Smoky Lake Region

REGIONAL ENGINEERING DESIGN STANDARDS (REDS)

July 2023

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Part A
GENERAL

A1 INTRODUCTION TO STANDARDS

A1.1 Foreword

The following "Smoky Lake Regional Engineering Design Standards" (REDS) have been prepared to provide information and define minimum acceptable standards to Developers and other interested parties requiring knowledge of the principles governing the development of land within the Smoky Lake Region, including Smoky Lake County, the Town of Smoky Lake, the Village of Vilna, and the Village of Waskatenau. These standards encourage good engineering and construction practices. Any deviation from these standards requires a written request to the Municipality for acceptance prior to implementation.

This document is available on the County's, Town's, and Village's websites, and will be updated on an as required basis. Revised documents will be uploaded to the municipal websites. Users of the REDS are urged to refer to the municipal websites periodically to ensure they have the latest edition.

The REDS have been prepared based on municipal and provincial regulations and standards, as well as industry best practices. If any standards set forth in this document contradict other applicable industry standards, the more stringent standards shall apply. Where these standards refer to bylaws, policies, acts, regulations, or standards, this shall mean the most recent edition or amendments of the referenced document.

A1.2 Scope

.1 This document includes the following parts:

- **Part A – General**
  - Outlines general requirements applicable to all developments, redevelopments, and capital projects.
- **Part B – Urban**
  - Outlines requirements for Urban developments, redevelopments, and capital projects. Refer to **Section A1.4** for the definition of Urban level of service.
- **Part C – Rural**
  - Outlines requirements for Rural developments, redevelopments, and capital projects. Refer to **Section A1.4** for the definition of Rural level of service.
- **Part D – Special Provisions**
  - Outlines requirements which are unique to each Municipality.

A1.2.1 New Development

.1 These standards and procedures apply to the preparation and submission of engineering drawings for Municipal Improvements in Rural and Urban Residential, Commercial, and Industrial developments and include:

- Water distribution systems, fire protection systems, and lot service connections;
- Sanitary sewage systems and lot service connections;
- Stormwater collection systems and related appurtenances, lot grading, lot service connections, and stormwater management facilities;
- Roadways, sidewalks, curb and gutter, and alley improvements;
- Shallow (franchise) utilities (i.e., gas, power, telephone, cable, fiber optics); and

- Landscape requirements, including hard and soft elements and walkway systems.

.2 All the items outlined in **Clause A1.2.1.1** may not be applicable for every development, redevelopment, or capital project. The level of service for Urban versus Rural applications is defined in **Section A1.4**. For applications that may not fall entirely under an Urban or Rural level of service, the required level of service will be at the discretion of the Municipality.

A1.2.2 Redevelopment

.1 These standards also apply to the redevelopment of lands within the Municipality.

A1.2.3 Capital Projects

.1 These standards also apply to capital projects undertaken by the Municipality to rehabilitate, maintain, or upgrade existing municipal infrastructure.

A1.3 Relationship: Municipality and Developer

.1 Municipality involvement, periodic inspections, and acceptance are required in all aspects of servicing and land development.

.2 Upon final acceptance by the Municipality, all Municipal Improvements, and the responsibilities thereof, are taken over by the Municipality. For that reason, the Municipalities are charged with the responsibility of ensuring that all Municipal Improvements provided in developing lands meet minimum acceptable standards, so that the Municipal Improvements can be properly operated and maintained for the benefit of the end users of the new development.

.3 The Municipalities will provide Municipal Services (snow clearing, garbage collection) to all new developments upon construction completion acceptance.

A1.4 Definitions

In this document the following words shall have the meaning hereinafter assigned to them. Words with definitions provided are capitalized throughout this document.

Term	Definition
Alberta Environment	The provincial ministry responsible for environmental policy and sustainable resource development. Known as the Ministry of Environment and Protected Areas, or EPA (2022). This general term is intended to encompass any future changes in department naming.
Alberta Transportation	The provincial ministry responsible for providing a safe and efficient transportation system. Known as the Ministry of Transportation and Economic Corridors, or TRAN (2022). This general term is intended to encompass any future changes in department naming.
Applicant	See definition for “Developer”.
Area Structure Plan (ASP)	ASPs provide the framework for developing and servicing new areas of the Municipality. ASPs must include the sequence of development proposed for the area, proposed land uses, proposed population density, the general location of major transportation routes and public utilities, and all other matters considered necessary by Council. Refer to the municipal websites for active ASPs.
Commercial	A lot used for the buying and selling of commodities and services.

Term	Definition
Construction Completion Certificate (CCC)	The Development Construction Completion Certificate. A certificate prepared by the Developer's Consultant and executed by the Municipality confirming that the work is complete and operational, that all deficiencies have been resolved to the satisfaction of the Municipality, and that the Warranty Period for the work can commence. References to Construction Completion Certificate throughout this document shall mean the CCC relative to the Development Agreement and are irrespective of any such similar certificate between the Developer and Contractor.
Contractor	Any qualified person, persons, or corporation which shall undertake installation of municipal infrastructure and services on behalf of either the Developer or the Municipality.
County	Smoky Lake County.
Developer	A person, persons, or corporation which has applied to subdivide and/or develop, or to service an existing parcel of land, whether as the owner or an agent for the owner of the land.
Developer's Consultant	An Engineer, Landscape Architect, or Alberta Land Surveyor hired by the Developer to assist with the design and oversee construction of the proposed development.
Developer's Representative	An Engineer, Landscape Architect, or Alberta Land Surveyor hired by the Developer to act on the Developer's behalf.
Easement	An agreement, usually registered on the certificate of title to the property, that gives the Municipality the right to use a landowner's property in some way (such as to access a utility). Easements can also partially restrict a landowner's use of the affected portions of land.
Engineer	The Professional Engineer, in good standing with the Association of Professional Engineers and Geoscientists of Alberta (APEGA), responsible for the design drawings and design specifications of public infrastructure, the supervision of the work, the certification that the materials and installation are in accordance with these REDS, recording and reporting of as-constructed information, and performing those duties with the standard of care prescribed by APEGA.
Environmental Reserve (ER)	Land owned by the Municipality to be preserved in its natural state. Environmental Reserve swamps, gullies, ravines, natural drainage courses, flood plains, and shorelines are defined in Section 664(1) of the Municipal Government Act.
Final Acceptance Certificate (FAC)	The Development Final Acceptance Certificate. A certificate prepared by the Developer's Consultant and accepted by the Municipality confirming that the work is complete and acceptable to the Municipality, that all deficiencies and Maintenance work have been resolved to the satisfaction of the Municipality, and that the Warranty Period for the work has expired. References to Final Acceptance Certificate throughout this document shall mean the FAC relative to the Development Agreement and are irrespective of any such similar certificate between the Developer and Contractor.
Geographic Information System (GIS)	A tool for collecting, managing, analyzing, and presenting geographic data. GIS organizes layers of information into maps and analyzes spatial location. The Smoky Lake Region uses GIS data to keep a record of their assets.
Industrial	Land used in the manufacturing, processing, assembling, cleaning, repairing, servicing, testing, storage, warehousing, distribution or trans-shipment of materials, finished goods, products, or equipment, which does not include artisan shops but may include an accessory use like storage, display, sale, and technical or administrative support areas where there are impacts to adjacent lots.

Term	Definition
Landscape Architect	A qualified landscape designer, in good standing with the Alberta Association of Landscape Architects (AALA), that is responsible for the design, layout, and supervision of installation of landscape and related work, recording as-constructed information, certifying the material and installation is in accordance with the standards, design drawings, and design specifications, and performing those duties with the standard of care prescribed by AALA.
Maintenance	All repairs and/or replacements of any Municipal Improvements which may, at the Municipality's discretion, be necessary during the Warranty Period. The Developer is responsible for all Maintenance during the Warranty Period.
Master Plan	A document that outlines existing and future trends for the Municipality. Examples include utilities (Water, Sanitary, Stormwater) and Transportation Master Plans. These reports describe the status of the existing systems and plan for future expansion areas. Any required upgrades to the existing systems to support future expansion areas are also described.
Municipal Engineer (or Designate)	An individual appointed by the Municipality that represents the Municipality in any engineering or related functions.
Municipal Improvements	A proposed development (such as a new subdivision) or off-site upgrades required to support a proposed development. Municipal Improvements are the responsibility of the Developer; examples of Municipal Improvements include deep utilities, shallow (franchise) utilities, roadways, alleys, street lighting, landscaping, and earthworks.
Municipal Reserve (MR)	Land owned by the Municipality for the development of parks and school grounds pursuant to Section 666 and Section 667 of the Municipal Government Act.
Municipal Services	Services provided by the Municipality upon construction completion acceptance; i.e., snow clearing and garbage collection.
Municipality	The Municipality for the development, redevelopment, or capital project in question; either Smoky Lake County, the Town of Smoky Lake, the Village of Vilna, or the Village of Waskatenau.
Open Space/Public Open Space	Any parcel of land or body of water which is dedicated and reserved for public use, including Municipal and Environmental Reserves.
Prime Contractor	A company that, through a written, contractual agreement with the Owner (the Developer or the Municipality as the case may be), is responsible for coordination of all activities conducted on a worksite and ensuring OHS legislation is followed. Without written assignment of Prime Contractor, the person with the highest degree of control over a worksite is deemed the Prime Contractor.
Public Utilities	Utilities owned and maintained by the Municipality, including the water distribution system, sanitary collection system, stormwater collection and management system, roadways, and open spaces.
Public Utility Lot (PUL)	Land required to be given under Division 8 of the Municipal Government Act for roads and/or Public Utilities.
Record Drawings	A revised set of drawings submitted by the Developer to the Municipality upon completion of construction. Record Drawings reflect all changes made to the specifications and drawings during construction and include updated dimensions, lengths, elevations, geometry, etc. of the work.
Region	The Smoky Lake Region.
Residential	A lot used for dwellings (generally single detached dwellings) and associated accessory buildings.

