8.1 Medians

The Developer shall use the following surface treatments for medians:

- Cap the median with concrete or paving stone if the median width is 3.0 m or less.
- Cap the median with concrete or paving stone or finish to level one landscaping standards where the median width is greater than 3.0 m.
- Do not plant trees in a collector and/or local roadway median where the median width is less than 5.0 m.
- Design the median cross-section to conform to the Town's current General Construction Specifications.

17.8.2 Boulevards

The Developer shall provide level one landscaping for all boulevards located between the curb and separate sidewalk. The property owner shall landscape the boulevard area located between the back-of-walk (BOW) and the property line.

The Developer shall provide roadway boulevard tree planting for designated roadways.

The Developer shall grade the boulevard area from the edge of right-of-way to the BOW/curb to provide positive drainage to the street. The minimum boulevard cross slope is 2.0%.

Drainage is prohibited to run from the right-of-way onto private property. If private property abuts the right-of-way, the Developer shall provide a swale within the boulevard to intercept drainage from the right-of-way and convey it to the storm sewer system.

17.8.3 Buffers and Berms

Landscaped buffers improve the residential environment and parkland setting of the Town. The Developer is responsible for landscaping buffer strips (berms) between residential areas and future arterial roads and the railway. These buffers shall have a solid screen minimum 3.0 m high. The screen can be a combination of screen fence, landscaped berm or tree planting.

The Developer shall design berms to have a maximum side slope of 3.5H:1V and a minimum 1.0 m wide horizontal crest. The Developer shall provide a taper along the bottom of all berms as illustrated in Section 19 of this document to transition into adjacent elevations. A retaining wall is required if the berm side slope is steeper than 3.5H:1V. The Developer shall determine the height of the wall using a 3.5H:1V slope on either the fore slope or the back slope while maintaining a constant alignment for the center of the berm.

The Developer shall grade berms along arterial roadways to provide 400 mm depressions at regular intervals along the length of the berm for tree and shrub plantings. The length of the depressions shall vary from 25 m to 50 m in length.

The Developer shall landscape berms at a minimum 75 trees per hectare. The Developer shall place plantings on the side slope of berms approximately one third (1/3) from the top of berm unless alternate locations are approved by the Town.

Refer to Section 19 of this document for further berm design standards.

17.8.4 Highway Corridors

The Developer shall design landscaping along highway corridors to provide an attractive, vibrant community image. All landscaping must conform to the Town's current Land Use Bylaw.

The Developer shall landscape highway corridors adjacent to residential developments to provide satisfactory screening / buffering of residential neighbourhoods while providing an aesthetically pleasing "green" edge along the highway.

The Developer shall landscape highway corridors adjacent to commercial developments to provide a satisfactory aesthetic look to the commercial zone while still providing a suitable view of commercial properties and signage.

The Developer shall landscape highway corridors adjacent to industrial developments to provide suitable screening of industrial yards while providing opportunities for views of office buildings and signage.

17.8.5 Utility Right-of-Ways

Utility right-of-ways may function as an integral part of the open space system by linking community parks, community facilities and natural areas. As linear corridors, these lands are well suited for the development of multi-use or connector trails. The Developer is responsible for the landscaping of utility right-of-ways.

17.8.6 Stormwater Management Facilities (SWMF)

Although stormwater management facilities (SWMF) are public utilities, ponds can contribute towards the Town's functional open space system. Wet ponds can serve as an aesthetic feature, can provide opportunities for secondary recreation and can provide a destination within the overall park system. Dry ponds may serve as dual sites providing space for functional playing fields and/or passive park areas.

The Developer is responsible for clearing, stripping and grading of the site as well as final grading and seeding. If a playing field is constructed in the bottom of the SWMF, the Developer is responsible for final grading and seeding of the site, and the Town is responsible for installing additional sport amenities.

The Developer shall use riparian seed mix around the perimeter of wet ponds (riparian zone), and the area shall be kept in a non-maintained, naturalized landscaped state to promote ecological benefits (i.e. sediment control, bank stabilization, habitat for aquatic animals, etc.).

Lands required for pond facilities will be dedicated as public utility lots (PUL). Lands adjacent to SWMF and above the 1:100 year storm event may be considered for MR dedication provided it is developed to the same standards as linear parks.

17.8.7 Natural Areas

The Developer must identify environmentally sensitive areas in the outline plan. Recreational or open space use of these areas will be dedicated as environmental reserve (ER) and will not be credited towards municipal reserve (MR).

The Developer shall design parks and open space which occur adjacent to natural areas to complement the natural area. The Developer shall construct trails through natural areas to the standards described in this section.

A development setback of 30 m from the high water mark of a Crown owned water body will be applied.

The Developer shall restore natural areas disturbed by land development to their original condition.

17.9 PLAY AREAS

17.9.1 Playgrounds

The Developer must design and construct playgrounds in accordance with the current Canadian Standards Association (CSA) Guidelines. The Developer shall design playground equipment to accommodate separate age groups as determined by the current CSA Guidelines. Innovative playground designs and themes are encouraged.

The Developer shall submit a detailed playground development plan to the Town for approval, and the Manufacturer shall submit manufacturing documentation, reference materials, two-dimensional drawings and three-dimensional drawings to the Town for approval at the time of detailed landscape design submission. This includes but is not limited to equipment for playgrounds, splash pads, skate parks and fitness parks.

The Developer shall include continuous concrete curb with a minimum depth of 300 mm compacted playground sand in the design of the playground. The Developer may use alternative surfaces upon approval of the Town.

The Developer must purchase all playground apparatus from an approved playground manufacturer or their sales representative.

In addition to the CSA Guidelines, all encroachment zones shall be within the retained play surface.

Playgrounds will receive final acceptance once the warranty period is complete, the equipment has passed an FAC inspection with no outstanding deficiencies and the Town has received copies of all playground installation certificates, inspection reports, and warranty information.

The Town reserves the right to remove, without compensation, any or all playground development on public lands which does not meet safety standards or has not been approved by the Town.

17.9.2 Sports Fields

Specific sports field requirements including locations, types and sizes will be determined based on the Town's current inventory, current user needs and the Town's current parks and open space master plan.

All proposed sports field plans must be prepared by a Landscape Architect or equivalent. The Town must receive and approve the plans prior to the issuing of a development agreement.

The Developer shall design sports fields to be crowned and have a drainage swale around the perimeter to prevent water retention near the play area. Grades shall be designed by the Landscape Architect (or equivalent) and are dependent on the type of play surface.

The Landscape Architect must perform inspections regularly during the construction of sports fields and must report deficiencies to the Town. The Developer must correct all deficiencies immediately. The Developer must receive Town approval before continuing onto the next phase of construction.

The Developer must supply maintenance and establishment records to the Town on the sports field for mowing, irrigation, weed management, fertilization, aeration, over seeding and top dressing at the time of FAC application.

17.10 OTHER FEATURES

17.10.1 Fencing

The Developer shall locate all fencing 150 mm inside property line on private property.

Where a park space is adjacent to a roadway, fencing shall be a minimum 1.2 m high. The Developer shall provide gates at controlled access points to the road system to allow maintenance equipment in the park.

Where private property abuts public property, screen fencing shall be 1.5 m to 1.8 m high.

The Developer shall provide post and rope fencing at the following locations:

- Separating a public roadway from a lane or public utility lot;
- Separating a lane from a park or other open space; and
- At other locations as specified by the Town.

Fencing will receive final acceptance once the fence has been installed and is free from deficiencies. A maintenance period is not required.

17.10.2 Bollards

The Developer shall install bollards at street/lane accesses to trails or public utility lots to prevent unauthorized vehicular use but to allow for pedestrian and/or emergency vehicle access. The Developer shall construct swing gate or break-away bollards as per Section 19 of this document.

The Developer shall locate front yard bollards at the building setback, and locate rear yard bollards at the easement line, unless approved otherwise by the Town.

17.10.3 Site Amenities

The Developer shall supply and install site amenities to the quantities specified in APPENDIX 17.B of this document and at locations approved by the Town. All site amenities must be approved by the Town prior to installation.

The Developer shall setback furniture a minimum 1 m from all trails, walkways and play structures. The Developer shall install furniture in accordance with manufacturers' specifications and the following:

- Castings to be made of non-corrosive aluminum;
- Metal finishes are to be powder coated with the colour selected by the Town;
- Fasteners to be tamper proof; and
- Wood to be No. 1 or better oak, spruce, pine or kiln dried cedar. All wood furniture elements are to be sanded or planed smooth with no sharp corners, checks or splinters. All cut ends shall be treated, stained or painted in accordance with manufacturer's specifications or as directed by the Town.

The Developer shall install regulatory, safety and directional signage on all parks and open space sites as directed by the Town. The Developer shall build and install signs in accordance with manufacturers' specifications.

The supply and installation of enhanced amenities such as gazeboes, sculptures, feature walls, water features, spray pools, etc. will be at the discretion of the Town. Such enhanced amenities will only be considered if arrangements for long-term maintenance by the Developer are agreed to prior to the issuance of a development

agreement. These maintenance agreements must be established prior to development agreement approval. The Developer is responsible for all associated costs of permitted enhanced amenities.

17.10.4 Neighbourhood Identification Signs

When a Developer proposes to construct identification signs to identify the new community, the following design criteria apply:

- The proposed identification sign shall be located on public property (e.g. municipal reserve, roadway boulevard, etc.) outside of the standard road right-of-way as recommended in Section 19 of this document;
- The Developer shall indicate which neighbourhood identification signs or other features require illumination on the electrical system drawings. The Developer shall meter the signs and/or features separately from the streetlight or other power distribution systems; and
- The Town must review and approve the location of any identification sign or feature.

17.10.5 Community Mailboxes

The Developer is responsible for coordinating the location of community mailboxes. The Developer shall forward copies of the approved outline plan and subdivision plan to Canada Post along with a request for mailbox locations.

The community mailbox locations must be shown on the landscaping design drawings.

END OF SECTION

APPENDIX 17.A DIGITAL AS-CONSTRUCTED LANDSCAPE DRAWING STANDARDS

Feature Name	Feature Type	Attribute Name	Attribute Type	Permissible Value(s)
prkTree	Point	InstallDate	Date	mm/dd/yyyy
		TreeType	Short Text	(species common name)
prkShrub	Point	InstallDate	Date	mm/dd/yyyy
		ShrubType	Short Text	(species common name)
prkTurf	Polygon	InstallDate	Date	mm/dd/yyyy
prkTrail	Line	InstallDate	Date	mm/dd/yyyy
		SurfType	Short Text	
		Width	Double	(m)
prkSign	Point	InstallDate	Date	mm/dd/yyyy
		SignType	Short Text	Directional Information Entrance
prkBench	Point	InstallDate	Date	mm/dd/yyyy
prkTable	Point	InstallDate	Date	mm/dd/yyyy
prkReceptacle	Point	InstallDate	Date	mm/dd/yyyy
		ReceptacleType	Short Text	Garbage Recycling Hot Coals
prkBollard	Point	InstallDate	Date	mm/dd/yyyy
		BollardType	Short Text	Swing Gate Break-Away
prkPlayEquipment	Polygon	InstallDate	Date	mm/dd/yyyy
		Description	Long Text	
prkSportField	Polygon	InstallDate	Date	mm/dd/yyyy

APPENDIX 17.B PARK STANDARDS

Item	Quantity		Type / Comments
	Minimum	Maximum	
Linear Park			
Site Preparation	Entire Site	Entire Site	As per Contract Specifications
Final Grading / Seeding	Entire Site	Entire Site	As per Contract Specifications
Trees	25 m^2/ha	70 m^2/ha	Approved Species
Shrub Plantings	20 m^2/ha	60 m^2/ha	Approved Species
Trails	2.0 m wide asphalt	2.5 m wide asphalt	As per Town's current General Construction Specifications
Bollards	1 set per trail opening	1 set per trail opening	As per Town's current General Construction Specifications
Benches	1 per site	5 per site	As per Contract Specification
Picnic Tables	0 per site	2 per site	As per Contract Specification
Garbage/Recycling Receptacles	1 pair per site	5 pairs per site	Locate near walkways
Park Signage	1 per site	1 per site	As per Town's current General Construction Specifications
Parkette			
Site Preparation	Entire Site	Entire Site	As per Contract Specifications
Final Grading / Seeding	Entire Site	Entire Site	As per Contract Specifications
Trees	40 m^2/ha	70 m^2/ha	Approved Species
Shrub Plantings	20 m^2/ha	60 m^2/ha	Approved Species
Pre-School Play Structure	1 per site	1 per site	Requires Town approval
Elementary Play Structure	Town Discretion	Town Discretion	Requires Town approval
Trails	2.0 m wide asphalt	2.5 m wide asphalt	As per Town's current General Construction Specifications
Bollards	1 set per trail opening	1 set per trail opening	As per Town's current General Construction Specifications
Benches	1 per site	5 per site	As per Contract Specification
Picnic Tables	0 per site	2 per site	As per Contract Specification
Garbage/Recycling Receptacles	1 pair per site	5 pairs per site	Locate near walkways
Park Signage	1 per site	1 per site	As per Town's current General Construction Specifications
Neighbourhood Park			
Site Preparation	Entire Site	Entire Site	As per Contract Specifications
Final Grading / Seeding	Entire Site	Entire Site	As per Contract Specifications
Trees	50 m^2/ha	100 m^2/ha	Approved Species
Shrub Plantings	20 m^2/ha	80 m^2/ha	Approved Species
Pre-School Play Structure	1 per site	1 per site	Requires Town approval
Elementary Play Structure	Town Discretion	Town Discretion	Requires Town approval
Recreational / Sports Equipment	Town Discretion	Town Discretion	Requires Town approval
Snow Bank Rink*	1 per site	1 per site	Requires Town approval

Item	Quantity		Type / Comments
	Minimum	Maximum	
Trails	2.5 m wide asphalt	3.0 m wide asphalt	As per Town's current General Construction Specifications
Bollards	1 set per trail opening	1 set per trail opening	As per Town's current General Construction Specifications
Benches	2 per site	6 per site	As per Contract Specification
Picnic Tables	1 per site	4 per site	As per Contract Specification
Garbage/Recycling Receptacles	3 pairs per site	6 pairs per site	Locate near walkways
Park Signage	1 per site	1 per site	As per Town's current General Construction Specifications
Community Park			
Site Preparation	Entire Site	Entire Site	As per Contract Specifications
Final Grading / Seeding	Entire Site	Entire Site	As per Contract Specifications
Trees	50 m^2/ha	100 m^2/ha	Approved Species
Shrub Plantings	20 m^2/ha	80 m^2/ha	Approved Species
Pre-School Play Structure	1 per site	1 per site	Requires Town approval
Elementary Play Structure	Town Discretion	Town Discretion	Requires Town approval
Recreational / Sports Equipment	Town Discretion	Town Discretion	Requires Town approval
Sports Fields	Town Discretion	Town Discretion	As per community needs and the Town's current Recreation, Parks and Open Space Master Plan
Multi-Use Pad	Town Discretion	Town Discretion	As per community needs and the Town's current Recreation, Parks and Open Space Master Plan
On-Site Asphalt Parking	Town Discretion	Town Discretion	As per Land Use Bylaw
Snow Bank Rink*	1 per site	1 per site	Requires Town approval
Trails	2.5 m wide asphalt	3.0 m wide asphalt	As per Town's current General Construction Specifications
Bollards	1 set per trail opening	1 set per trail opening	As per Town's current General Construction Specifications
Benches	6 per site	10 per site	As per Contract Specification
Picnic Tables	4 per site	8 per site	As per Contract Specification
Garbage/Recycling Receptacles	10 pairs per site	16 pairs per site	Locate near walkways
Park Signage	2 per site	2 per site	As per Town's current General Construction Specifications

**Developer will not construct, but shall design the area for access and proper ground conditions to allow rink construction.*

APPENDIX 17.C RECOMMENDED TREE AND SHRUB SPECIES

Consider planting native species. Native trees and shrubs are adapted to local soil, rainfall and temperature conditions and have developed natural defenses to withstand many types of insects and diseases. Because of this, native plants will thrive with a minimal amount of maintenance once established.

*Native to Alberta
(e) Edible

Botanical Name	Common Name	Minimum Size	Size At Maturity Height/Spread
Coniferous Trees			
Abies balsamea	*Balsam Fir	2.5 m Ht.	25 m / 8 m
Larix laricina	*Tamarack	2.5 m Ht.	15 m / 4 m
Larix sibirica	Siberian Larch	2.5 m Ht.	12 m / 5 m
Picea pungen 'Glauca'	Colorado Blue Spruce	2.5 m Ht.	12 m / 5 m
Picea abies	Norway Spruce	2.5 m Ht.	15 m / 8 m
Picea glauca	*White Spruce	2.5 m Ht.	15 m / 5 m
Picea mariana	*Black Spruce	2.5 m Ht.	30 m / 5 m
Picea pungens	Colorado Spruce	2.5 m Ht.	12 m / 5 m
Pinus banksiana lamb.	*Jack Pine	2.5 m Ht.	20 m / 8 m
Pinus contorta latifolia	*Lodgepole Pine	2.5 m Ht.	12 m / 3 m
Pinus ponderos	Ponderosa Pine	2.5 m Ht.	12 m / 6 m
Pinus sylvestris	Scots Pine	2.5 m Ht.	12 m / 6 m
Deciduous Trees			
Acer negundo	*Manitoba Maple (Baron)	60 mm cal.	14 m / 6 m
Acer negundo sensation	Sensation Boxelder Maple	60 mm cal.	9 m / 6 m
Acer saccharinium 'Unity'	Unity Sugar Maple	60 mm cal.	10 m / 8 m
Acer saccharinum	Silver Maple	60 mm cal.	12 m / 6 m
Acer tartaricum	Hot Wings Tartarian Maple	50 mm cal.	6 m / 5 m
Aesculus glabra	Ohio Buckeye	60 mm cal.	12 m / 10 m
Alnus crispa	Green Alder	60 mm cal.	7 m / 3 m
Alnus tenuifolia	*River Alder	50 mm cal.	8 m / 4 m
Betula papyrifera	*Paper Birch	60 mm cal.	12 m / 6 m
Crataegus mordneensis 'Snowbird'	Snowbird Hawthorn	60 mm cal.	3 m / 2.5 m
Crataegus mordneensis 'Toba'	Toba Hawthorn	60 mm cal.	3 m / 2.5 m
Elaeagnus angustifolia	Russian Olive	60 mm cal.	6 m / 5 m
Fraxinum pennsylvanica	*Green Ash	60 mm cal.	12 m / 8 m
Malus species	Flowering Crabapple	50 mm cal.	5 m / 4 m
Malus species	(e) Apple species	50 mm cal.	5 m / 4 m
Populus x 'Brooks #6'	Brooks #6 Poplar	60 mm cal.	15 m / 8 m
Populus balsamifera	*Balsam Poplar	60 mm cal.	25 m / 6 m
Populus tremula 'Erecta'	Swedish Columnar Aspen	60 mm cal.	12 m / 1.5 m
Populus tremuloides	*Trembling Aspen	60 mm cal.	20 m / 3 m

Botanical Name	Common Name	Minimum Size	Size At Maturity Height/Spread
Populus x canescens 'Tower'	Tower Poplar	60 mm cal.	10 m / 1.5m
Populus x 'Northwest'	Northwest Poplar	60 mm cal.	10 m / 15 m
Prunus maackii	Amur Cherry	50 mm cal.	12 m / 10 m
Pyrus ussuriensis	(e) Ussarian Pear	50 mm cal.	8 m / 5 m
Quercus macrocarpa	Bur Oak	60 mm cal.	10 m / 10 m
Salix pentandra	Laurel-Leaf Willow	60 mm cal.	15 m / 15 m
Siringa reticulata 'Ivory Silk'	Ivory Silk / JapaneseTree Lilac	50 mm cal.	8 m / 5 m
Sorbus species	Mountain Ash	60 mm cal.	variety
Sorbus scopulina	*Western Mountain Ash	60 mm cal.	9 m / 6 m
Tilia americana	American Linden	60 mm cal.	10 m / 5 m
Tilia cirdata	Little Leaf Linden	60 mm cal.	12 m / 9 m
Tilia flavescens 'Dropmore'	Dropmore Linden	60 mm cal.	10 m / 7 m
Ulmus Americana	American Elm	60 mm cal.	20 m / 15 m
Ulmus americana 'Brandon'	Brandon Elm	60 mm cal.	15 m / 10 m
Shrubs *All shrub species to be a minimum #2 pot size with a minimum plant size as indicated in chart.*			
Acer ginnala	Amur Maple	750 mm Ht.	4 m / 4 m
Amelanchier alnifolia sp.	(e) Saskatoon species	600 mm Ht.	3 m / 2 m
Amelanchier alnifolia 'Northline'	*(e) Northline Saskatoon	600 mm Ht.	3 m / 2 m
Betula pumila	*Dwarf Birch	450 mm Ht.	2.4 m / 1.2 m
Caragana Frutex 'Globosa'	Globe Caragana	450 mm Ht.	1 m / 1 m
Caragana pygmaea	Pygmy Caragana	450 mm Ht.	1 m / 2 m
Caragana-arborescens 'Lorbergii'	Fern-Leaved Caragana	600 mm Ht.	3 m / 2 m
Cornus sp.	Dogwood species	450 mm Ht.	1.5 m / 2 m
Cornus sericea	*Red Osier Dogwood	450 mm Ht.	1.5 m / 2 m
Cornus sericea flaviramea	*Yellow Twigged Dogwood	450 mm Ht.	2 m / 2 m
Corylus cornutu	*(e) Beaked Hazelnut	750 mm Ht.	5 m / 2 m
Elaeagnus commutata	*Wolf Willow	450 mm Ht.	2 m / 2 m
Euonymus nana 'Turkenstanica'	Turkestan Burning Bush	450 mm Ht.	1 m / 1 m
Juniperus sabina species	Savin Juniper Varieties or Cultivars	450 mm Ht.	0.6 m / 2 m
Juniperus scopulorum sp.	Upright Juniper species	600 mm Ht.	3 m / 1.5 m
Ledum groenlandicum	Labrador Tea	N/A	5. m / 0.5 m
Lonicera-maximiwoczii sachalinesis	Sakhalin Honeysuckle	450 mm Ht.	1.5 m / 1.5 m
Physocarpus opulifolius 'Dart's Gold'	Dart's Gold Ninebark	450 mm Ht.	1 m / 1 m
Physocarpus opulifolius 'Diablo'	Diablo Ninebark	450 mm Ht.	2 m / 2 m
Pinus Mugo	Mugo Pine	450 mm Ht.	2 m / 2 m
Potentilla fruticosa	Potentilla (Shrubby Cinquefoil)	450 mm Ht.	1 m / 1 m
Prinsepia sinensis	Cherry Prinsepia	450 mm Ht.	2 m / 1.5 m
Prunus tenella	Russian Almond	450 mm Ht.	1 m / 1 m

Botanical Name	Common Name	Minimum Size	Size At Maturity Height/Spread
Prunus tomentosa	(e) Nanking Cherry	450 mm Ht.	2 m / 2 m
Prunus triloba 'Multiplex'	Double-Flowering Plum	450 mm Ht.	2 m / 2 m
Rhus glabra	Smooth Sumac	750 mm Ht.	3 m / 4 m
Ribes alpinum	(e) Alpine Currant	450 mm Ht.	1 m / 1.5 m
Ribes aureum	(e) Golden Flowering Currant	450 mm Ht.	2 m / 2 m
Rosa sp.	Hansa Rose	450 mm Ht.	1.5 m / 1.5 m
Rosa sp.	Persian Yellow Rose	450 mm Ht.	1.5 m / 1.5 m
Rosa sp.	Theresa Bugnet Rose	450 mm Ht.	2 m / 2 m
Rosa sp.	Wild Rose (Nursery)	450 mm Ht.	1 m / 1 m
Salix brachycarpa 'Blue Fox'	Blue Fox Willow	450 mm Ht.	1 m / 1 m
Salix discolor	Pussy Willow	750 mm Ht.	4 m / 4 m
Sambucus sp.	Elder species	600 mm Ht.	3 m / 2 m
Shepherdia argentea	*Silver Buffaloberry	750 mm Ht.	4 m / 3 m
Shepherdia canadensis	*Canadian Buffaloberry	450 mm Ht.	1 m / 1 m
Spirea sp.	Spirea	450 mm Ht.	1 m / 1 m
Symphoricarpos albus	Snowberry	450 mm Ht.	1 m / 1 m
Syringa vulgaris	Lilac species	600 mm Ht.	3 m / 2.5 m
Thuja occidentialis 'Globosa'	Globe Cedar	450 mm Ht.	1.5 m / 1.5 m
Vaccinium myrtilliodes	*(e) Blueberry – Common Wild	N/A	0.5 m / 0.5 m
Vaccinium vitis-idaea	*(e) Bog Cranberry	N/A	0.2 m / 1 m
Vibernum lantana	Wayfaring Tree	600 mm Ht.	3 m / 2 m
Vibernum lentago	Nannyberry	750 mm Ht.	4 m / 3 m
Vibernum edule	*(e) Lowbush Cranberry	450 mm Ht.	1 m / 1.5 m
Vibernum trilobum	(e) Highbush Cranberry	600 mm Ht.	3 m / 2 m

18 SHALLOW UTILITIES

18.1 GENERAL

The Developer is responsible for coordinating the location of power, natural gas and communications (telephone, internet and cable TV), including obtaining alignment approvals. The Developer shall forward copies of the approved roadway and deep utilities engineering drawings and copies of the approved power distribution and street lighting engineering drawings to the utility companies.

The Developer shall make arrangements for the provision of power, natural gas and communications services for each phase of development.

Shallow utility installation requests must be approved by the Town prior to the issuance of a construction completion certificate (CCC) for surface works. Generally, the preferred timing of installation is after the installation of curb and gutter. Installation prior to completion of curb and gutter requires prior written approval of the Town.

18.2 DRAWING REQUIREMENTS

The Developer must show shallow utility easements on the detailed design drawings.

The electrical servicing plan must conform to the current Power Distributor's standards.

Copies of every services' shallow utility plan must be forwarded to the Town for approval prior to the proposed installation. The Developer and/or Utility Provider shall show the following on the shallow utility plan(s):

- Property lines, block numbers, lot numbers and street names;
- Primary and secondary cable runs, including in symbol form the number of cables to be installed;
- Communication alignments;
- URD pull boxes and service stub outs;
- Transformers;
- Streetlights; and
- Neighbourhood identification or entry signs that require illumination.

18.3 DESIGN CONSIDERATIONS

The Developer shall arrange for the installation of street and walkway lighting and power distribution in accordance with the following:

- Have an Electrical Consulting Engineer prepare the design in accordance with Illuminating Engineering Society of North America (IESNA) guidelines, and have a qualified contractor complete all electrical installations in accordance with the Power Distributor's contract specifications.

- The design of the power system must be approved by the current Power Distributor prior to installation, and the current Power Distributor must inspect the installation. Energization of the system shall be performed by the current Power Distributor once they have accepted the system.
- Street lighting shall be “dark sky friendly” in accordance with the model lighting ordinance developed by IESNA and the International Dark-Sky Association (IDA).
- Utilize light-emitting diode (LED) lamps in all new lighting installations unless otherwise approved by the Town.
- Indicate neighbourhood identification signs or other features which require illumination on the electrical system drawings and meter them separately from the streetlight or other power distribution systems.

18.4 BURIAL OF EXISTING OVERHEAD UTILITIES

Where required by statutory plan or when otherwise requested by the Town, the Developer shall make arrangements for the burial of existing overhead utilities. This is typically required when the development area fronts onto an existing public right-of-way containing overhead utilities. The Developer shall confirm requirements for burial of overhead utilities with the Town prior to entering into a development agreement.

18.5 CONSTRUCTION COSTS

The Developer is responsible for any costs related to the provision of power, natural gas and communications to service a development, including the cost of installing ducts for road crossings.

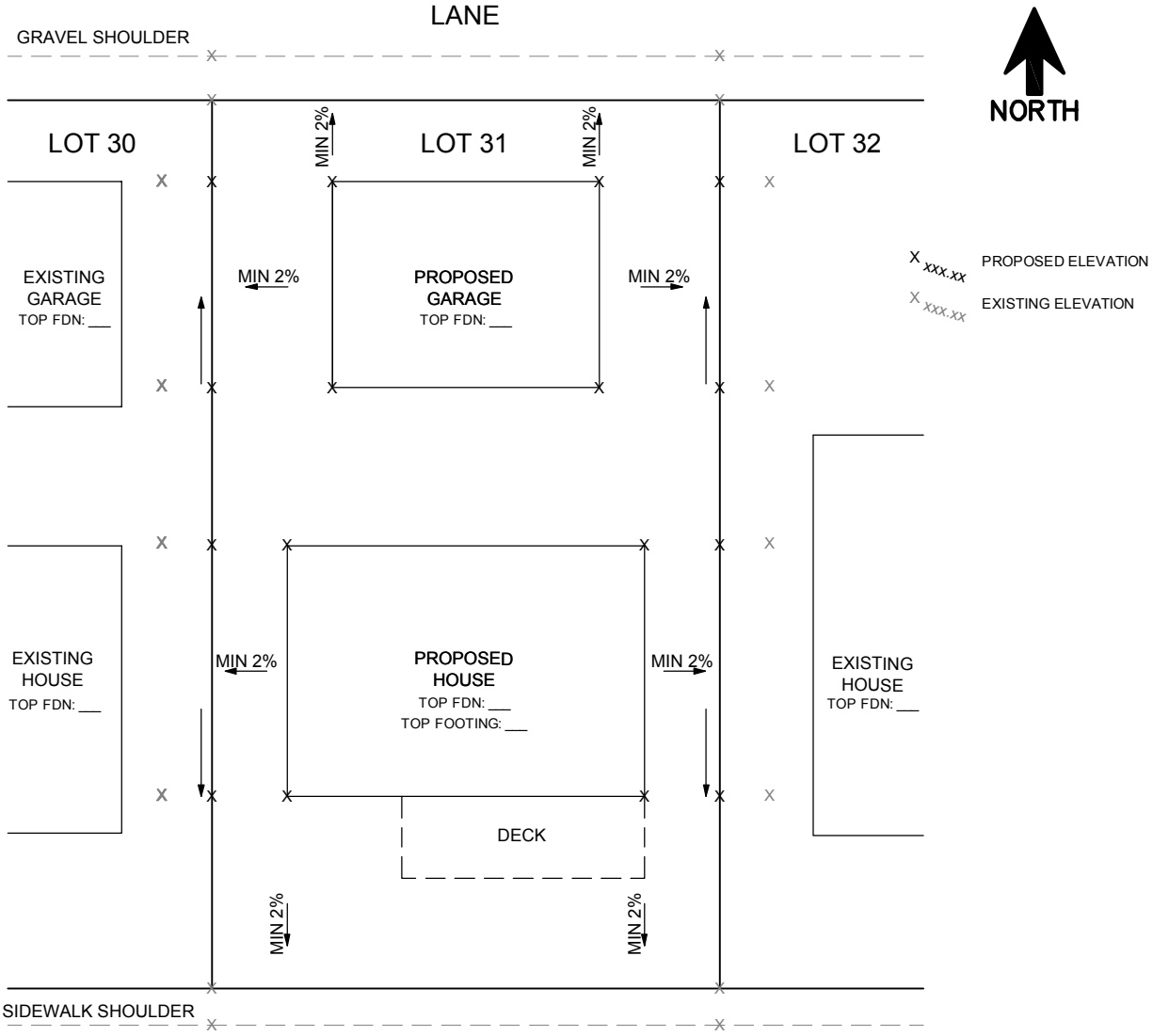
The Developer is also responsible for any costs related to the burial of overhead utilities along the frontage portion of their development area.

END OF SECTION

19 DESIGN GUIDELINE DRAWINGS

Description	Drawing No.
Section 7 – DEVELOPMENT PERMIT	
Typical Re-Development Site Grading Plan	7.01
Section 11 – ENGINEERING DRAWINGS	
Typical New Residential Building Grade Certificate	11.01
Section 12 – ROADWAY DESIGN	
Relationship of Street Classifications	12.01
Undivided Arterial Roadway	12.02
Undivided Collector Residential Roadway Two Multi-Use Sidewalks	12.03
Divided Collector Residential Roadway Two Multi-Use Sidewalks	12.04
Undivided Collector Residential Roadway One Multi-Use Sidewalk	12.05
Divided Collector Residential Roadway One Multi-Use Sidewalk	12.06
20m ROW Redevelopment Collector Residential Roadway	12.07
Undivided Local Residential Roadway Two Separate Sidewalks w/ Trees	12.08
Undivided Local Residential Roadway Two Separate Sidewalks	12.09
Divided Local Residential Roadway Two Separate Sidewalks	12.10
Undivided Local Residential Roadway Mono & Separate Sidewalks w/ Trees	12.11
Undivided Local Residential Roadway Mono & Separate Sidewalks	12.12
Divided Local Residential Roadway Mono & Separate Sidewalks	12.13
Undivided Local Residential Roadway One Separate Sidewalk w/ Trees	12.14
Undivided Local Residential Roadway One Separate Sidewalk	12.15
Divided Local Residential Roadway One Separate Sidewalk	12.16
Undivided Local Residential Roadway One Mono Sidewalk w/ Trees	12.17
Undivided Local Residential Roadway One Mono Sidewalk	12.18
Divided Local Residential Roadway One Mono Sidewalk	12.19
Rural Undivided Industrial Collector & Local Roadway	12.20
Urban Undivided Industrial Collector & Local Roadway	12.21
Gravel and Paved Lanes Two or More Deep Utilities	12.22
Gravel and Paved Lanes One or Fewer Deep Utilities	12.23
Typical Front Servicing Alignments	12.24
Lane / PUL Servicing Alignments	12.25
Rural Cross-Section Hydrant and Power Pole Access	12.26
Arterial Roadway Pavement Structure Cross-Section	12.27
Residential Roadway Pavement Structure Cross-Section	12.28
Industrial Roadway Pavement Structure Cross-Section	12.29
Gravel / Paved Lane Pavement Structure Cross-Section	12.30
Local Residential Cul-De-Sac	12.31
Urban Industrial Cul-De-Sac	12.32
Rural Industrial Cul-De-Sac	12.33
Lane Turn-Arounds Two or More Deep Utilities	12.34
Lane Turn-Arounds One or Fewer Deep Utilities	12.35

Description	Drawing No.
Lane Grade Calculations	12.36
Collector and Local Roadway Centre Island	12.37
Intersection Grade Adjustment	12.38
Divided to Undivided Roadway Transition	12.39
Roadway Sight Triangle	12.40
Arterial Roadway Right Turn Design	12.41
Intersection Centre Line Control Radii	12.42
W.B. Design Vehicles	12.43
W.B. Vehicle Compound Curve Turn Design	12.44
Upgraded Street Sign Options	12.45
Section 13 – WATER DESIGN	
Water System Pressure Zones	13.01
Typical Valve & Hydrant Locations	13.02
Section 15 – STORMWATER DESIGN	
Shallow Storm Sewer Service Connection	15.01
Typical Lot Grading	15.02
Laneless Subdivision Drainage Swale	15.03
Manhole Inlet / Outlet Pipe Design Considerations	15.04
Typical Trapped Low Storage Area	15.05
Wet Stormwater Storage Facility	15.06
Dry Stormwater Storage Facility	15.07
Inlet / Outlet Structure Apron	15.08
Section 16 – SERVICE CONNECTION	
Service Locations	16.01
Typical Service Connections	16.02
Section17 – LANDSCAPE DESIGN	
Typical Asphalt Trail Detail	17.01
Typical Shrub Planting Detail	17.02
Typical Tree Planting Detail	17.03
Typical Tree Planting on Sloped Ground Detail	17.04
Typical Tree Planting Machine Dug Detail	17.05
Berm Side Slope / Retaining Wall Requirements for Arterial Roadways	17.06
Typical Berm Cross-Section for Arterial Roadways	17.07
Berm Height Reduction next to a Commercial Site	17.08
Post & Rope Fence Detail	17.09
Typical Swing Gate Bollard	17.10
Typical Break-Away Bollard	17.11
Neighbourhood Identification Sign Locations	17.12



SYLVAN STREET

NOTE :
LABEL PROPOSED AND EXISTING ELEVATIONS ON THE PROPERTY, ADJACENT PROPERTIES AND ROAD/SIDEWALK/DITCH EDGES AT THE LOCATIONS SHOWN OR GREATER.

WATER IS PROHIBITED FROM FLOWING ONTO ADJACENT PROPERTIES AS PER TOWN BYLAWS.

LABEL PROPOSED GRADES AT THE LOCATIONS SHOWN OR GREATER.

GRADE AWAY FROM STRUCTURES AT A MINIMUM 2.0% FOR A MINIMUM 2m.

RE-DEVELOPMENT WITHIN THE NE33 38-1-5 QUARTER SECTION AND THE PERIMETER OF LAKESHORE DRIVE, 50 AVENUE AND 40 STREET (CABIN AREA) MUST FOLLOW THE CABIN AREA GRADING PLAN PROVIDED BY THE TOWN, AND ALL ELEVATIONS MUST BE GEODETIC.

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Development Permit

APPROVED BY:

PUBLIC WORKS MANAGER

DATE: 2018

TYPICAL RE-DEVELOPMENT
SITE GRADING PLAN

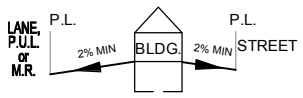
SCALE: N.T.S.

DRAWING NO.
7.01

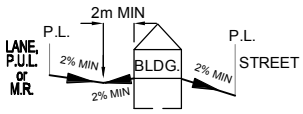
BUILDING GRADE CERTIFICATE

Town of Sylvan Lake
Issued by: | No. 2002-000

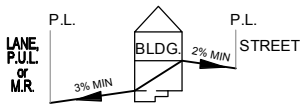
1. WHEN EXCAVATING IN A RIGHT OF WAY (EASEMENT), CHECK FOR UTILITIES.
2. STANDING AT THE WATER SHUTOFF AND FACING THE BUILDING, THE SANITARY SERVICE (PAINTED RED) IS ON THE LEFT SIDE OF THE WATER SERVICE: STORM SERVICE (PAINTED GREEN) IS ON THE RIGHT SIDE OF THE WATER SERVICE.
3. ALL DIMENSIONS ARE IN METRES AND DECIMALS THEROF. THE ELEVATIONS ARE IN METRES ABOVE GEODETIC MEAN SEA LEVEL.
4. ELEVATIONS NOTED ON THE CERTIFICATE ARE WITHIN 100mm OF ACTUAL.
5. THE BUILDER MUST CONSTRUCT WITHIN 100mm OF THE DESIGN LANDSCAPE ELEVATION & ILLUSTRATED DRAINAGE PATTERNS UNLESS OTHERWISE APPROVED BY THE DEVELOPMENT OFFICER.
6. IF THE INFORMATION ON THIS CERTIFICATE HAS BEEN PREPARED BY A PRIVATE DEVELOPER OR THEIR AGENT, THE TOWN OF SYLVAN LAKE ACCEPTS NO RESPONSIBILITY FOR ITS ACCURACY.



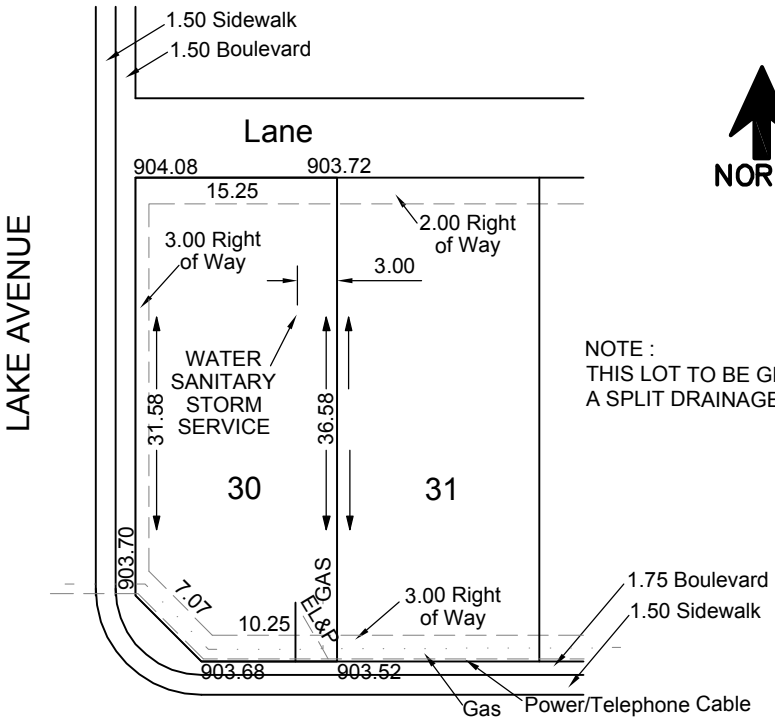
SPLIT DRAINAGE



BACK TO FRONT DRAINAGE



REARYARD BASEMENT WALKOUT SPLIT DRAINAGE



NOTE :
THIS LOT TO BE GRADED USING A SPLIT DRAINAGE PATTERN.

TOP OF FOOTING:
MAX. DEPTH BELOW AVERAGE SIDEWALK = 1.92
LOWEST ELEVATION = 901.68

AS-BUILT SEWER INVERT ELEVATIONS:
SANITARY AT RIGHT OF WAY LINE = 900.77
STORM AT RIGHT OF WAY LINE = 900.78

DESIGN LANDSCAPE ELEVATIONS
ELEV. AT FRONT OF HOUSE = 903.95
ELEV. AT REAR OF HOUSE = 903.95

CIVIC ADDRESS: 75 Sylvan Street
LOT: 30 BLOCK: 11 PLAN No.: 972 9999
DEVELOPER: ABC Developments Ltd. SCALE: 1:500
DRAWN BY: XYZ Consulting Ltd. DATE: June 28, 2000
APPROVED BY: DATE:
RECEIVED BY: DATE:

NO.	DATE	REVISION
1	2018	Revised drainage type notes

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Engineering Drawings

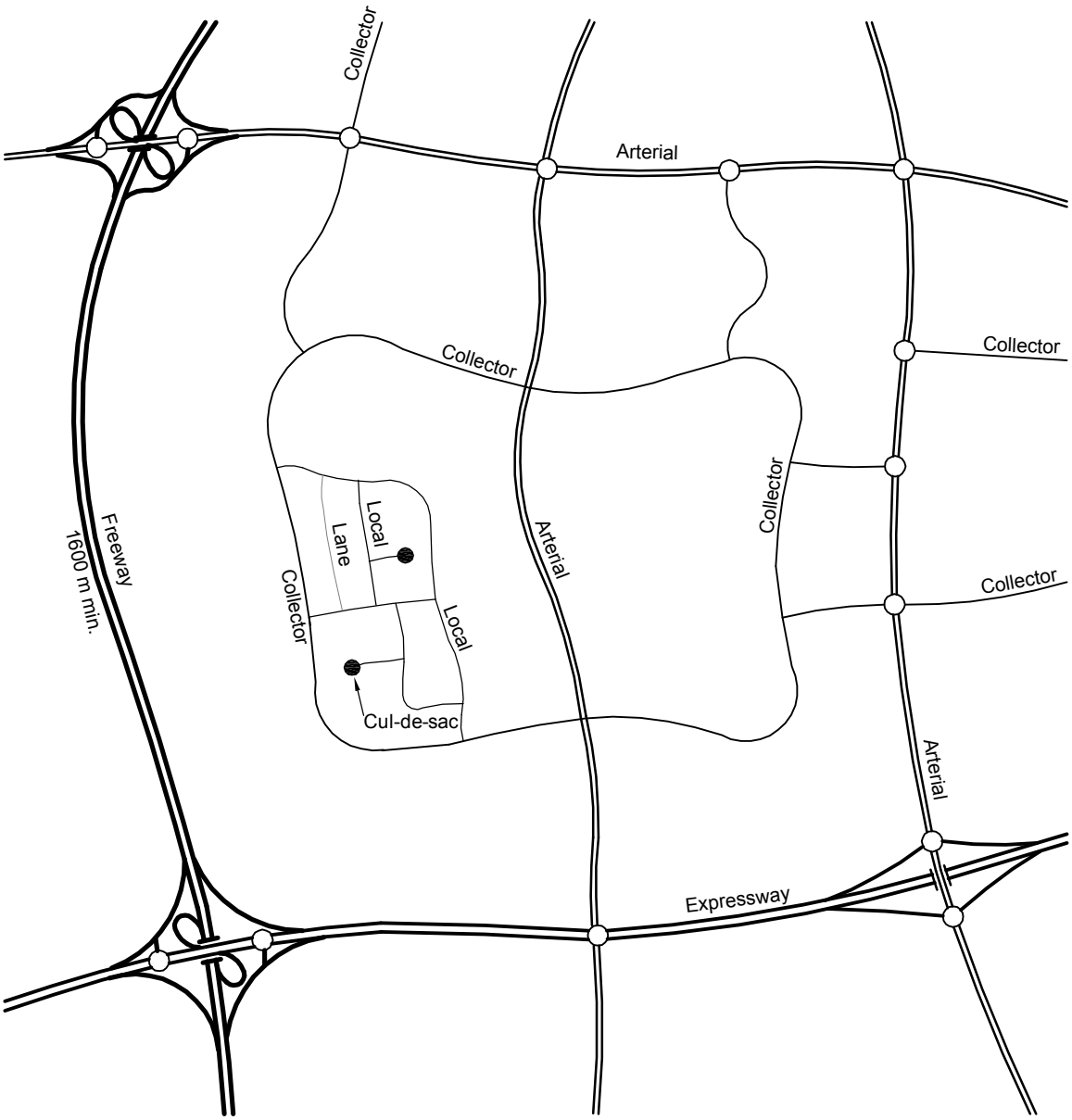
APPROVED BY:
PUBLIC WORKS MANAGER

DATE: 2018

TYPICAL NEW RESIDENTIAL BUILDING GRADE CERTIFICATE

SCALE: N.T.S.

DRAWING NO. 11.01



LEGEND

- FREEWAY
- EXPRESSWAY
- ARTERIAL
- COLLECTOR
- LOCAL
- PUBLIC LANE
- SIGNALIZED INTERSECTION
- CUL-DE-SAC

NO.	DATE	REVISION
1	2018	Removed distances and "major" arterial

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

RELATIONSHIP OF STREET CLASSIFICATIONS

DRAWN BY: M.M.

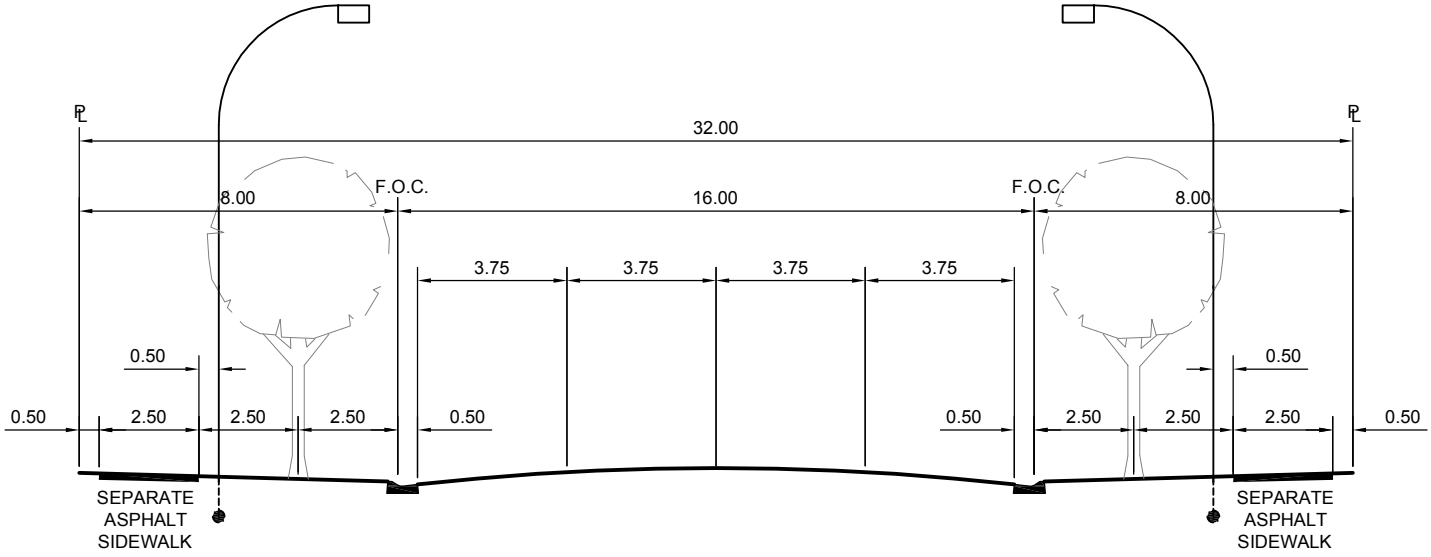
DATE: 2018

SCALE: N.T.S.

APPROVED BY:

PUBLIC WORKS MANAGER

DRAWING NO. 12.01



NO.	DATE	REVISION
1	2019	Specified sidewalk material

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

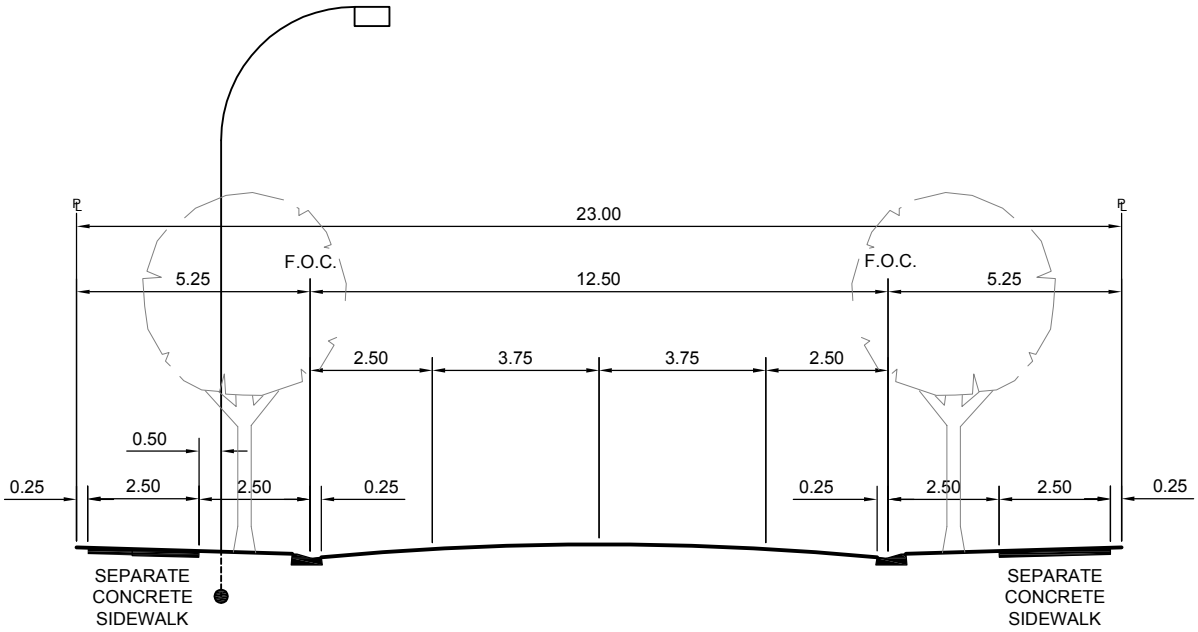
DIRECTOR OF PUBLIC WORKS

DATE: 2019

UNDIVIDED ARTERIAL ROADWAY

SCALE: N.T.S.

DRAWING NO. 12.02



NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

UNDIVIDED COLLECTOR
RESIDENTIAL ROADWAY
TWO MULTI-USE SIDEWALKS

DRAWN BY: M.M

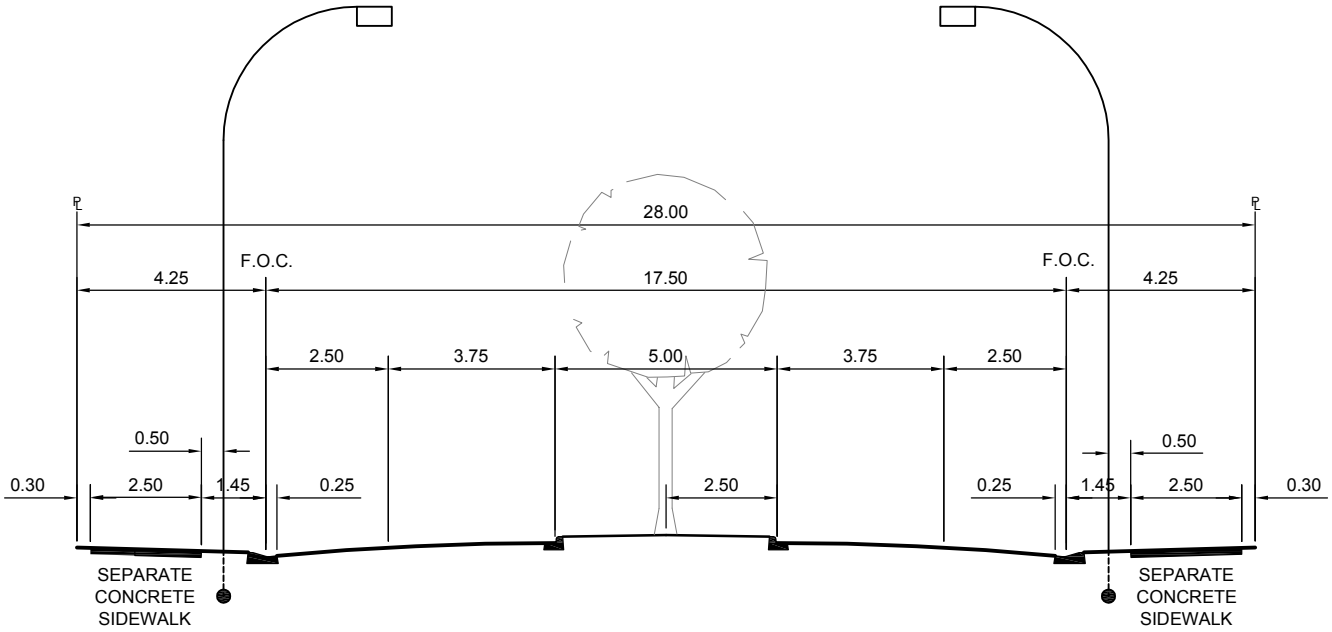
DATE: 2019

SCALE: N.T.S.

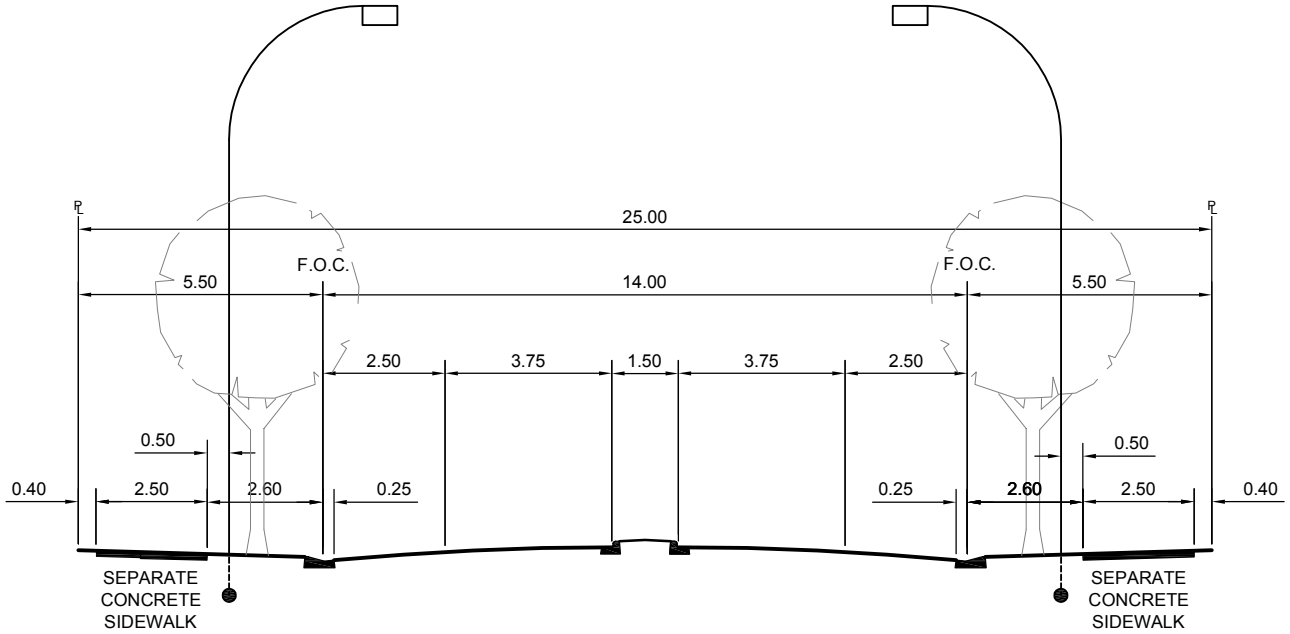
APPROVED BY:

DIRECTOR OF
PUBLIC WORKS

DRAWING NO.
12.03



DIVIDED COLLECTOR ROADWAY
WITH TREES IN 5.0m MEDIAN



DIVIDED COLLECTOR ROADWAY
WITH 1.5m MEDIAN

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

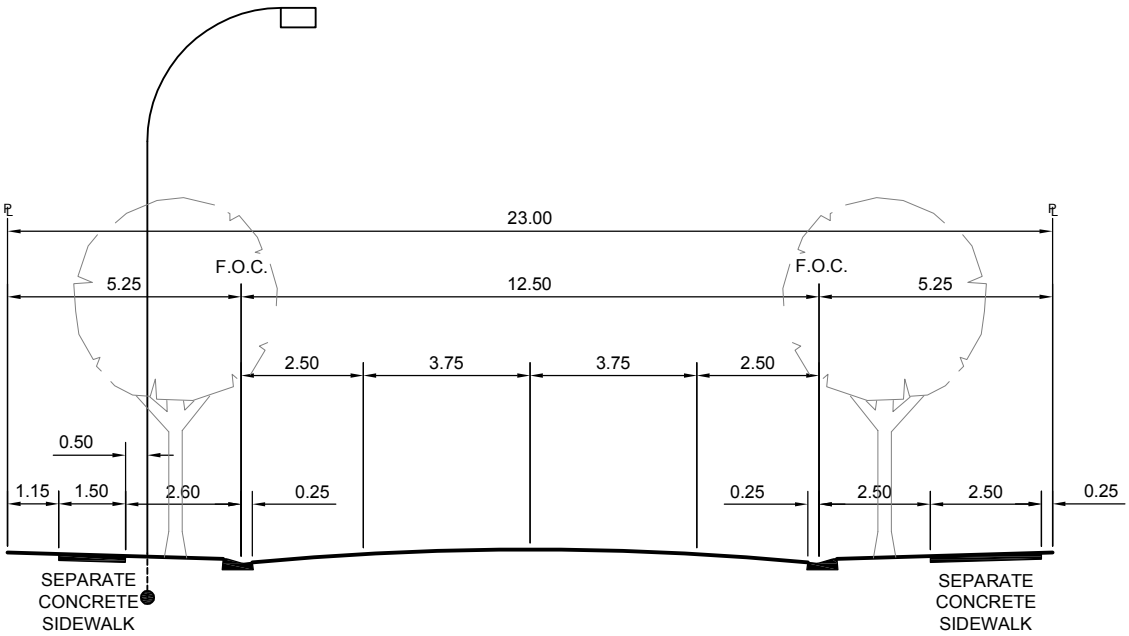
DIRECTOR OF PUBLIC WORKS

DATE: 2019

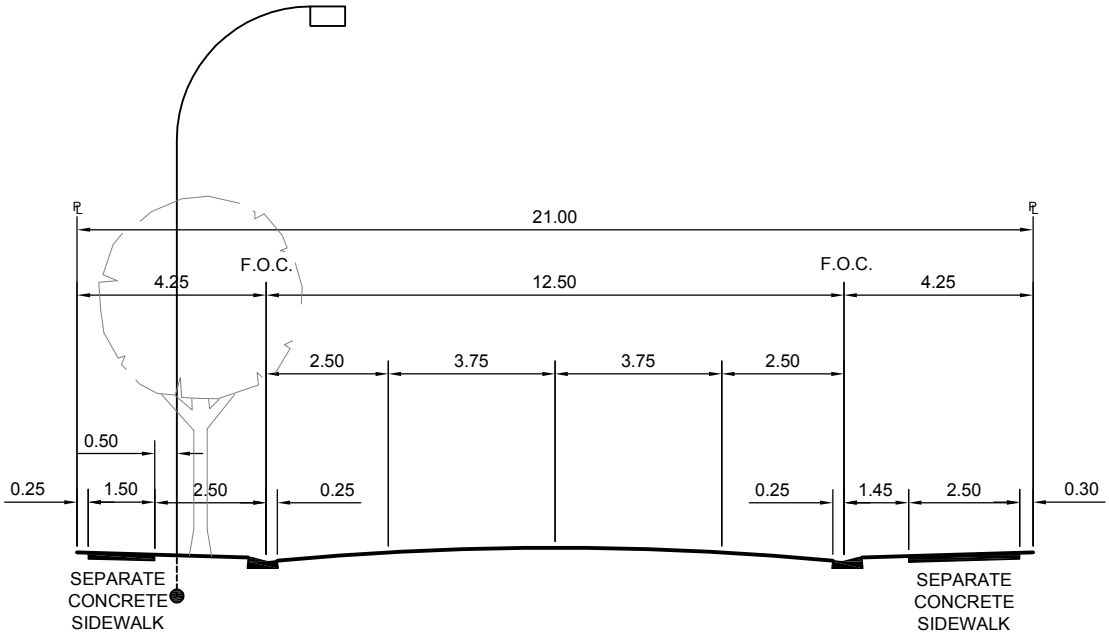
DIVIDED COLLECTOR
RESIDENTIAL ROADWAY
TWO MULTI-USE SIDEWALKS

SCALE: N.T.S.

DRAWING NO. 12.04



UNDIVIDED COLLECTOR ROADWAY
WITH TREES IN BOULEVARDS



UNDIVIDED COLLECTOR ROADWAY
WITH ONE TREE IN BOULEVARD

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

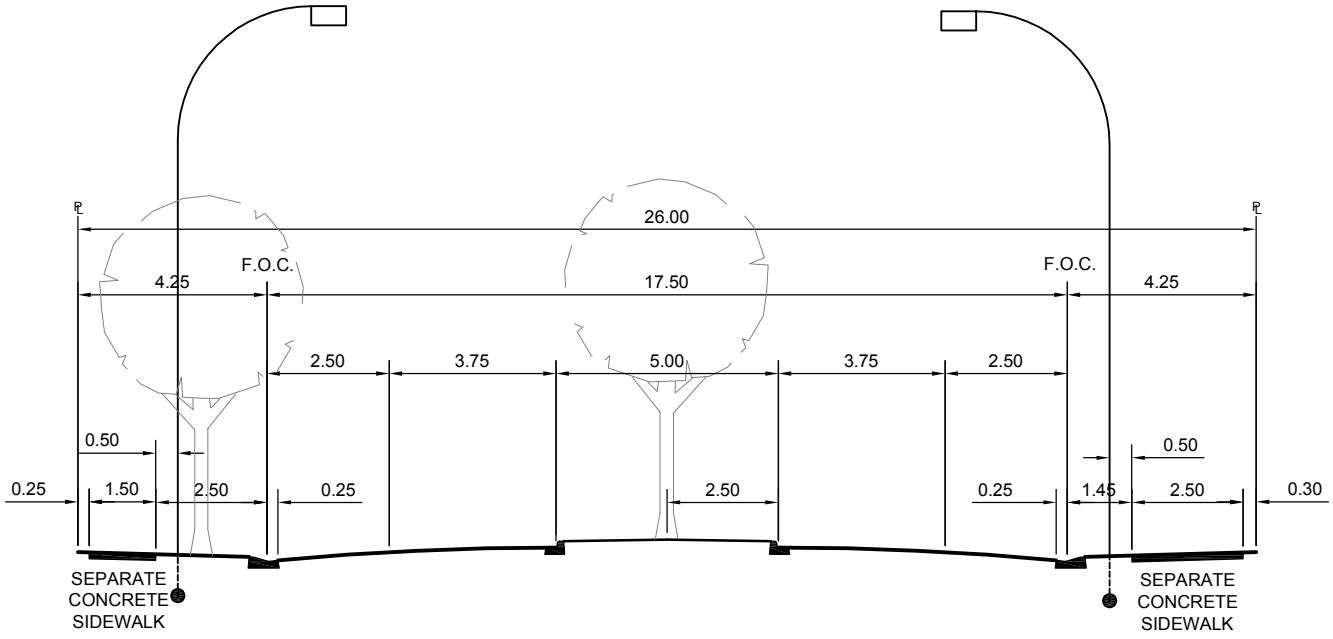
DIRECTOR OF PUBLIC WORKS

DATE: 2019

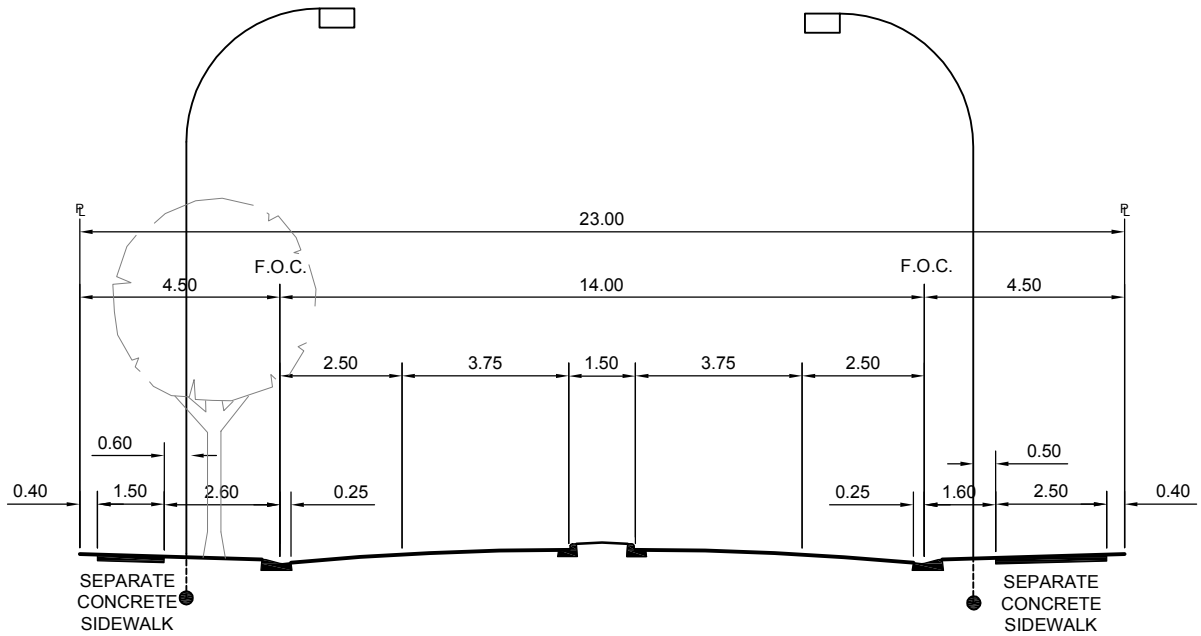
UNDIVIDED COLLECTOR
RESIDENTIAL ROADWAY
ONE MULTI-USE SIDEWALK

SCALE: N.T.S.

DRAWING NO. 12.05



DIVIDED COLLECTOR ROADWAY
WITH TREES IN 5.0m MEDIAN



DIVIDED COLLECTOR ROADWAY
WITH 1.5m MEDIAN

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

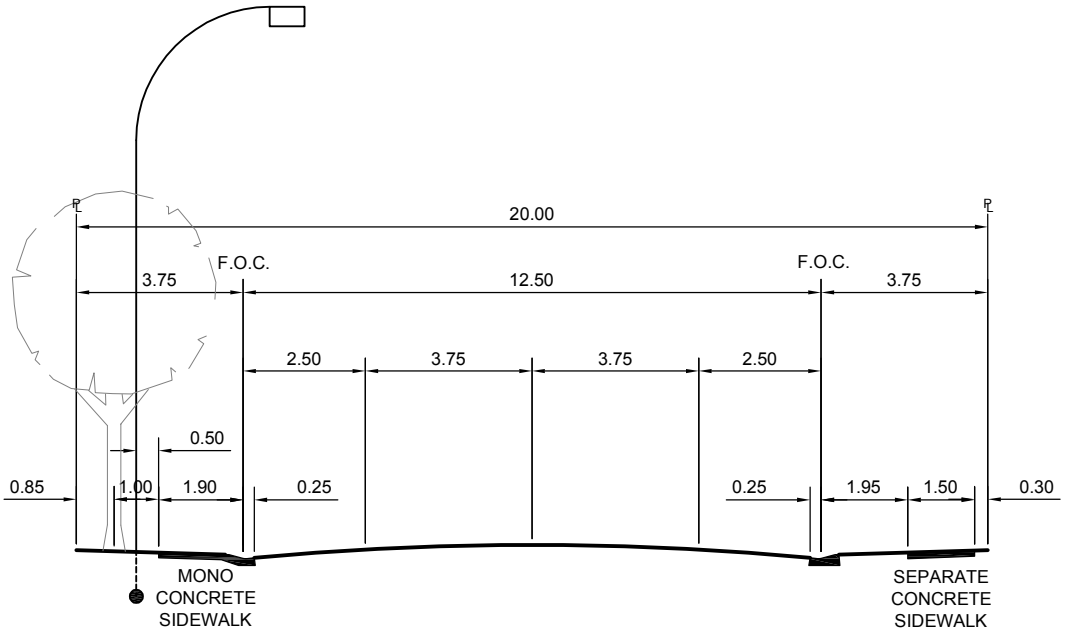
DIRECTOR OF PUBLIC WORKS

DATE: 2019

DIVIDED COLLECTOR
RESIDENTIAL ROADWAY
ONE MULTI-USE SIDEWALK

SCALE: N.T.S.

DRAWING NO. 12.06



20m REDEVELOPMENT COLLECTOR ROADWAY
FOR USE IN REDEVELOPMENT WITH RESTRICTED EXISTING RIGHT OF WAY ONLY

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

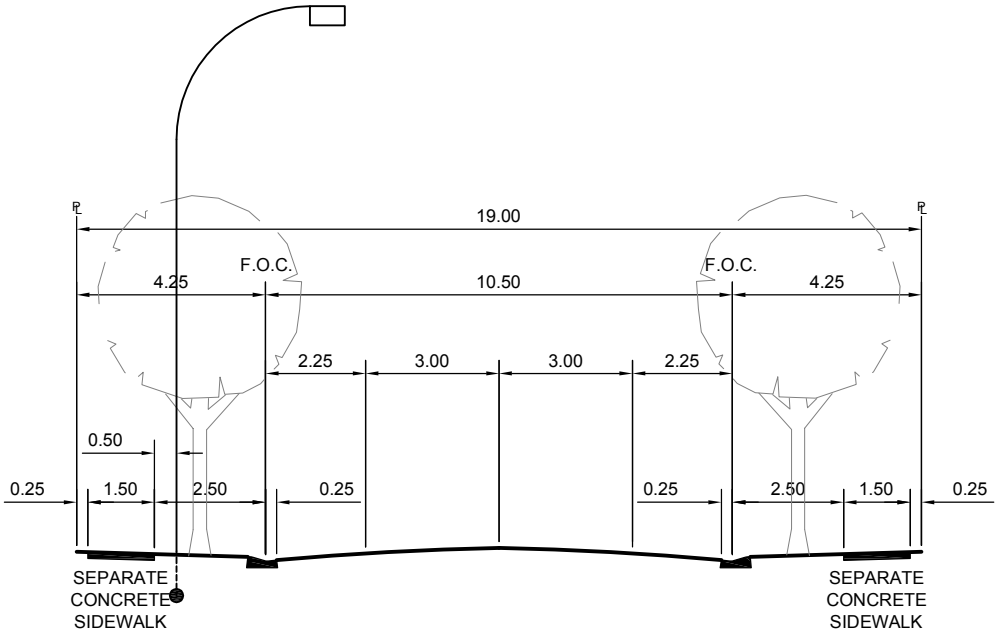
DIRECTOR OF PUBLIC WORKS

DATE: 2019

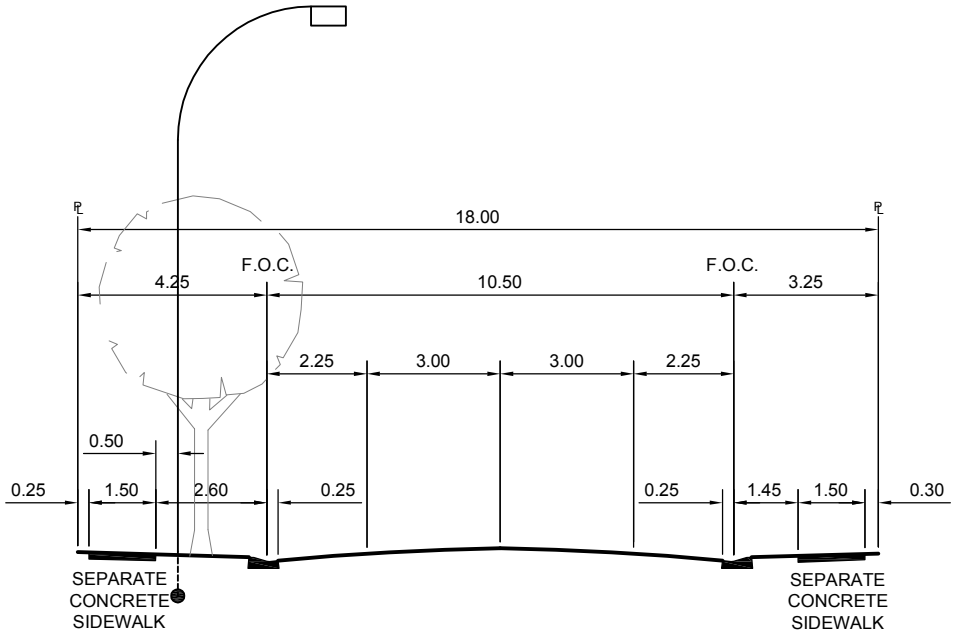
20m ROW REDEVELOPMENT COLLECTOR RESIDENTIAL ROADWAY

SCALE: N.T.S.

DRAWING NO. 12.07



UNDIVIDED LOCAL ROADWAY
WITH TREES IN BOULEVARDS



UNDIVIDED LOCAL ROADWAY
WITH ONE TREE IN BOULEVARD

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

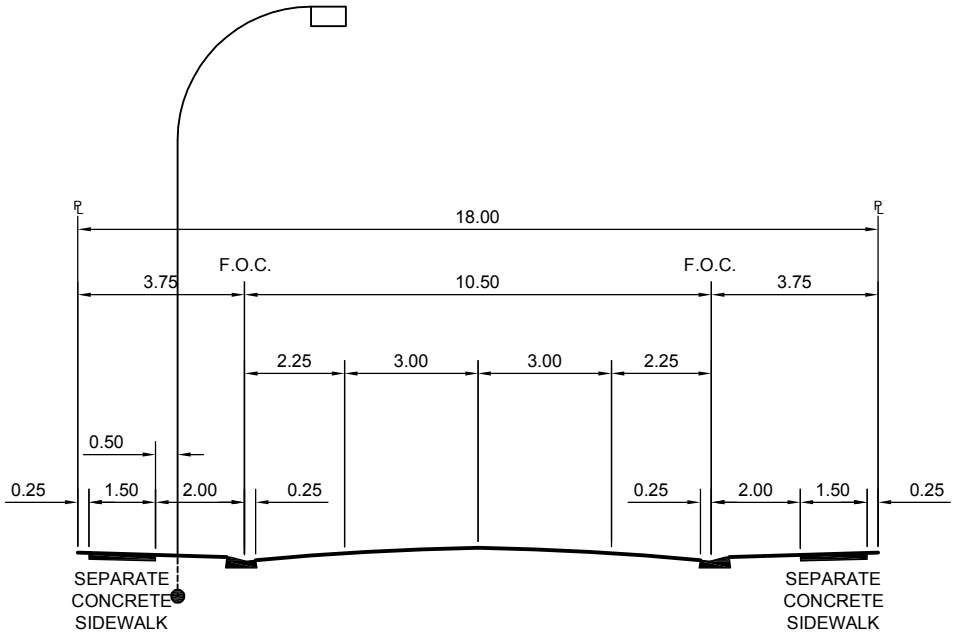
DIRECTOR OF PUBLIC WORKS

DATE: 2019

UNDIVIDED LOCAL
RESIDENTIAL ROADWAY
TWO SEPARATE SIDEWALKS
w/ TREES

SCALE: N.T.S.

DRAWING NO. 12.08



UNDIVIDED LOCAL ROADWAY
WITH NO TREES

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

UNDIVIDED LOCAL
RESIDENTIAL ROADWAY
TWO SEPARATE SIDEWALKS

DRAWN BY: M.M.

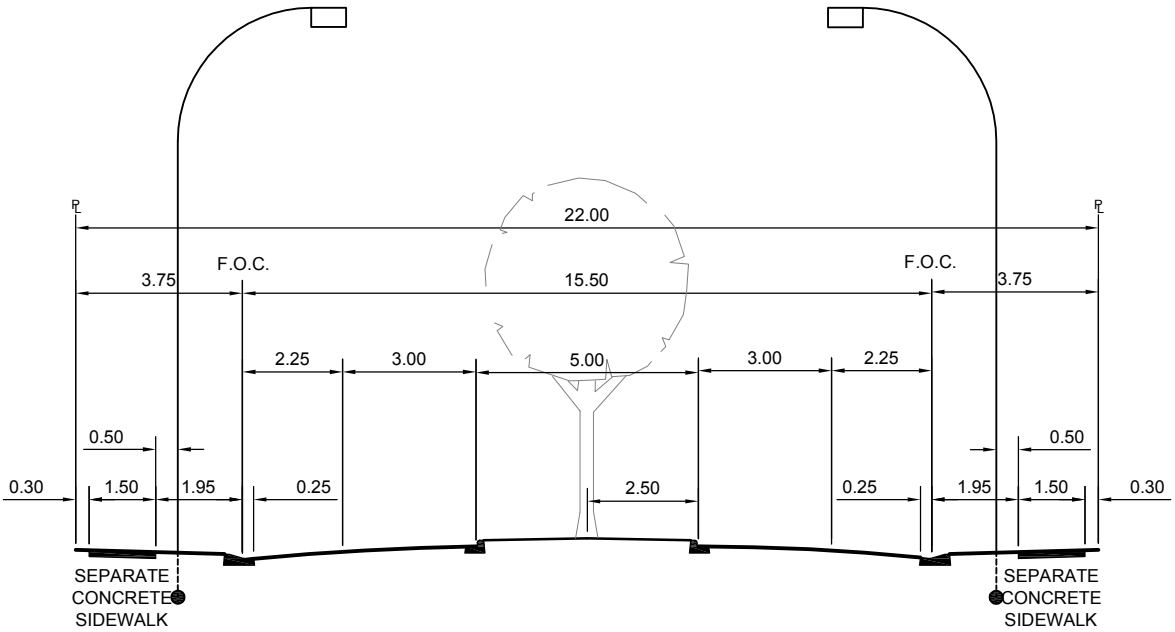
DATE: 2019

SCALE: N.T.S.

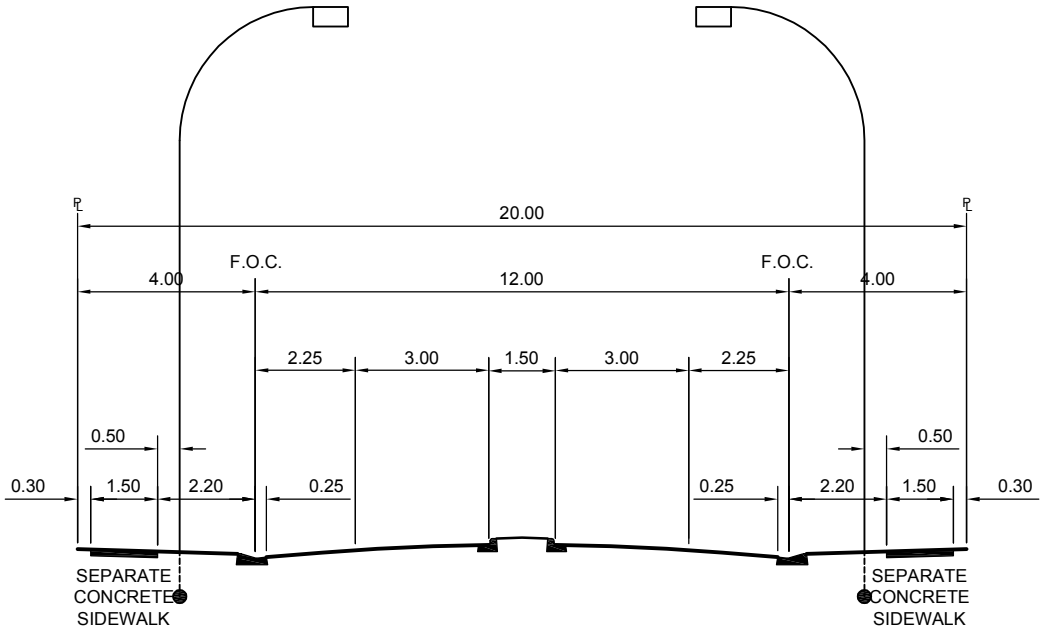
APPROVED BY:

DIRECTOR OF
PUBLIC WORKS

DRAWING NO. 12.09



DIVIDED LOCAL ROADWAY
WITH TREES IN 5.0m MEDIAN



DIVIDED LOCAL ROADWAY
WITH 1.5m MEDIAN

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

DRAWN BY: M.M.

DATE: 2019

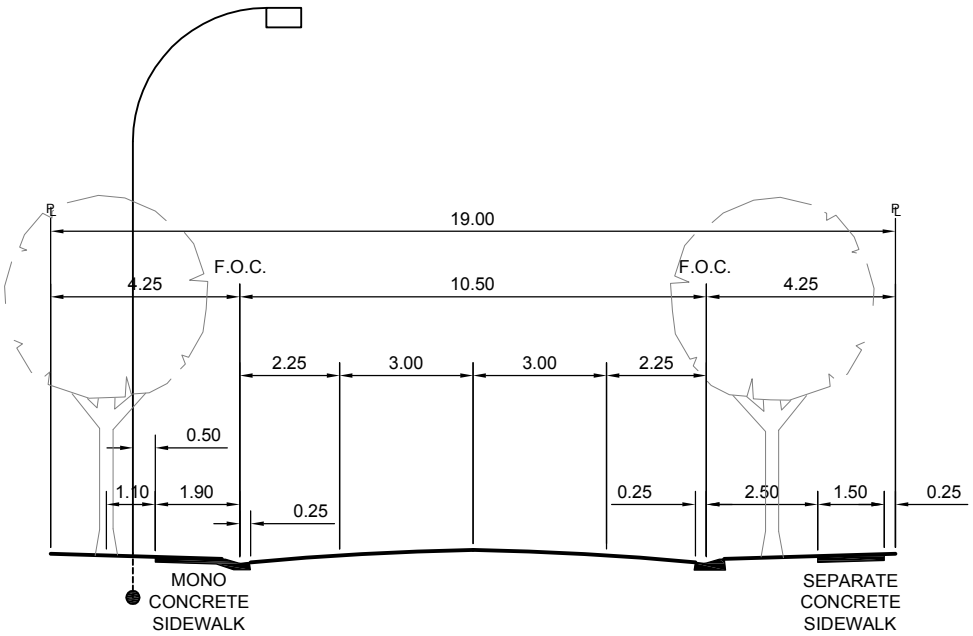
SCALE: N.T.S.