Term	Definition
Rural	An area within the Region with Rural Services; generally, the County.
Rural Services	A level of service that entails individually owned and operated water and sewage systems, serviced from municipally owned trickle fill (or truck fill) water distribution systems and low pressure sanitary sewer systems. Transportation level of service includes gravelled roadways with ditches.
Seasonal Deficiency	A Municipal Improvement which cannot be completed due to the time of year (for example: landscaping, concrete, paving, etc.) and which is deferred until the following construction season. Seasonal Deficiencies will not be included in the issuance of a CCC for completed work; Seasonal Deficiencies shall have a separate CCC, Warranty Period, and FAC.
Security	A financial assurance given by the Developer to the Municipality to ensure the due and proper performance of its obligations under the Development Agreement.
SPMDD	Standard Proctor Maximum Dry Density.
Tangible Capital Assets (TCA)	An economic resource managed by the Municipality and can include roadways, buildings, equipment, land, utilities, stormwater management facilities, etc.
Town	Town of Smoky Lake.
Traffic Impact Assessment (TIA)	A report, prepared by the Developer's Consultant, which investigates the impact a proposed development may have on traffic operations and recommends any mitigation measures that may be required as a result of the proposed development.
Urban	An area within the Region with Urban Services; generally, the Town, Villages, and Hamlets.
Urban Services	A level of service that includes a municipally owned water distribution system, sanitary collection system, and stormwater collection and management system. Transportation level of service includes paved roads which may have curb and gutter.
Vilna	The Village of Vilna.
Warranty Period	A minimum two year period of time commencing with the execution of a Construction Completion Certificate and ending with the execution of a Final Acceptance Certificate. Refer to **Section A2.16**.
Waskatenau	The Village of Waskatenau.
Water Network Analysis (WNA)	A report, prepared by the Developer's Consultant, which demonstrates that the proposed water system is capable of meeting these REDS based on system pressures, flow velocities, head losses, and flow rates and does not negatively impact adjacent areas or infrastructure.

A1.5 Reference Materials

.1 Throughout the REDS, references may be made to other standards and regulations including the following:

- Alberta Environment Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems:
  - Standards for Municipal Waterworks
  - Guidelines for Municipal Waterworks
  - Wastewater Systems Standards for Performance and Design
  - Wastewater Systems Guidelines for Design, Operating and Monitoring
  - Stormwater Management Guidelines
- Safety Codes Council: Alberta Private Sewage Systems – Standard of Practice
- Transportation Association of Canada (TAC):
  - Geometric Design Guide for Canadian Roads
  - Manual of Uniform Traffic Control Devices for Canada
- Alberta Transportation: Highway Geometric Design Guide
- Occupational Health and Safety (OHS) Legislation, including the OHS Act, OHS Regulation, and OHS Code
- FireSmart: Protecting Your Community from Wildfire

.2 Additional applicable standards and regulations, not noted above, may also be referenced.

.3 Where these standards refer to bylaws, policies, acts, regulations, or standards, this shall mean the most recent edition or amendments of the referenced document.

A1.6 Freedom of Information and Protection of Privacy Act

.1 The Freedom of Information and Protection of Privacy Act is in effect for each Municipality, and it gives any person a right of access to the records in municipal custody or control, subject to limited and specific exceptions.

.2 All documents and information, including correspondence, agreements, plans, and specifications that are written, photographed, recorded, or stored in any manner by the Municipality may be subject to the access and privacy provisions of the Act.

.3 Developers and their agents, consultants, and Contractors shall identify all information that they consider confidential, and the basis for confidentiality (including those parts of their submission that relate to trade secrets, commercial, financial, labour relations, scientific, and technical information).

.4 While the Municipality will endeavour to use Sections 15 and 16 of the Freedom of Information and Protection of Privacy Act to protect the confidentiality of the information identified by the Developer or their representatives as confidential, other sections of the Act may apply, and the information may have to be disclosed to members of the public who request access to records in the Municipality's custody and control.

A2 PROCEDURES FOR DEVELOPMENT

A2.1 General

.1 In addition to these Regional Engineering Design Standards (REDS), each Municipality has a number of other documents that Developers and/or their agents should be fully aware of in advance of undertaking the design of a specific subdivision or project. Examples include:

- **Intermunicipal Development Plan (IDP)** – provides a framework for land use planning between two Municipalities, with the goal of enhancing regional cooperation and collaboration. The following IDPs exist for the Region:
  - Smoky Lake County & Town of Smoky Lake
  - Smoky Lake County & Village of Vilna
  - Smoky Lake County & Village of Waskatenau
  - Smoky Lake County & Lamont County
- **Municipal Development Plan (MDP)** – describes general policies and guidelines with respect to land development within the Municipality.
- **Area Structure Plans (ASPs)** – accepted Area Structure Plans are available on the County's website. (At the time these REDS were prepared, neither the Town, Vilna, nor Waskatenau had ASPs in effect. It is the Developer's responsibility to check with the Municipality to determine if there are any ASPs in effect which may affect his/her proposed development.)
- **Land Use Bylaw (LUB)** – describes permitted and discretionary uses for each land use district and defines numerous design parameters.
- **Master Plans** – examples include water, wastewater, stormwater, transportation, parks, open spaces and trails, etc. (At the time these REDS were prepared, there were not currently any utility or transportation Master Plans available for review.)
- **Other Reports/Studies** – the Municipalities may have other reports and/or studies which may impact proposed development (or redevelopment). Examples include Infrastructure Assessments, Capital Plans, Integrated Community Sustainability Plan, Regional Recreation Master Plan, Regional Heritage Management Plan, Regional Stormwater Management Plan, and Alberta's Iron Horse Trail: A Master Plan to Unlock our Potential.

.2 Communication is key and early preliminary meetings with Municipal staff to discuss land development proposals and options are encouraged.

.3 A list of required submittals is provided at the end of **Section A2**.

.4 Lot grading, deep services, roadways, drainage easements, and landscape improvements within bare land condominiums and mobile home parks are to comply with the requirements of these REDS.

.5 The Development Officer shall have discretionary authority in the application of the requirements set forth in this document.

A2.2 Pre-Application Meetings

.1 The primary purpose of a pre-application meeting is to provide the Developer with specific information on application process requirements; pre-application meetings are expected to expedite the processing of applications.

.2 A pre-application meeting is intended to provide an opportunity for the Developer to receive preliminary feedback from municipal departments and stakeholders.

.3 A pre-application meeting is required for any of the following types of developments, at the discretion of the Development Officer:

- Multi-lot subdivisions;
- Multi-family Residential;
- Commercial/Industrial;
- Institutional;
- Projects requiring laydown areas that are located on Municipal lands;
- Projects requiring an Environmental Site Assessment; and
- Developments within areas identified by the Province of Alberta as being in a Floodway or Flood Fringe zone.

.4 The Developer shall contact the Municipality for the scheduling and coordination of the pre-application meeting.

.5 Regular consultation with the Municipality throughout the acceptance process may also expedite the time for acceptance.

A2.3 Conceptual Engineering Design

.1 The Developer may be required to submit a conceptual engineering design report to the Municipality for the purpose of discussing the project prior to the pre-application meeting, at the discretion of the Development Officer.

.2 The conceptual engineering design report shall serve as the basis of the project between the Developer and the Municipality and may avoid expenditure by the Developer and/or their agents of time, effort, and money on concepts and plans that are unacceptable to the Municipality.

.3 At a minimum, the conceptual engineering design report shall describe and provide a concept of the proposed development and explain how it will relate to applicable existing planning documentation (such as the Land Use Bylaw and relevant Area Structure Plan) at time of subdivision.

A2.4 Preliminary Engineering and Landscape Design

A2.4.1 Submission and Acceptance

.1 After finalization of the conceptual engineering design report, the Developer shall prepare, for submission to the Municipality, preliminary plans of the road network, site servicing layouts, and landscape improvements. The plans are to show all proposed rights-of-way, easements, and PULs and shall be accompanied with preliminary calculations supporting the means by which the development will be serviced.

.2 Preliminary design drawings shall indicate the proposed layout of the development and the layout shall consider overall development of the Municipality and future expansions.

.3 Proposed Municipal Improvements shall not overload existing systems and, should there be future development upstream of the proposed development, the Developer shall oversize the deep utilities accordingly to provide sufficient capacity for the future upstream developments.

.4 The preliminary site layout shall indicate the size of lots, widths of road rights-of-way, road classifications, typical road cross-sections, size and location of parks, population densities, land use districting, and other planning requirements of the Municipality.

.5 The preliminary site layout shall be accepted in principle prior to submission of the detailed design drawings, to allow necessary or desirable revisions to be incorporated without requiring major changes to the detailed design drawings.

.6 Preliminary engineering plans are to include a servicing layout (water, sanitary, storm) with preliminary pipe sizing indicated are to indicate the volume of stormwater to be stored, the method of storage, and are to include a preliminary road network with road classifications identified.

.7 Preliminary landscape plans are to provide an overview of the development indicating community themes, reserve areas, open play areas, pedestrian linkage, and facilities including spray parks, playgrounds, gazebos, rest areas, and other park amenities.

A2.4.2 Supporting Documents

.1 The preliminary design package is to be accompanied by a preliminary geotechnical investigation, prepared by a qualified Geotechnical Engineer, highlighting any design constraints which may need to be considered during detailed design.

.2 Other supporting documents required to be submitted with the preliminary design package may include:

- Preliminary design calculations;
- Preliminary clearing, stripping, and rough grading plans*;
- Wildfire Risk Assessment*;
- Environmental Impact Assessment*; and
- Historical Resources review*.

***Consideration for Small-Scale Developments**

Proposed developments less than 4 ha in size shall be considered small-scale development. The Municipality, on a case-by-case basis, may relax the requirement for the level of detail provided with some of the required technical studies. If the requirements are relaxed for a small-scale development, it is not intended to set precedence for future small-scale developments. The Municipality must be consulted to confirm the supporting documentation requirements for the proposed development prior to submission of the preliminary design package.