DIVIDED LOCAL
RESIDENTIAL ROADWAY
TWO SEPARATE SIDEWALKS

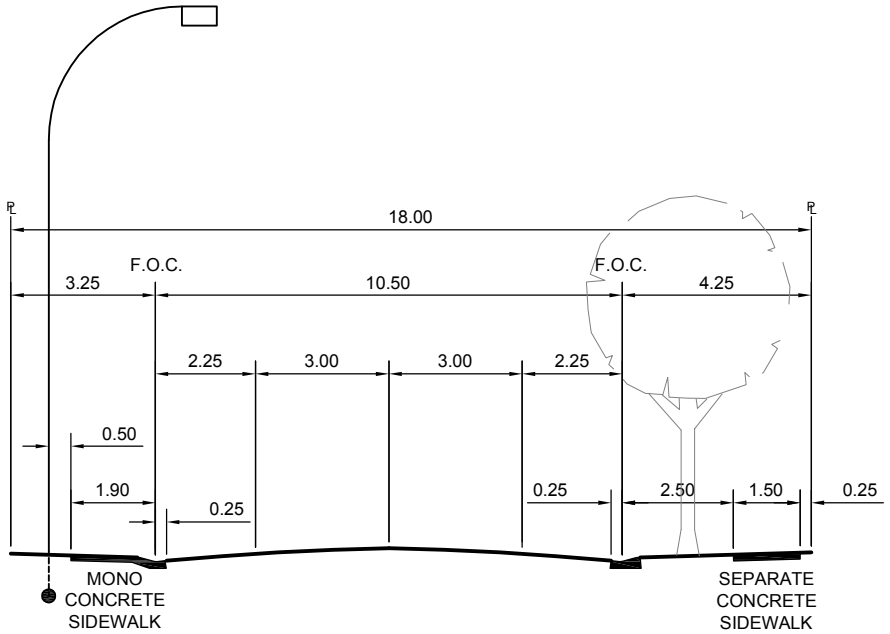
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO. 12.10



UNDIVIDED LOCAL ROADWAY
WITH TREES IN BOULEVARDS



UNDIVIDED LOCAL ROADWAY
WITH ONE TREE IN BOULEVARD

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

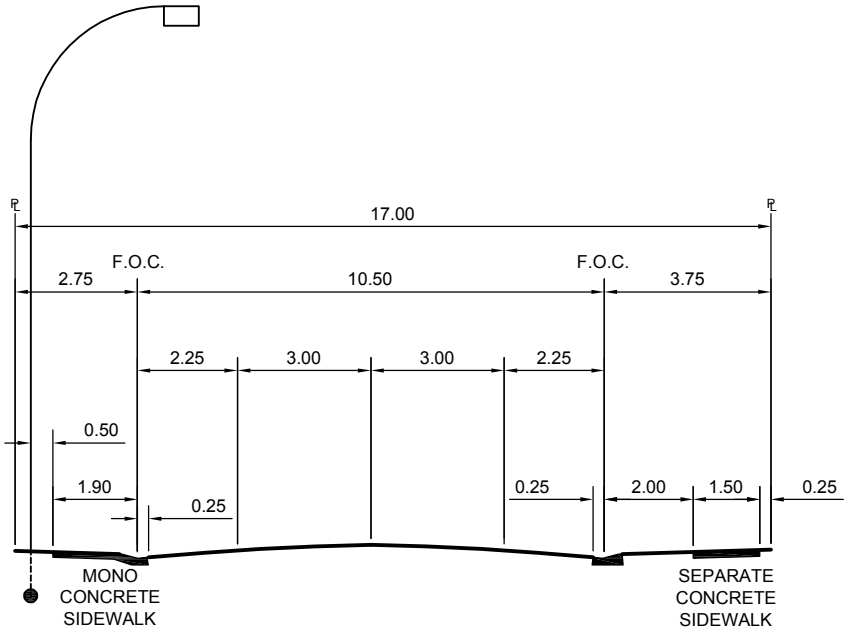
DIRECTOR OF PUBLIC WORKS

DATE: 2019

UNDIVIDED LOCAL
RESIDENTIAL ROADWAY
MONO & SEPARATE SIDEWALKS
w/ TREES

SCALE: N.T.S.

DRAWING NO. 12.11



UNDIVIDED LOCAL ROADWAY
WITH NO TREES

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

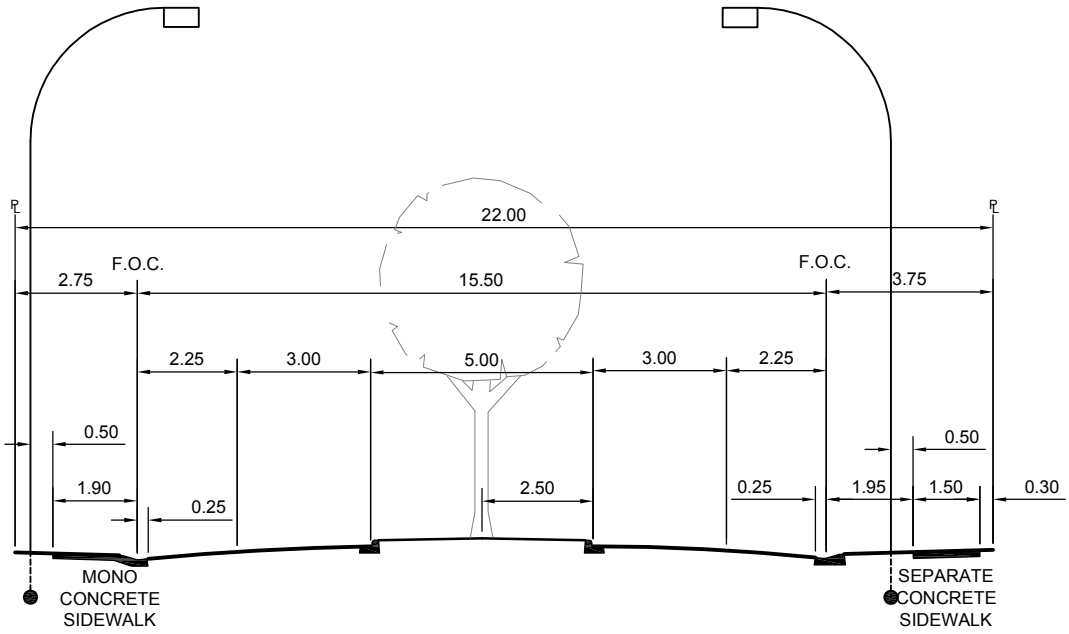
DIRECTOR OF PUBLIC WORKS

DATE: 2019

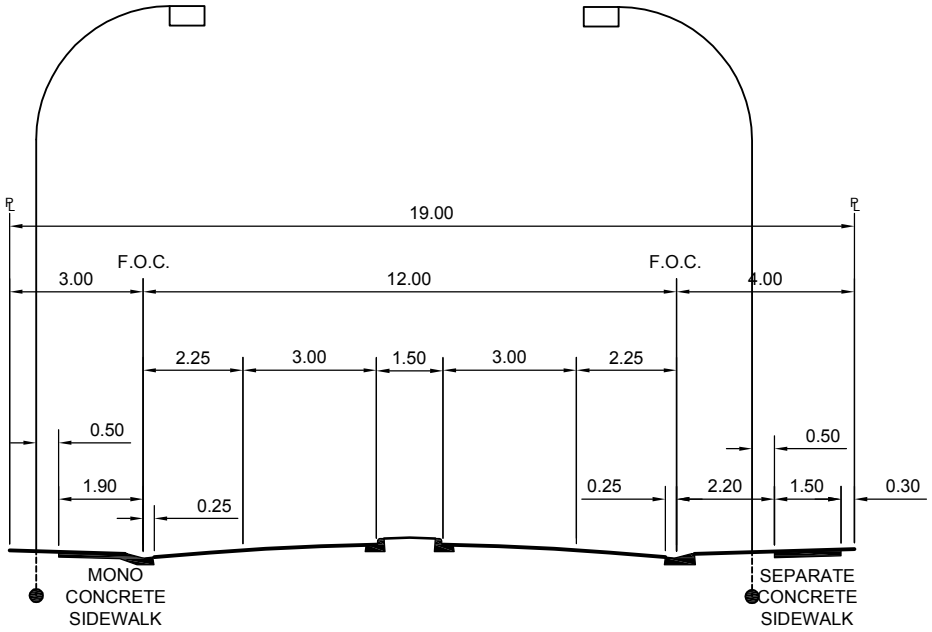
UNDIVIDED LOCAL
RESIDENTIAL ROADWAY
MONO & SEPARATE SIDEWALKS

SCALE: N.T.S.

DRAWING NO. 12.12



DIVIDED LOCAL ROADWAY
WITH TREES IN 5.0m MEDIAN



DIVIDED LOCAL ROADWAY
WITH 1.5m MEDIAN

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

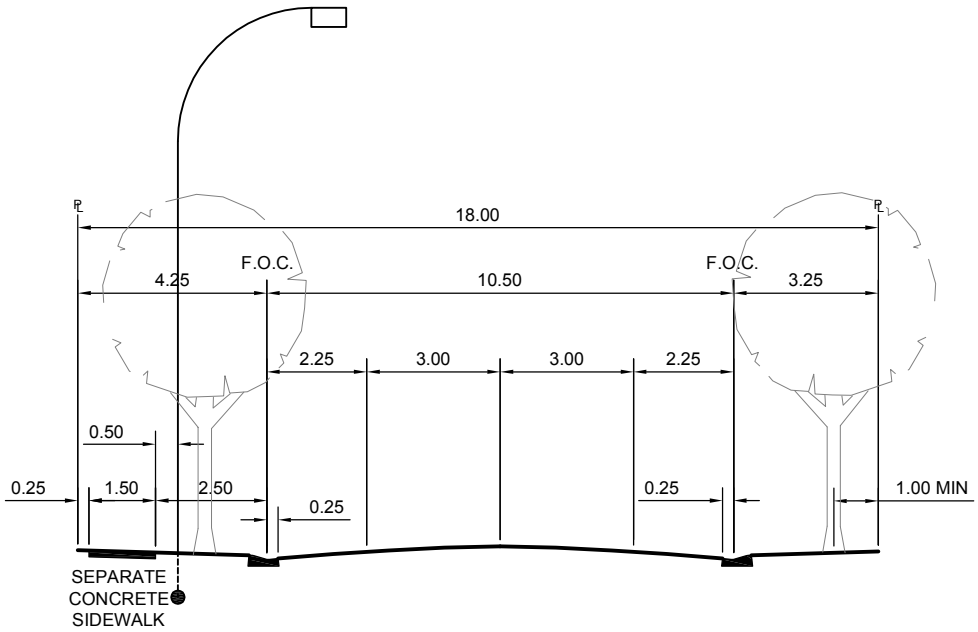
DIRECTOR OF PUBLIC WORKS

DATE: 2019

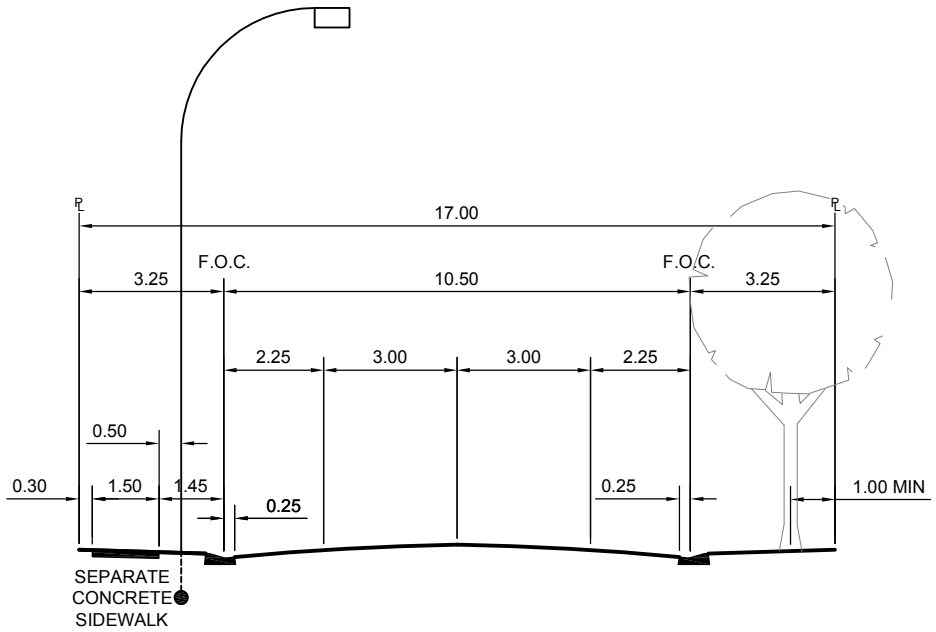
DIVIDED LOCAL
RESIDENTIAL ROADWAY
MONO & SEPARATE SIDEWALKS

SCALE: N.T.S.

DRAWING NO. 12.13



UNDIVIDED LOCAL ROADWAY
WITH TREES IN BOULEVARDS



UNDIVIDED LOCAL ROADWAY
WITH ONE TREE IN BOULEVARD

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

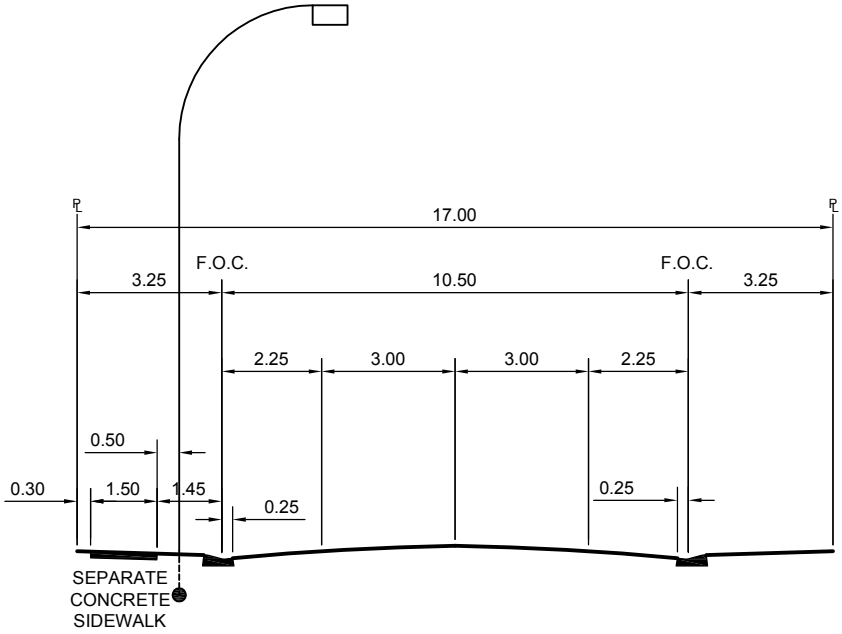
DIRECTOR OF PUBLIC WORKS

DATE: 2019

UNDIVIDED LOCAL
RESIDENTIAL ROADWAY
ONE SEPARATE SIDEWALK
w/ TREES

SCALE: N.T.S.

DRAWING NO. 12.14



UNDIVIDED LOCAL ROADWAY
WITH NO TREES

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

UNDIVIDED LOCAL
RESIDENTIAL ROADWAY
ONE SEPARATE SIDEWALK

DRAWN BY: M.M.

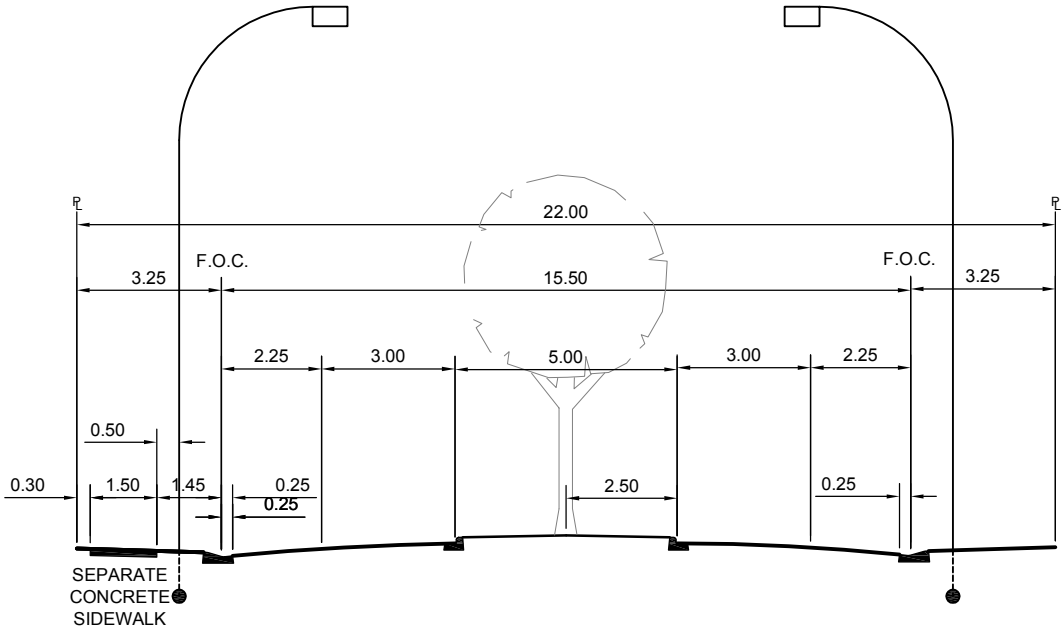
DATE: 2019

SCALE: N.T.S.

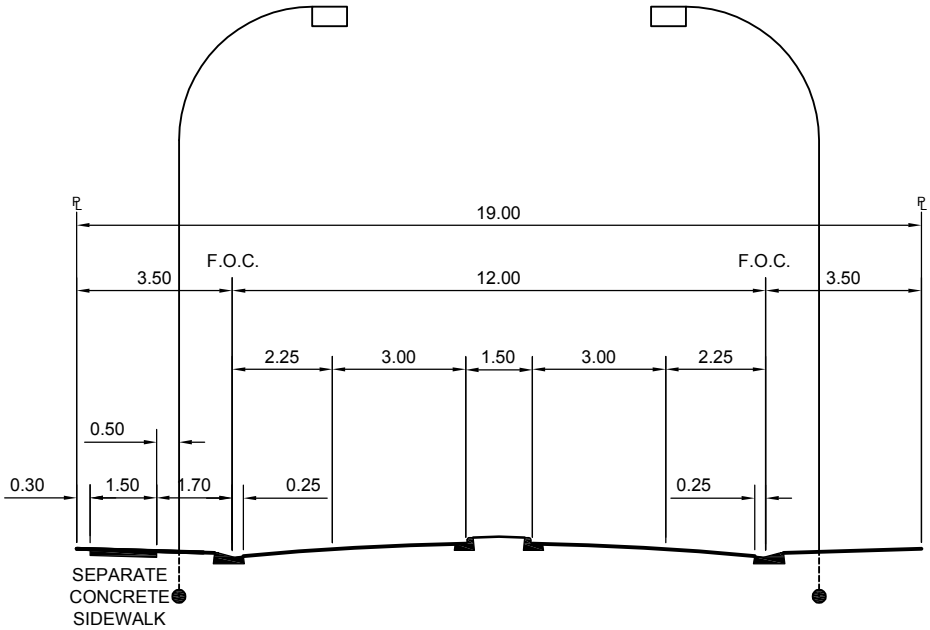
APPROVED BY:

DIRECTOR OF
PUBLIC WORKS

DRAWING NO. 12.15



DIVIDED LOCAL ROADWAY
WITH TREES IN 5.0m MEDIAN



DIVIDED LOCAL ROADWAY
WITH 1.5m MEDIAN

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

DRAWN BY: M.M.

DATE: 2019

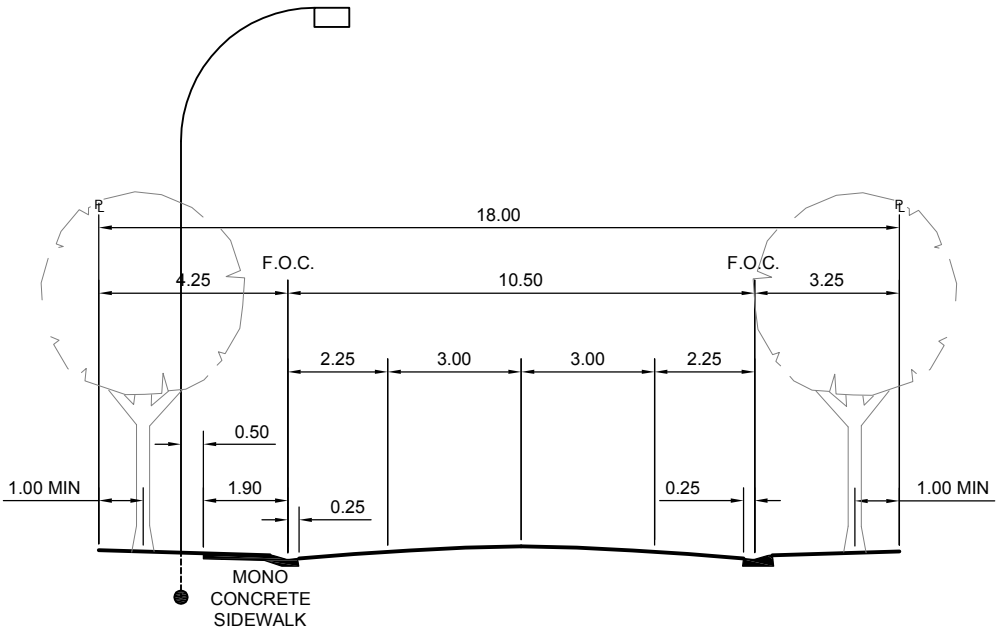
SCALE: N.T.S.

DIVIDED LOCAL
RESIDENTIAL ROADWAY
ONE SEPARATE SIDEWALK

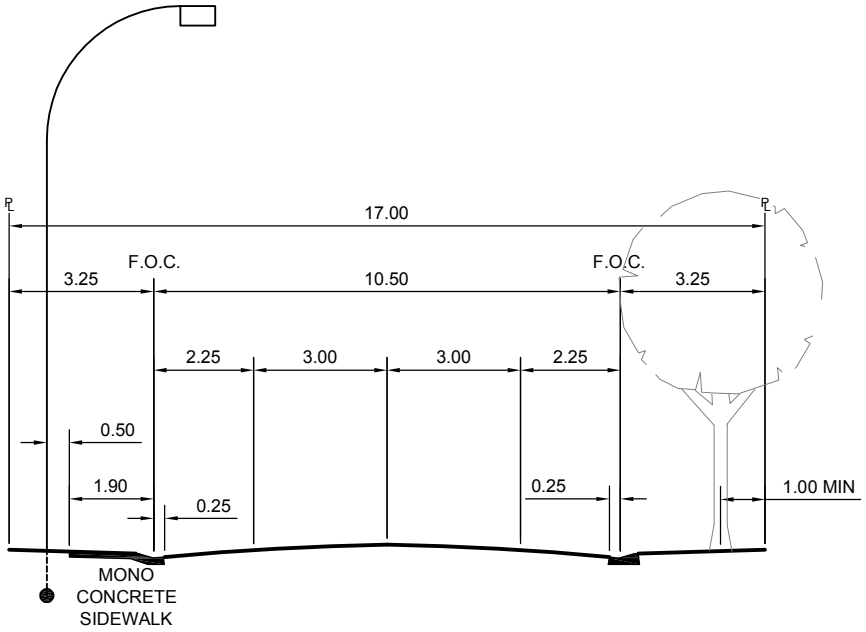
APPROVED BY:

DIRECTOR OF
PUBLIC WORKS

DRAWING NO.
12.16



UNDIVIDED LOCAL ROADWAY
WITH TREES IN BOULEVARDS



UNDIVIDED LOCAL ROADWAY
WITH ONE TREE IN BOULEVARD

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

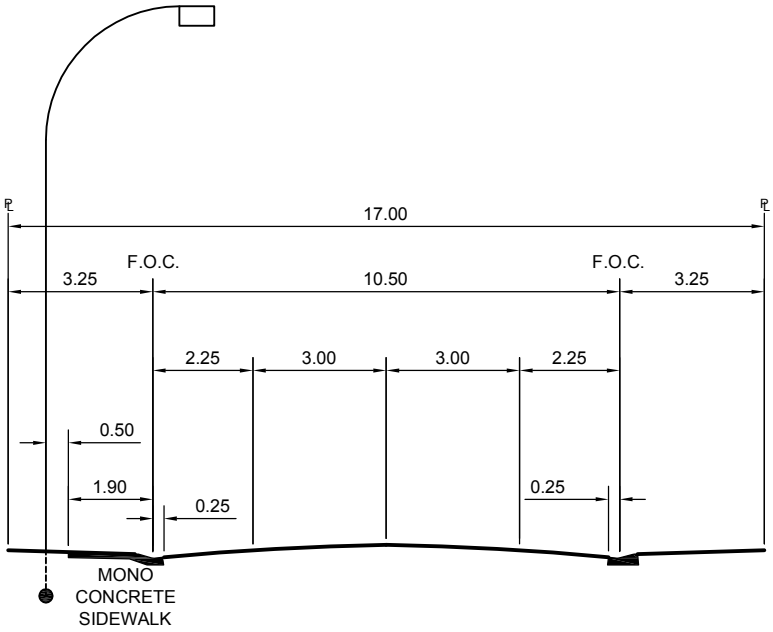
DIRECTOR OF PUBLIC WORKS

DATE: 2019

UNDIVIDED LOCAL
RESIDENTIAL ROADWAY
ONE MONO SIDEWALK
w/ TREES

SCALE: N.T.S.

DRAWING NO. 12.17



UNDIVIDED LOCAL ROADWAY
WITH NO TREES

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

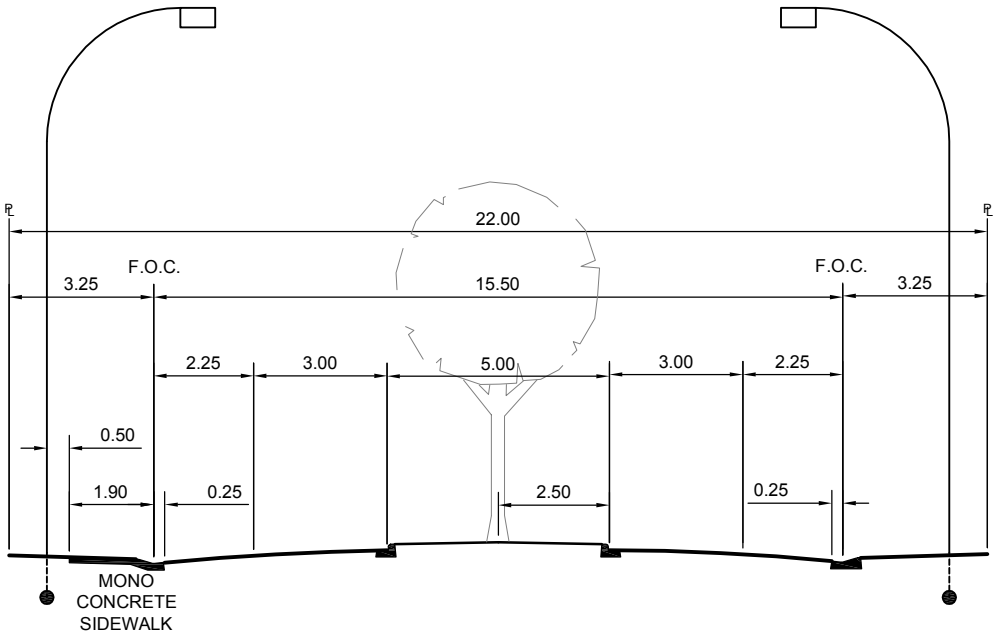
DIRECTOR OF PUBLIC WORKS

DATE: 2019

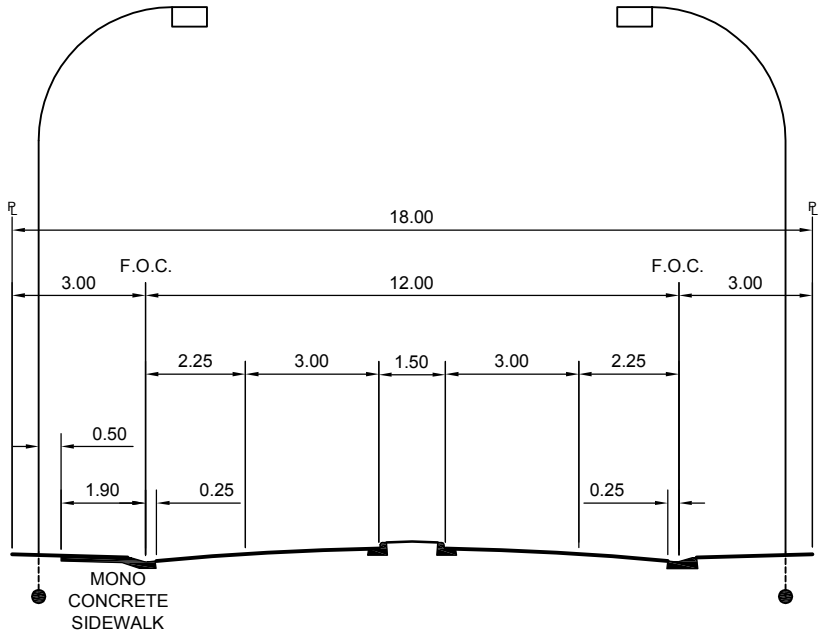
UNDIVIDED LOCAL
RESIDENTIAL ROADWAY
ONE MONO SIDEWALK

SCALE: N.T.S.

DRAWING NO. 12.18



DIVIDED LOCAL ROADWAY
WITH TREES IN 5.0m MEDIAN



DIVIDED LOCAL ROADWAY
WITH 1.5m MEDIAN

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

DIVIDED LOCAL
RESIDENTIAL ROADWAY
ONE MONO SIDEWALK

DRAWN BY: M.M.

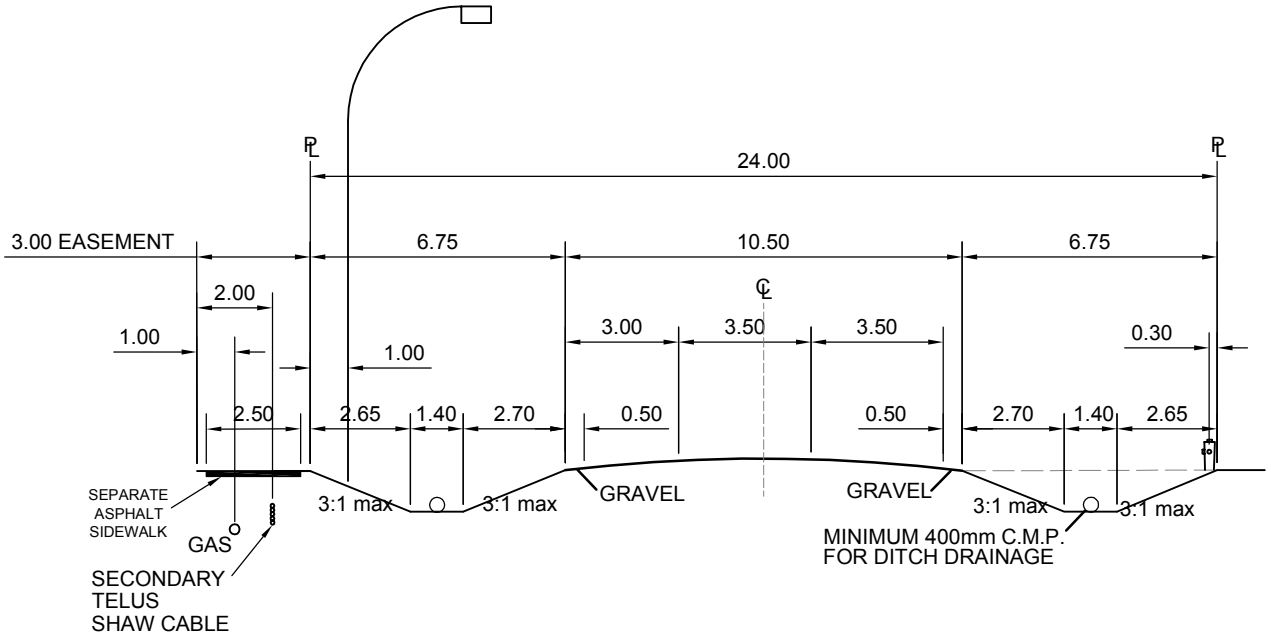
DATE: 2019

SCALE: N.T.S.

APPROVED BY:

DIRECTOR OF
PUBLIC WORKS

DRAWING NO.
12.19



UNDIVIDED RURAL INDUSTRIAL
COLLECTOR & LOCAL ROADWAY

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

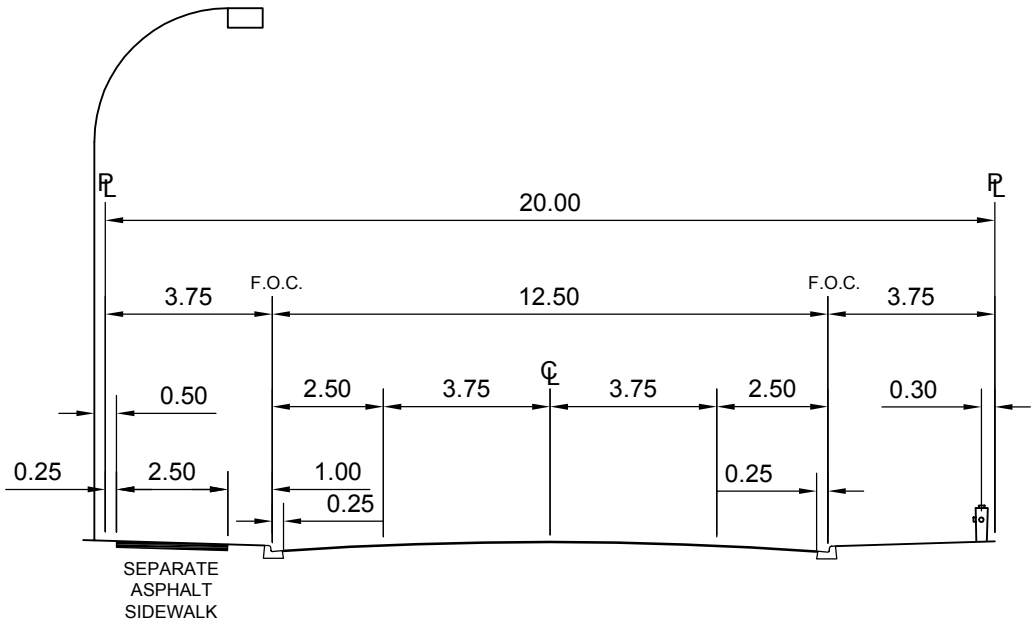
DIRECTOR OF PUBLIC WORKS

DATE: 2019

RURAL UNDIVIDED INDUSTRIAL
COLLECTOR & LOCAL ROADWAY

SCALE: N.T.S.

DRAWING NO. 12.20



UNDIVIDED URBAN INDUSTRIAL
COLLECTOR & LOCAL ROADWAY

NO.	DATE	REVISION
1	2019	Revised standard cross-sections

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

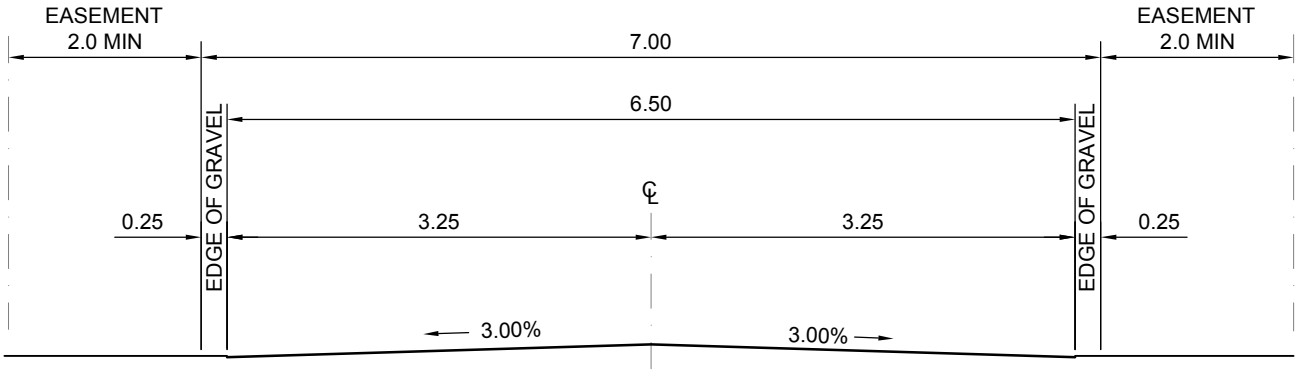
DIRECTOR OF PUBLIC WORKS

DATE: 2019

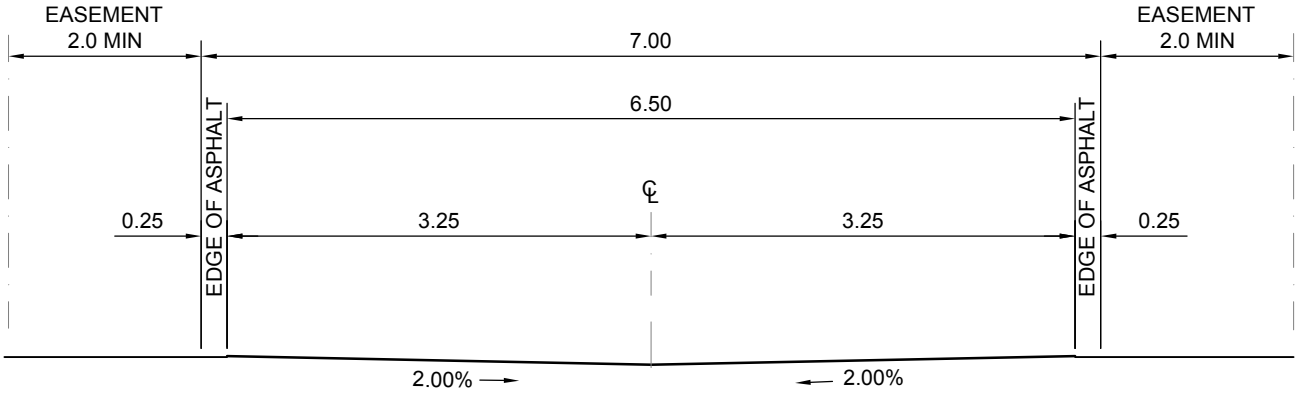
URBAN UNDIVIDED INDUSTRIAL
COLLECTOR & LOCAL ROADWAY

SCALE: N.T.S.

DRAWING NO. 12.21



GRAVEL LANE



PAVED LANE

NOTE :
- MINIMUM 2.00m WIDE EASEMENT REQUIRED ON BOTH SIDES OF LANE FOR REAR SERVICING.
- LANE TO BE PAVED ADJACENT TO MULTI-FAMILY AND COMMERCIAL DEVELOPMENTS WHERE LANE ACCESS IS PROVIDED.

NO.	DATE	REVISION
3	2019	Removed crowned asphalt lane option
2	2018	Added easement dimensions
1	2018	Revised CL to EOA widths

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

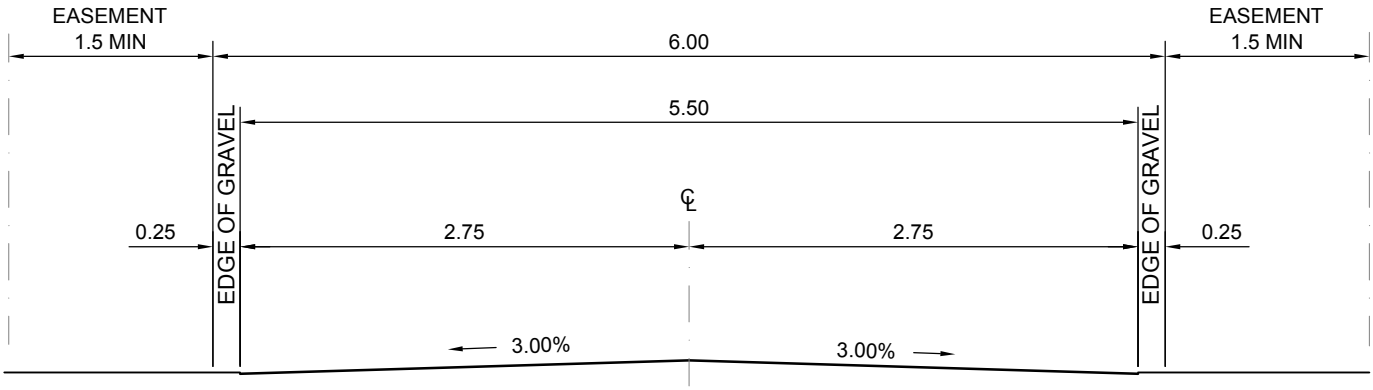
APPROVED BY:
DIRECTOR OF PUBLIC WORKS

DATE: 2019

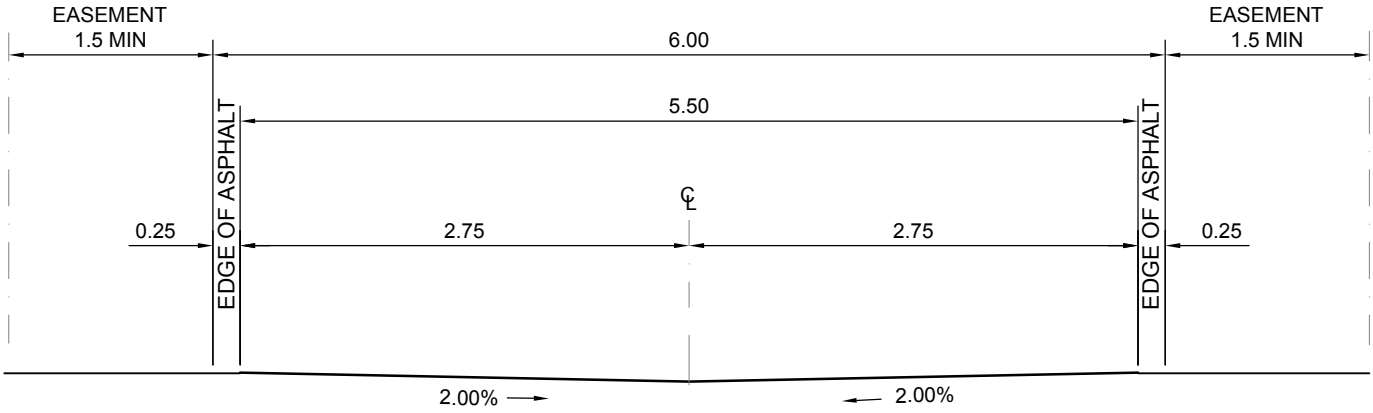
GRAVEL AND PAVED LANES
TWO OR MORE DEEP UTILITIES

SCALE: N.T.S.

DRAWING NO. 12.22



GRAVEL LANE



PAVED LANE

NOTE :
- LANE TO BE PAVED ADJACENT TO MULTI-FAMILY AND COMMERCIAL DEVELOPMENTS WHERE LANE ACCESS IS PROVIDED.

NO.	DATE	REVISION
3	2019	Removed crowned asphalt lane option
2	2018	Added easement dimensions
1	2018	Revised CL to EOA widths

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

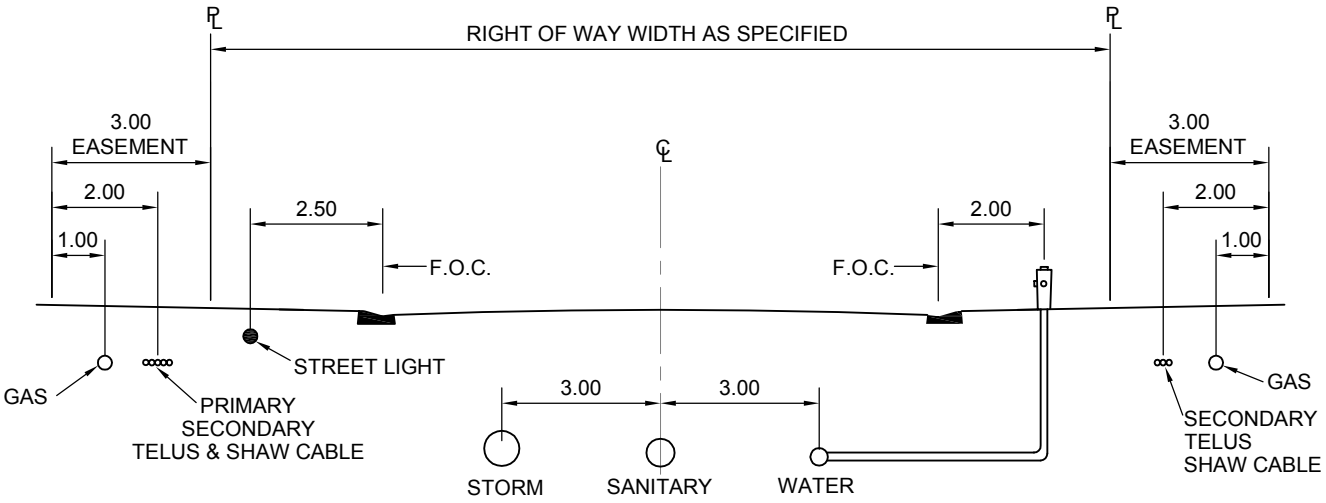
DIRECTOR OF PUBLIC WORKS

DATE: 2019

GRAVEL AND PAVED LANES
ONE OR FEWER DEEP UTILITIES

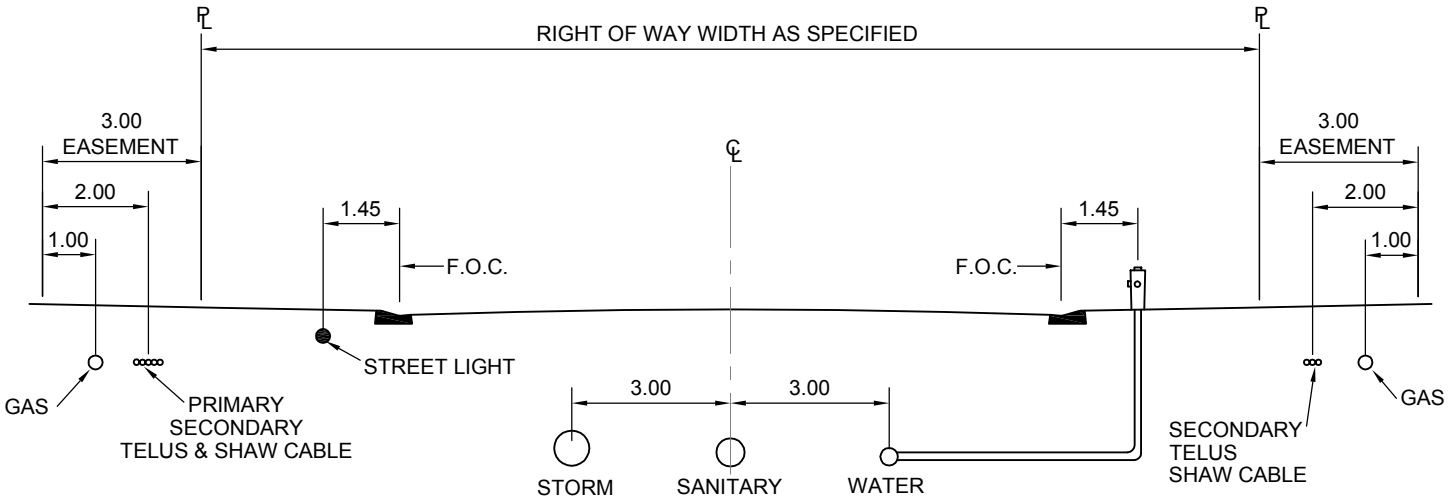
SCALE: N.T.S.

DRAWING NO. 12.23



LOCAL ROAD

NOTE: DEFLECT CABLE ALIGNMENTS AT HYDRANT



COLLECTOR ROAD

NOTE:
1. GAS MAY BE RELOCATED TO COMMON PROPERTY AT REAR.
2. MONOLITHIC SIDEWALK PERMITTED ONLY WHERE EXISTING MUST BE EXTENDED IN THE SAME BLOCK.

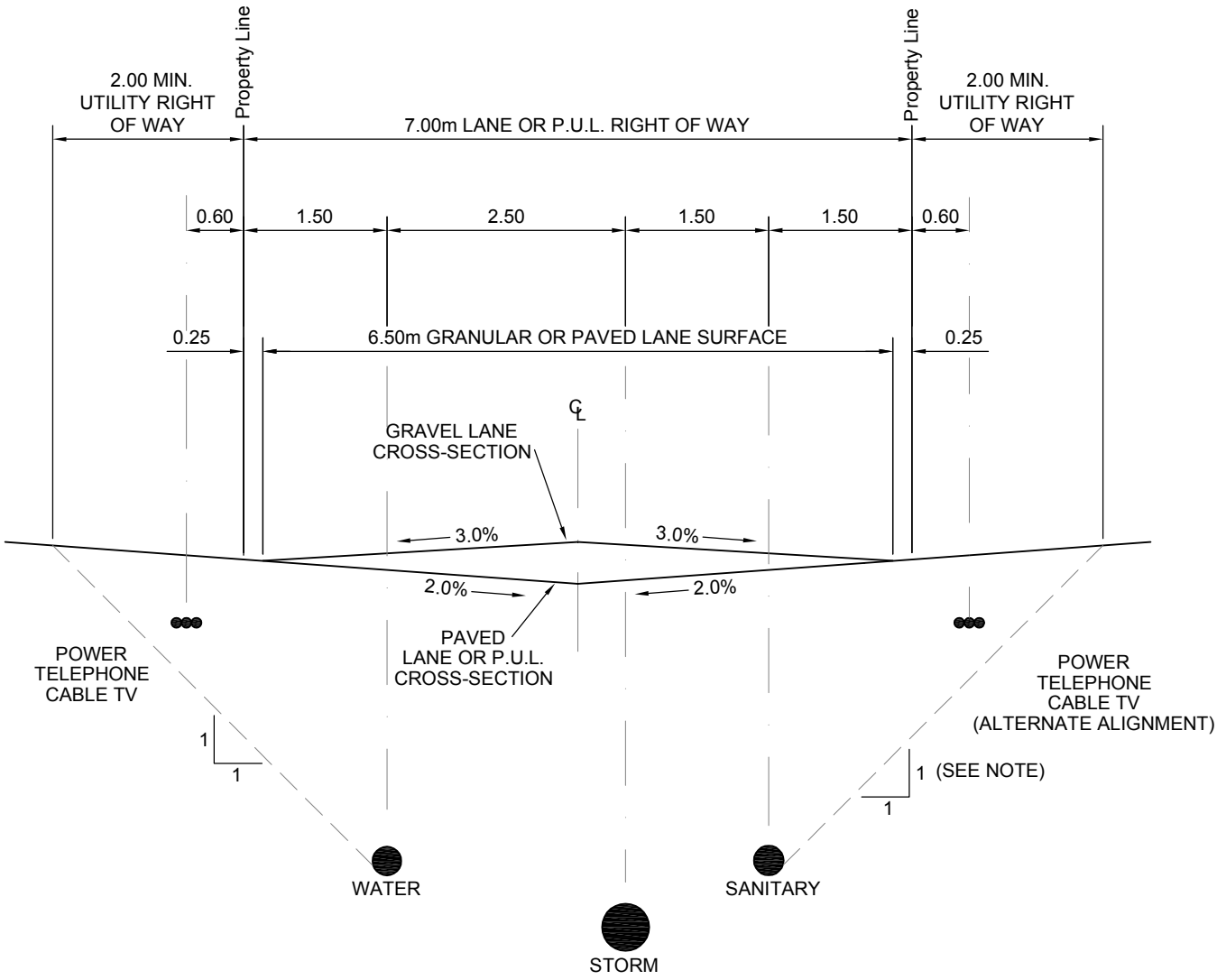
NO.	DATE	REVISION
2	2019	Removed specific ROW widths
1	2018	Removed road widths and sidewalks

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

TYPICAL FRONT SERVICING ALIGNMENTS

DRAWN BY: M.M.
DATE: 2019
SCALE: N.T.S.
APPROVED BY: DIRECTOR OF PUBLIC WORKS
DRAWING NO. 12.24



NOTE :

- 1:1 SIDESLOPE SHOWN IS TO BE USED AS A GUIDELINE FOR ESTABLISHING EASEMENT REQUIREMENTS TO PROVIDE A MINIMUM SETBACK FOR EXISTING REAR YARD BUILDINGS (EG. GARAGE, STORAGE SHED).
- ACTUAL TRENCH SIDESLOPES ARE TO BE BASED ON OCCUPATIONAL HEALTH & SAFETY GUIDELINES
- IF ANY REAR SERVICING PROPOSED - ALL LANES IN DEVELOPEMENT ARE TO BE 7.0m IN WIDTH.

NO.	DATE	REVISION
2	2019	Removed crowned asphalt lane option
1	2018	Moved trench lines to be within ROW

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

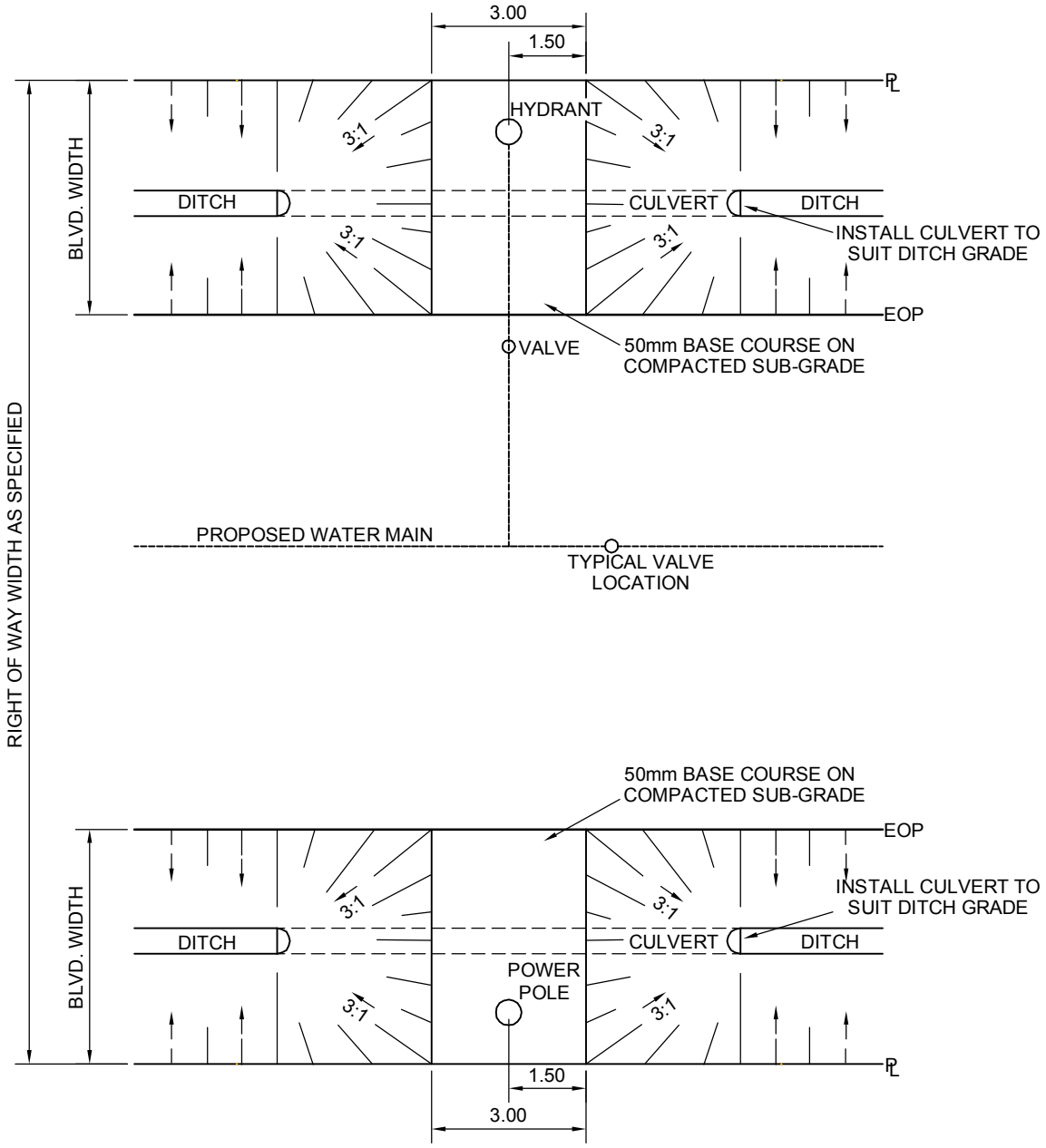
DIRECTOR OF PUBLIC WORKS

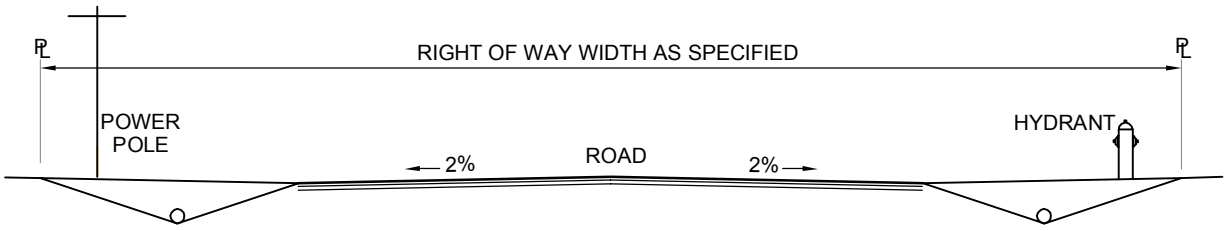
DATE: 2019

LANE / P.U.L.
SERVICING ALIGNMENTS

SCALE: N.T.S.

DRAWING NO. 12.25





CROSS - SECTION

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

RURAL CROSS SECTION
HYDRANT AND POWER POLE
ACCESS

DRAWN BY: M.M.

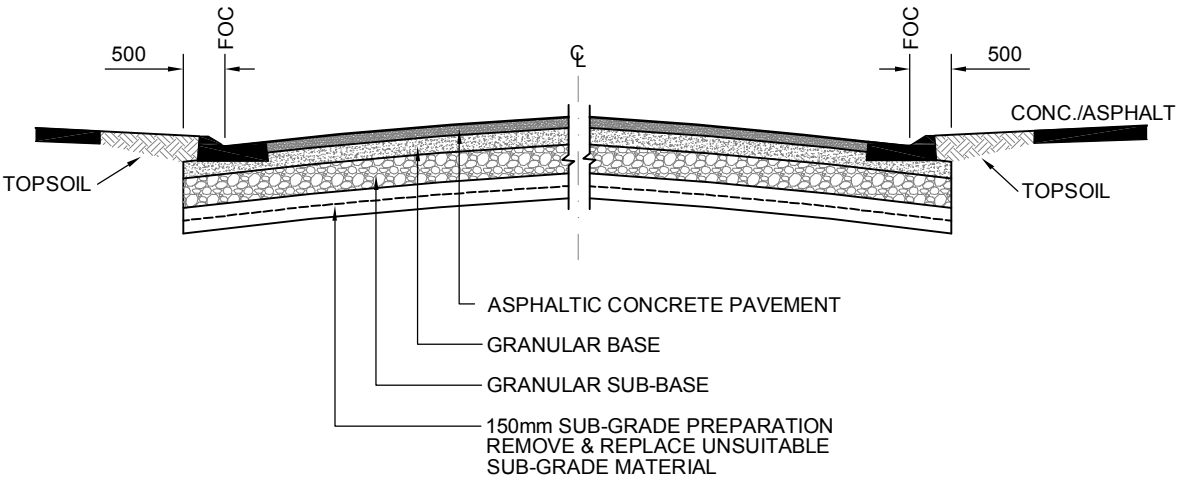
DATE: 2018

SCALE: N.T.S.

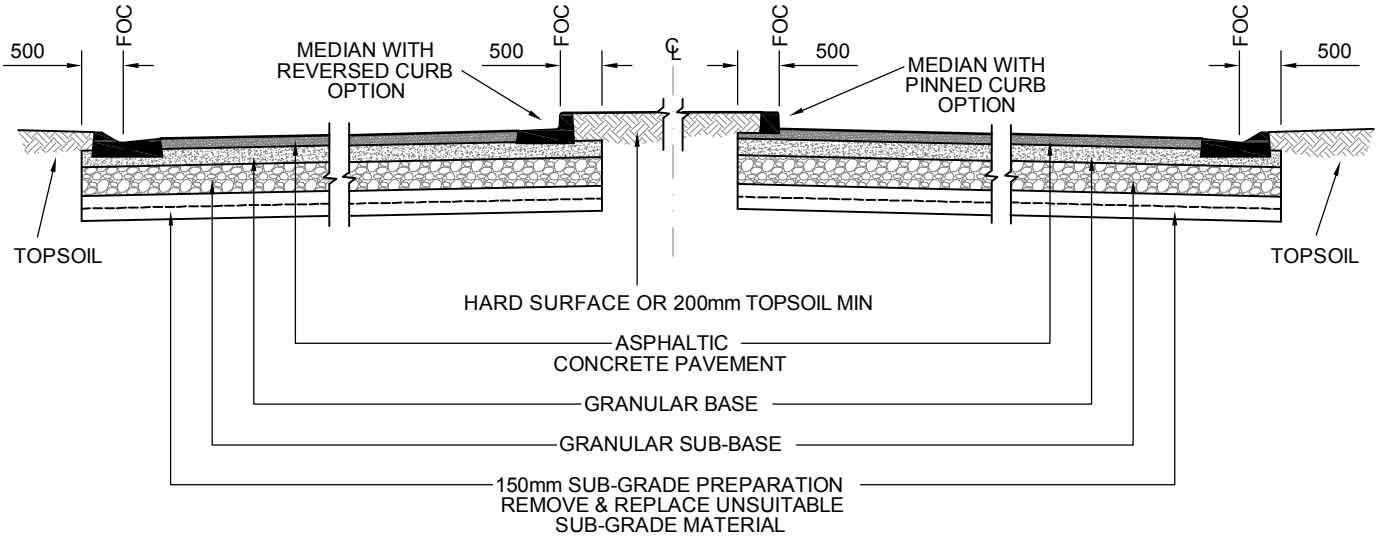
APPROVED BY:

PUBLIC WORKS MANAGER

DRAWING NO. 12.26



UNDIVIDED ARTERIAL ROADWAY



DIVIDED ARTERIAL ROADWAY

MINIMUM DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB-BASE (mm)	TOTAL DEPTH (mm)
ARTERIAL & EXPRESSWAY	125	200	350	675

NO.	DATE	REVISION
1	2018	Revised median material types

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

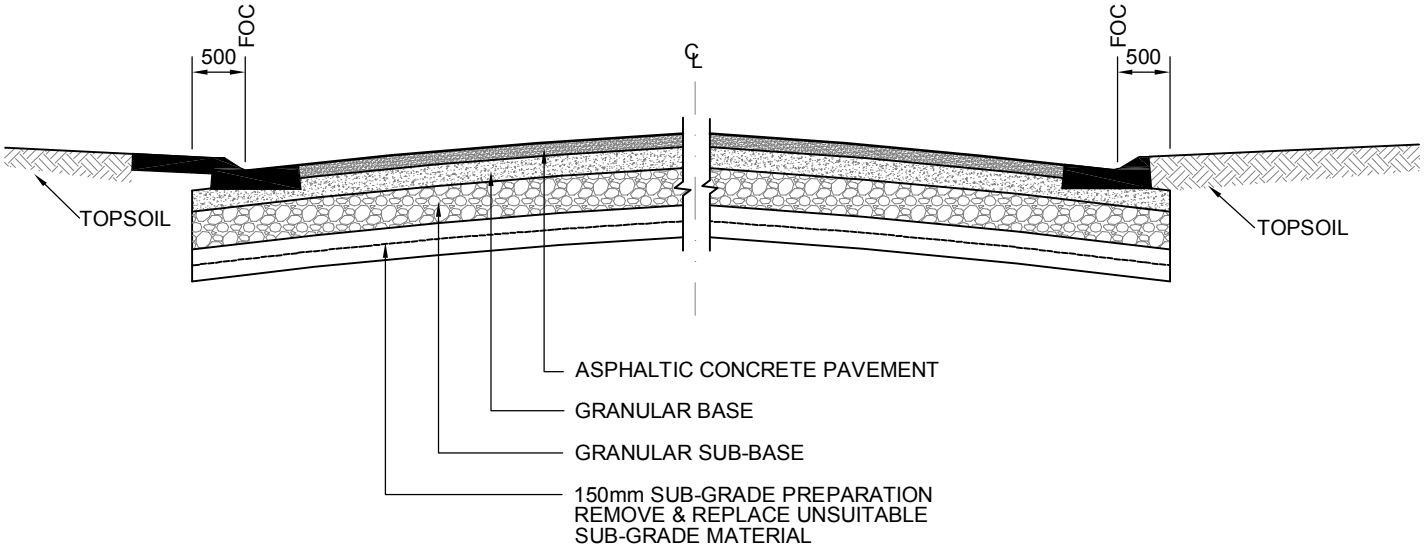
PUBLIC WORKS MANAGER

DATE: 2018

ARTERIAL ROADWAY
PAVEMENT STRUCTURE
CROSS SECTION

SCALE: N.T.S.

DRAWING NO. 12.27



STANDARD RESIDENTIAL LOCAL & COLLECTOR ROADWAY

MINIMUM DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB-BASE (mm)	TOTAL DEPTH (mm)
RESIDENTIAL LOCAL	90	100	250	440
RESIDENTIAL COLLECTOR	100	150	300	550

NO.	DATE	REVISION
1	2018	Revised pavement structure table

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

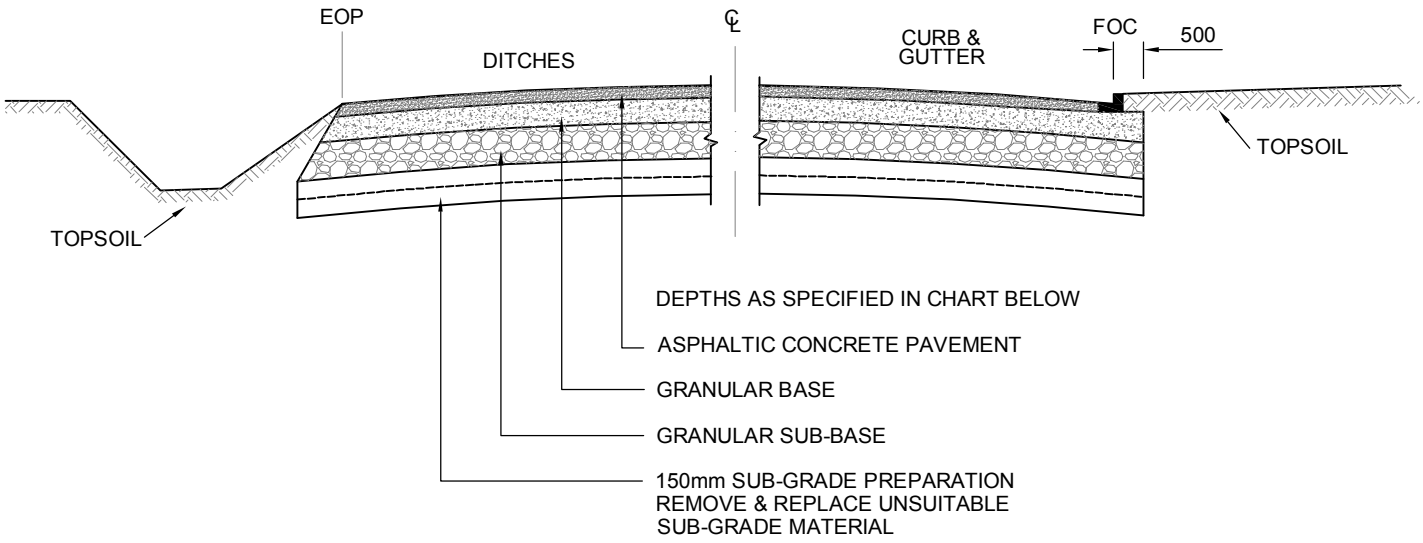
PUBLIC WORKS MANAGER

DATE: 2018

RESIDENTIAL ROADWAY
PAVEMENT STRUCTURE
CROSS SECTION

SCALE: N.T.S.

DRAWING NO. 12.28



INDUSTRIAL LOCAL / COLLECTOR ROADWAY

DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB-BASE (mm)	TOTAL DEPTH (mm)
INDUSTRIAL LOCAL	90	150	300	540
INDUSTRIAL COLLECTOR	100	200	300	600

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

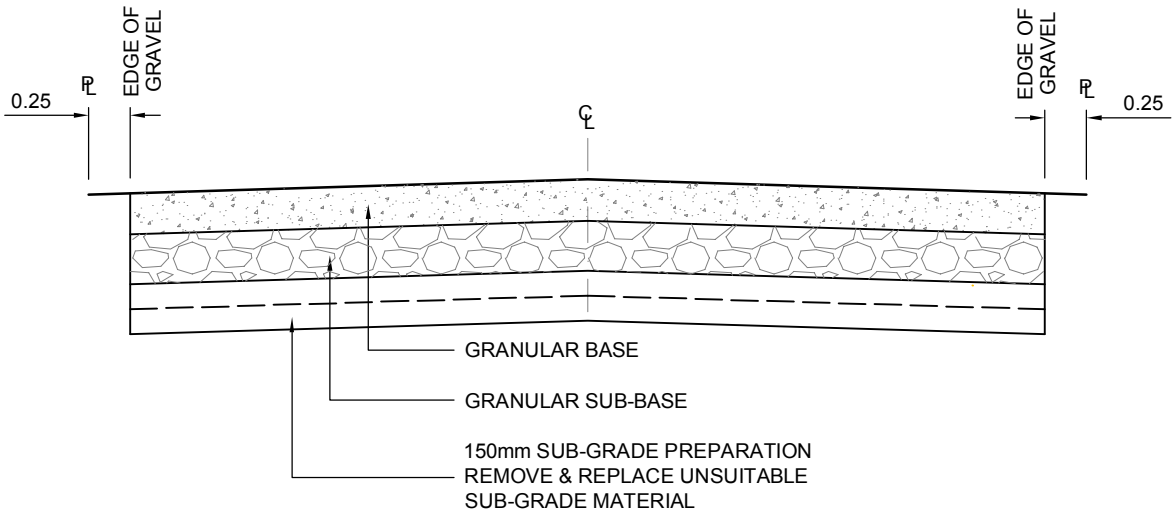
PUBLIC WORKS MANAGER

DATE: 2018

INDUSTRIAL ROADWAY
PAVEMENT STRUCTURE
CROSS SECTION

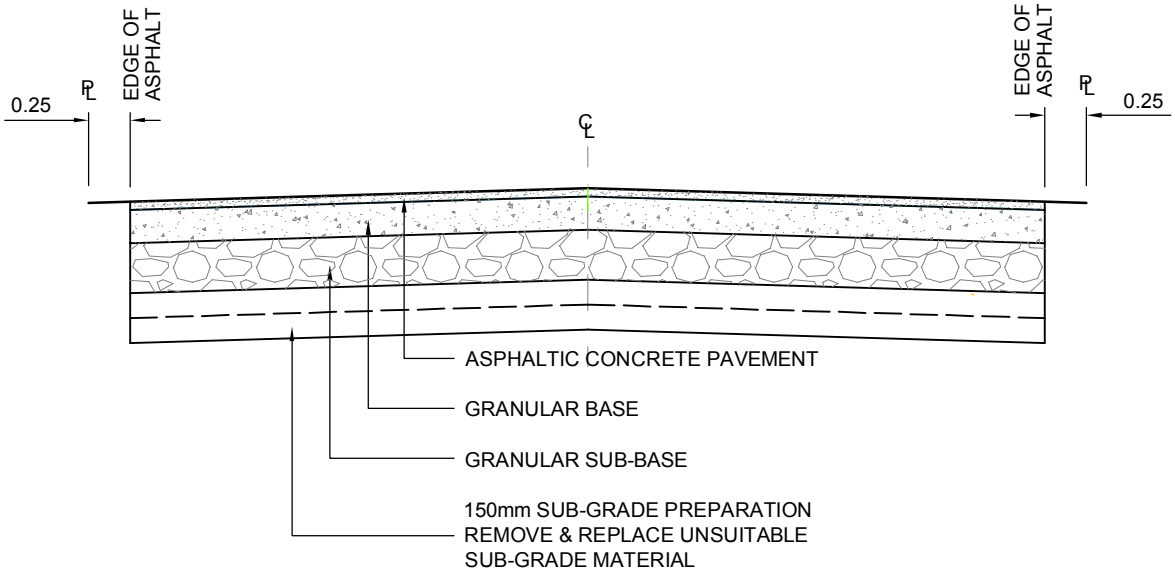
SCALE: N.T.S.

DRAWING NO. 12.29



NOTE : DEPTHS ARE AS SPECIFIED IN CHART BELOW

GRAVEL LANE



NOTE : DEPTHS ARE AS SPECIFIED IN CHART BELOW

PAVED LANE

DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB-BASE (mm)	TOTAL DEPTH (mm)
RESIDENTIAL GRAVEL LANES	--	100	200	300
RESIDENTIAL PAVED LANES	75	100	200	375

NO.	DATE	REVISION
1	2018	Revised DWG to show granular sub-base

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

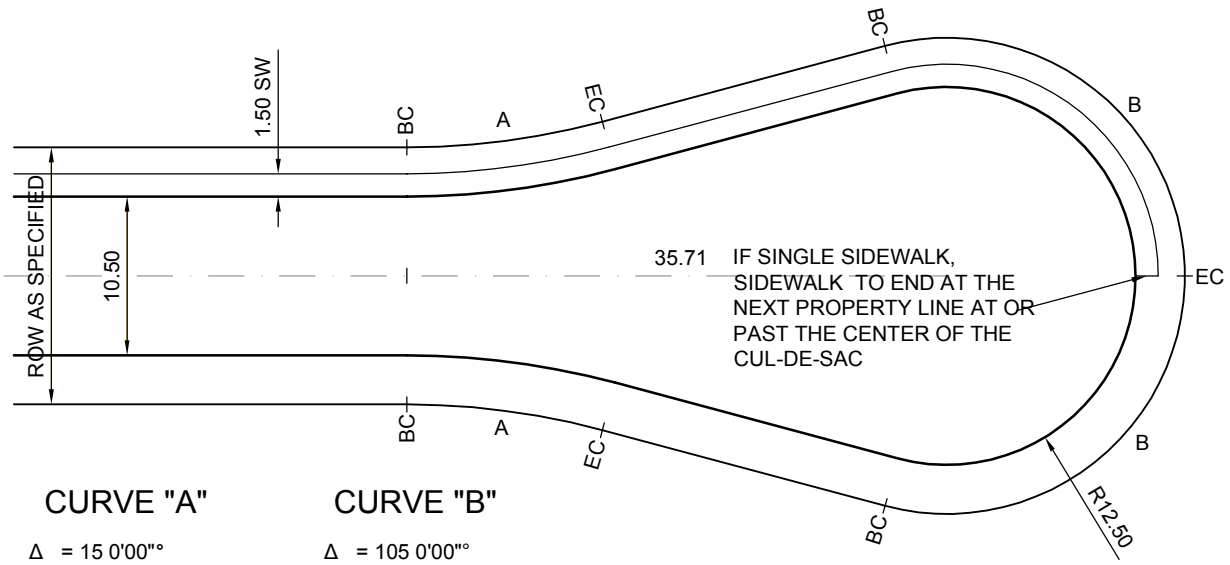
PUBLIC WORKS MANAGER

DATE: 2018

GRAVEL / PAVED LANE
PAVEMENT STRUCTURE
CROSS SECTION

SCALE: N.T.S.

DRAWING NO. 12.30

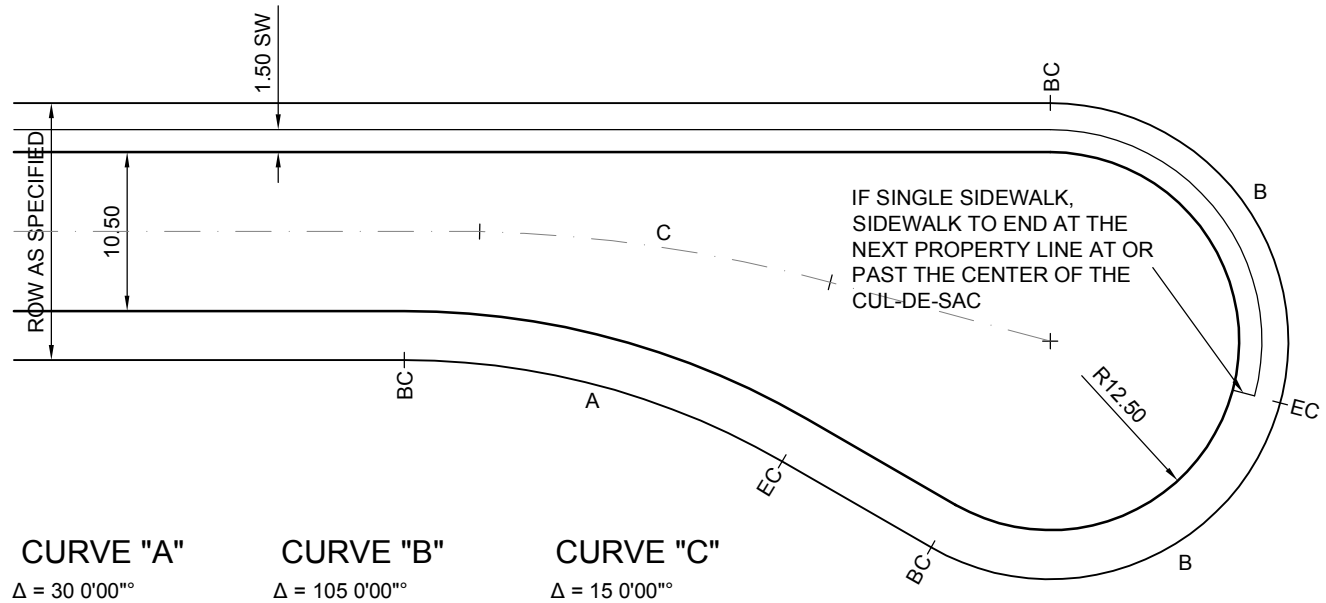


CURVE "A"

Δ = 15 0'00"°
R = 50.00
(at property line)

CURVE "B"

Δ = 105 0'00"°
R = 15.75
(at property line)



CURVE "A"

Δ = 30 0'00"°
R = 50.00
(at property line)

CURVE "B"

Δ = 105 0'00"°
R = 15.75
(at property line)

CURVE "C"

Δ = 15 0'00"°

NO.	DATE	REVISION
1	2019	Removed specific ROW widths

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

LOCAL RESIDENTIAL
CUL-DE-SAC

DRAWN BY: M.M.

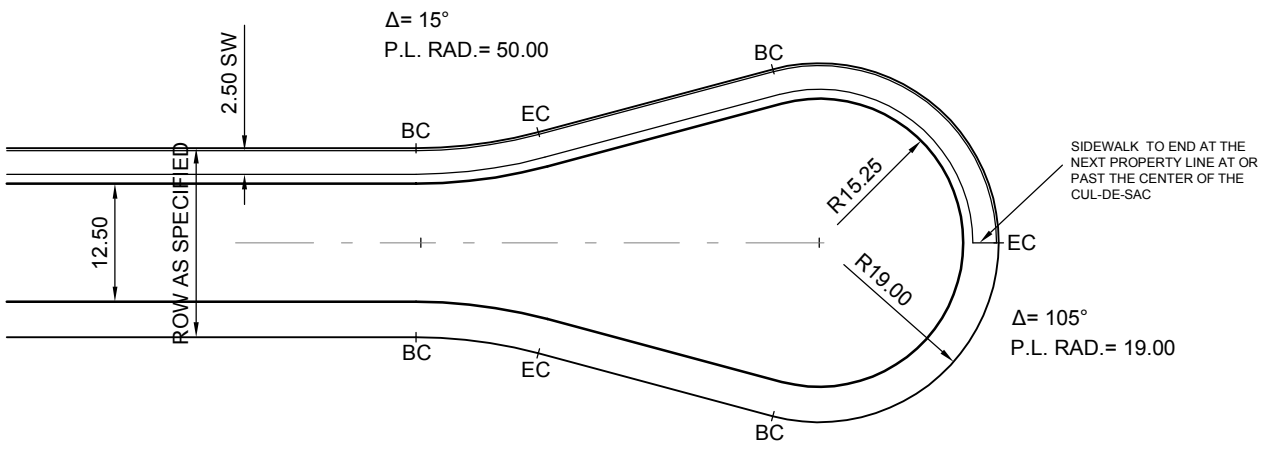
DATE: 2019

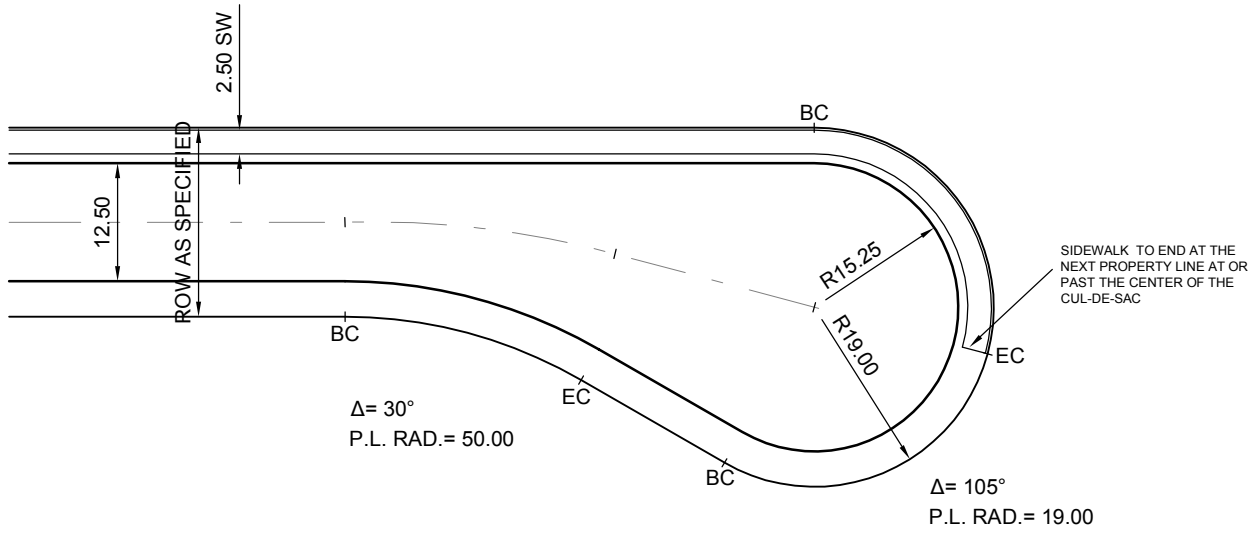
SCALE: N.T.S.

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO. 12.31





NO.	DATE	REVISION
1	2019	Removed specific ROW widths

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

URBAN INDUSTRIAL
CUL-DE-SAC

DRAWN BY: M.M.