.3 **Requirements for Facility/Mechanical Plant Pre-design Reports:**

.1 A pre-design report must be prepared by the Developer's Consultant and submitted to the Municipality for acceptance prior to undertaking the detailed design of new facilities or mechanical plants.

.2 The pre-design report must include all relevant text, tables, and figures outlined below and the pre-design report must be signed and sealed by the Developer's Consultant.

.3 A pre-design report for a new facility/mechanical plant should include the following elements:

- **Introduction** – describe the proposed development and include a figure illustrating the project area. Include a description of land ownership and identify if land acquisition is required for the proposed development.
- **Topography** – describe the topography and any notable features; include a map of the topography.
- **Existing Infrastructure** – describe the existing infrastructure adjacent to the proposed development.
- **Boundary Conditions** – summarize the boundary conditions used in the analysis. Boundary conditions are to be requested from the Municipality.
- **Description of Proposed Facility/Mechanical Plant** – describe the proposed facility/mechanical plant and site-specific considerations which will impact the design of the facility/mechanical plant.
- **Design Criteria** – describe modelling software (if applicable) and state assumptions to be used in the design.
- **Environmental Considerations** – describe any environmental permits or approvals that may be required for the proposed development.

A2.5 Detailed Engineering and Landscape Design

A2.5.1 Submission and Acceptance

.1 Upon acceptance of the preliminary engineering and landscape plans, the Developer shall submit the following to the Municipality for review:

- One (1) full-sized (22”x34”) set of design drawings and specifications;
- Three (3) half-size (11”x17”) sets of design drawings;
- One (1) digital (PDF) set of design drawings and specifications; and
- Geotechnical report(s) sealed by a qualified Engineer.

.2 The review by the Municipal Engineer is for the sole purpose of ascertaining conformance to the REDS, the Municipal and Intermunicipal Development Plans, Land Use Bylaw, and other municipal plans, standards, and guidelines. Acceptance of the submission does not relieve the Developer of their responsibility for errors or omissions or of their responsibility of meeting all requirements of the REDS and other Federal and Provincial rules and regulations.

.3 Other information may be required to be submitted during the acceptance process, including:

- Design calculations;
- Copy(ies) of any environmental approval(s);
- Intersection designs, with consideration of emergency response vehicle movements*;
- Traffic Impact Analysis*;
- Water Network Analysis*;
- Sanitary sewer analysis;
- Stormwater management plan;
- Detailed clearing, stripping, and grading plans;
- Snow storage considerations*;
- Copy(ies) of any Crossing/Proximity Agreements issued by third party pipeline companies; and

- Cost estimates for over-sized and/or cost-shared infrastructure*.

***Consideration for Small-Scale Developments**

Proposed developments less than 4 ha in size shall be considered small-scale development. The Municipality, on a case-by-case basis, may relax the requirement for the level of detail provided with some of the required technical studies. If the requirements are relaxed for a small-scale development, it is not intended to set precedence for future small-scale developments. The Municipality must be consulted to confirm the supporting documentation requirements for the proposed development prior to submission of the detailed design package.

.4 Technical reports/calculations (such as: traffic impact analyses, water network analyses, sanitary sewer analyses, stormwater management calculations, geotechnical reports, and any other technical reports) shall be valid for a maximum of 5 years, provided that the site conditions and intended use of the proposed development have not changed. The use of a technical report more than 5 years after the technical report was issued will require a letter stamped by an Engineer indicating that the information and recommendations within the technical report are still valid.

.5 Following the Municipal Engineer's review of the submitted drawings and documents, review comments will be forwarded to the Developer's Consultant.

.6 Prior to resubmission of any drawings and documents, the Developer's Consultant is to prepare a response letter outlining the comments received from the Municipality and how each comment has been addressed. The Developer's Consultant shall submit the response letter to the Municipality in support of the revised drawings and documents.

.7 Final engineering drawings, diagrams, and reports must be sealed by a qualified Engineer. Landscape plans are to be submitted with the engineering drawings; final landscape plans are to be sealed by a qualified Landscape Architect.

A2.5.2 Engineering Design

.1 The Developer shall retain an Engineer, and other registered professionals (such as a Landscape Architect) as required, who will be responsible for the design and preparation of drawings and specifications for all services as required.

.2 All services will be designed in accordance with the REDS.

.3 The design drawings shall show all existing and proposed services.

.4 The Developer's Representative shall be responsible for coordinating with the utility companies to establish the location of their existing and proposed services.

.5 Final engineering drawings must be signed and stamped by the Engineer; final landscape plans must be signed and stamped by the Landscape Architect.

A2.5.3 Responsibility for Existing Structures and Utilities

.1 The presence and location of underground utilities indicated on the plans which have been determined from existing records are not guaranteed and shall be investigated and verified in the field by the Developer's Consultant.

.2 The Municipality takes no financial responsibility for errors or omissions represented on record information.

.3 The Developer shall contact Alberta One-Call for utility locates prior to proceeding with any ground disturbance.

.4 The Developer will be held responsible for any damage to, and for Maintenance and protection of, existing structures and utilities during construction.

.5 Existing utilities are to be protected from damage or unauthorized use by means of boundary valves for watermains and plugs for sanitary and storm sewers.

.6 Boundary valves are to be operated by municipal staff. The Municipality must be given at least 72 hours notice prior to the need to have boundary valves opened to fill new watermains for testing and chlorination purposes.

.7 Boundary valves are to be fully opened (by municipal staff) and sewer plugs removed only after Construction Completion Certification and clean up.

A2.5.4 Format for Engineering and Landscape Drawings

.1 Engineering and landscape drawings submitted to the Municipality for acceptance is to follow this basic format:

General Requirements	
Plan Size	ANSI-D 22”x34”
Material	Originals shall be printed on bond paper
Orientation	Continuous chainage shall be used whenever possible. Generally, drawings shall be orientated such that north arrows point to the top or left-hand side of a page; lettering should be read from bottom-to-top or left-to-right.
Elevations	Elevations shall be relative to the Geodetic datum. Benchmark numbers, locations, and elevations used shall be shown on the design drawings.
Layout	• Allow a minimum of 75 mm binding edge along the left side; nothing shall be drawn in this area. • The plan portion of a drawing shall not extend into the profile section and vice versa.
Digital Format	Digital submissions of record information to be in a format compatible with the Region’s GIS database (shapefiles).
Lettering Size	Lettering must be 2.5 mm or larger in height and 0.18 mm or thicker in line thickness.

Title Block Requirements
Title blocks shall contain the following information:
• Municipality’s logo (either the County’s, Town’s, Vilna’s, or Waskatenau’s, as appropriate)
• Project name or name of development
• Description of drawing
• Legal description
• Name of consultant and consultant’s Permit to Practice stamp
• Engineer’s or Landscape Architect’s stamp, as applicable
• Draftsperson and designer identification
• List of checks and approvals
• List of revisions
• Legend (if not on a separate plan)
• Scale(s)
• Date
• Drawing number

Scale Requirements - Urban	
Overall Plans	1:1000
Plan/Profiles	Horizontal: 1:500 Vertical: 1:50
Cross-sections	Horizontal: 1:100 Vertical: 1:50
Overall System Network Analysis	1:2000
Landscape Plans	1:200
Details	1:100
Scale Requirement - Rural	
Regional Overview	1:5000
Overall Plans	1:2000
Plan/Profiles	Horizontal: 1:1000 Vertical: 1:100
Cross-sections	Horizontal: 1:100 Vertical: 1:50
Overall System Network Analysis	1:5000
Landscape Plans	1:200
Details	1:100

.2 Additionally, points of drawing technique that are significant to the drawings include:

- Care is taken to ensure a balanced distribution of detail throughout the drawing.
- Letters and figures are clearly legible, well spaced, and properly formed and proportioned.
- Lines are uniform in weight and density.
- New and existing features are readily distinguishable.
- Dimensioning of a drawing shall be drawn in a manner such that it will not be misinterpreted. Dimensions should be given from an iron pin, lot line, chainage station, centreline, curb line, or other accepted reference that can be readily established. All dimensions shall be in SI (System International) units.

A2.5.5 Drawing Requirements Checklist

.1 The following checklist has been provided to help the Developer's Consultant ensure detailed design drawings include the required information. A completed checklist does not have to be submitted as part of the detailed design submission.

Cover Sheets

- ☐ Municipal logo
- ☐ Project name or name of development
- ☐ Stage of development
- ☐ Drawing issue (i.e., Issued for Review, Issued for Tender, Issued for Construction, Issued for Record, etc.)
- ☐ Name of the Developer
- ☐ Date
- ☐ Name of the engineering firm
- ☐ Name of the landscape firm

Key Plan, Index Plan, and List of Drawings

The key plan, index plan, and list of drawings may be contained on one drawing or on separate drawings, depending on the size of the project and on individual preference.

- ☐ Legal information is shown
- ☐ The portion of a street relating to a particular plan/profile sheet is indicated
- ☐ A complete list of drawings is included (may be included on a separate drawing, such as the Cover Sheet)
- ☐ A key plan showing the development as it relates to the surrounding lands is included (may be included on a separate drawing, such as the Cover Sheet)
- ☐ Street names are labelled
- ☐ A Phase/Stage Boundary is shown

OVERALL PLANS

The following overall plans are to be included:

Topography and Land Use Plan

- ☐ Existing contours at 1 m intervals (maximum) or 0.5 m (preferred) are shown
- ☐ Proposed land use is identified
- ☐ Existing features (i.e., buildings, trees, temporary access roads, etc.) are identified
- ☐ Street names, lot, and block numbers are labelled
- ☐ Easements and rights-of-way, including widths and alignments, are labelled

Erosion and Sedimentation Control (ESC) Plan

- ☐ Existing contours at 1 m intervals (maximum) or 0.5 m (preferred). Must be sufficient for distinguishing runoff patterns before disturbance.
- ☐ Existing vegetation, such as grassy areas or vegetative buffers, that may reduce erosion or off-site sedimentation
- ☐ Limits of clearing and grading
- ☐ Critical areas within or near the project area, such as streams, lakes, wetlands, highly erodible soils, public streets, and residences
- ☐ Locations and types of ESC measures, with dimensions
- ☐ A legend, if necessary
- ☐ Details of ESC structures and measures, showing dimensions, materials, and other important details

Road and Sidewalk Plans

- ☐ Road and sidewalk widths and alignments
- ☐ Cross-section design by road classification
- ☐ Road structure design elements and details
- ☐ Catch basins and drainage swales
- ☐ Pertinent topographical features (i.e., ditches)
- ☐ Limits of disturbance
- ☐ Rights-of-way and Easements
- ☐ Existing roadways, street names, and lot and block numbers
- ☐ Proposed street names, and lot and block numbers
- ☐ Proposed traffic markings and signage information

Lot Grading Plan

- ☐ Design elevations at lot corners and split points
- ☐ Drainage arrows indicating direction of proposed surface drainage flow and major overland drainage routes
- ☐ Contours of original ground
- ☐ Sewer inverts at property line
- ☐ Uniform fencing requirements
- ☐ Important surface features (i.e., light standards, hydrants, pedestals, transformers)
- ☐ Individual lot types and detailed drawings
- ☐ Drainage Easements and swales
- ☐ Driveway locations, if known
- ☐ Street names and lot and block numbers

Storm, Sanitary, and Watermain Plans

- ☐ Sizes, alignment, depths, spacing, dimensions from property lines, and direction of flow* of all underground Municipal Improvements
  **Sanitary, storm, and foundation drain sewers only*
- ☐ Local drainage areas which contribute to storm sewers
- ☐ Sanitary sewer areas
- ☐ Manholes, catch basins, and catch basin leads
- ☐ Hydrants, valves, and other appurtenances, including hydrant coverage
- ☐ Services
- ☐ Foundation drain sewer
- ☐ Street names and lot and block numbers
- ☐ Easements, rights-of-way, and PULs

Shallow Utilities Plan

- ☐ Alignments and all pertinent information (i.e., pedestals, transformers, switching cubicles, etc.) for all shallow (franchise) utilities (gas, power, telephone, cable)
- ☐ Easements, rights-of-way, and PULs
- ☐ Driveway locations, if known
- ☐ Streetlights
- ☐ Services
- ☐ Street names and lot and block numbers
- ☐ Community mailbox locations, if known
- ☐ Other surface features such as valves, manholes, hydrants, curbs, etc., to avoid conflicts

Signage and Pavement Markings Plan

- ☐ Traffic signs (types and locations)
- ☐ Street name sign locations
- ☐ Information sign locations
- ☐ Details of sign installation
- ☐ Pavement markings
- ☐ Street names and lot and block numbers

PLAN/PROFILE DRAWINGS

Generally, all underground and surface improvements are to be shown on the same drawings. Although some of the following information may not necessarily be required for construction drawings, the following information will be required for Record Drawings.

General Information

Plan

- ☐ Positioned at the top of the drawing
- ☐ Chainages to correlate with profile section
- ☐ Legal subdivision information
- ☐ References to cross-sections
- ☐ Street and walkway names and numbers
- ☐ Centreline chainages of roadways
- ☐ Accuracy of grade information to 2 decimal places

Profile

- ☐ Positioned at the bottom of the drawing
- ☐ Chainages to correlate with plan section
- ☐ Existing ground profile
- ☐ Centreline chainages of roadways
- ☐ Grade information to 2 decimal places

Roadway Information

Plan

- ☐ Horizontal alignments of roadway(s), curb and gutter, sidewalks, and alley(s)
- ☐ Dimensions of roadway(s), sidewalks, and alley(s)
- ☐ Cross-section design by roadway classification
- ☐ Chainages of the PI, BC, and EC of horizontal curves, together with delta angles, radius, tangent length, and arc lengths for each curve
- ☐ Pavement elevations at intersection
- ☐ Curb elevations at changes in alignment and at the BC and EC of corner radii
- ☐ Road structure design elements

Profile

- ☐ Vertical alignment (roadway crown or lip of gutter)
- ☐ Grades of sidewalks, swales, alleys, etc.
- ☐ Vertical curve information:
  - ☐ Chainage to BVC, EVC, and PVI
  - ☐ Elevations of BVC, EVC, and PVI
  - ☐ Lengths of curves
  - ☐ Elevations and chainages at sags and crests of curves
  - ☐ External value, E
  - ☐ K-value of crest and sag curves
  - ☐ Curb and centreline grades

Watermain Information

Plan

- ☐ Alignment of watermain(s)
- ☐ Location of hydrants, valves, and other appurtenances tied to property line
- ☐ Dimension offsets of watermain to property line
- ☐ Details of connection to existing watermains
- ☐ Degrees of bends, if other than 90°
- ☐ Label size of watermains, valves, and appurtenances

Profile

- ☐ Label size, pipe material, and class of pipe for watermains, and class of bedding
- ☐ Label location of hydrants; show and label valves and fittings
- ☐ Show required depth of bury and top of pipe elevations at all grade changes, valves, and fittings
- ☐ Indicate requirements for backfill compaction
- ☐ Indicate areas requiring insulation, if applicable

Sanitary and Storm Sewer Information

Plan

- ☐ Alignment of sanitary and storm sewer(s)
- ☐ Location of sewers, manholes, clean outs, and other appurtenances, tied to property line
- ☐ Location of catch basins based on road chainages
- ☐ Show leads between catch basins and manholes
- ☐ Manholes shall be numbered (sanitary with the prefix “SA”; storm with the prefix “ST” or as required by the Municipality)
- ☐ Catch basins shall be numbered
- ☐ Details of connections to existing manholes
- ☐ Label size of sewers, manholes (if larger than 1200 mm in diameter), and appurtenances

Profile

- ☐ Length and slope (in percent) between manholes
- ☐ Label size, pipe material, and class of pipe for sewers, and class of bedding
- ☐ Rim elevation and diameter of manholes
- ☐ Invert elevations at all inlet(s) and outlet(s) of manholes
- ☐ Indicate requirements for backfill compaction
- ☐ Indicate minimum cover requirements
- ☐ Indicate areas requiring insulation, if applicable

Service Connection Information

Plan

- ☐ Show location of all services, with references to property lot corner
- ☐ Invert at property line for each service

Shallow Utility Information

Plan

- ☐ Show location of gas, power, and telecommunications infrastructure
- ☐ Show offsets from property line to gas, power, and telecommunications infrastructure

Special Requirements for Design Drawings

The design drawings shall be supplemented with the following information, when applicable:

- ☐ Details of special protection for pipe sections which are exposed to high velocities or which require corrosion protection or insulation
- ☐ Drawings required for obtaining permits for crossing oil, gas, power transmission lines, railroads, or highways
- ☐ Details of placement in areas of fill
- ☐ Details pertaining to trenchless installations
- ☐ Thrust block details

Requirements for Design Calculations

Design calculations for the sanitary and storm sewer systems shall be included in the drawing package and shall include the following information:

- ☐ All manholes and sewer sizes
- ☐ Length of sewer sections, between manholes, in metres
- ☐ Grade of sewer sections, between manholes, in percent
- ☐ Total area of tributary sewers for each sewer section, between manholes, in hectares or square metres
- ☐ Tributary area in hectares and runoff coefficient (C value) for each storm sewer section, between manholes; tributary areas to be cross-referenced to any summary tables
- ☐ Estimated peak loading based on tributary area and infiltration in litres per second

- ☐ Part-full velocity in metres per second, and pipe capacity in litres per second
- ☐ The depth and extents of ponding (if any)
- ☐ Invert elevations at manholes and catch basins

Requirements for Water Network Analyses

Where the size of a development warrants, or when required by the Municipality, a Water Network Analysis shall be carried out by the Developer's Consultant and all relevant information shall be submitted with the design documents.

Requirements for Landscape Plans

Landscape plans are to integrate with the detailed engineering drawings and should include:

- ☐ Existing and proposed contours (0.5 m interval) within the site and to 3 m beyond, and all other grading details
- ☐ Site boundaries
- ☐ Temporary site access(es), laydown area(s), parking
- ☐ Stockpile location(s)
- ☐ Existing and proposed utility information
- ☐ Existing vegetation and/or other natural features to remain
- ☐ Existing trees to be relocated
- ☐ Proposed plant material illustrated at the mature spread or diameter, as noted in the Alberta Horticulture Guide (shown in plan view, as well as in a table with the following indicated: quantity of individual species, botanical name and common name, size of material – height and calliper, method of transport – balled and burlap, container stock, bare root, etc., Canadian Plant Hardiness Zone)
- ☐ Plant schedules, including overall quantities
- ☐ Areas to be sodded or seeded, with seed mix specified
- ☐ Details of hard and soft landscape installation
- ☐ Type and depth of mulch for shrub beds and tree wells
- ☐ Location of proposed site furnishings and related construction
- ☐ Areas of concrete, asphalt, or special paving
- ☐ Irrigation systems, where applicable
- ☐ Fencing locations and construction details
- ☐ Locations of bollards along PULs, walkways, or trails
- ☐ Lighting details (including streetlights and park lighting, where applicable)
- ☐ Trail locations, details, signage, and proposed drainage
- ☐ Adjacent land use information
- ☐ Total areas (m^2) of shrubs beds, islands, buffers, PULs, Municipal Reserves, Environmental Reserves, and parks
- ☐ Total areas (m^2) of sodded and seeded areas
- ☐ Any other details that relate to the landscape design

The above items shall be presented on the following plans, as required:

- ☐ Existing Site Conditions
- ☐ Site Preparation/Clearing
- ☐ Erosion and Sedimentation Control Plan
- ☐ Layout Plan
- ☐ Grading Plan
- ☐ Planting Plan
- ☐ Construction Details and Specifications

These plans are to be submitted with the engineering drawings for each phase; refer to **Section B6** or **C6**, as applicable, for additional information.

A2.5.6 Supporting Documents

A2.5.6.1 Requirements for Geotechnical Investigations

.1 A geotechnical report, signed and sealed by a Geotechnical Engineer, is required for all projects.