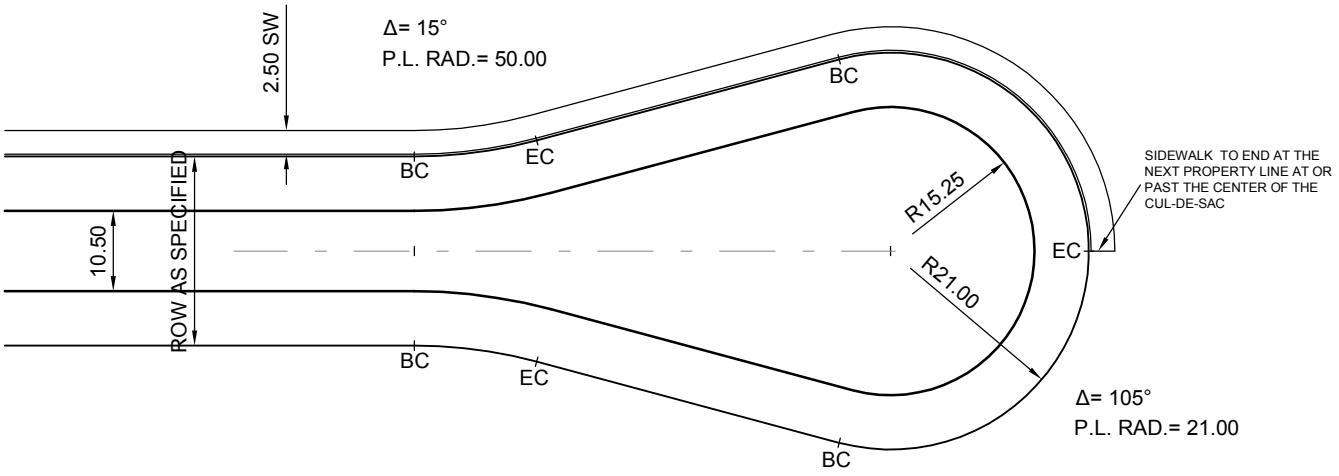
DATE: 2019

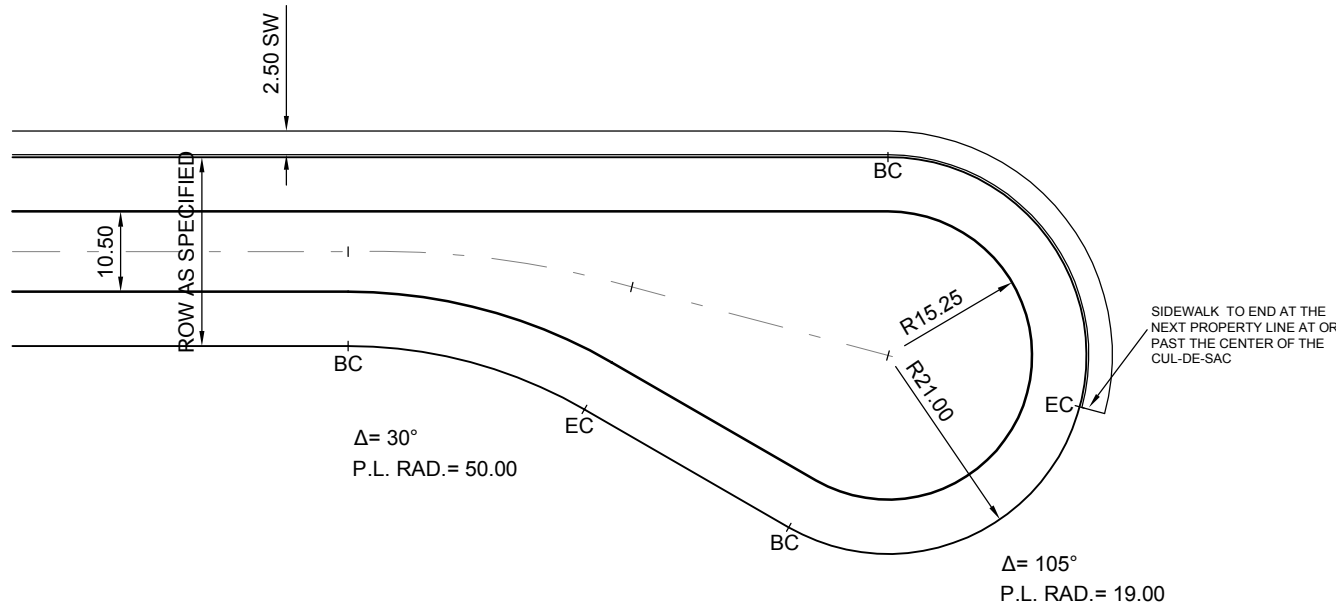
SCALE: N.T.S.

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO. 12-32





NO.	DATE	REVISION
1	2019	Removed specific ROW widths

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

RURAL INDUSTRIAL
CUL-DE-SAC

DRAWN BY: M.M.

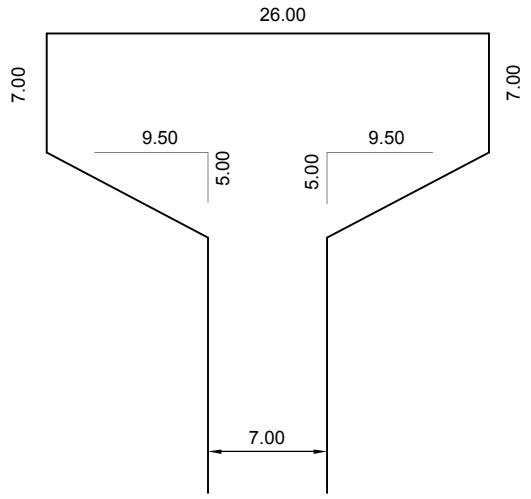
DATE: 2019

SCALE: N.T.S.

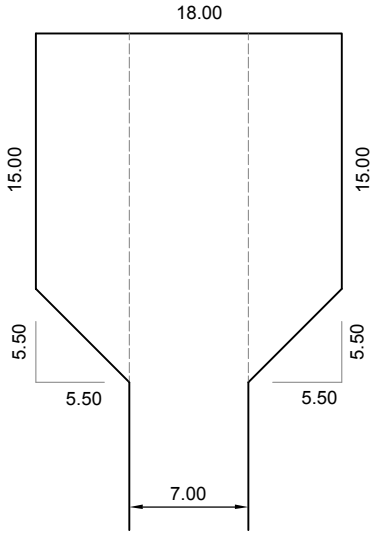
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

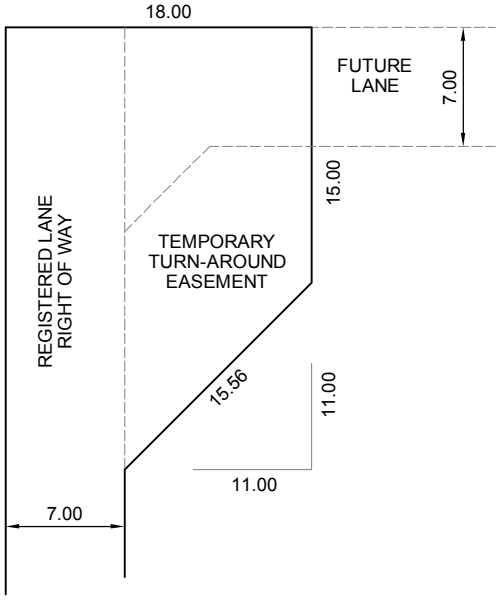
DRAWING NO. 12.33



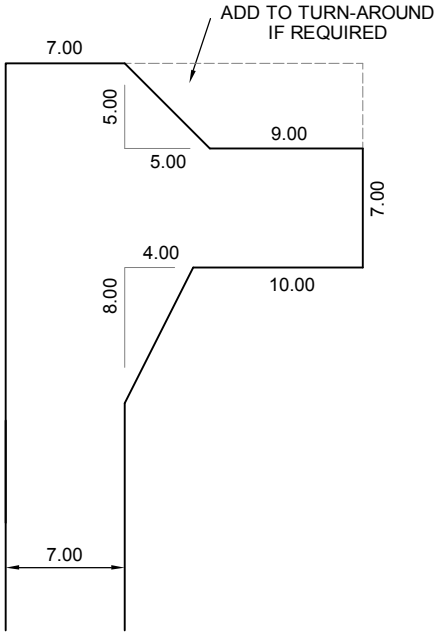
" T " TYPE



STANDARD TYPE



OFFSET TYPE



BRANCH TYPE

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

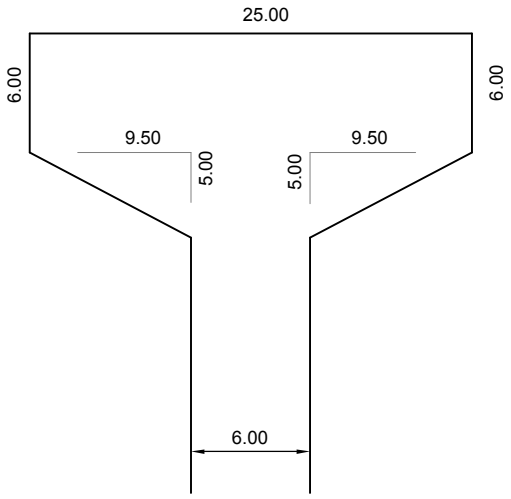
PUBLIC WORKS MANAGER

DATE: 2018

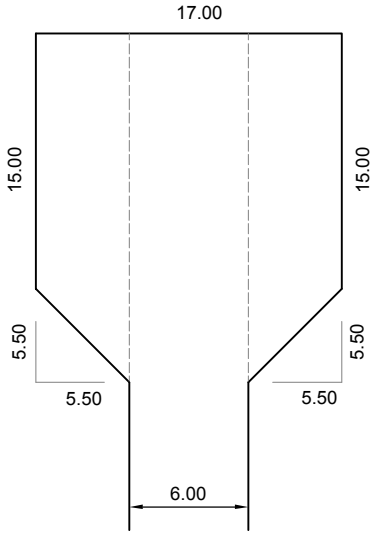
LANE TURN-AROUNDS
TWO OR MORE DEEP UTILITIES

SCALE: N.T.S.

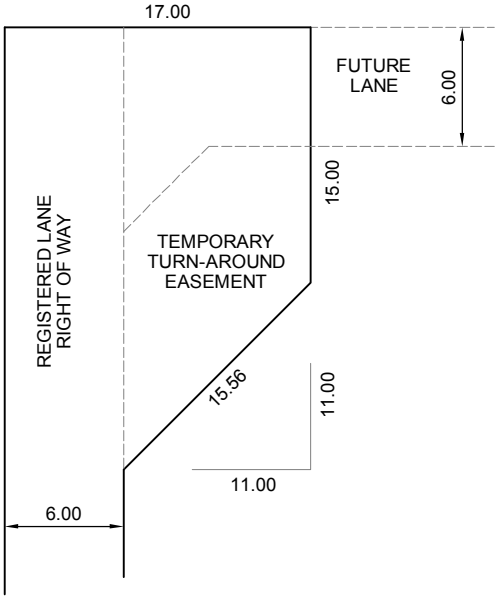
DRAWING NO. 12.34



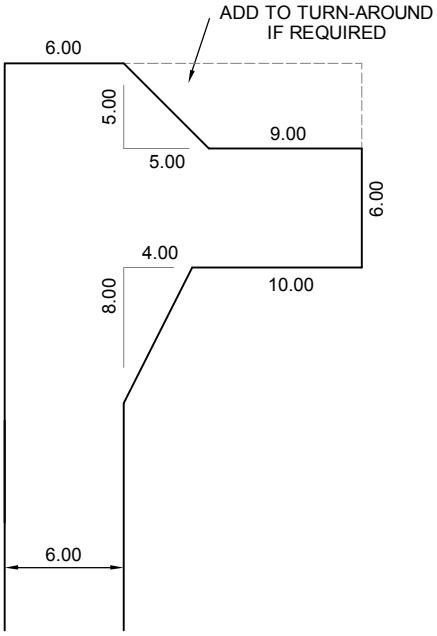
" T " TYPE



STANDARD TYPE



OFFSET TYPE



BRANCH TYPE

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

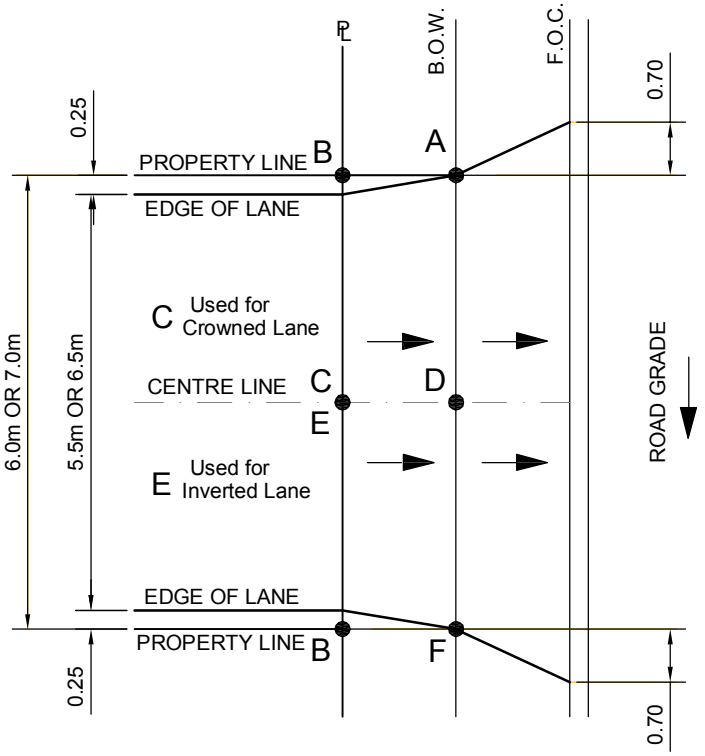
PUBLIC WORKS MANAGER

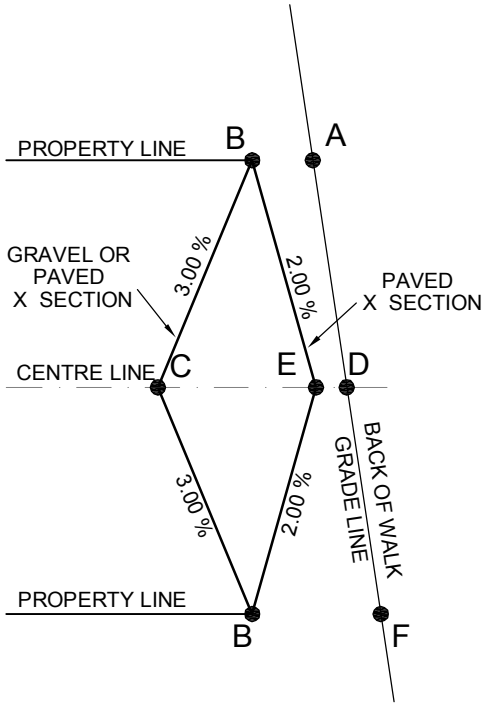
DATE: 2018

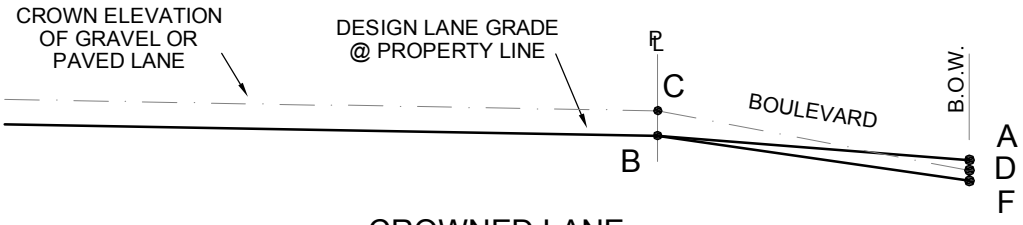
LANE TURN-AROUNDS
ONE OR FEWER DEEP UTILITIES

SCALE: N.T.S.

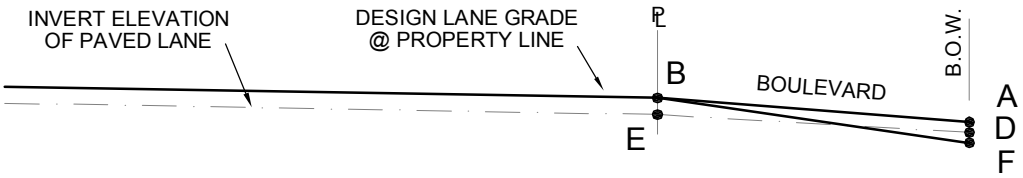
DRAWING NO. 12.35







CROWNED LANE



INVERTED LANE

NOTE :

IF LANE ELEVATION (E) IS LOWER THAN BACK OF WALK ELEVATION (D), A DEPRESSED CROSSING MAY BE REQUIRED FOR DRAINAGE.

NO.	DATE	REVISION
1	2018	Revised lane labels and dimensions

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

LANE GRADE CALCULATIONS

DRAWN BY: M.M.

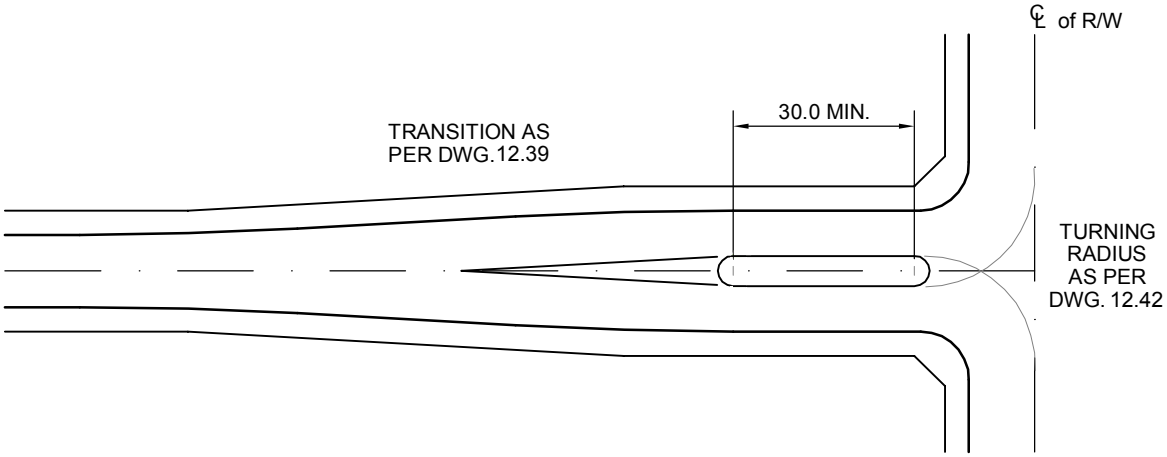
DATE: 2018

SCALE: N.T.S.

APPROVED BY:

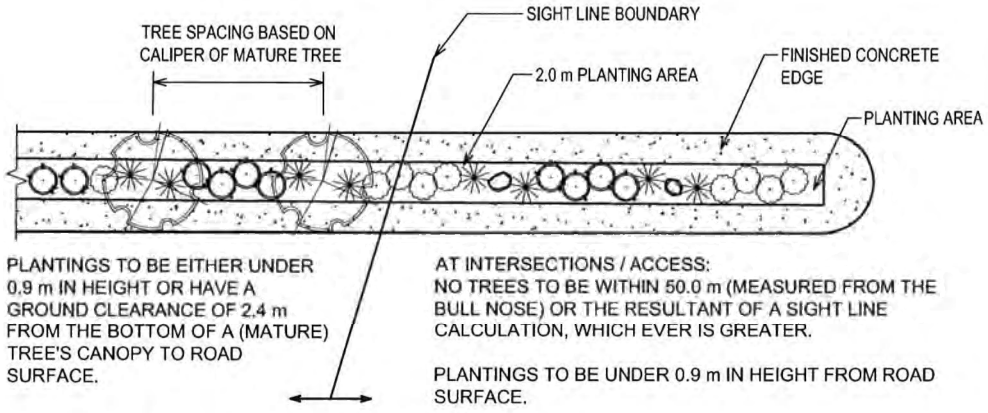
PUBLIC WORKS MANAGER

DRAWING NO. 12.36

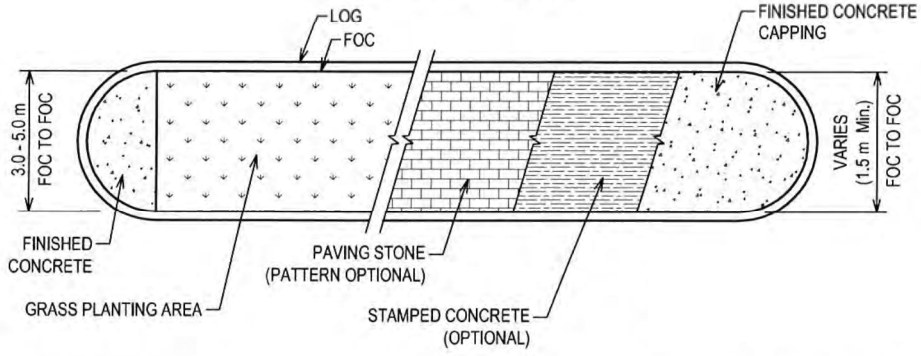


PLANTING OPTION

(TREE AND SHRUB PLANTINGS IN 5.0 m OR WIDER MEDIAN)



CAP OPTIONS



NO.	DATE	REVISION
1	2018	Revised x-section & DWG references

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Roadway Design

COLLECTOR AND LOCAL
ROADWAY CENTRE ISLAND

DRAWN BY: M.M.

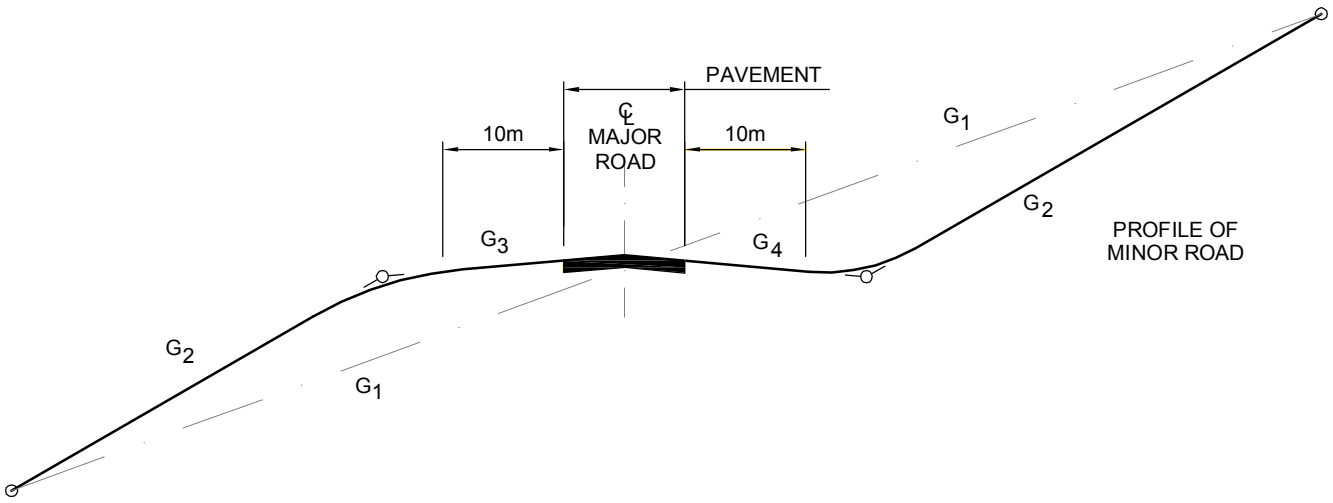
DATE: 2018

SCALE: N.T.S.

APPROVED BY:

PUBLIC WORKS MANAGER

DRAWING NO. 12.37



NOTE :

G_1 - ORIGINAL GRADE OF MINOR ROAD

G_2 - GRADE INTRODUCED TO ADJUST GRADE AT INTERSECTION

G_3 & G_4 - GRADE ON MINOR ROAD CONFORMS TO CROSS SLOPE ON MAJOR ROADWAY (EG. 0.5% TO 5.0%, NORMAL CROWN TO SUPERELEVATION).

NO.	DATE	REVISION
1	2018	Revised road labels

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

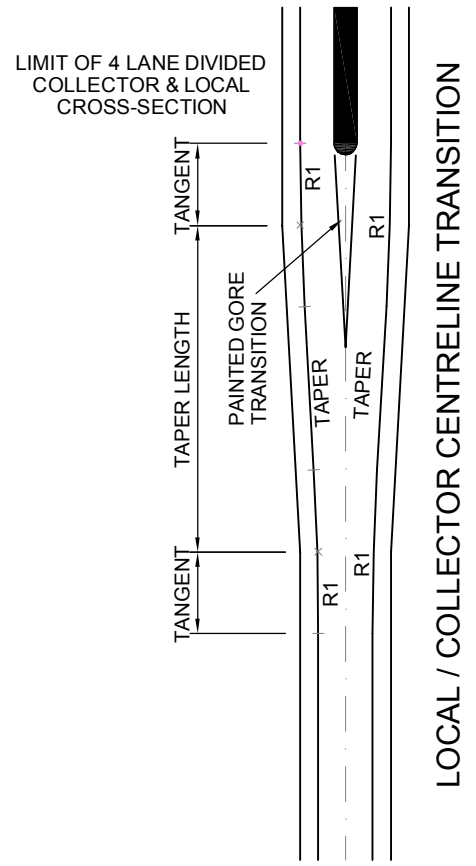
PUBLIC WORKS MANAGER

DATE: 2018

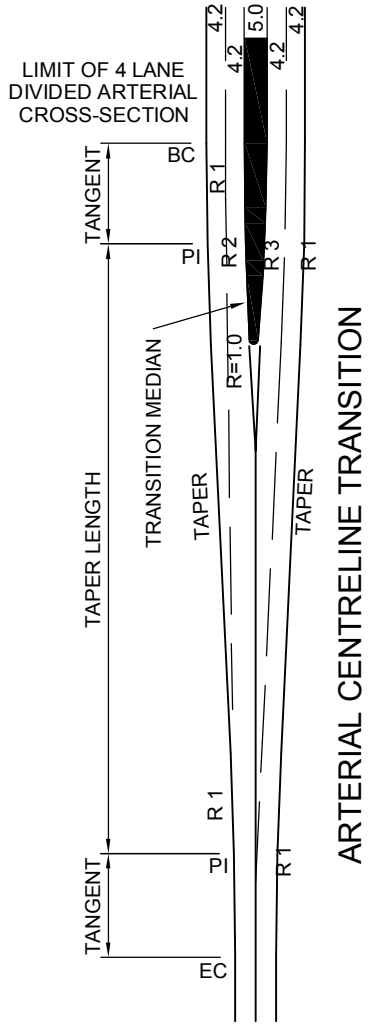
INTERSECTION GRADE ADJUSTMENT

SCALE: N.T.S.

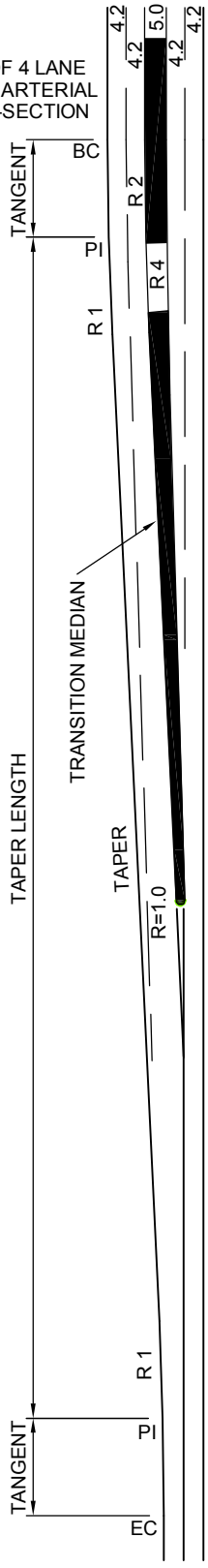
DRAWING NO. 12.38



LOCAL / COLLECTOR CENTRELINE TRANSITION



ARTERIAL CENTRELINE TRANSITION



ARTERIAL OFFSET TRANSITION

OVERALL APPROACH OR DEPARTURE TAPER LENGTHS						
ROADWAY	DESIGN SPEED KM/H	TAPER RATIO	TRANSITION RADII (m)			
			R 1	R 2	R 3	R 4
LOCAL	50	15:1	500	---	---	---
COLLECTOR	60	18:1	700	---	---	---
ARTERIAL	70	21:1	930	921.6	475	2000
ARTERIAL	80	24:1	1200	1191.6	475	2000

INFORMATION SHOWN FOR ARTERIAL ROADWAY TRANSITIONSARE BASED ON 70 km/hr DESIGN SPEED.

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

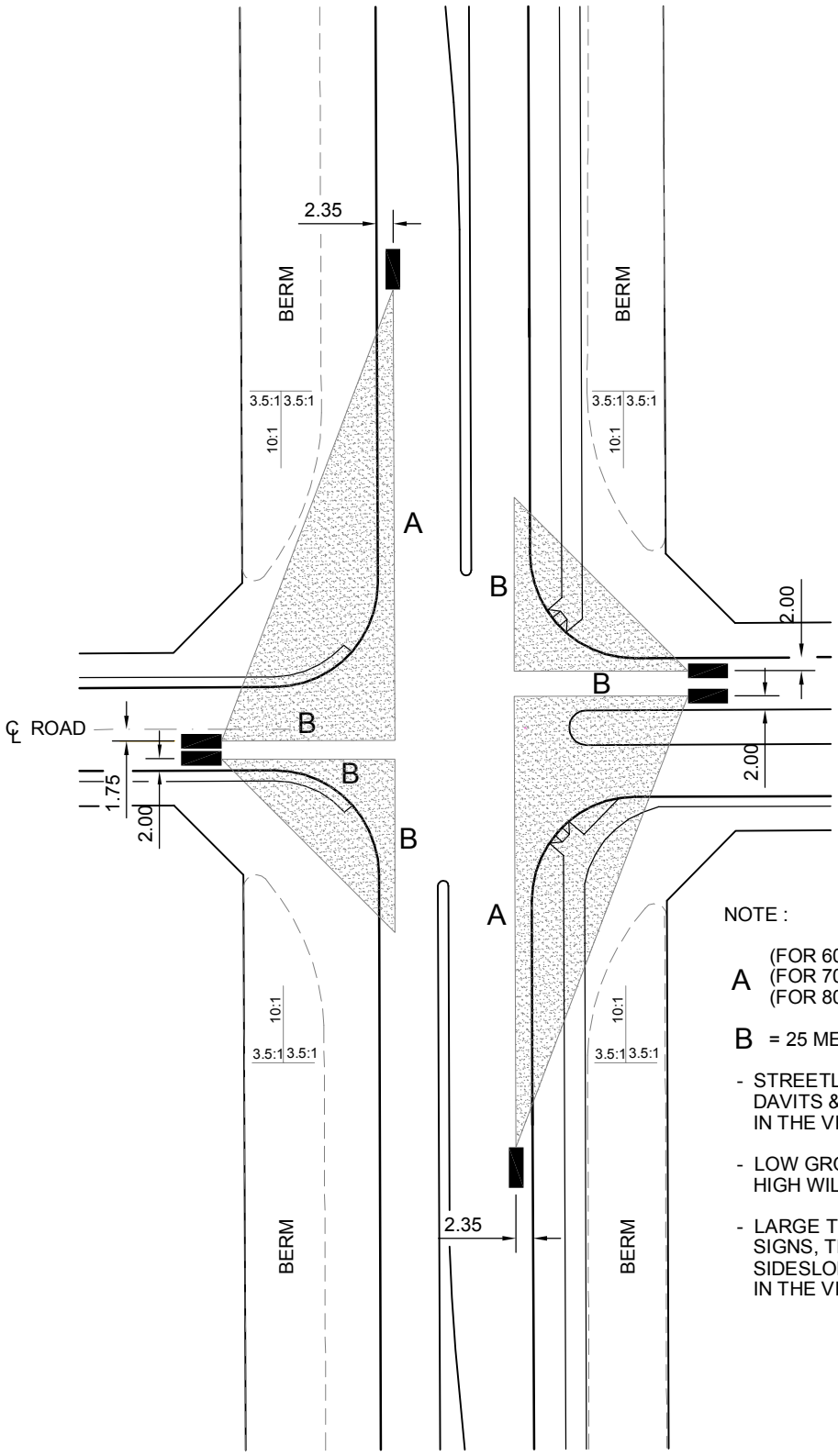
PUBLIC WORKS MANAGER

DATE: 2018

DIVIDED TO UNDIVIDED ROADWAY TRANSITION

SCALE: N.T.S.

DRAWING NO. 12.39



NOTE :

A
(FOR 60 KM/HR DESIGN SPEED) = 50 METERS
(FOR 70 KM/HR DESIGN SPEED) = 60 METERS
(FOR 80 KM/HR DESIGN SPEED) = 65 METERS

B = 25 METERS

- STREETLIGHT POLES, POWER POLES, TRAFFIC DAVITS & TRAFFIC SIGNS WILL BE PERMITTED IN THE VISIBLITY TRIANGLE.
- LOW GROWING SHRUBS LESS THAN 1.00 METER HIGH WILL BE PERMITTED
- LARGE TREES (DECIDUOUS & CONIFEROUS), SIGNS, TRAFFIC CONTROL CABINETS, BERM SIDESLOPES, ETC. WILL NOT BE PERMITTED IN THE VISIBILITY TRIANGLE.

NO.	DATE	REVISION
1	2018	Added 60km/hr design speed criteria

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

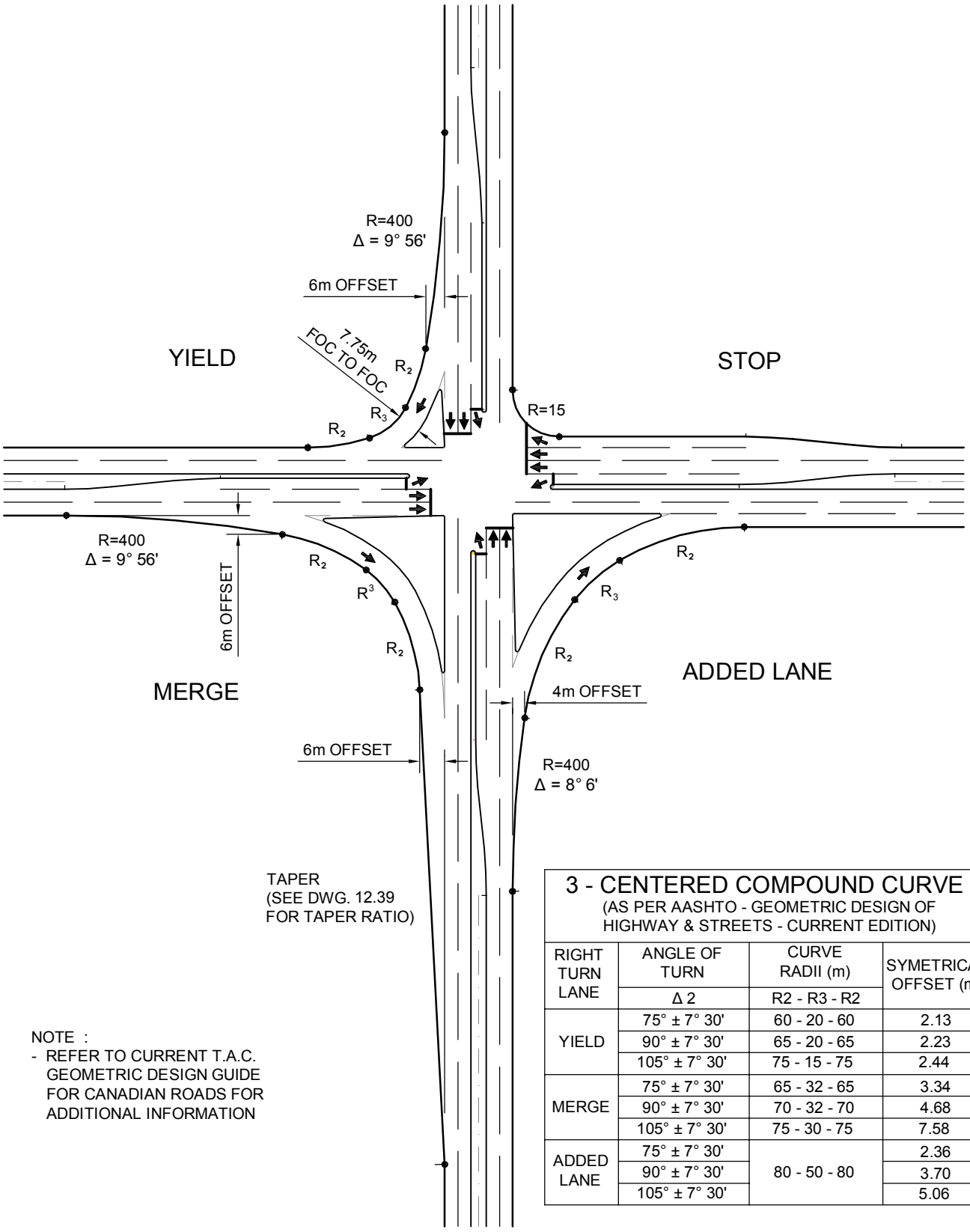
APPROVED BY:
PUBLIC WORKS MANAGER

DATE: 2018

ROADWAY
SIGHT TRIANGLE

SCALE: N.T.S.

DRAWING NO.
12.40



TAPER
(SEE DWG. 12.39
FOR TAPER RATIO)

NOTE :
- REFER TO CURRENT T.A.C. GEOMETRIC DESIGN GUIDE FOR CANADIAN ROADS FOR ADDITIONAL INFORMATION

3 - CENTERED COMPOUND CURVE
(AS PER AASHTO - GEOMETRIC DESIGN OF HIGHWAY & STREETS - CURRENT EDITION)

RIGHT TURN LANE	ANGLE OF TURN	CURVE RADII (m)	SYMETRICAL OFFSET (m)
	Δ 2	R2 - R3 - R2	
YIELD	75° ± 7° 30'	60 - 20 - 60	2.13
	90° ± 7° 30'	65 - 20 - 65	2.23
	105° ± 7° 30'	75 - 15 - 75	2.44
MERGE	75° ± 7° 30'	65 - 32 - 65	3.34
	90° ± 7° 30'	70 - 32 - 70	4.68
	105° ± 7° 30'	75 - 30 - 75	7.58
ADDED LANE	75° ± 7° 30'	80 - 50 - 80	2.36
	90° ± 7° 30'		3.70
	105° ± 7° 30'		5.06

NO.	DATE	REVISION
1	2018	Revised notes & DWG reference

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

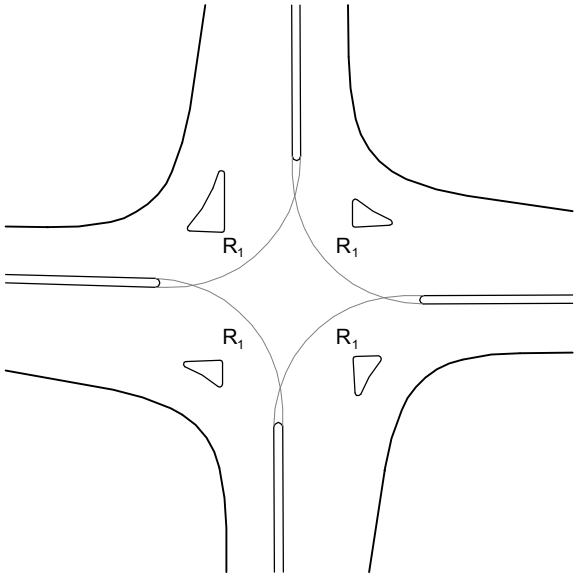
APPROVED BY:
PUBLIC WORKS MANAGER

DATE: 2018

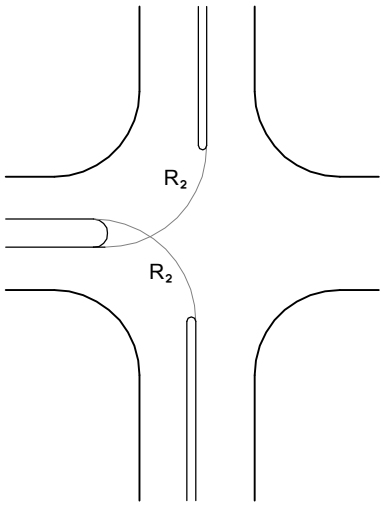
ARTERIAL ROADWAY
RIGHT TURN DESIGNS

SCALE: N.T.S.

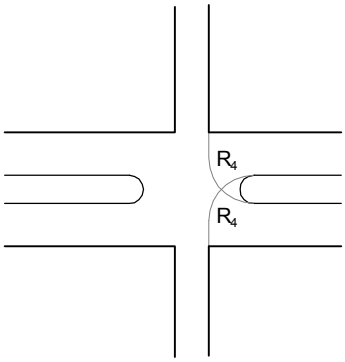
DRAWING NO. 12.41



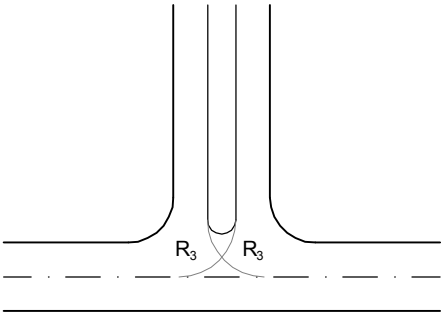
ARTERIAL TO ARTERIAL



ARTERIAL TO COLLECTOR



DIVIDED COLLECTOR OR LOCAL
TO LANE OR DRIVEWAY



COLLECTOR OR LOCAL
TO COLLECTOR OR LOCAL

TURNING RADII

ARTERIAL TO ARTERIAL	R1	22m
ARTERIAL TO COLLECTOR	R2	18m
COLLECTOR TO COLLECTOR	R3	15m
COLLECTOR TO LOCAL	R3	12m
LOCAL TO LOCAL	R3	10m
COLLECTOR/LOCAL TO LANE	R4	8m

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

PUBLIC WORKS MANAGER

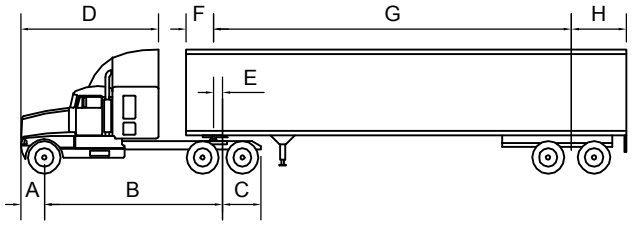
DATE: 2018

INTERSECTION CENTRE LINE CONTROL RADII

SCALE: N.T.S.