.2 Geotechnical investigations shall be undertaken by a qualified engineering firm and specifically prepared for the development/project according to the respective scope and magnitude.

.3 As a minimum, geotechnical investigations and reports shall include the following characteristics and content:

- Data collection;
- Geotechnical investigative program;
- Field investigation and sampling, including hydrogeotechnical investigation and considerations;
- Laboratory testing;
- Evaluation of soil conditions, soil parameters, and groundwater;
- Conclusions and recommendations; and
- Appendices.

.4 In the event that the geotechnical investigation reveals areas of high water table and/or unstable subsurface soil conditions, the report shall recommend special techniques required to ensure the stability of the proposed Municipal Improvements. The geotechnical report shall include recommendations for how to deal with any identified springs in the vicinity of the proposed Municipal Improvements.

.5 Geotechnical reports shall be valid for a maximum of 5 years, provided that the site conditions and intended use of the proposed development have not changed. The use of a geotechnical report more than 5 years after the report was issued will require a letter stamped by an Engineer indicating that the information and recommendations within the report are still valid.

A2.5.6.2 Requirements for Water Network Analyses

A2.5.6.2.1 General Requirements

.1 A Water Network Analysis (WNA), signed and sealed by a qualified Engineer, is required to support proposed Land Use Bylaws, Area Structure Plans, subdivision applications, and detailed engineering drawings.

.2 A WNA report should include the following elements:

- **Introduction** – describe the proposed development and include a figure illustrating the project area.
- **Topography** – describe the topography and any notable features; include a map of the topography.
- **Proposed Staging** – describe the proposed construction staging and estimated timelines.
- **Existing Water Network** – describe the existing water network.
- **Boundary Conditions** – summarize the boundary conditions used in the analysis. Boundary conditions are to be requested from the respective Municipality.
- **Districting** – include a districting (land use) map with the required fire flows indicated.
- **Demands** – state the assumptions used to estimate the demands for each scenario and summarize the demands in a table; include a figure with the demand nodes and consumption boundaries.

- **Proposed Pipe Network** – describe the proposed pipe network and include a map of the proposed pipe network with model facility names and pipe sizes.
- **Design Criteria** – describe the modelling software used for the design, state the assumptions used in the design (pipe material, Hazen-Williams C-factor, etc.), state the requirements for the area (fire flows, velocities, pressures, head losses).
- **Results** – describe the simulations that were run and compare the results to the required values, explain why specific nodes were chosen for the analysis, identify any deficiencies and necessary corrections.
- **Appendices** – show appropriate tables for the model simulations.

.3 A WNA report must be prepared by the Developer's Consultant and submitted to the Municipality for acceptance.

.4 The WNA report must include all relevant text, tables, and figures outlined above; must be in conformance with the current Water Master Plan (if available); and the report must be signed and sealed by the Developer's Consultant.

A2.5.6.2.2 Area Structure Plan WNA

.1 The scope of an Area Structure Plan (ASP) WNA includes the entire ASP area and the WNA report must be submitted concurrently with the submission of the ASP to the Municipality.

.2 The purpose of an ASP WNA is to:

- Guide all future development in the area;
- Identify major watermains for the area;
- Consider the development of the looped distribution system as stages are constructed;
- Recognize areas of extreme or deficient pressures and deficient fire flows; and
- Identify requirements to service adjacent areas.

.3 The Developer's Consultant must clearly state design assumptions required to create the model in the WNA report and shall ensure that all pipes are sized to meet velocity criteria during peak flows. The analysis must include the following simulations:

- Peak Hour Demand (PHD); and
- Peak Day plus Fire Flow.

.4 Main feeds within a neighbourhood section of the ASP, mains servicing areas of extreme elevation, and mains required to satisfy the above simulations must be included in the ASP WNA.

A2.5.6.2.3 Subdivision Stage WNA

.1 The scope of a Subdivision Stage WNA includes the proposed stage of development.

.2 The purpose of a Subdivision Stage WNA is to ensure that a proposed stage of development will meet all servicing and fire flow requirements in the interim. If the proposed stage is not the first stage of development, it shall consider the water distribution system(s) of the previous stage(s).

.3 The Developer's Consultant must clearly state design assumptions required to create the model in the WNA report and shall ensure that all pipes are sized to meet velocity criteria during peak flows. The analysis must include the following simulations:

- Peak Hour Demand (PHD); and

- Peak Day plus Fire Flow.

.4 The Developer's Consultant must include all pipes to service the proposed stage of development and must ensure that looping is provided to minimize the number of lots that would be isolated in the event of a watermain break or watermain shut-off for maintenance purposes.

A2.5.6.3 Requirements for Traffic Impact Assessments

.1 At a minimum, Traffic Impact Assessments (TIAs) shall include the following sections:

- Traffic Analysis;
- Traffic Demand Analysis Steps;
- Capacity Analysis;
- Traffic Signal Warrant Analysis and Traffic Signal Design;
- Intersection and Roadway Illumination Warrant Analysis;
- Proposed Geometry of Study Intersections and Roadways Sections;
- Safety Analysis; and
- Other Issues.

.2 Traffic Impact Assessments shall be signed and sealed by a qualified Engineer.

.3 Notification of acceptance of the TIA will be provided, in writing, by the Municipality to the Developer.

A2.5.6.4 Environmental Assessments and Approvals

A2.5.6.4.1 Requirements for Environmental Impact Assessments

.1 Subject to the scope, scale, and location of the proposed work, the Municipality may require that an Environmental Impact Assessment (sometimes referred to as a Biophysical Impact Assessment) be completed to identify the environmental sensitivities of the site and provide recommendations to avoid, protect, and/or mitigate potential impacts to the environment. This may be requested during the development of an Area Structure Plan and/or for Development Permit applications.

.2 The assessment must be completed by a qualified professional (P.Biol., P.Ag., R.P.F., or an equivalent standard acceptable to the Municipality) and will be at the cost of the Developer.

.3 The Environmental Impact Assessment shall include the following:

- **Project Description:** the scope of magnitude of the project.
- **Baseline Conditions:** including existing or historical environmental features.
- **Description of Environmental Features:** a description, including maps, of the environmental features within the property including natural sub-regions, terrain, surface water resources (floodplains, creeks, wetlands, etc.), groundwater, terrestrial resources (wildlife [i.e., sensitive owl habitat], vegetation), rare or endangered species, soil characteristics, and historical resources.
- **Methodology:** a discussion about the methodology used to determine and evaluate environmental features.
- **Short- and Long-Term Impacts:** a discussion about the potential short- and long-term impacts, including cumulative effects of developing the land.
- **Mitigation Measures:** the identification of appropriate and feasible mitigation measures to reduce the impacts to important environmental features.

- **Recommendations:** recommendations to avoid, protect, and/or mitigate impacts to the natural environment with respect to the property, and adjacent properties, for all phases of development, including clearing and grubbing, construction, reclamation, and operation.
- **Environmental Restriction Periods:** considerations of specific environmental restriction periods (i.e., nesting periods for non-migratory/migratory birds or sensitive owls, restricted activity periods for fish, tree clearing restrictions for ungulates [Key Wildlife Biodiversity Zone]) relating to the construction schedule.
- **Regulatory Framework:** with respect to the environmental aspects of the project that should be considered during all phases of the project.

.4 The assessment must also establish requirements of the Environmental Construction Operation (ECO) Plan, as per the Government of Alberta ECO Plan Framework, that:

- Will guide specific aspects of environmental protection for the work;
- Is prepared by and at the cost of the Contractor;
- Includes erosion and sedimentation control, soil and water management, and emergency spill response; and
- Sets out the remediation and reclamation plan for disturbed areas.

.5 The Environmental Impact Assessment shall also consider conservation recommendations, where appropriate, for the property through Environmental Reserves, conservation easements, and setback areas (i.e., riparian areas).

.6 The Environmental Impact Assessment should clearly identify what lands are considered as Environmental Reserve and the quantitative or qualitative criteria used to establish this.

.7 Environmental assessments shall be valid for a maximum of 5 years, provided that site conditions, regulatory requirements, permitting requirements, and intended use of the proposed development have not changed. The use of an environmental assessment more than 5 years after the report was issued will require a letter signed by a qualified environmental professional indicating that the information and recommendations within the assessment are still valid.

A2.5.6.4.2 Environmental Approvals

.1 The Developer's Consultant shall submit the detailed plans and specifications to applicable Provincial and/or Federal regulatory body(ies) for approval. A copy of the submission, together with the approval(s), shall be supplied to the Municipality.

.2 The applicable environmental approvals are required prior to execution of the Development Agreement.

.3 Examples of acts requiring approval may include:

- *Fisheries Act* (R.S.C. 1985, c. F-14);
- *Canadian Navigable Waters Act* (R.S.C. 1985, c. N-22);
- *Environmental Protection and Enhancement Act* (R.S.A. 2000, c. E-12);
- *Water Act* (R.S.A. 2000, c. W-3);
- *Historical Resources Act* (R.S.A. 2000, c. H-9); and
- *Public Lands Act* (R.S.A. 2000, c. P-40).

.4 Obtaining environmental approval in no way removes the responsibility of the Developer to comply with the REDS and to receive the Municipality's acceptance of the detailed plans and specifications.

A2.5.7 Reference Standards

.1 All references to specifications, standards, or methods of technical associations are to refer to the latest adopted revision, including all amendments, in effect on the date of submission of design drawings, calculations, specifications, or reports to the Municipality.

A2.5.8 Canada Post – Community Mailboxes

.1 If applicable to the subdivision, the Developer's Consultant shall submit an overall subdivision layout plan (Area Structure Plan) to the local Canada Post Delivery Planning office to establish the location, size, and details of community mailboxes.

.2 For further information and requirements, consult Canada Post's "Delivery Planning Standards Manual for Builders and Developers."

.3 Upon approval of location and details by Canada Post, community mailboxes are to be shown on all applicable drawings and brochures.

A2.5.9 Approval by Other Agencies

.1 The Developer shall submit documentary evidence to the Municipality that permission has been received from appropriate authorities for the crossing of pipelines, railways, highways, or other facilities, if such crossings are intended. These supporting documents shall be submitted in conjunction with submission of the detailed drawings and specifications or soon thereafter - but, in any event, prior to construction.

A2.5.10 Utility Crossings and Proximity Agreements

A2.5.10.1 Third Party Crossings of Utility Rights-of Way and Government Road Allowances

.1 The following requirements shall apply to third party (oil and gas) pipelines crossing municipal utilities or Government Road Allowances.

A2.5.10.1.1 Typical Pipeline Crossing of Municipal Underground Utilities

.1 The third-party pipeline company is required to apply for and receive acceptance, in writing, from the Municipality for the crossing of municipal underground utilities prior to construction.

.2 Crossings shall be constructed in accordance with CSA Z662 and as per the requirements of the authorities having jurisdiction.

.3 Pipelines shall be constructed with the following minimum clearances to other utilities: 1 m vertical and 3 m horizontal.

.4 Pipelines shall be constructed along a straight alignment, extended 8 m beyond the limits of the road right-of-way. If utilities are within an Easement, straight pipe shall be extended 4 m beyond the limits of the utility right-of-way.

.5 Pipeline marker tape shall be placed over the pipeline(s).

.6 Backfilling shall maintain the original compaction around the municipal utilities, or as specified by an Engineer.

.7 The Municipality shall be notified at least 48 hours prior to commencement of excavation to allow for municipal inspection.

.8 The Municipality shall be notified for municipal inspection upon construction completion.

.9 Record Drawings shall be provided to the Municipality upon construction completion.

A2.5.10.1.2 Typical Pipeline Crossing of Government Road Allowance

.1 The third-party pipeline company is required to apply for and receive acceptance, in writing, from the Municipality for the crossing of a Government Road Allowance prior to construction.

.2 Crossings shall be constructed in accordance with CSA Z662 and as per the requirements of the authorities having jurisdiction.

.3 Pipeline marker tape shall be placed over the pipeline(s).

.4 Municipal utilities, if any, shall be located on site prior to commencing construction.

.5 All crossings shall be constructed in accordance with all requirements of the Transportation Safety Board of Canada, the Energy Resources Conservation Board (ERCB), and any other authority having jurisdiction.

.6 The pipeline alignment shall be straight, with no vertical or horizontal bends within 8 m minimum from the Government Road Allowance boundary.

.7 The crossing deflection angle shall be as close to 90 degrees as is practical but shall not be less than 70 degrees or more than 110 degrees.

.8 The Municipality shall be notified at least 48 hours prior to commencement of excavation to allow for municipal inspection.

.9 The Municipality shall be notified for municipal inspection upon construction completion.

.10 Record Drawings shall be provided to the Municipality upon construction completion.

.11 Backfill details shall be as follows:

Road Allowance	Minimum Cover	Compaction	Recommended Construction Method
Undeveloped (no future development planned)	1.20 m	Maintain Original	May use Open Cut
Undeveloped (future development anticipated)	2.0 m	95%	May use Open Cut
Developed	1.50 m from lowest bottom of ditch	95% or greater, per direction from Municipal Engineer	Trenchless

A2.5.10.2 Shallow Utility Installations

.1 Authorization of franchise utility, monitoring wells, or any third-party infrastructure installations within public road rights-of-way by external agencies and private utility companies must first enter into an agreement with the relevant Municipality.

.2 The agreement usually takes the form of a Right-of-Way Consent & Access Agreement or a Franchise Agreement. A standard condition of the agreement is that all utility installations require acceptance by the Municipality, in writing.

.3 Applications for acceptance by the Municipality shall include utility alignment plans showing where new underground or aerial utility lines will be built, or where environmental testing will occur within the municipal road right-of-way.

.4 The Applicant that is proposing the installation, the Municipal Engineer, other utility departments and agencies, and other stakeholders all play a role in reviewing, approving, constructing, inspecting, and/or recording information on these installations.

A2.5.10.3 Underground Infrastructure in the Vicinity of a Provincial Highway

.1 Proposed Municipal Improvements which require work within 800 m of a Provincial Highway right-of-way will require coordination with Alberta Transportation. The Developer's Consultant shall coordinate with Alberta Transportation to determine permit requirements on a case-by-case basis.

.2 Authorization from Alberta Transportation is required prior to any work within a Provincial Highway right-of-way.

.3 Any disturbance within a Provincial Highway right-of-way shall be reinstated to Alberta Transportation standards.

A2.5.10.4 Crossing Agreements

.1 The Developer shall submit documentary evidence to the Municipality that permission has been received from appropriate authorities for crossing of pipelines, railways, highways, or other facilities.

.2 If such crossings are intended, submit the evidence at the time of submission of detailed plans and specifications or soon thereafter; but, in any event, prior to construction.

.3 All costs related to preparation of crossing applications, application fees, and third-party inspections during crossing (if required) shall be borne by the Applicant.

A2.6 Regional Engineering Design Standards Deviation Process

.1 The Developer's Consultant shall identify and provide justification for any deviations or nonconformances from the REDS as part of the submission of the detailed design drawings. Otherwise, the submittal of detailed design drawings will be assumed to be in accordance with the REDS.

.2 All applications for deviation shall be supported with a stamped letter of recommendation from an Engineer and all applications shall be accompanied by a completed Engineering Standards Deviation Form, a blank copy of which is provided at the end of **Section A3.** (Users of this document are responsible for selecting the correct form, based on the Municipality for the location of the proposed development or redevelopment.)

.3 The Municipality has the ultimate authority with regards to setting minimum standards and not accepting deviations from the REDS.

.4 Note that under no circumstances will a deviation from the REDS be considered by the Municipal Engineer without the submission of detailed documentation demonstrating the justification for the deviation. The added benefit (to the Municipality) of the deviation must be equal to or better than that described in the REDS.

.5 The costs incurred by the Municipality for review of submissions and resubmissions, or third-party reviews as required, are the responsibility of the Developer (refer to **Section A2.7 Review Costs**).

A2.7 Review Costs

.1 The Developer will be responsible for any review costs deemed appropriate by the Municipality or at the discretion of the Development Officer.

.2 Costs may be incurred for the following:

- When specialized consulting expertise is required by the Municipality to review development proposals, concept plans, and drawings;
- When additional staffing is required to review developments;
- For the review of complex resubmissions and deviations from the REDS;
- When excessive errors and omissions are encountered;
- When insufficient information is provided; and/or
- When improper procedures are followed.

.3 The cost of review may take several forms, including:

- A lump sum fee charged to the Developer;
- A time and materials fee charged to the Developer; or
- An invoiced cost by specialized consultant, plus mark-up for handling and administration.

.4 Each and every submittal by the Developer will be reviewed by the Municipal Engineer, and the Developer will be informed of the anticipated review costs.

.5 The Developer shall reimburse the Municipality prior to review of resubmissions.

A2.8 Acceptance by the Municipality

.1 After receipt of the detailed design submission, the Municipality shall inform the Developer, in writing, whether the Developer's submission has been accepted. The duration of the acceptance period shall be at the discretion of the Development Officer.

.2 Should the Municipality not accept a part of the Developer's plans or proposals, they will be returned to the Developer for revision to the satisfaction of the Municipal Engineer. The acceptance period will begin again on the receipt of any resubmission.

.3 Upon receipt and acceptance of certified drawings and specifications, and on the Satisfactory Execution of the Development Agreement and payment of Security deposit(s), the Developer may proceed to install the Municipal Improvements.

.4 No construction shall commence until the detailed design drawings have been accepted, in writing, by the Municipality.

.5 A copy of all accepted drawings and specifications shall be maintained at the construction site during the installation of Municipal Improvements.

A2.9 Security Calculations

.1 The Developer is required to submit the estimated cost of all underground deep utilities and surface improvements including roads, sidewalks, pipelines, lift stations, water booster stations/reservoirs, stormwater management facilities, etc. required for the calculation of the Security.

.2 The costs should also include the estimates for the total cost of consulting services through construction, including construction inspection, contract administration, quality assurance, and record drawing production.

.3 If the Developer or the Developer's Consultant has not provided estimates, the Municipality may establish costs in its sole discretion for the purpose of establishing the required Security.

.4 The Security is calculated as 100% of the estimated construction cost of the described infrastructure, plus 100% of the landscaping costs.

.5 The Security must be deposited, by the Developer or the Developer's Consultant, with the Municipality upon or before the execution of the Development Agreement and, in any event, prior to endorsement of the Plan of Subdivision or commencement of construction of the development area.

.6 Security must be in the form of an Irrevocable Letter of Credit from a Charter Bank or Treasury Branch or as a cash Security deposit or combination thereof.

A2.10 Development Agreement

.1 The Municipality has guidelines for the preparation of Development Agreements. The Developer shall coordinate with the Municipality for the requirements of and the preparation and execution of the document.

A2.11 Construction Activities Requiring Notification Prior to Commencement

A2.11.1 Clearing and Grading

.1 Applicants are required to provide notice to the Municipality, in writing, prior to undertaking clearing and grading under the following conditions:

- Cuts/fills greater than 400 m^3;
- Existing slopes greater than 20% on subject property or adjacent properties;
- Sites near water bodies, streams, rivers, or wetlands;
- Clearing greater than 1,000 m^2; and
- Work that will result in publicly owned and operated infrastructure.

.2 The following information is to be provided to the Municipality:

- Erosion and sedimentation control plan;
- Cut/fill plan, showing existing and proposed contours;
- Locations of all stockpiles on a site plan overview of the area;
- Stockpile sizes (width, length, height) and estimated quantity; and
- Duration the stockpile will occupy the space.

.3 Stockpiles will only be allowed on proposed (undeveloped) school sites or Municipal Reserves if prior approval has been granted by the Municipality.