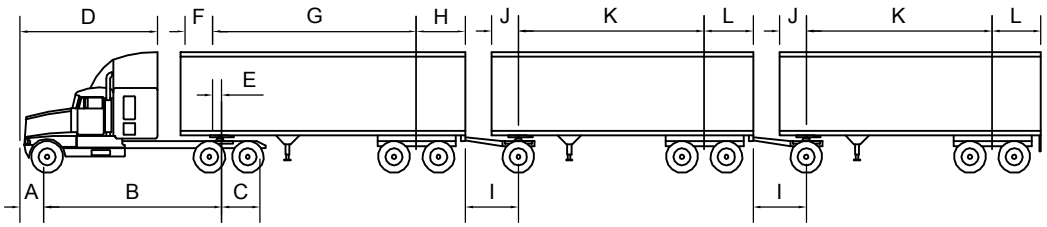
DRAWING NO. 12.42

WB-15, 17, 20 & 21



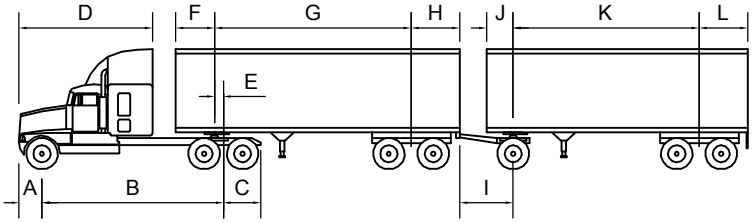
Tractor Width : 2.60
Trailer Width: 2.60
Tractor Track: 2.60
Trailer Track: 2.60
Steering Angle: 26.22
Tractor/Trailer Angle: 48.24

WB-29



Tractor Width : 2.60
Trailer Width: 2.60
Tractor Track: 2.60
Trailer Track: 2.60
Steering Angle: 17.17
Tractor/Trailer Angle: 28.08
Trailer 1/Trailer 2 Angle: 45.56
Trailer 2/Trailer 3 Angle: 48.94

WB-35



Tractor Width : 2.60
Trailer Width: 2.60
Tractor Track: 2.60
Trailer Track: 2.60
Steering Angle: 21.01
Tractor/Trailer Angle: 46.18
Trailer/Trailer Angle: 66.23

DESCRIPTION		T.A.C. DESIGN VEHICLES					
		WB-15	WB-17	WB-20	WB-21	WB-29	WB-35
TRACTOR							
A	Tractor Front	1.0	1.0	1.0	1.9	1.0	1.0
B	Tractor Wheelbase	5.5	5.5	5.5	6.2	5.5	5.5
C	Tractor Rear	1.3	1.3	1.3	1.3	1.3	1.3
D	Cab Length	3.5	3.5	3.0	3.0	3.0	3.0
E	Axle to Kingpin	0.0	0.0	0.0	0.0	0.0	0.0
FIRST TRAILER							
F	Trailor Front	1.3	1.3	1.3	1.3	1.3	1.3
G	Pin to Trailor Axle	9.1	11.5	14.3	12.5	6.3	12.2
H	Trailor Rear	1.5	1.5	1.5	4.4	1.0	1.0
SECOND AND / OR THIRD TRAILER							
I	Towbar	N/A	N/A	N/A	N/A	1.8	2.4
J	Trailor Front	N/A	N/A	N/A	N/A	0.9	1.2
K	Pin to Trailor Axle	N/A	N/A	N/A	N/A	6.6	12.2
L	Trailor Rear	N/A	N/A	N/A	N/A	1.0	1.2

THE NOTED DIMENSIONS FOR THE VARIOUS DESIGN VEHICLES, ARE BASED ON FIELD DIMENSIONS OBTAINED FROM THE TWO MAJOR TRUCKING FIRMS OPERATING IN RED DEER.

WB-21 DIMENSIONS HAVE BEEN TAKEN FROM THE ALBERTA INFASTRUCTURE HIGHWAY GEOMETRIC DESIGN GUIDE.

SEE DWG. 12.44 FOR VEHICLE TURNING RADII.

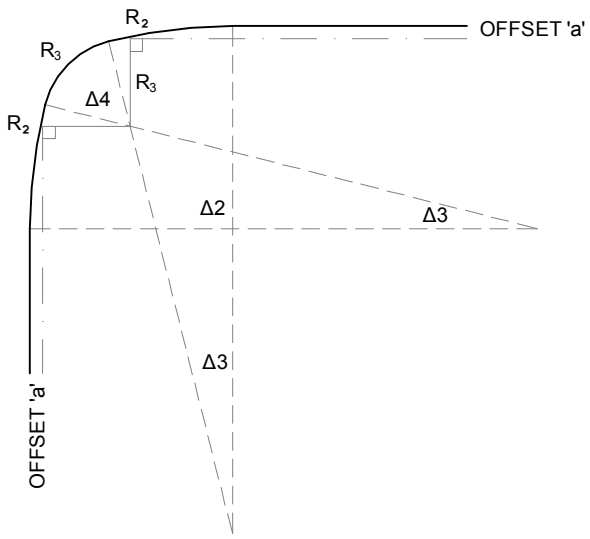
NO.	DATE	REVISION
1	2018	Revised DWG reference

THE TOWN OF SYLVAN LAKE

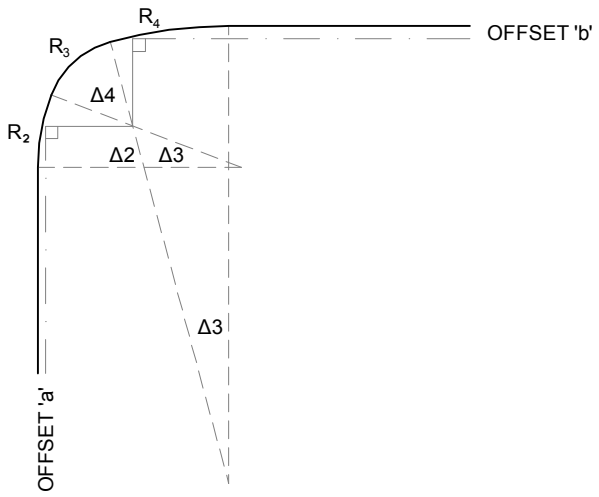
DESIGN GUIDELINE DRAWINGS
Roadway Design

W.B. DESIGN VEHICLES

DRAWN BY: M.M.
DATE: 2018
SCALE: N.T.S.
APPROVED BY: PUBLIC WORKS MANAGER
DRAWING NO. 12.43



3 - CENTRED SYMETRICAL COMPOUND CURVE



3 - CENTRED ASYMETRICAL COMPOUND CURVE

NOTE :
Δ3 AND Δ4 TO BE CALCULATED USING
R_2,R_3 AND OFFSET DISTANCE

MINIMUM DESIGN FOR TURNS AT INTERSECTIONS

Reference : A Policy on Geometric Design of Highways and Streets (AASHTO 1994 Metric Edition)

Design Vehicle (see Dwg 12.43)	Angle of Turn (degrees)	3 - Centered Symetrical Compound Curve				3 - Centered Asymetrical Compound Curve				
		Minimum Curve Radii (meters)			Symetric Off-set (meters)	Minimum Curve Radii (meters)			Asymetric Off-set (meters)	
		R_2	R_3	R_2	a	R_2	R_3	R_4	a	b
WB-15	75° ± 7° 30'	46	15	46	1.83	46	15	69	0.61	3.05
	90° ± 7° 30'	55	18	55	1.83	37	12	61	0.61	3.05
	105° ± 7° 30'	55	14	55	2.44	46	12	64	0.61	3.05
WB-17	75° ± 7° 30'	61	21	61	2.13	37	18	61	0.61	3.05
	90° ± 7° 30'	61	20	61	2.13	30	17	79	0.61	3.05
	105° ± 7° 30'	73	15	73	2.44	30	14	152	1.22	3.05
WB-20	75° ± 7° 30'	134	23	134	4.57	43	30	165	1.52	3.66
	90° ± 7° 30'	122	21	122	3.05	49	21	110	1.83	3.05
	105° ± 7° 30'	158	15	158	4.57	110	23	183	1.22	3.20
WB-29	75° ± 7° 30'	76	24	76	1.40	30	24	91	0.50	1.50
	90° ± 7° 30'	76	21	76	1.40	61	21	91	0.30	1.50
	105° ± 7° 30'	76	18	76	1.50	30	18	91	0.50	1.80
WB-35	75° ± 7° 30'	213	38	213	2.00	46	34	168	0.50	3.50
	90° ± 7° 30'	213	34	213	2.00	46	29	168	0.60	3.50
	105° ± 7° 30'	213	29	213	2.40	46	24	152	0.90	4.60

NO.	DATE	REVISION
1	2018	Revised DWG reference

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

APPROVED BY:

PUBLIC WORKS MANAGER

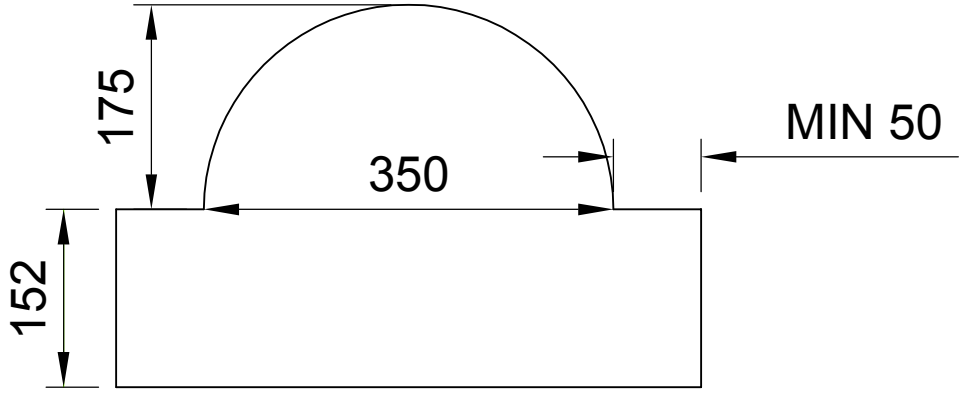
DATE: 2018

W.B. VEHICLE COMPOUND CURVE TURN DESIGN

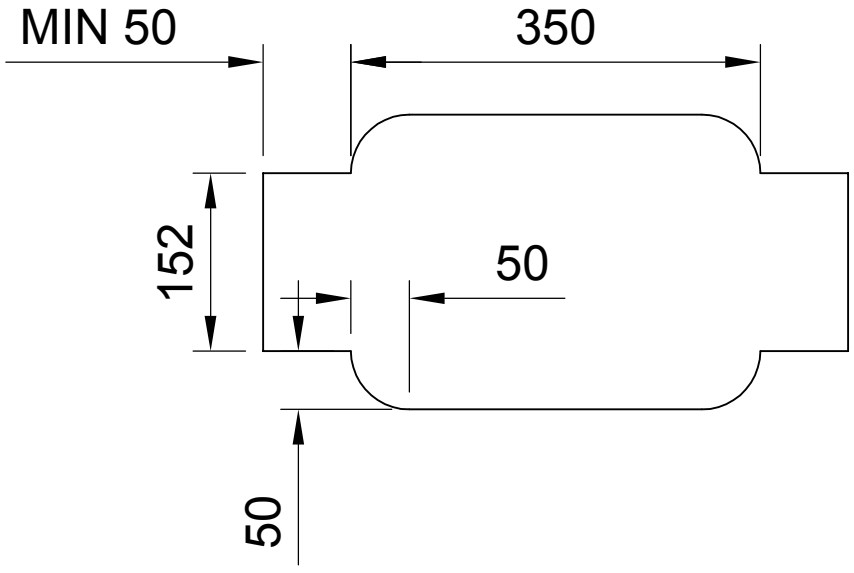
SCALE: N.T.S.

DRAWING NO. 12.44

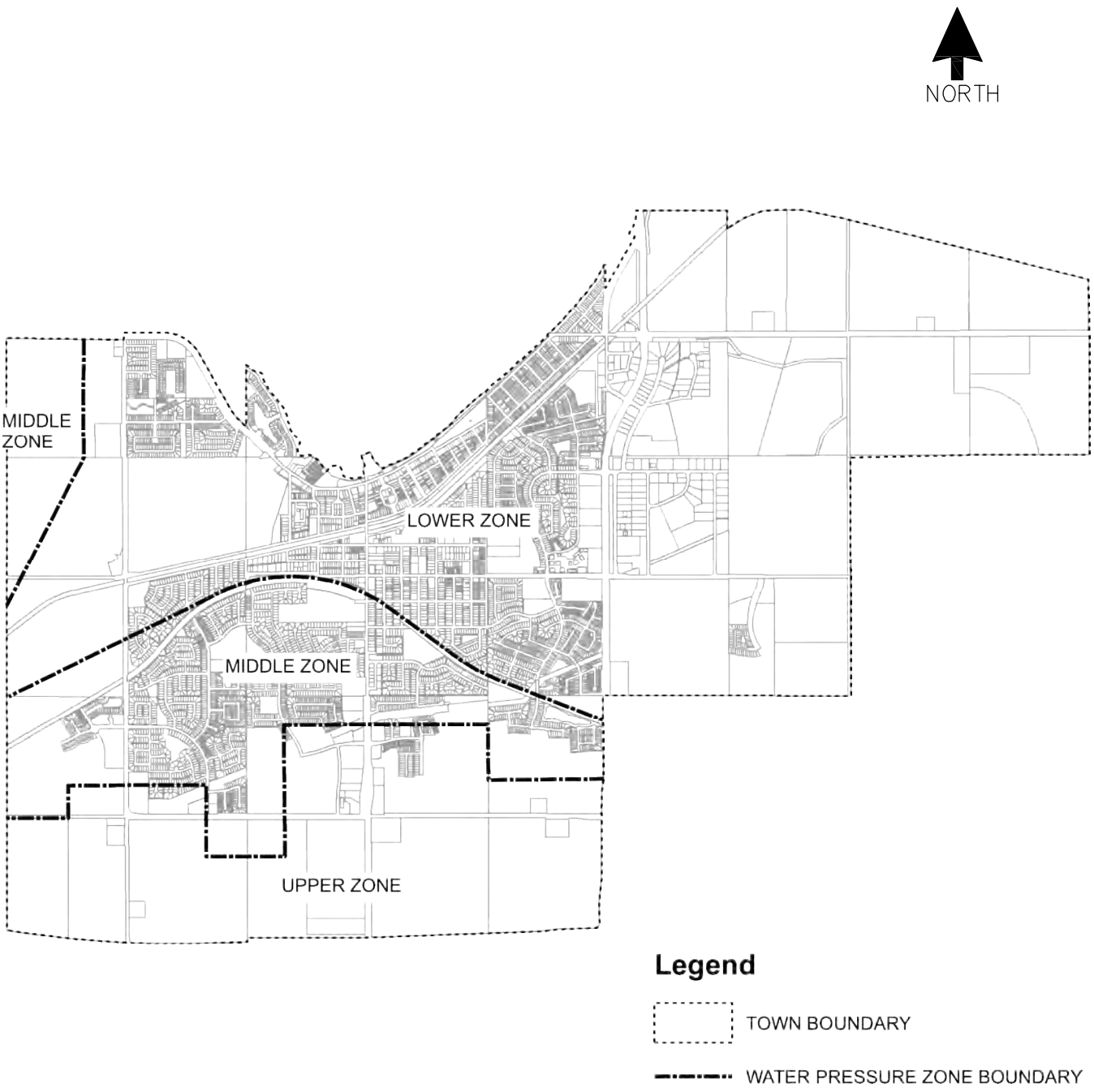
OPTION 1



OPTION 2



NO.	DATE	REVISION	THE TOWN OF SYLVAN LAKE		
			DRAWN BY: M.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY: DIRECTOR OF PUBLIC WORKS
			DATE: 2019	UPGRADED STREET SIGN OPTIONS	DRAWING NO. 12.45
			SCALE: N.T.S.		



NO.	DATE	REVISION
1	2018	Revised Town boundary

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Water Design

WATER SYSTEM
PRESSURE ZONES

DRAWN BY: M.M.

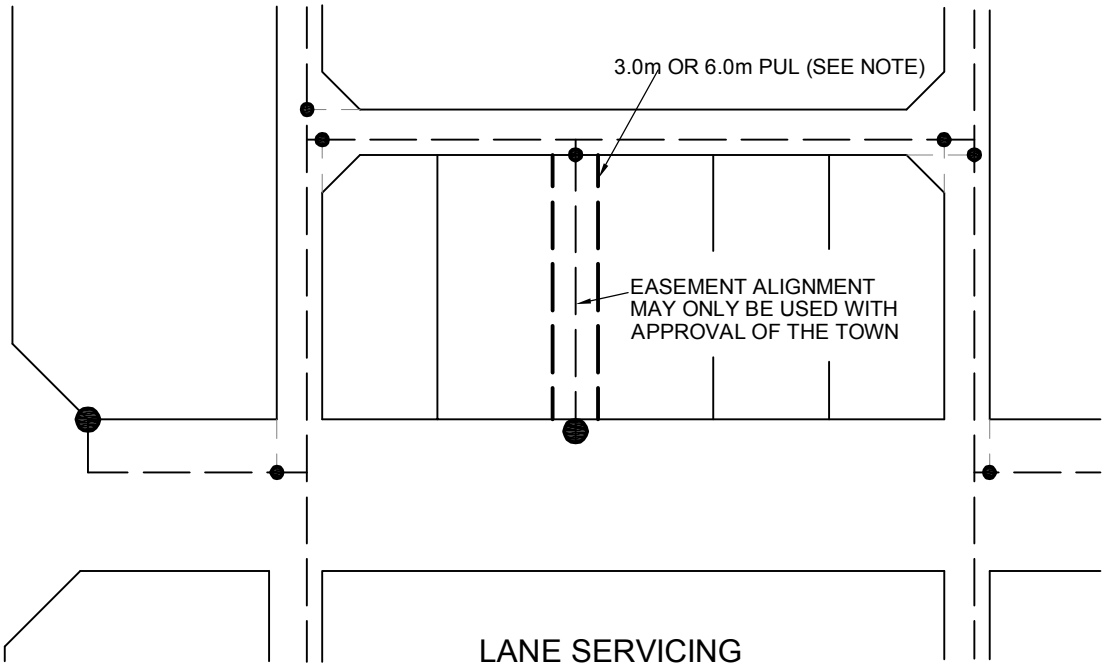
DATE: 2018

SCALE: N.T.S.

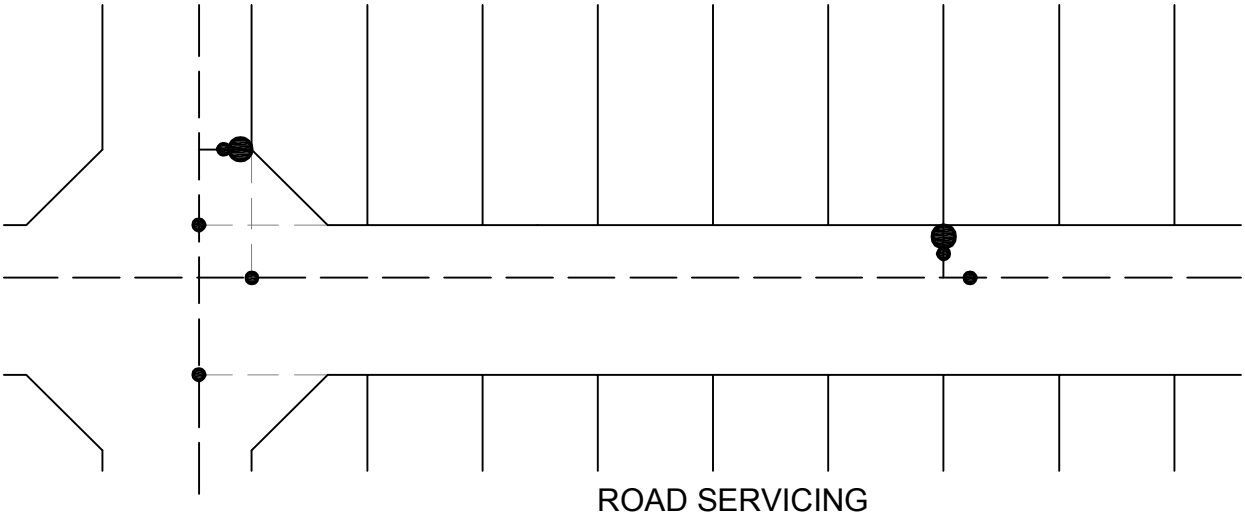
APPROVED BY:

PUBLIC WORKS MANAGER

DRAWING NO. 13.01



LANE SERVICING



ROAD SERVICING

VALVE

HYDRANT

HYDRANT AND VALVE

NOTE :
- AVOID USE OF EASEMENTS WHERE A STREET OR LANE ALIGNMENT IS AVAILABLE.
- HYDRANTS NORMALLY TO BE LOCATED NEAR STREET INTERSECTIONS.
- VALVES TO BE LOCATED OPPOSITE PROPERTY LINES AS ILLUSTRATED.
- 3m PUL PERMITTED WHEN ROUTING ONE UTILITY MAIN

NO.	DATE	REVISION
1	2018	Revised allowable PUL widths

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Water Design

APPROVED BY:

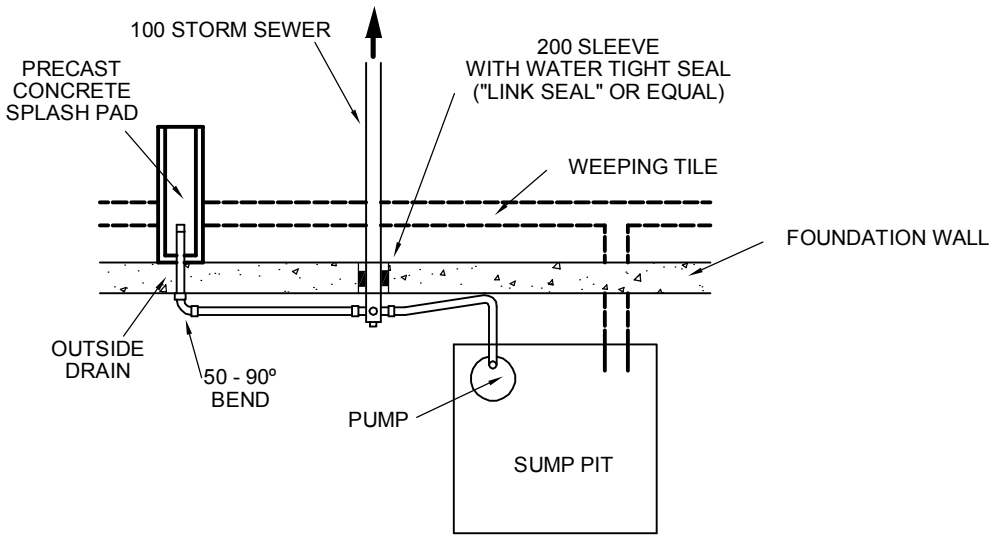
PUBLIC WORKS MANAGER

DATE: 2018

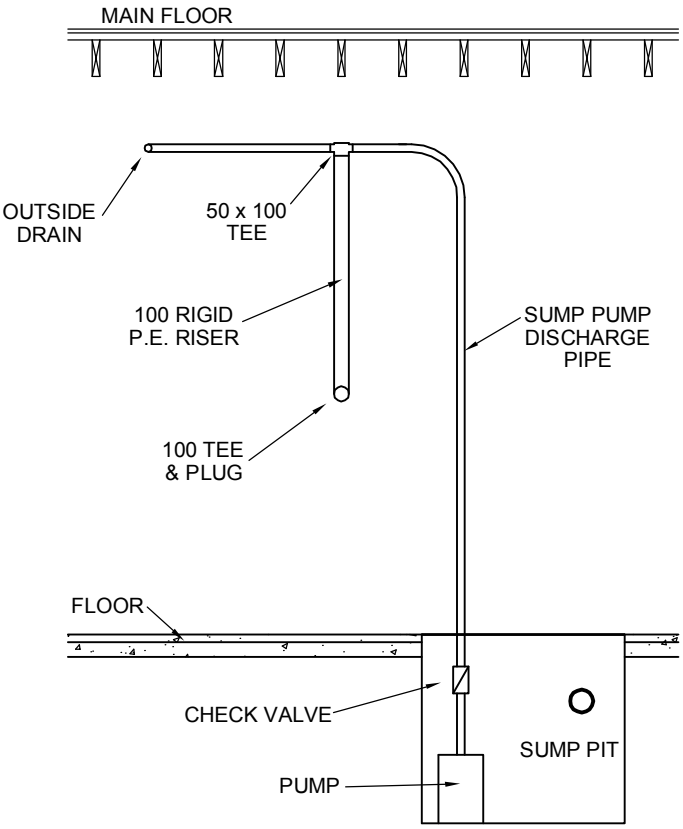
TYPICAL VALVE & HYDRANT LOCATIONS

SCALE: N.T.S.

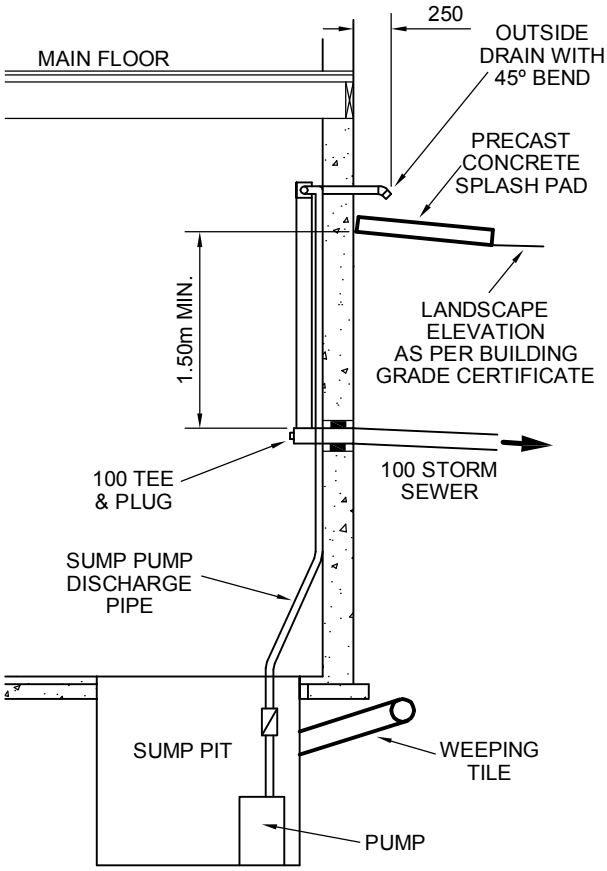
DRAWING NO. 13.02



TOP VIEW



FRONT VIEW



SIDE VIEW

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Stormwater Design

APPROVED BY:

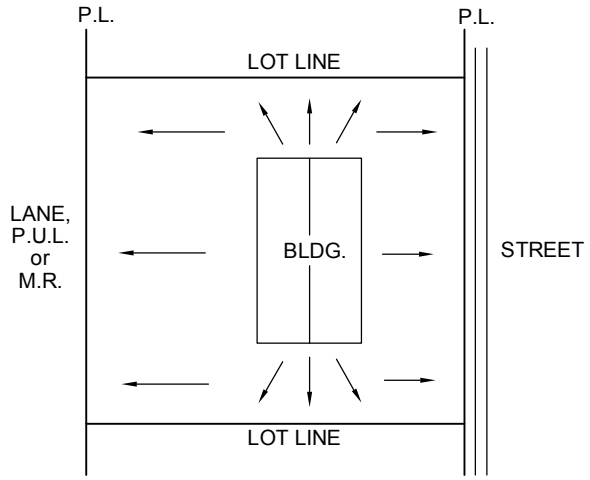
PUBLIC WORKS MANAGER

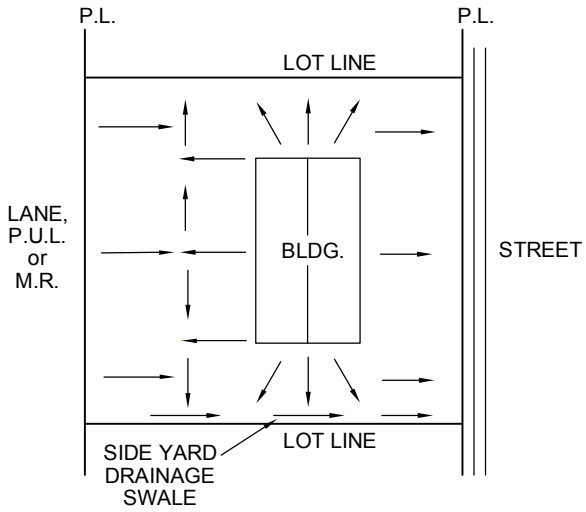
DATE: 2018

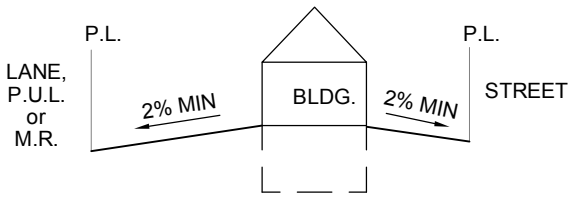
SHALLOW STORM SEWER SERVICE CONNECTION

SCALE: N.T.S.

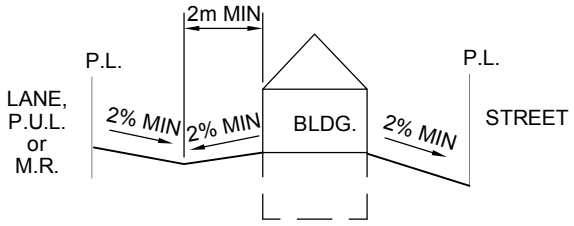
DRAWING NO. 15.01



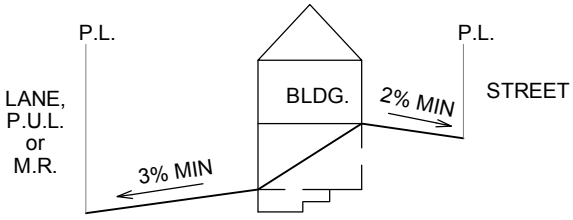




SPLIT DRAINAGE



BACK TO FRONT DRAINAGE



REARYARD BASEMENT WALKOUT
SPLIT DRAINAGE

NO.	DATE	REVISION
1	2018	Revised grades, distances & flow arrows

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Stormwater Design

APPROVED BY:

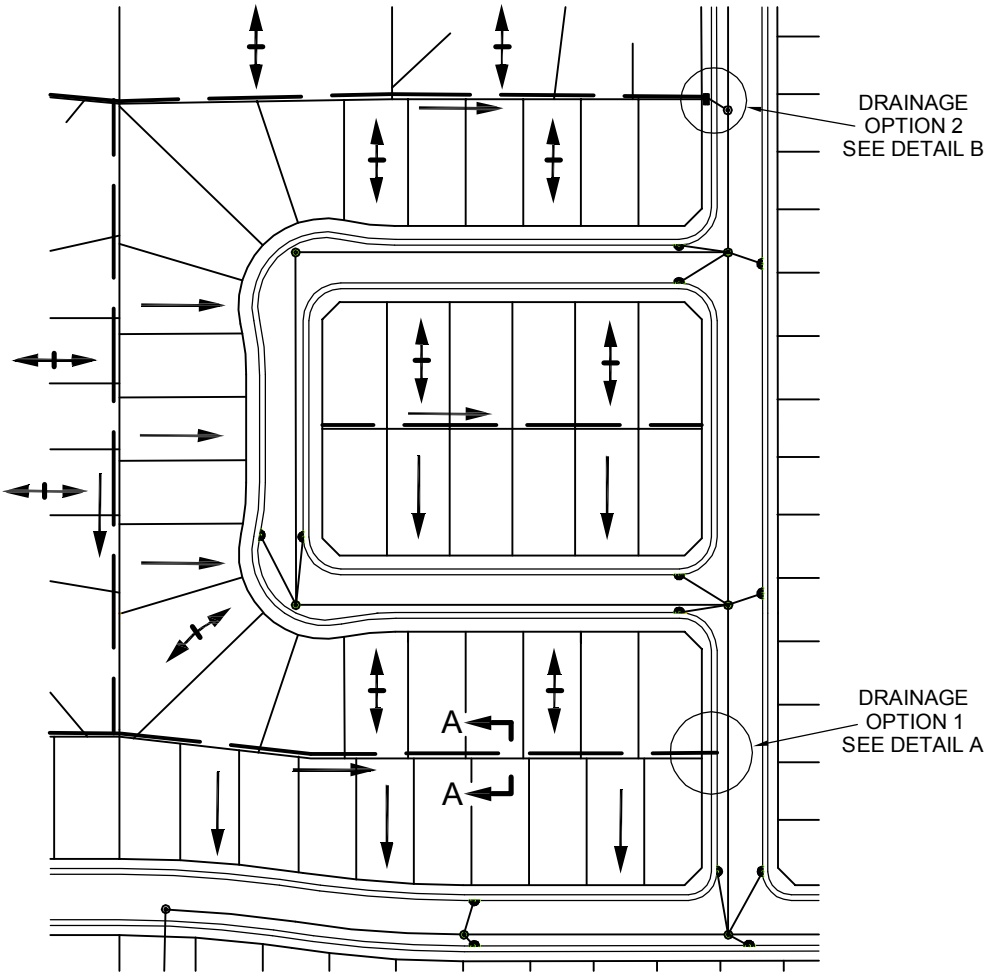
PUBLIC WORKS MANAGER

DATE: 2018

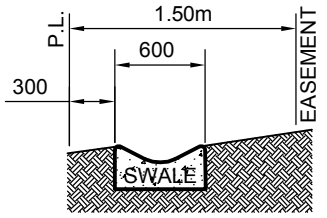
TYPICAL LOT GRADING

SCALE: N.T.S.

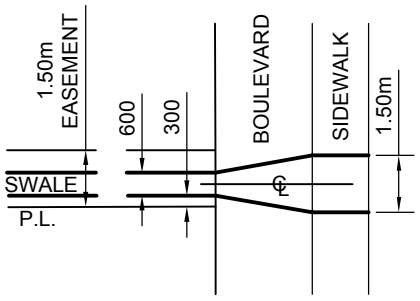
DRAWING NO. 15.02



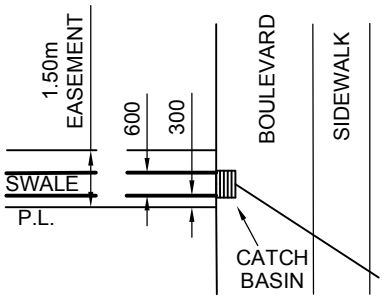
DENOTES DRAINAGE DIRECTION



SECTION 'A - A'



DETAIL A



DETAIL B

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Stormwater Design

LANELESS SUBDIVISION
DRAINAGE SWALE

DRAWN BY: M.M.

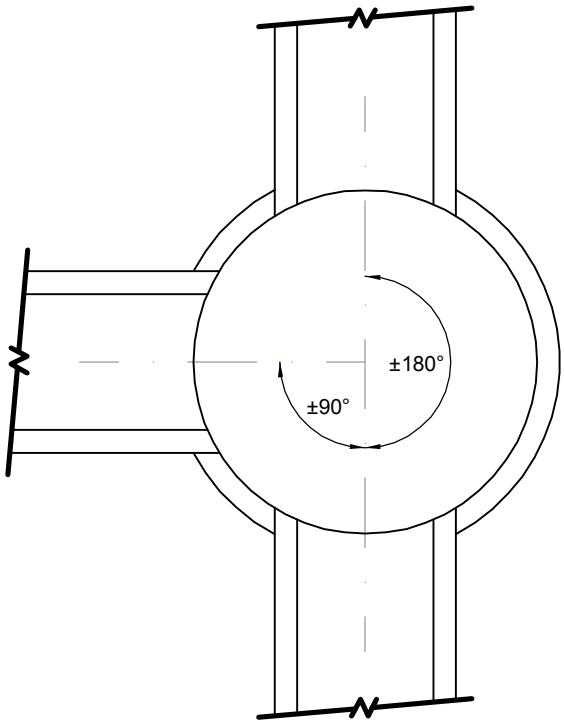
DATE: 2018

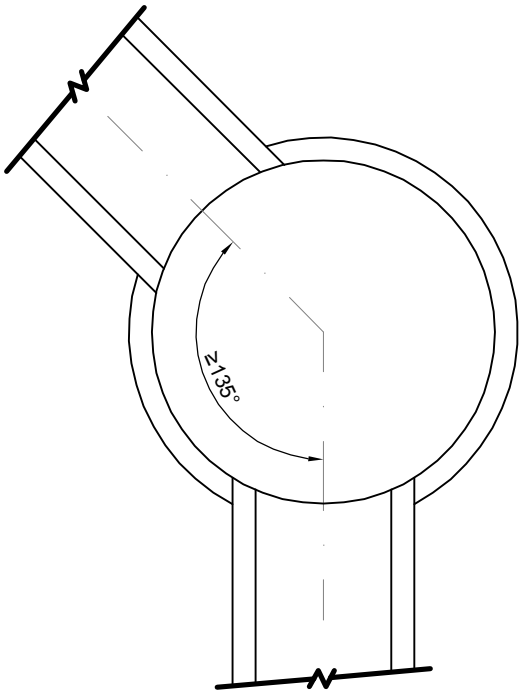
SCALE: N.T.S.

APPROVED BY:

PUBLIC WORKS MANAGER

DRAWING NO. 15.03





MANHOLE NOMINAL INSIDE DIAMETER	INLET / OUTLET PIPE SIZE		
	DEFLECTION ANGLE		
	±90°	≥135°	±180°
1200	600mm (765mm MAX. O.D.)	675mm	750mm (940mm MAX. O.D.)
1500	750mm (940mm MAX. O.D.)	750 & 900mm	900mm (1120mm MAX. O.D.)
1800	900mm (1120mm MAX. O.D.)	1050mm	1200mm (1475mm MAX. O.D.)
2100	1050mm (1335mm MAX. O.D.)		1500mm (1828mm MAX. O.D.)
2400	1200mm (1475mm MAX. O.D.)		1800mm (2184mm MAX. O.D.)
3000	1500mm (1828mm MAX. O.D.)		2100mm (2540mm MAX. O.D.)

NO.	DATE	REVISION
1	2018	Removed pipe material classifications

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Stormwater Design

MANHOLE INLET / OUTLET
PIPE DESIGN CONSIDERATIONS

DRAWN BY: M.M.

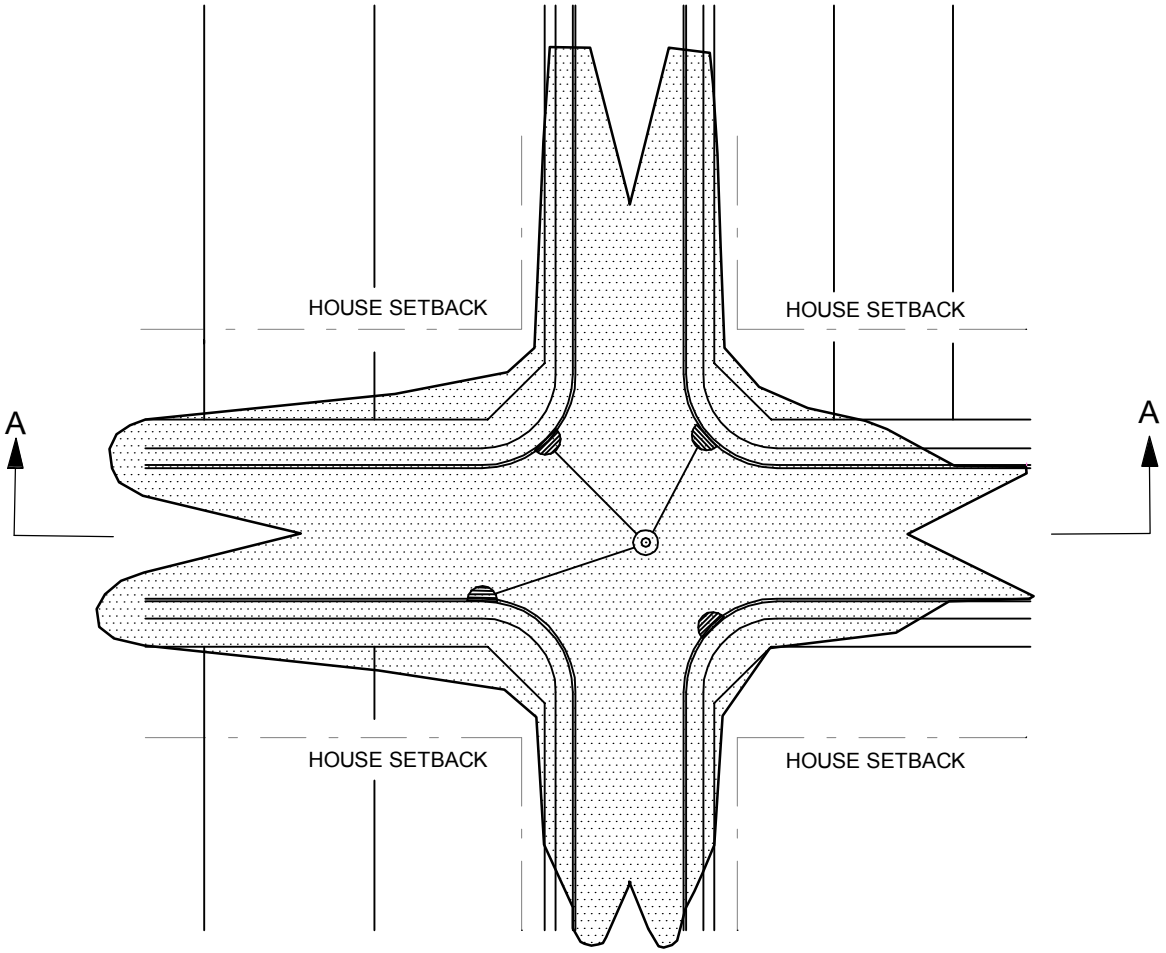
DATE: 2018

SCALE: N.T.S.

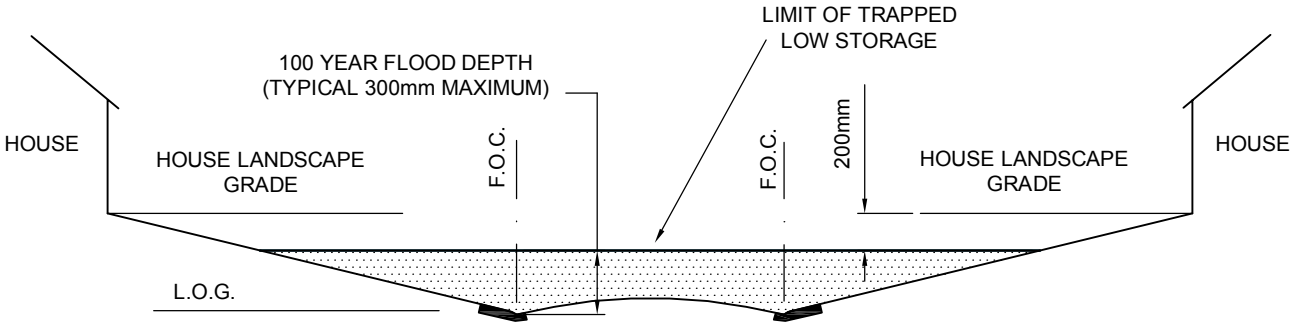
APPROVED BY:

PUBLIC WORKS MANAGER

DRAWING NO. 15.04



PLAN



SECTION 'A – A'

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Stormwater Design

TYPICAL TRAPPED LOW STORAGE AREA

DRAWN BY: M.M.

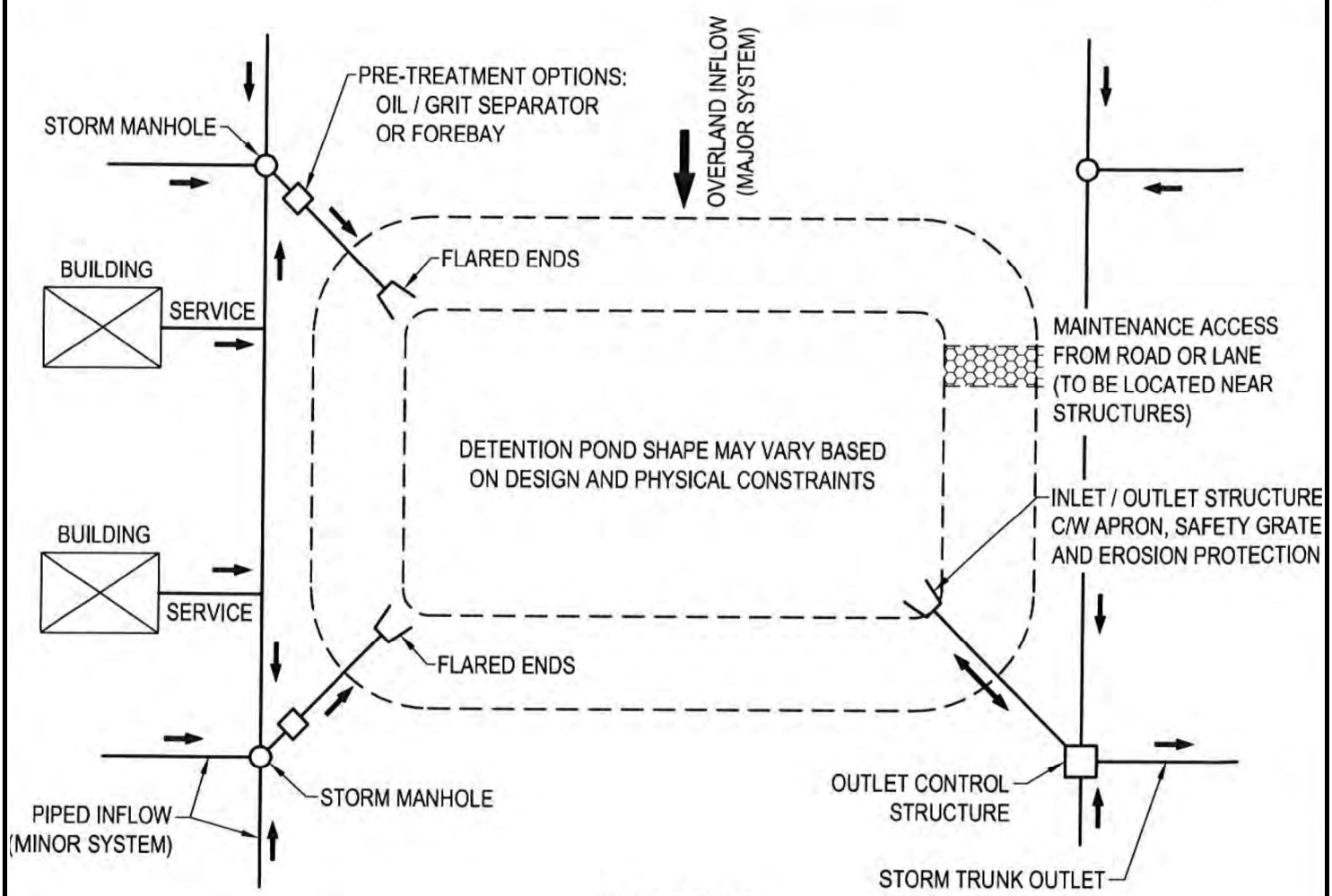
DATE: 2018

SCALE: N.T.S.

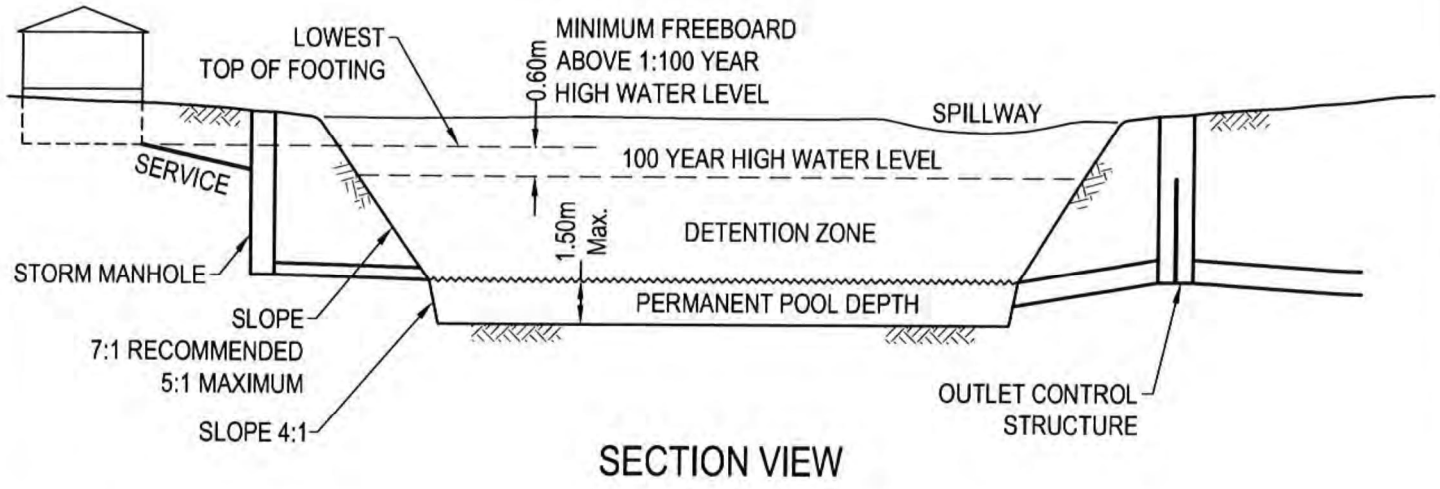
APPROVED BY:

PUBLIC WORKS MANAGER

DRAWING NO. 15.05



PLAN VIEW

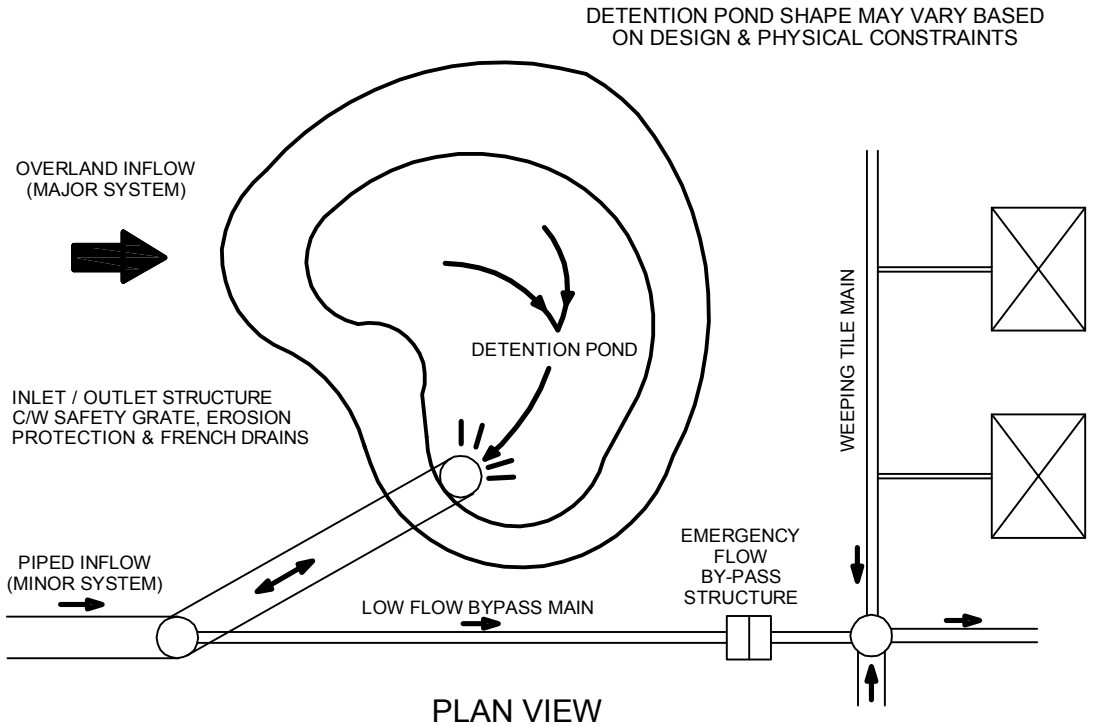


SECTION VIEW

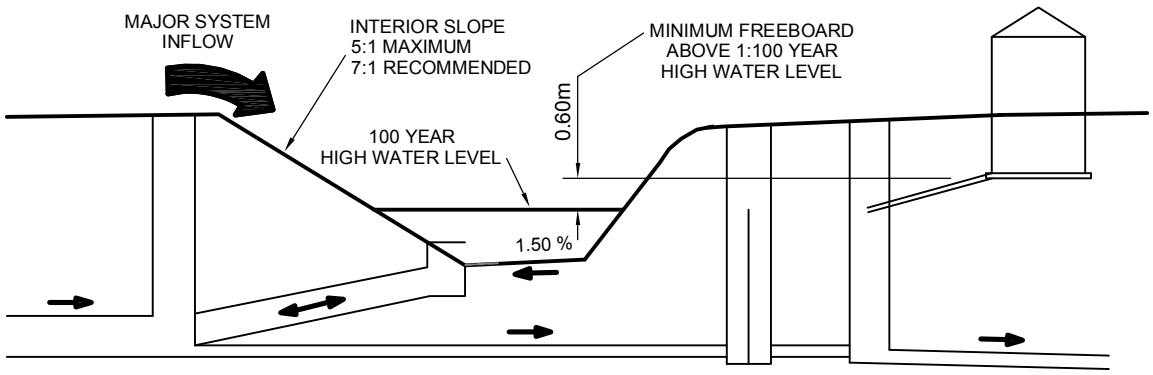
NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.	DESIGN GUIDELINE DRAWINGS Stormwater Design	APPROVED BY: PUBLIC WORKS MANAGER
DATE: 2018	WET STORMWATER STORAGE FACILITY	DRAWING NO. 15.06
SCALE: N.T.S.		



PLAN VIEW



SECTION VIEW

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Stormwater Design

DRAWN BY: M.M.

DATE: 2018

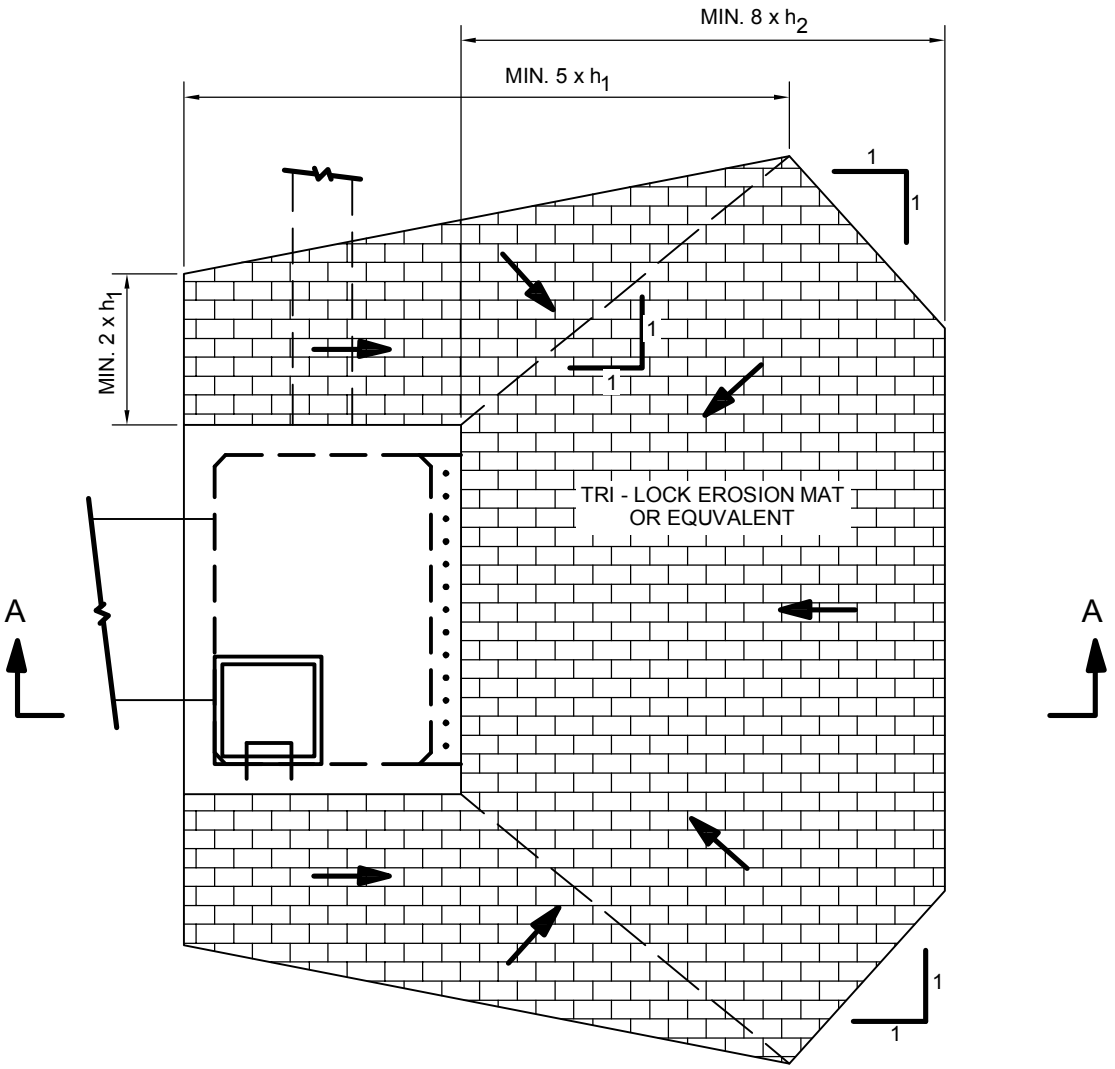
SCALE: N.T.S.

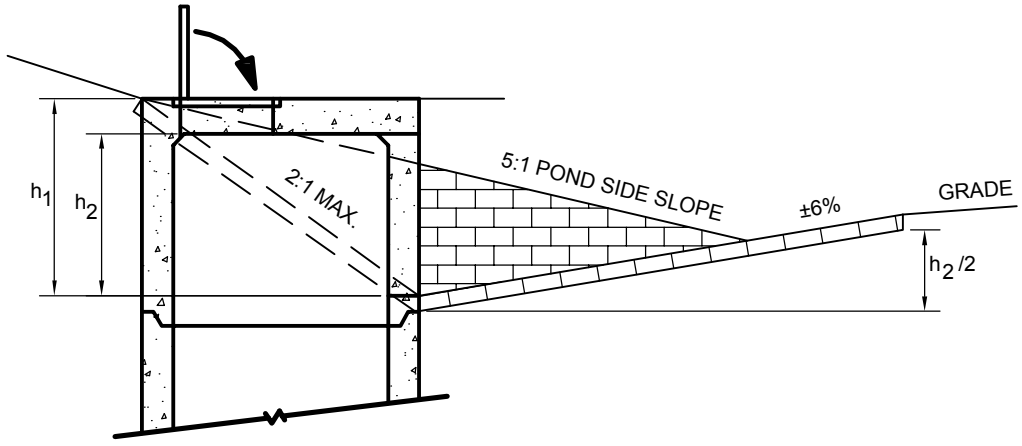
DRY STORMWATER
STORAGE FACILITY

APPROVED BY:

PUBLIC WORKS
MANAGER

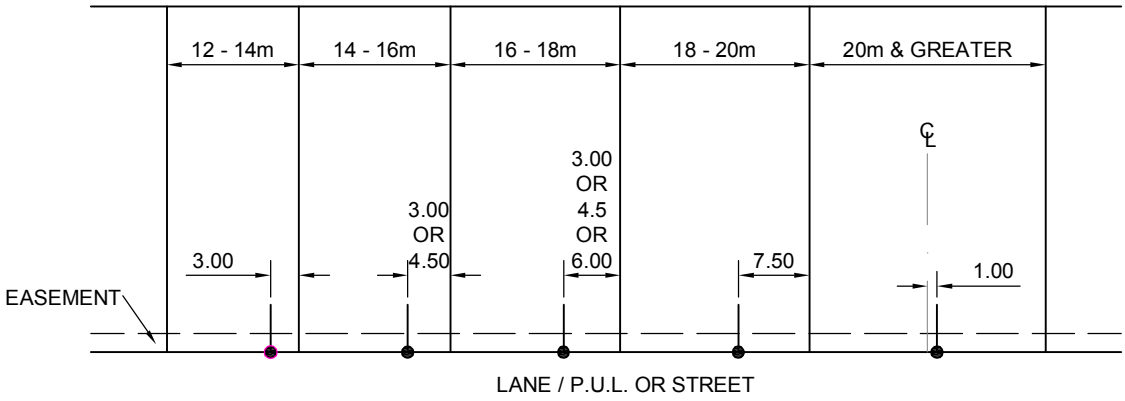
DRAWING NO.
15.07



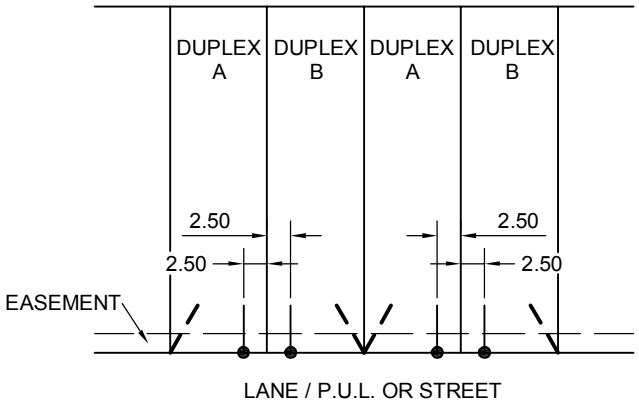


SECTION 'A - A'

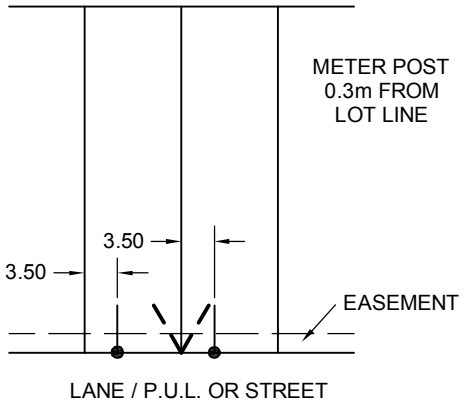
NO.	DATE	REVISION			
			THE TOWN OF SYLVAN LAKE		
			DRAWN BY: M.M.	DESIGN GUIDELINE DRAWINGS Stormwater Design	APPROVED BY: PUBLIC WORKS MANAGER
			DATE: 2018	INLET / OUTLET STRUCTURE APRON	DRAWING NO. 15.08
			SCALE: N.T.S.		



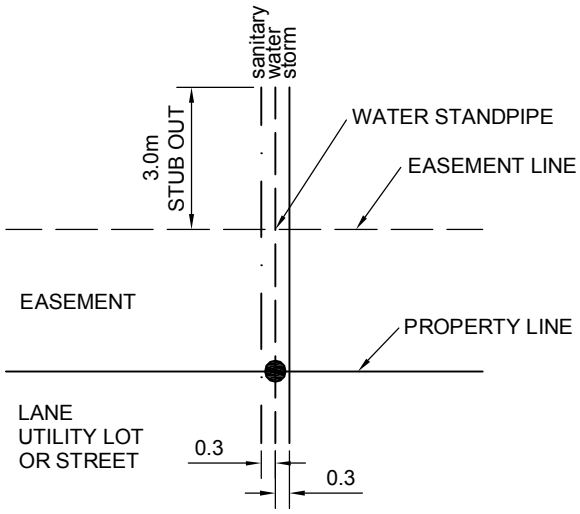
SINGLE FAMILY DWELLING



DUPLEX



MANUFACTURED HOME



SERVICE DETAIL

LEGEND

- SANITARY SEWER, STORM SEWER & WATER SERVICE
- ELECTRICAL SERVICE

NOTE :

1. STANDPIPE & CURB STOP TO BE LOCATED ON PROPERTY LINE.
2. MINIMUM CLEARANCE FROM EDGE OF ELECTRICAL TRANSFORMER TO CENTRE OF WATER SHALL BE 3.30m.
3. EASEMENT WIDTH AS REQUIRED.
4. TWO OR MORE BUILDINGS FRONTING ON THE SAME STREET CANNOT HAVE A SINGLE SERVICE UNLESS IT IS DIVIDED WITHIN PUBLIC PROPERTY AND SEPARATE SHUT OFFS ARE PROVIDED.

NO.	DATE	REVISION
1	2018	Added dual servicing note

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Service Connection Design

SERVICE LOCATIONS

DRAWN BY: M.M.

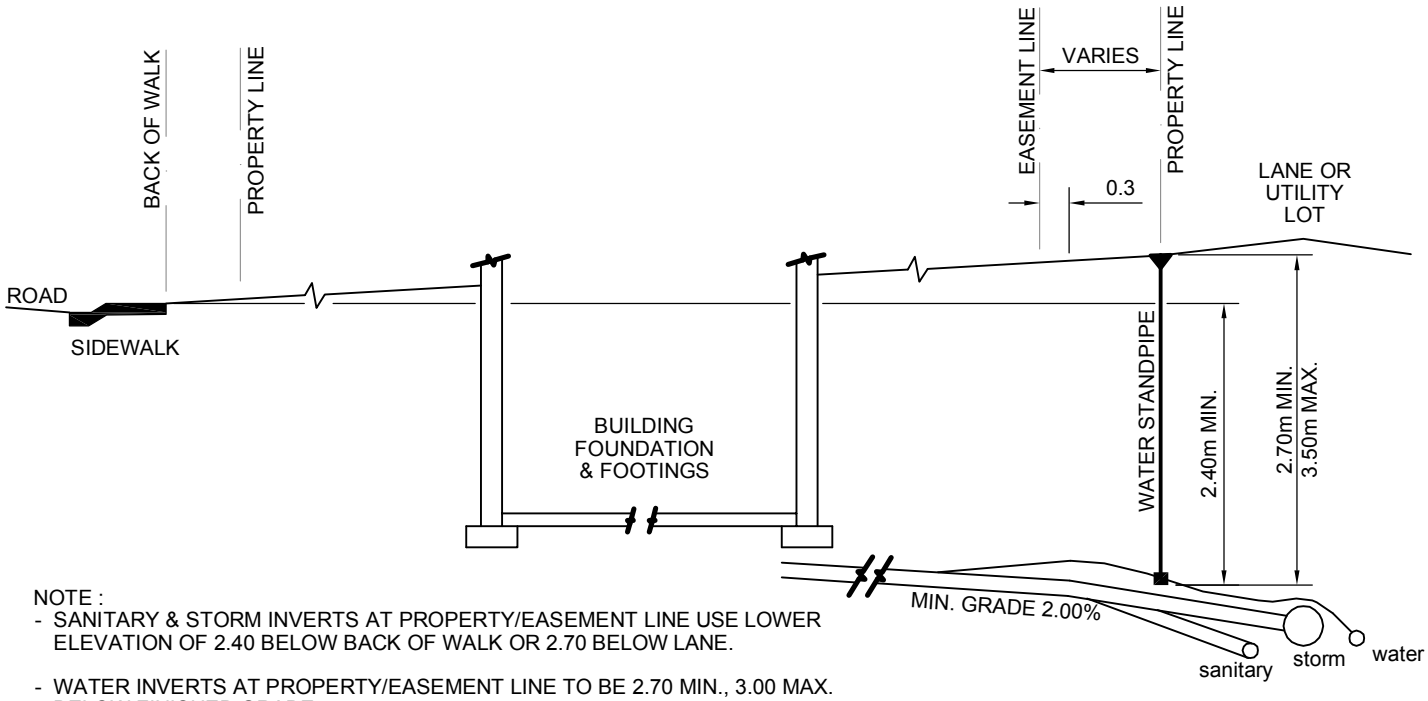
DATE: 2018

SCALE: N.T.S.

APPROVED BY:

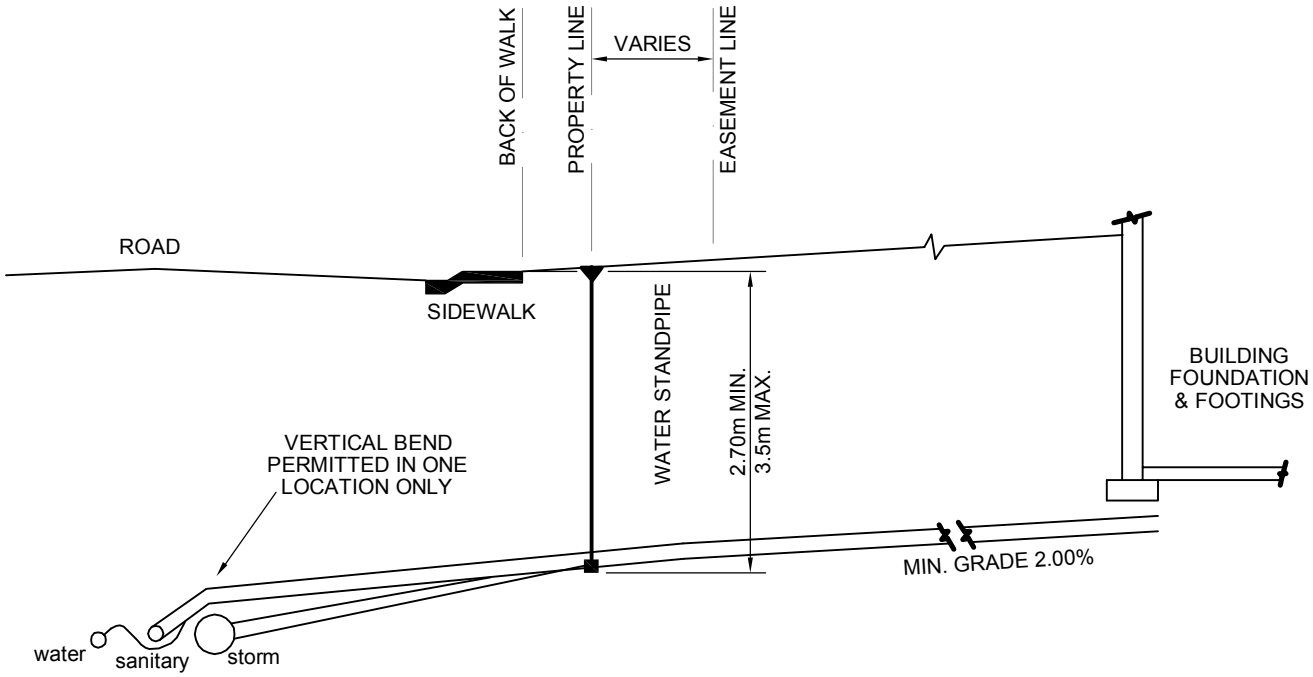
PUBLIC WORKS MANAGER

DRAWING NO. 16.01



NOTE :
- SANITARY & STORM INVERTS AT PROPERTY/EASEMENT LINE USE LOWER ELEVATION OF 2.40 BELOW BACK OF WALK OR 2.70 BELOW LANE.
- WATER INVERTS AT PROPERTY/EASEMENT LINE TO BE 2.70 MIN., 3.00 MAX. BELOW FINISHED GRADE.

REAR YARD SERVICE CONNECTION



FRONT YARD SERVICE CONNECTION

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Service Connection Design

APPROVED BY:

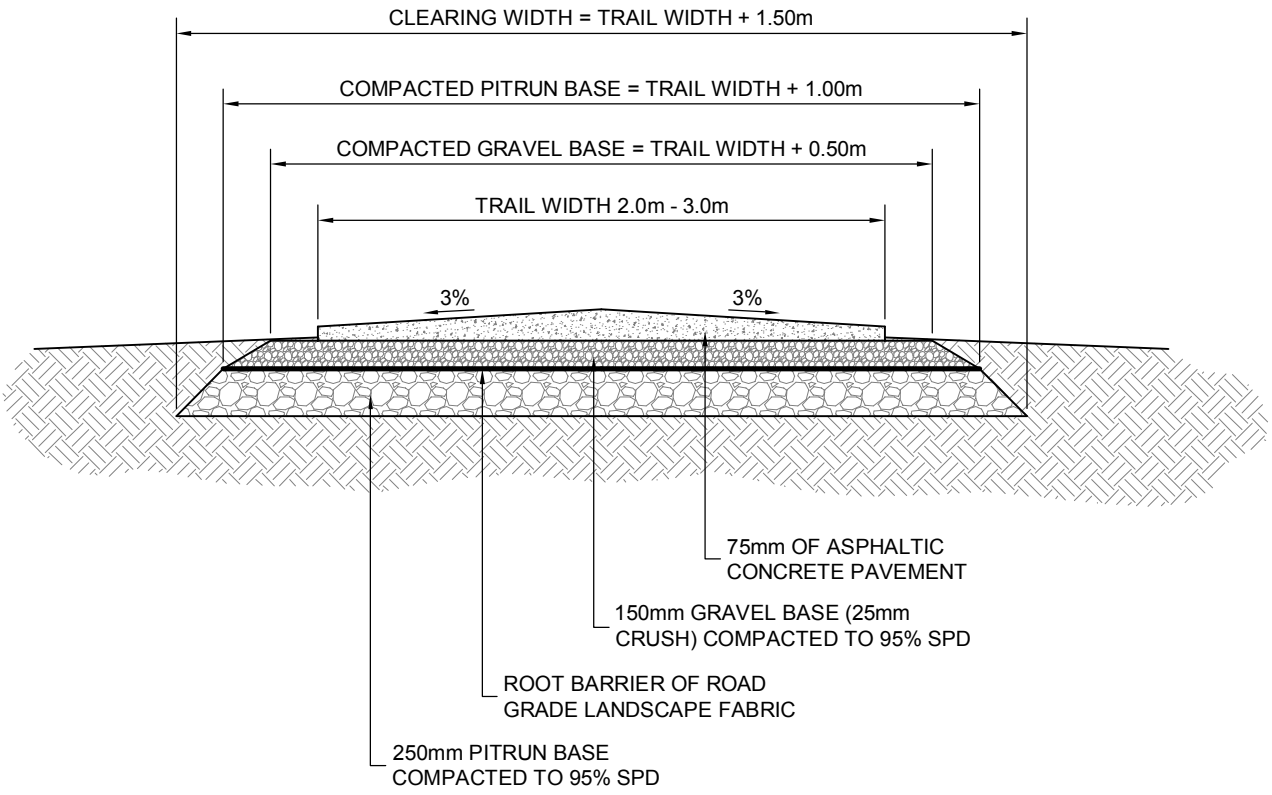
PUBLIC WORKS MANAGER

DATE: 2018

TYPICAL SERVICE CONNECTIONS

SCALE: N.T.S.

DRAWING NO. 16.02



NOTE:

- ON A SIDE SLOPE, PAVING SHALL BE CROSSFALLED AT 3% TO LOW SIDE OF THE EXISTING GROUND CONTOUR
- MAKE ALL JOINS WITH EXISTING VEGITATION SMOOTH AND CONTINOUS. WHERE NECESSARY TRIM BACK ALL ROOTS AND CLEAR ALL DEBRIS

NO.	DATE	REVISION
1	2018	Revised trail width

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Landscape Design

TYPICAL ASPHALT TRAIL DETAIL

DRAWN BY: M.M.

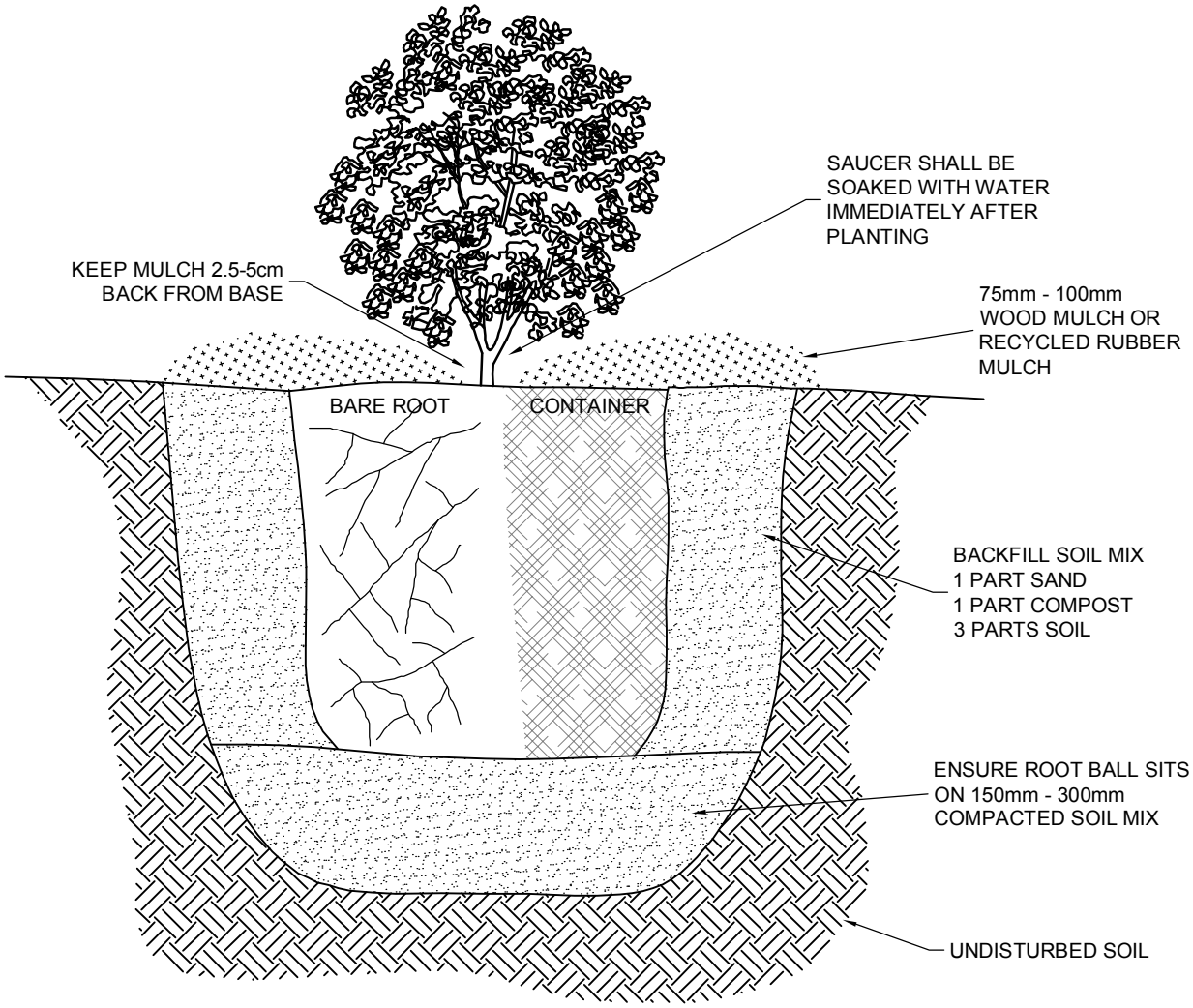
DATE: 2018

SCALE: N.T.S.

APPROVED BY:

PARKS MANAGER

DRAWING NO. 17.01



NOTE:

- CONTAINER TO BE CAREFULLY CUT AWAY FROM THE ROOT SYSTEM. SHRUB SHALL NOT BE PULLED AWAY FROM THE CONTAINER.
- SPREAD ROOTS EVENLY OVER COMPACTED SOIL. PRUNE ALL DAMAGED ROOTS LEAVING TIPS WITH CLEAN ENDS.
- CONTRACTOR TO ALLOW FOR 20% SETTLEMENT WHEN PLACING THE PLANT.
- BURLAP SHALL BE ROLLED DOWN 1/3 PRIOR TO BACK FILLING.

NO.	DATE	REVISION
1	2018	Added mulch setback

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Landscape Design

TYPICAL SHRUB PLANTING DETAIL

DRAWN BY: M.M.

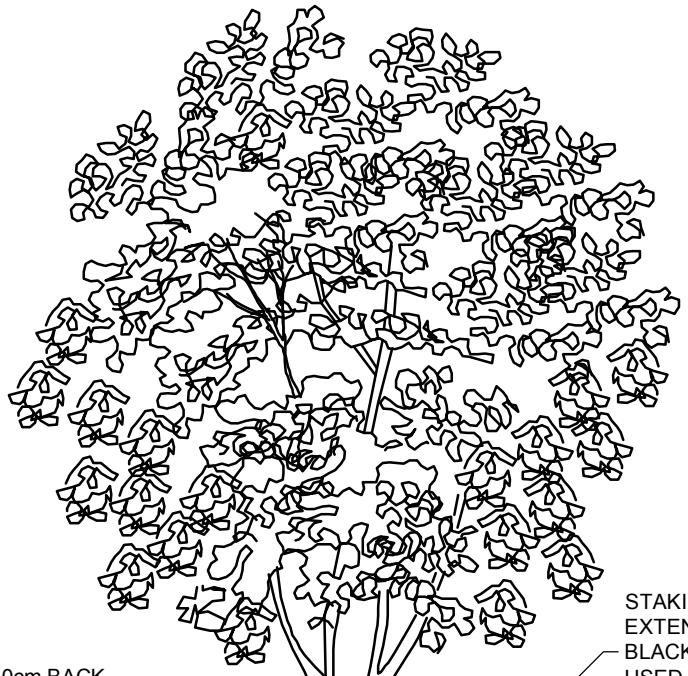
DATE: 2018

SCALE: N.T.S.

APPROVED BY:

PARKS MANAGER

DRAWING NO. 17.02



STAKING OPTION #1 - METAL POST EXTENDED INTO UNDISTURBED SOIL. BLACK RUBBER HOSE AND WIRE TO BE USED AND ATTACHED TO THE TREE APPROXIMATELY 2/3 OF TREE HEIGHT

KEEP MULCH 5-10cm BACK FROM BASE OF TRUNK

STAKING OPTION #2 - METAL T-BAR STAKE EXTENDED INTO UNDISTURBED SOIL. BLACK RUBBER HOSE AND WIRE TO BE USED AND ATTACHED TO THE TREE APPROXIMATELY 2/3 OF TREE HEIGHT

SAUCER SHALL BE SOAKED WITH WATER IMMEDIATELY AFTER PLANTING

75mm - 100mm WOOD MULCH OR RECYCLED RUBBER MULCH

ROLL BACK BURLAP & WIRE 1/3 FROM TOP OF ROOT BALL

BACKFILL SOIL MIX
1 PART SAND
1 PART COMPOST
3 PARTS SOIL

ENSURE ROOT BALL SITS ON 150mm - 300mm COMPACTED SOIL MIX

UNDISTURBED SOIL

NOTE:

- CONTRACTOR TO ALLOW FOR 20% SETTLEMENT WHEN PLACING THE PLANT.
- ALL STAKING MUST BE MAINTAINED FOR A MINIMUM 1 MAXIMUM OF 2 GROWING SEASONS.
- RESTRAINING SYSTEM TO BE OPTION #1 POST WHEN PLANTING IN NEW SOD AND OPTION #2 STAKE WHEN PLANTING IN PRE-EXISTING SOIL.
- PRUNE ONLY TO REMOVE DEAD, DAMAGED, DISEASED OR INTERFERING WOOD
- 2.5cm - 5.0cm OF TRUNK FLARE SHALL BE VISIBLE AFTER PLANTING

CONIFEROUS TREES TO FOLLOW SAME DETAIL

NO.	DATE	REVISION
1	2018	Added mulch setback & notes

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Landscape Design

TYPICAL TREE PLANTING DETAIL

DRAWN BY: M.M.