.4 Legislative and due diligence requirements pertaining to tree clearing must be determined on a case-by-case basis and is influenced by the time of year the clearing is proposed, whether the tree clearing is proposed on Crown Land, and whether the trees provide habitat for sensitive owls or migratory birds. Surveys for due diligence purposes under the Migratory Birds Convention Act and the Wildlife Act (for sensitive owls) may be undertaken where necessary; consult with an environmental professional for project-specific details.

.5 Any nests associated with a Schedule 1 species of bird (such as the pileated woodpecker) identified in an area to be disturbed may require a waiting period of up to 36 months before the nest can be disturbed, damaged, removed, or destroyed (in order to confirm if the nest is active). The Developer is responsible for confirming such requirements based on the latest Alberta Environment regulations in effect at the time the clearing is proposed to take place.

.6 The general migratory birds nesting period in the Smoky Lake Region is between mid-April and late August; this period is a general guideline of the likelihood of encountering migratory birds. More specific annual dates can be obtained from Environment Canada, Canadian Wildlife Service. Sensitive owls may nest in the Smoky Lake Region between mid-March and late July/early August.

.7 The Federal Migratory Birds Convention Act and the provincial Wildlife Act regulate disturbance to birds, their nests, and their eggs; neither of these Acts regulates tree clearing. Due diligence requirements under these Acts should be evaluated on a case-by-case basis to determine whether bird surveys are needed.

.8 Both migratory bird and sensitive owl nest surveys require a research and collection license/permit under the Wildlife Act. In order to confirm or deny the presence of owl species, call-playback surveys are typically required; however, call-playback surveys may be unnecessarily disruptive and should only be carried out when there is a high likelihood of impacting sensitive owl nests.

.9 Clearing and grading submissions are to be included as part of the Development Permit application.

A2.11.2 Temporary Road Closure

.1 All construction projects that will occupy or block access to municipal lands are required to provide notice, in writing, to the Municipality at least 5 days prior to starting any construction. All work performed under this application shall conform to the REDS.

.2 Prior to any work being carried out within the Municipality or an existing right-of-way, the Developer and/or the franchise utility companies, and the Contractor(s) must provide notice, in writing, to the Municipality at least 3 business days prior to partial road closures and at least 5 business days prior to full road closures before commencement of any work.

.3 Excavations under roadways and alleys may require backfill with fillcrete, at the Municipality's discretion. Larger excavations may use granular or approved native fill, provided that geotechnical testing and documentation demonstrating 97% SPMDD (Standard Proctor Maximum Dry Density) compaction has been achieved.

A2.11.3 Service Connections

.1 A Service Connection in this context refers to installing, altering, or relocating sewer and water infrastructure belonging to the Municipality, such as:

- Watermains;
- Storm or sanitary sewer mains;
- Service connections to mains; and
- Foundation drains.

.2 Contact the Municipality for confirmation of required documentation for proposed service connections.

A2.12 General Construction Requirements

.1 All work for construction of Municipal Improvements carried out by the Developer shall be in accordance with all Federal, Provincial, and Local statutes, acts, bylaws, and regulations and shall meet the following general requirements.

A2.12.1 Occupational Health and Safety

.1 The Developer, Developer's Representative, Developer's Consultant, and Contractor shall comply with current Occupational Health and Safety Legislation and the applicable Municipality's health and safety management system.

A2.12.2 Right-of-Way Documents

.1 When Easement or right-of-way documents are deemed necessary, they shall be prepared by a registered Alberta Land Surveyor (ALS) at the Developer's expense.

.2 Easements or rights-of-way shall be of sufficient size to allow access for maintenance purposes. It is the sole responsibility of the Developer's Consultant to prepare and submit such documents to the satisfaction of the Municipality.

A2.12.3 Construction Commencement Notice

.1 The Developer shall give the Municipality at least two weeks' notice prior to commencing construction to allow for time to arrange for inspection staff.

A2.12.4 Site Protection, Preparation, and Restoration

.1 The Developer is responsible for the protection of existing infrastructure, municipal assets, survey monuments, and natural areas which are to remain.

.2 The Developer is responsible to locate all utilities prior to commencing construction.

.3 Any disturbed areas within a municipal right-of-way are to be restored, by the Developer, to existing or better condition.

A2.12.5 Project Supervision

.1 The Developer's Representative shall be responsible for the layout, field surveys, inspection, and approval of materials and the supervision of all Municipal Improvement installations which are the responsibility of the Developer.

.2 The Developer's Representative shall be on site at all times during the installation of services to certify that all Municipal Improvements are in conformance with the REDS, accepted drawings, and specifications. The Developer will be held responsible to the Municipality for Contractor nonconformance, construction errors, and/or omissions.

.3 In addition to supervision carried out by the Developer's Representative, the Municipality may periodically inspect the work and assist in coordinating the Municipal Improvements with any related municipal work.

.4 The Municipality will bring the use of any unacceptable materials or practices to the attention of the Developer's Representative. If remedial action is not taken to the satisfaction of the Municipality, a Stop Work Order may be

issued, and all work will cease. The unacceptable work will be corrected and/or replaced with direction given from the Developer's Representative to the Contractor.

A2.12.6 Staged Construction

.1 The Municipalities understand that staged construction is an acceptable business approach, either between development phases and stages or over the course of the seasonal cycles within a single phase or stage.

.2 The Developer shall prepare a Site Management Plan for any staged construction activities and shall be responsible for Maintenance of partially completed works that have been opened for use. The Site Management Plan shall address:

- The intended functionality of the site (i.e., whether the site is open to the general public, or third-party tradespeople working on the site, or the Developer's own staff, Contractors, and agents, or closed off completely).
- Access for:
  - Emergency vehicles;
  - Residents and/or local businesses (if applicable);
  - Construction equipment (if applicable); and
  - Maintenance equipment.
- Access control requirements, including signage, barricades, and fencing.
- Maintenance requirements, including frequency or Level of Service to be maintained by the Developer.
- Any interim measures required to be undertaken by the Developer to safeguard the public and the environment as a result of the interim conditions.

.3 Any deficiencies in partially completed works shall be rectified prior to commencing with the next stage of construction.

A2.12.7 Stockpile Locations

.1 The location of all stockpiles shall be subject to acceptance by the Municipality.

.2 The Municipality's acceptance of a stockpile location does not alleviate the Developer's responsibility to ensure safety, dust control, and weed control.

.3 Stockpile locations may need to be temporarily fenced, depending on the circumstances.

.4 Silt fencing, placed around the perimeter of the stockpile, is required for stockpiles adjacent to a stormwater management facility, ditch, road, neighbouring property, Municipal Reserve, or Environmental Reserve.

A2.12.8 Dust Control

.1 The Developer shall be solely responsible for controlling dust nuisance resulting from the installation of Municipal Improvements, both within the right-of-way and elsewhere, be it with calcium chloride, water, or by other means available and acceptable to the Municipality.

A2.12.9 Street and Sidewalk Cleaning

.1 During the construction and Warranty Period and until issuance of the Final Acceptance Certificate, the Developer shall be solely responsible for the removal and disposal of mud and debris from streets and sidewalks within the project boundary and outside the project boundary when mud tracking from the development occurs.

.2 Any mud/debris entering the public right-of-way shall be removed and disposed immediately; there will be zero tolerance for mud tracking onto public roadways. All applicable bylaws pertaining to this work must be followed.

A2.12.10 Barricades, Temporary Fencing, and Safety Provisions

.1 The Developer is responsible to protect persons from injury and to avoid property damage.

.2 The Developer shall place and maintain barricades, construction signs, warning lights, and temporary fencing at all times until the work is safe for traffic or pedestrian use.

A2.12.11 Erosion and Sedimentation Control (ESC)

.1 The Developer shall have ESC measures in place to prevent erosion and the transport of sediment from the development.

.2 The Developer's Consultant shall prepare an ESC plan, which shall address the following items:

- Phasing of construction to limit soil exposure;
- Minimizing needless stripping and grading;
- Stabilization of exposed soils;
- Protection of waterways and stabilization of drainage ways;
- Protection of steep slopes and cuts;
- Perimeter controls;
- Sediment settling controls;
- Implementation, inspection, and maintenance/repair of ESC controls;
- Adjustment of ESC Plan on site as conditions change; and
- Post-storm assessments.

.3 The ESC plan and strategy shall be implemented prior to development and shall be maintained throughout construction and the Warranty Period, until issuance of the Final Acceptance Certificate.

.4 Additionally, an ESC report may be required, at the discretion of the Municipality. The requirement for an ESC report will be considered on a case-by-case basis.

.5 When an ESC report is required, it shall include:

- A brief description of the proposed land-disturbing activities, existing site conditions, and adjacent areas that might be affected by the land disturbance;
- A description of critical areas on the site which have the potential for serious erosion problems (for example, severe grades, highly erodible soils, areas near wetlands/waterbodies, etc.);
- A construction schedule that includes the date stripping and grading will begin and the expected date of stabilization;
- A brief description of the measures that will be used to minimize erosion and control sedimentation on the site, when they will be installed, and where they will be located;

- An inspection and maintenance program, including frequency of inspection, reseeding, repair and reconstruction of damaged structures, cleanout and disposal of trapped sediment, duration of maintenance program, and final disposition of the measures when site work is complete;
- Shutdown plans when construction activities are delayed for an extended period of time; ESC shutdown plans need to address ongoing maintenance and inspection issues;
- An emergency response plan that identifies available short-term resources in terms of personnel, equipment, and ESC measures, and steps to be taken for incident reporting to regulatory authorities where discharge of sediment exceeds regulatory requirements;
- Name and signature of person preparing the plan and professional stamp/designation; and
- Special issues that may need to be addressed (sensitive area protection, inlet protection, etc.).

.6 The Developer shall comply with Federal and Provincial acts, regulations, codes of practice, standards, and guidelines that are applicable to development activities that result or could result in erosion, sedimentation, or other adverse impacts to the environment.

.7 The Developer shall be held solely accountable to Alberta Environment for noncompliance.