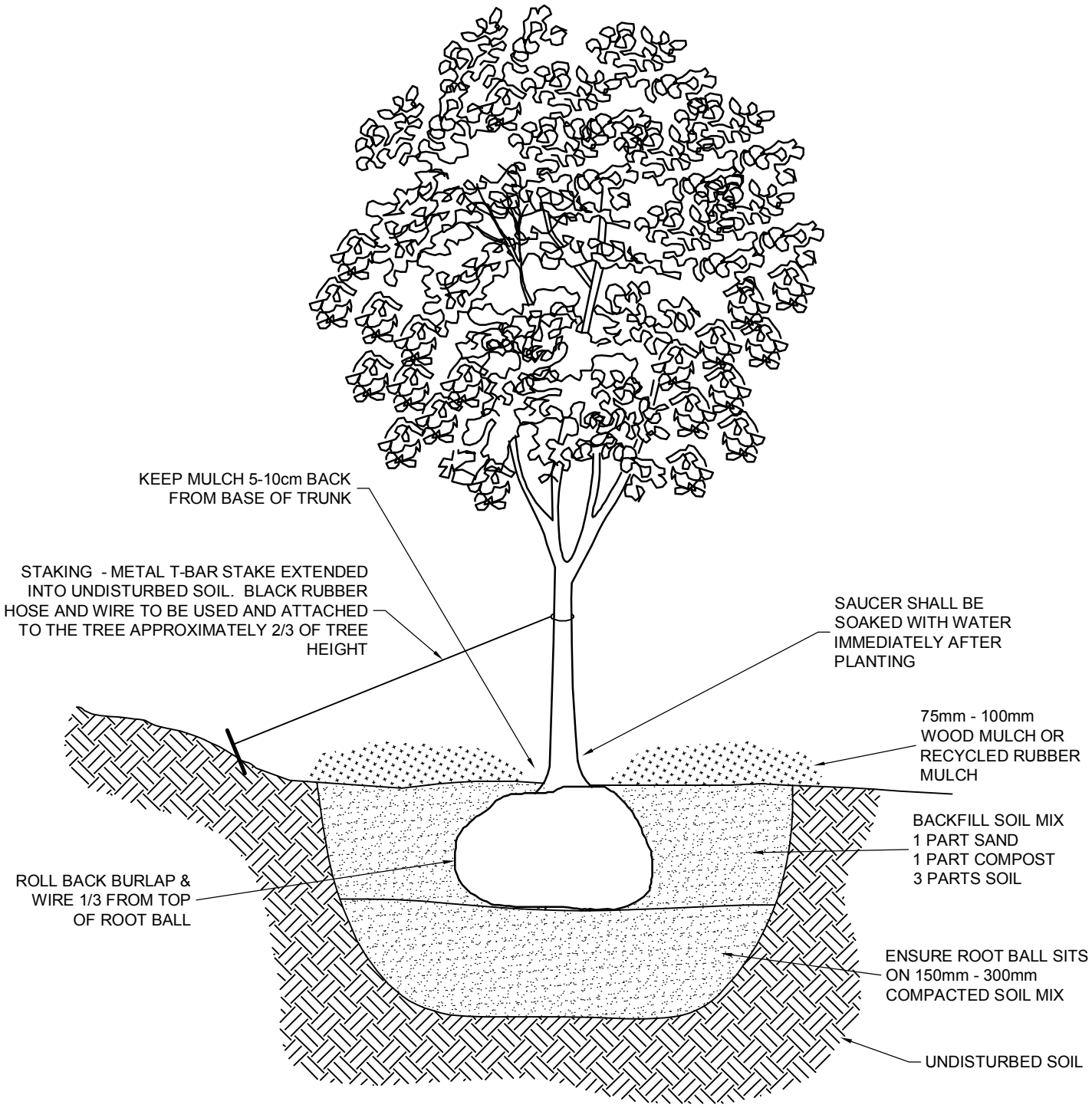
DATE: 2018

SCALE: N.T.S.

APPROVED BY:

PARKS MANAGER

DRAWING NO. 17.03



NOTE:

- CONTRACTOR TO ALLOW FOR 20% SETTLEMENT WHEN PLACING THE PLANT.
- ALL STAKING MUST BE MAINTAINED FOR A MINIMUM 1 MAXIMUM OF 2 GROWING SEASONS.
- PRUNE ONLY TO REMOVE DEAD, DAMAGED, DISEASED OR INTERFERING WOOD
- 2.5cm - 5.0cm OF TRUNK FLARE SHALL BE VISIBLE AFTER PLANTING.

CONIFEROUS TREES TO FOLLOW SAME DETAIL

NO.	DATE	REVISION
1	2018	Added mulch setback & notes

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Landscape Design

TYPICAL TREE PLANTING ON SLOPED GROUND DETAIL

DRAWN BY: M.M.

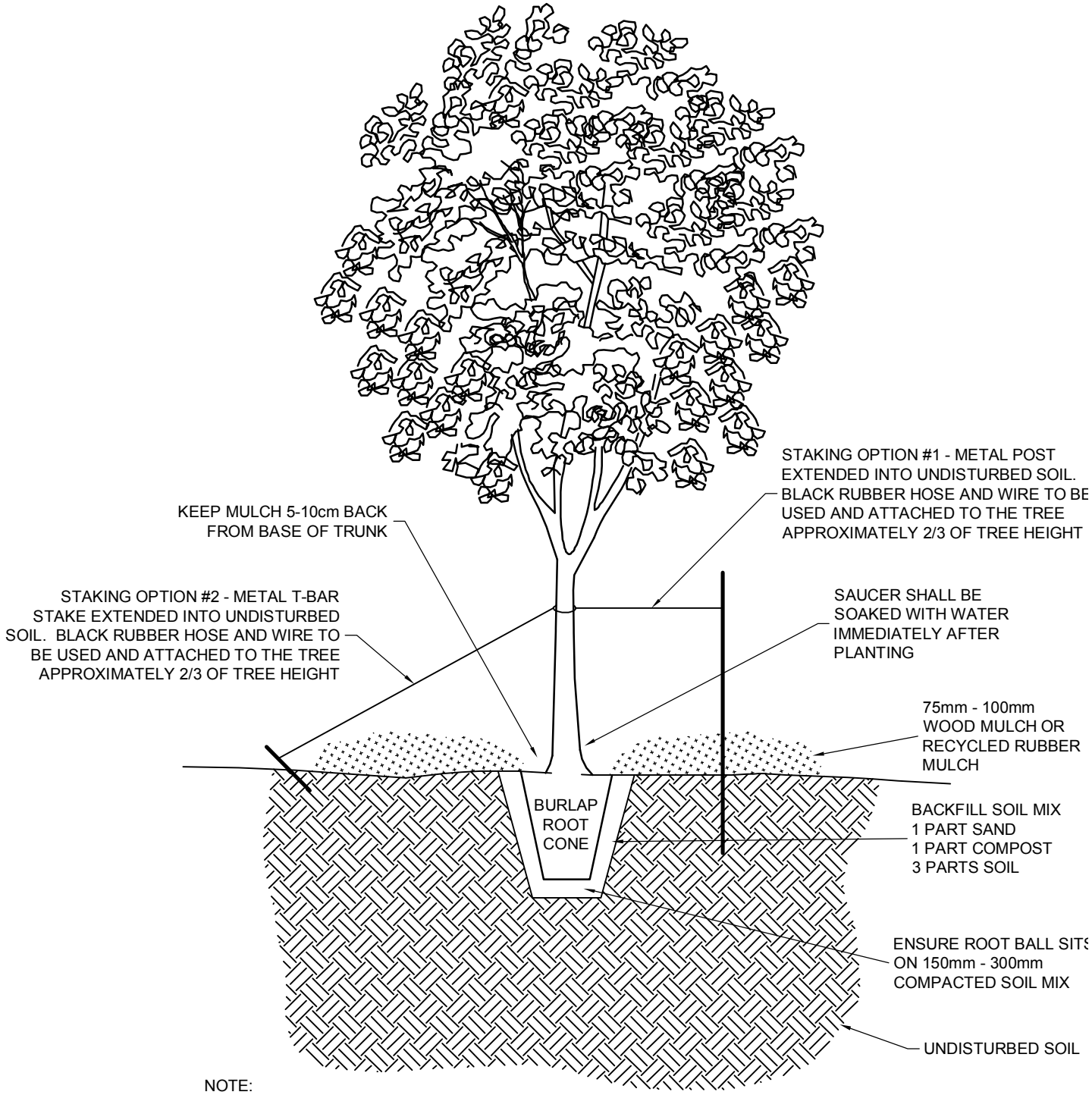
DATE: 2018

SCALE: N.T.S.

APPROVED BY:

PARKS MANAGER

DRAWING NO. 17.04



NOTE:

- CONTRACTOR TO ALLOW FOR 20% SETTLEMENT WHEN PLACING THE PLANT.
- ALL STAKING MUST BE MAINTAINED FOR A MINIMUM 1 MAXIMUM OF 2 GROWING SEASONS.
- RESTRAINING SYSTEM TO BE OPTION #1 POST WHEN PLANTING IN NEW SOD AND OPTION #2 STAKE WHEN PLANTING IN PRE-EXISTING SOIL.
- PRUNE ONLY TO REMOVE DEAD, DAMAGED, DISEASED OR INTERFERING WOOD.
- BURLAP SHALL BE ROLLED DOWN 1/3 PRIOR TO BACK FILLING
- 2.5cm - 5.0cm OF TRUNK FLARE SHALL BE VISIBLE AFTER PLANTING

CONIFEROUS TREES TO FOLLOW SAME DETAIL

NO.	DATE	REVISION
1	2018	Added mulch setback & notes

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Landscape Design

TYPICAL TREE PLANTING
MACHINE DUG DETAIL

DRAWN BY: M.M.

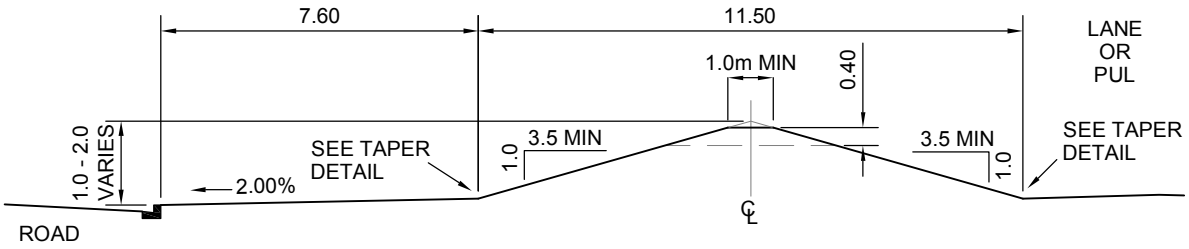
DATE: 2018

SCALE: N.T.S.

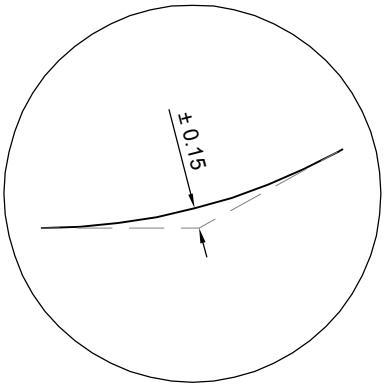
APPROVED BY:

PARKS MANAGER

DRAWING NO. 17.05

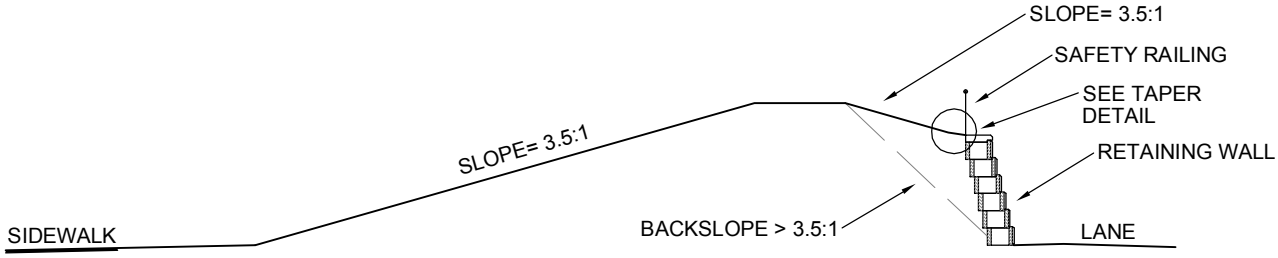


NORMAL BERM CROSS SECTION

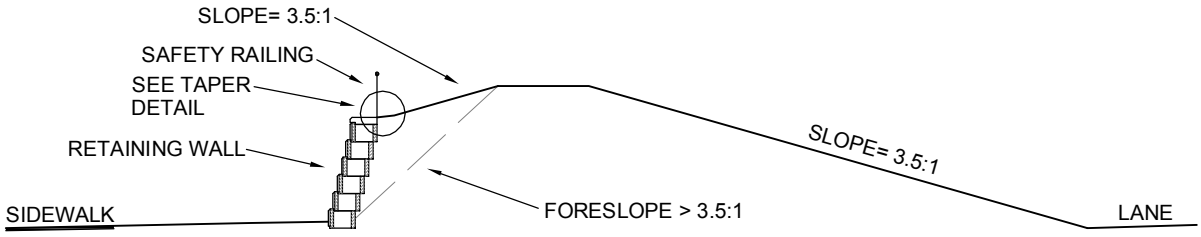


NOTE :
PROVIDE A TAPER TO THE BERM ADJACENT
TO THE BOULEVARD & PUBLIC UTILITY LOT/M.R.
WHERE APPLICABLE

BERM TAPER DETAIL



BACKSLOPE CROSS SECTION

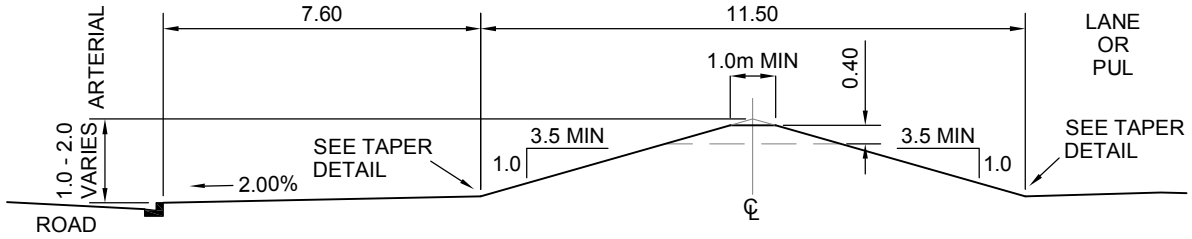


FORESLOPE CROSS SECTION

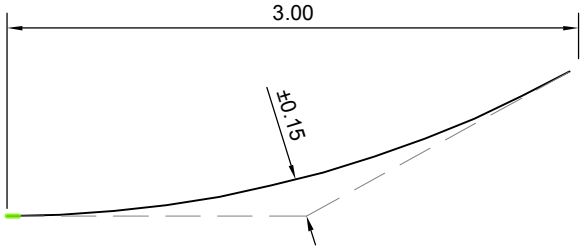
NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.	DESIGN GUIDELINE DRAWINGS Landscape Design	APPROVED BY: PARKS MANAGER
DATE: 2018	BERM SIDE SLOPE / RETAINING WALL REQUIREMENTS FOR ARTERIAL ROADWAY	DRAWING NO. 17.06
SCALE: N.T.S.		



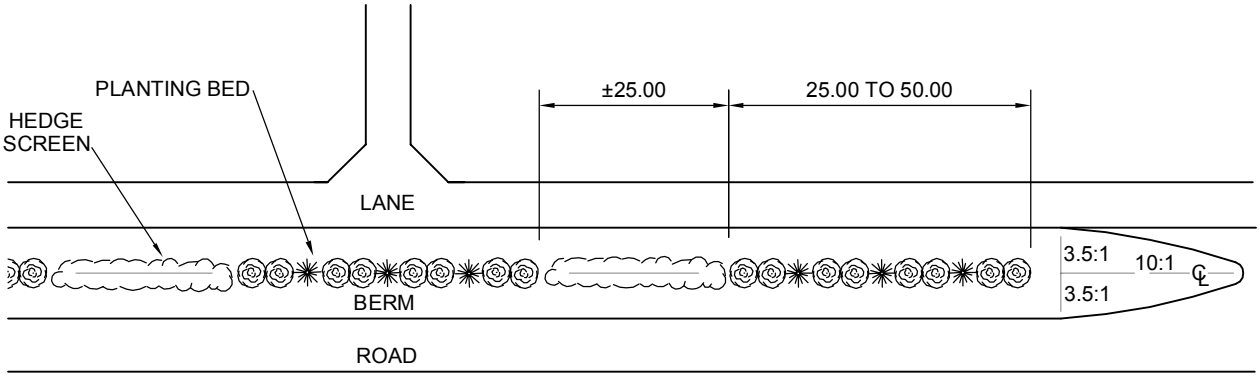
CROSS SECTION



NOTE :
PROVIDE A TAPER TO THE BERM ADJACENT TO THE BOULEVARD & PUBLIC UTILITY LOT/M.R. FOR MOWER TRANSITION.

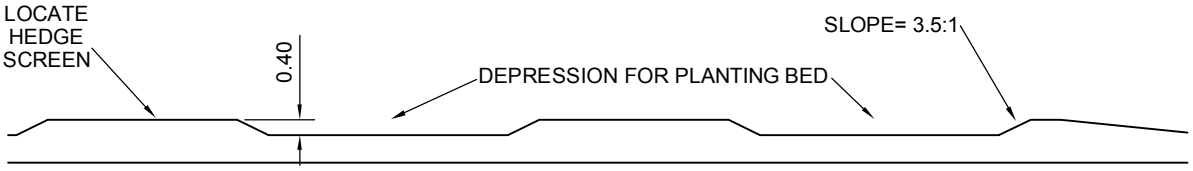
A TRANSITION IS NOT REQUIRED IF A LANE IS CONSTRUCTED ADJACENT TO THE BERM.

BERM TAPER DETAIL



BERM PLAN VIEW

NOTE :
SEE DWG. 17.08 FOR BERM DETAIL
LOCATED ADJACENT TO COMMERCIAL SITES



BERM ELEVATED VIEW

NO.	DATE	REVISION
1	2018	Revised DWG reference

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Landscape Design

APPROVED BY:

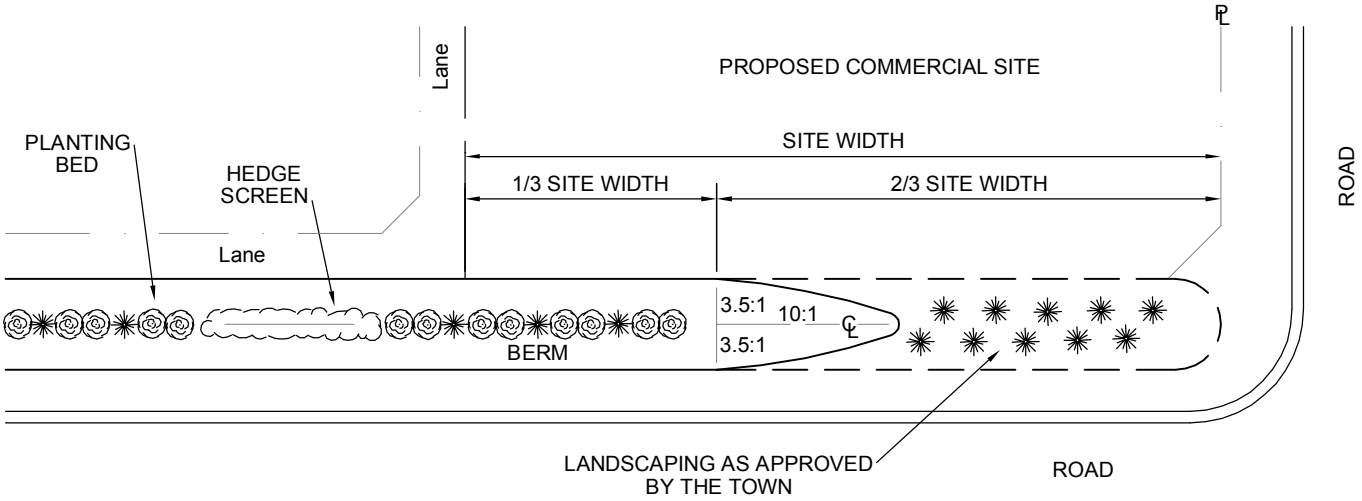
PARKS MANAGER

DATE: 2018

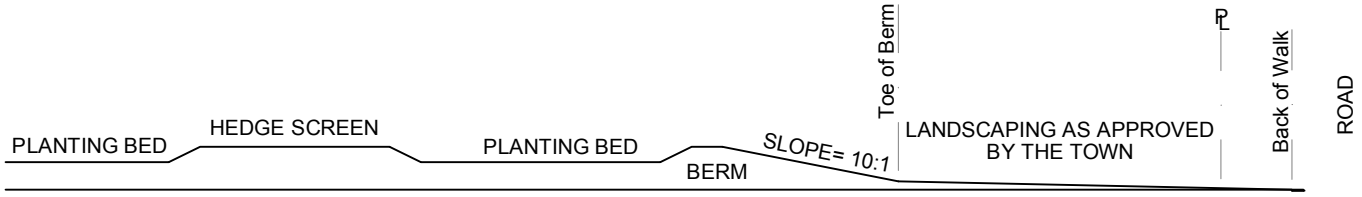
TYPICAL BERM
CROSS SECTION
FOR ARTERIAL ROADWAY

SCALE: N.T.S.

DRAWING NO. 17.07



BERM PLAN VIEW

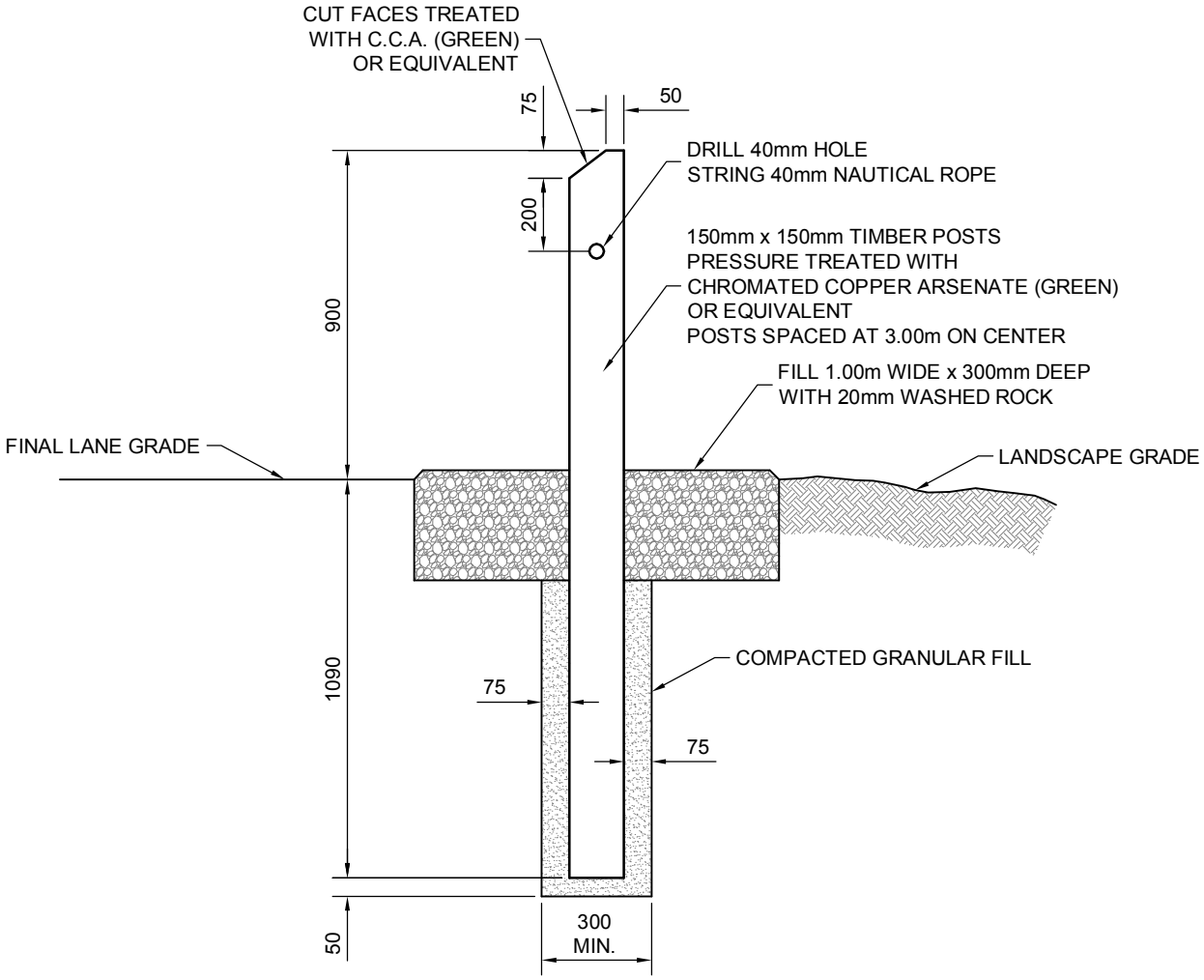


BERM ELEVATED VIEW

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.	DESIGN GUIDELINE DRAWINGS Landscape Design	APPROVED BY: PARKS MANAGER
DATE: 2018	BERM HEIGHT REDUCTION NEXT TO A COMMERCIAL SITE	DRAWING NO. 17.08
SCALE: N.T.S.		



NOTE:
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SPECIFIED

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Landscape Design

POST & ROPE
FENCE DETAIL

DRAWN BY: M.M

DATE: 2018

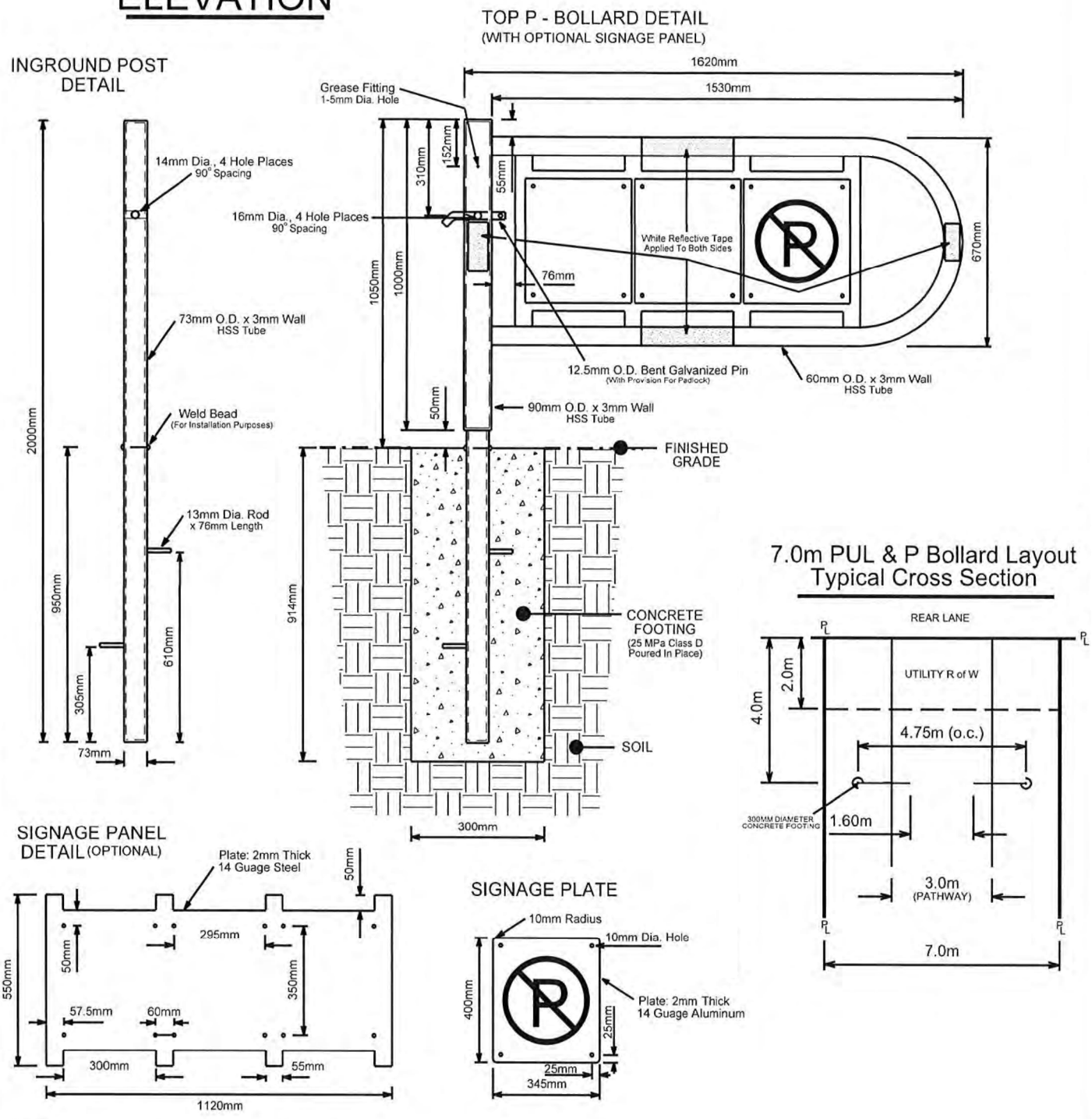
SCALE: N.T.S.

APPROVED BY:

PARKS MANAGER

DRAWING NO. 17.09

ELEVATION



NOTES:

- 4MM THICK STEEL PLATE (WELDED POST CAPS).
- THE WELD BEAD MARK WILL BE LEVEL TO EXISTING GRADE TO DETERMINE BOLLARD HEIGHT.
- FINISHES: ELECTROSTATICALLY APPLIED POLYESTER POWDER TOP COAT. FOR COLOR REFERENCE: AVERY BROWN UC-900-995-0.
- STEEL COMPONENTS RECEIVE CORROSION PROTECTION FROM AN E-COAT PRIMER.
- ALL CEMENT TAILINGS WILL BE CLEANED OFF BOLLARD IMMEDIATELY AFTER INSTALLATION.
- ALL AREAS SURROUNDING INSTALLED BOLLARD WILL BE COMPLETED TO FINISHED GRADE & NOT EXCEED 50MM VARIATION.
- DIMENSIONS ARE IN MILLIMETERS.

NO.	DATE	REVISION
1	2018	Changed DWG to "swing-gate" detail

THE TOWN OF SYLVAN LAKE

DRAWN BY: M.M.

DESIGN GUIDELINE DRAWINGS
Landscape Design

APPROVED BY:

PARKS MANAGER

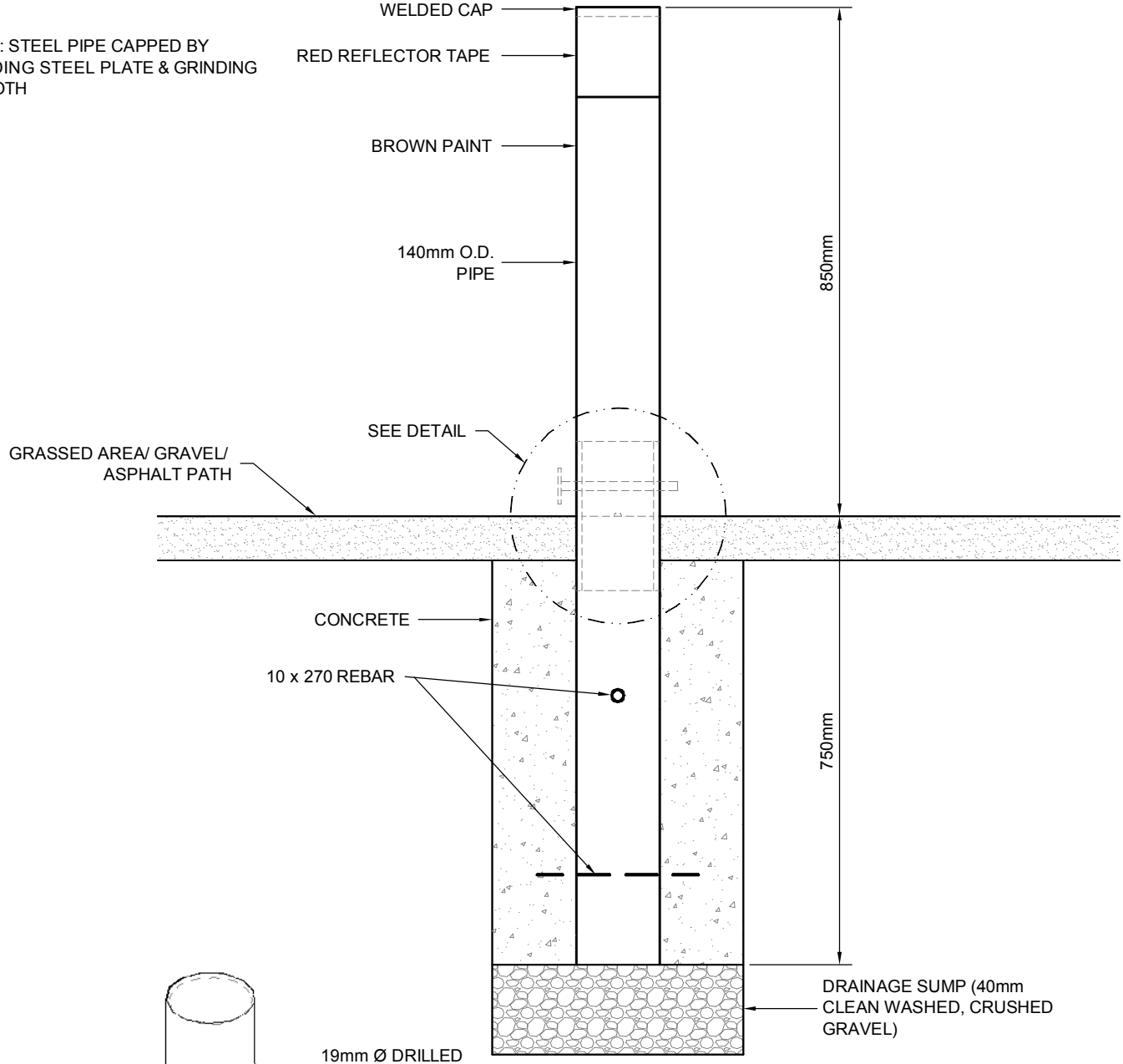
DATE: 2018

TYPICAL SWING GATE BOLLARD

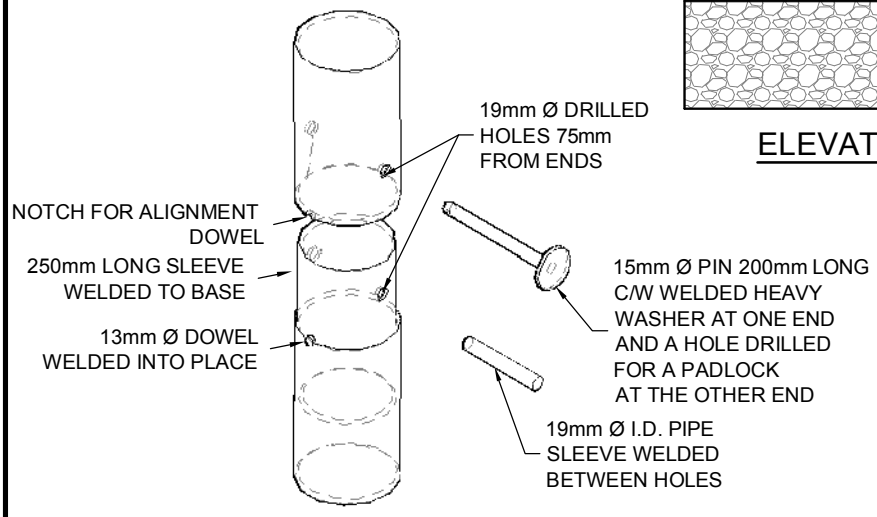
SCALE: N.T.S.

DRAWING NO. 17.10

NOTE: STEEL PIPE CAPPED BY WELDING STEEL PLATE & GRINDING SMOOTH



ELEVATION



DETAIL

NO.	DATE	REVISION

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Landscape Design

TYPICAL BREAK-AWAY BOLLARD

DRAWN BY: M.M.

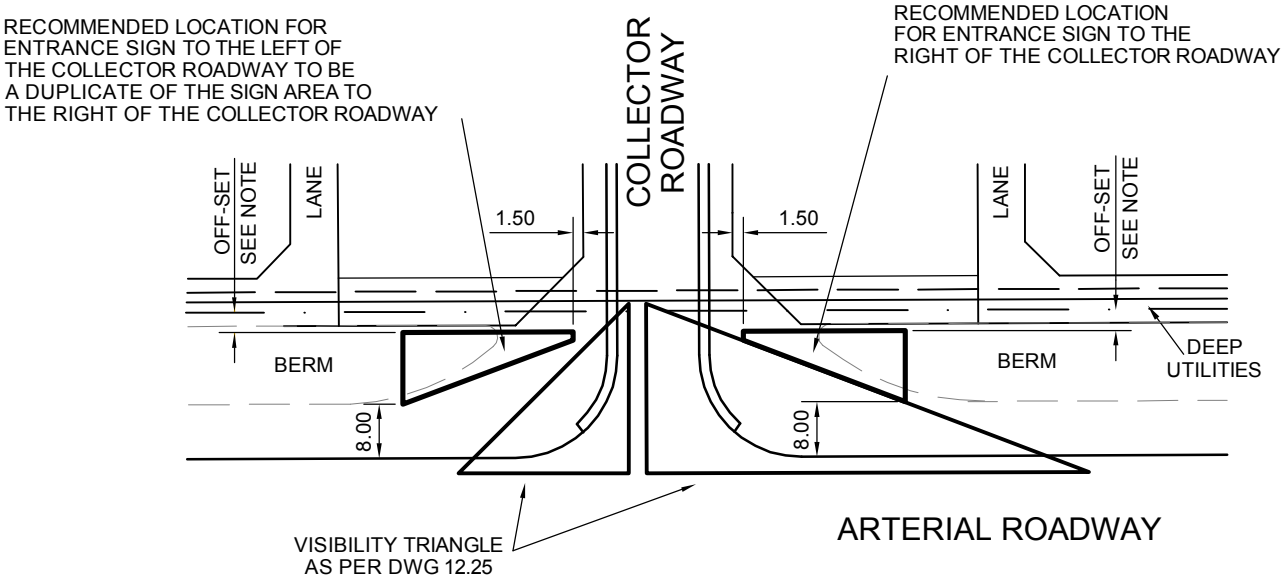
DATE: 2018

SCALE: N.T.S.

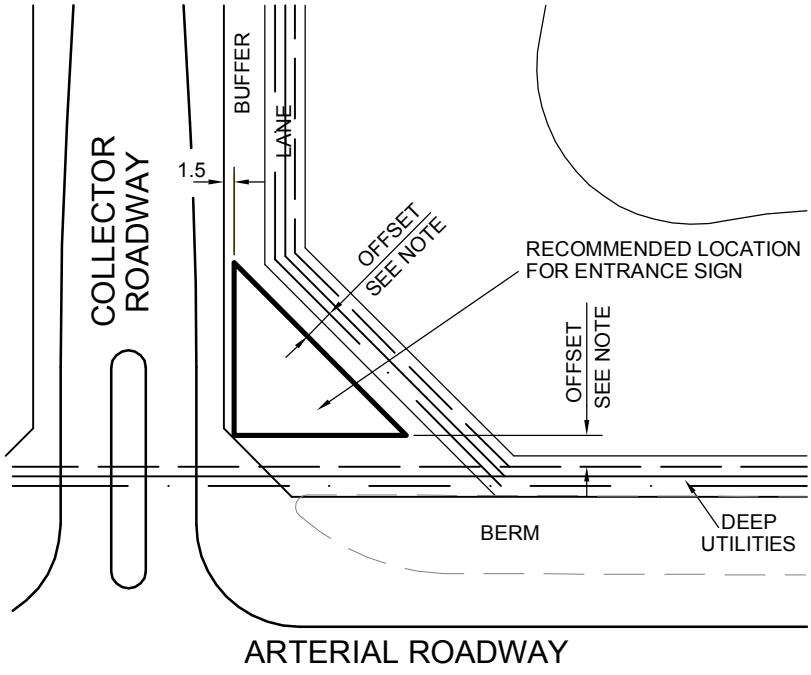
APPROVED BY:

PARKS MANAGER

DRAWING NO. 17.11



OPTION 1



OPTION 2

NOTE :

- OFFSET NOT TO BE LESS THAN 1:1 SEPARATION FROM THE INVERT OF THE NEAREST UTILITY MAIN TO GROUND ELEVATION, OR A MINIMUM OF 3.0m FROM NEAREST DEEP UTILITY.

NO.	DATE	REVISION
1	2018	Revised DWG reference

THE TOWN OF SYLVAN LAKE

DESIGN GUIDELINE DRAWINGS
Landscape Design

NEIGHBOURHOOD IDENTIFICATION SIGN LOCATIONS

DRAWN BY: M.M.

DATE: 2018

SCALE: N.T.S.

APPROVED BY:

PARKS MANAGER

DRAWING NO. 17.12