.8 Refer to **Section A3** for an ESC Inspection/Maintenance Report. The ESC Inspection/Maintenance Report shall be kept up to date at all times during construction and shall be made available for the Municipality's review upon request. (It is the user's responsibility to ensure that they select the ESC Inspection/Maintenance Report form that is appropriate for the location the work is being done.)

A2.12.12 Traffic Accommodation Plan

A2.12.12.1 Acceptance

.1 Prior to any work being done within the municipal right-of-way, the Developer must obtain acceptance, in writing, from the Municipality at least five (5) working days prior to work commencing.

.2 Traffic Accommodation Plans shall be reviewed by any other affected jurisdictions or authorities.

.3 Notification of acceptance of the Traffic Accommodation Plan will be provided by the Municipality, in writing, to the Developer.

A2.12.12.2 Traffic Disruption

.1 All construction related operations on or near a public roadway shall be conducted to cause the least interruption to traffic.

.2 The Developer shall provide and maintain safe and suitable temporary bridges at street and driveway crossings where traffic must cross open trenches and/or excavations.

.3 Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, and other utility controls shall be unobstructed and accessible during the construction period.

A2.12.12.3 Flagpersons

.1 At locations of traffic disruption, certified flagpersons, able to handle traffic safely and effectively, are required to minimize traffic disruption to the public.

A2.12.12.4 Adjacent Property Owner Notification

.1 All property owners affected by the construction of Municipal Improvements shall be informed by the Developer, in consultation with the Municipality, before any construction operations which will impact access and shall be advised of the probable time when access will be restored.

.2 Notices will be required to inform residents of any construction operations which will impact access; these notices are required to be distributed to residents 72 hours prior to any disruption to access, or as per specific project requirements, at the discretion of the Development Officer.

A2.12.12.5 Detours

.1 Prior to any road closure, the Developer must submit, at the Developer's expense, a detour plan for acceptance by the Municipality.

.2 Public safety is of the utmost importance and an acceptable detour plan must include provisions outlining safe vehicular passage and pedestrian movement.

.3 If the proposed road closure is within an 800 m radius of a Provincial Highway, Alberta Transportation must be notified, and Alberta Transportation approval of the detour plan must be obtained and provided to the Municipality in support of the detour plan.

.4 The Municipality's acceptance of the detour plan does not relieve the Developer of their responsibility for maintaining the provisions outlined on the detour plan during construction.

.5 The Developer shall be solely responsible for supplying, placing, and maintaining detour signage at all times for the duration of construction.

.6 Emergency access must be maintained at all times.

.7 It is solely the Developer's responsibility to contact emergency services (Fire Department, RCMP, and Alberta Health Services) within a reasonable timeframe of the planned road closure and to satisfy in full any additional requirements emergency services may have.

.8 Prior to the road closure, written confirmation that emergency services have accepted the proposed detour plan is required to be submitted to the Municipality.

A2.12.12.6 Signage

.1 The Developer must, at their expense, provide, erect, and maintain all signs, barricades, flares, etc. to the satisfaction of the Municipality.

.2 Road closures/detours must be advertised to the public at least 72 hours prior to the road closure and commencement of the detour, or as per specific project requirements, at the discretion of the Development Officer.

.3 Any required changes to the date(s) of the road closure/detour will require a new 72-hour notification period prior to the road closure and commencement of the detour, or as per specific project requirements, at the discretion of the Development Officer.

.4 Any damage to or lost signage shall be repaired or replaced immediately, at the Developer's expense.

.5 All signage shall be placed in accordance with the Manual of Uniform Traffic Control Devices.

.6 All signage shall be inspected and maintained on a regular basis for legibility and/or damage.

.7 All signage shall be mounted on fixtures appropriate for the intended use. Measures shall be taken to ensure that the signage remains erect during inclement weather.

A2.12.12.7 Staged Construction

.1 To permit movement of traffic across streets where new pavement is being constructed, the Municipality may require that the Developer construct intersections one-half at a time. This will allow traffic to cross the road through a gap in the pavement until traffic is allowed to cross on the new pavement at which time the gap in the pavement can be filled in.

A2.12.13 Municipal Utility Controls

A2.12.13.1 Acceptance

.1 Prior to any work being done within a municipal right-of-way, the Developer must obtain acceptance from the Municipality, in writing, at least 72 hours prior to work commencing.

A2.12.13.2 Utility Disruption

.1 Adequate provision must be made for the flow of sewers, drains, and water courses encountered during construction.

.2 Valves and other controls on the existing utility system shall only be operated by the Municipality.

A2.12.13.3 Adjacent Property Owner Notification

.1 All property owners affected by the construction of Municipal Improvements shall be informed by the Developer, in consultation with the Municipality, before any service interruptions and shall be advised of the probable time when service will be restored.

.2 Notices will be required to inform residents of service interruptions; these notices are required to be distributed to residents 72 hours prior to any service interruptions.

A2.12.14 Boundary Controls

.1 A boundary valve is to be placed at the tie-in to the existing water distribution system. The valve is to remain closed until a CCC is issued.

.1 The exception is when the boundary valve is opened to fill the new main for testing and chlorination purposes.

.2 Valves are to be operated only by municipal staff; municipal staff must be given a minimum of 72 hours notice when requested to operate valves.

.3 Filling and Flushing Plans are required for each project and are to be submitted to the Municipality for acceptance prior to undertaking watermain testing. Copies of all bacteriological tests performed are to be forwarded to Infrastructure Services.

.4 Plugs are to be placed at the downstream end of new pipes at the tie-in manholes to the existing sanitary and storm sewer systems. The plugs are to remain in place until a CCC is issued on the sanitary and storm sewer systems.

A2.12.15 Noise and Vibration Control

A2.12.15.1 General Requirements

.1 Subject to the nature, scope, and scale of the Municipal Improvements, the Municipality may require a Noise and Vibration Control Study to protect sensitive land uses from noise and vibration disruptions.

.2 Sensitive land uses adjacent to a Residential area (such as highways, arterial roadways, railways, or industrial land uses) may require a Noise and Vibration Control Study.

.3 The Noise and Vibration Control Study shall be prepared by the Developer, at the request of the Municipality, at the Developer's cost.

.4 The Noise and Vibration Control Study may require monitoring of existing noise levels, and/or computer modelling to predict future noise and vibration levels.

.5 The Noise and Vibration Control Study will determine the applicable jurisdictional and environmental limits and recommended control measures to be implemented as part of the Municipal Improvements.

.1 Control measures may include subdivision layout, dwelling orientation, sound insulating walls and windows, or noise attenuation barriers.

A2.12.15.2 Noise Attenuation for New Developments

.1 The maximum design outdoor noise level shall be 55 dBA Leq (24 hour).

.2 A Noise Impact Assessment, satisfactory to the Municipality, is required for all new Residential developments proposed to be constructed within the vicinity of existing and proposed major (arterial) roadways.

.3 The Noise Impact Assessment must address background noise levels, the impact of current traffic levels, and the noise attenuation measures necessary to not exceed the design outdoor noise level.

.4 Noise attenuation for new Residential development shall be provided for rear yard outdoor amenity areas and be achieved through building orientation, privacy walls, and fences.

.5 Noise attenuation measures shall be designed and constructed by the Developer at the Developer's expense.

A2.12.15.3 Noise Attenuation for Existing Residential Developments

.1 Noise attenuation measures are required for Residential developments where the measured outdoor noise levels exceed 65 dBA Leq (24 hour) at locations 5 m from the rear façade of a dwelling and 1.5 m above the ground or deck elevation.

.2 No noise attenuation measures are required for outdoor spaces at second or subsequent storeys of houses if such noise attenuation can be achieved by a maximum 2.5 m wall on the existing grades at the road right-of-way limit, unless noise attenuation is warranted as outlined in **Clause A2.12.15.3.1**.

.3 Noise attenuation measures shall be designed and constructed by the Municipality for capital projects.

A2.12.16 Progress Meetings

.1 Prior to commencement of any construction activities, the Developer's Consultant shall administer a pre-construction meeting with representatives of the Contractor and subcontractor(s) in attendance.

.2 Subsequent progress meetings are to be held at a frequency to suit the timelines of the project.

.1 The frequency of progress meetings is to be determined between the Municipality and Developer.

.3 Municipality representatives shall be invited to the pre-construction meeting and all subsequent progress meetings.

.4 The Municipality shall be included in the meeting minutes distribution list.

A2.12.17 Stop Work Order

.1 The Municipality may issue a Stop Work Order to the Contractor due to nonconformance. Nonconformance includes:

- Unsafe work practices;
- Risk of imminent danger;
- Lack of traffic control;
- Construction not in accordance with accepted drawings, specifications, and REDS; and/or
- Damage to existing facilities.

.2 Should a Stop Work Order be issued, the Developer shall immediately cease operation, rectify the nonconformance and obtain the Municipality's written acceptance prior to proceeding.

A2.12.18 Material

.1 The Developer shall only install materials which have been approved in these REDS, or as otherwise approved in writing by the Municipality.

.2 If non-approved materials are being installed, a Stop Work Order will be issued immediately. A formal meeting will take place with the stakeholders involved and when the Stop Work Order is lifted, any and all materials installed without consent from the Municipality shall immediately be removed and replaced with municipal staff present before other work can commence.

.3 As part of the post-construction submission package, the Developer shall submit certification by an accredited materials testing firm or manufacturer confirming that all materials conform to the REDS (or any approved deviations).

A2.12.19 Survey Monument Control

.1 The Developer shall be responsible to maintain and, if necessary, replace monuments that are destroyed, damaged or removed by the operation of the Developer in carrying out the construction and installation of Municipal Improvements.

A2.12.20 Red-line Submissions

.1 Whenever it is necessary, for any reason, to make changes to the design drawings after they have been accepted, two prints and one digital (PDF) copy of each original drawing affected shall be submitted with the proposed changes shown in red, accompanied by a letter outlining the reasons for the required changes.

.2 Red-line drawings shall be authenticated (signed and sealed) by the Developer's Consultant.

.3 The Municipality will review red-line submissions within 10 working days after receipt. The timeline for Municipality acceptance of the proposed changes is dependent on whether additional revisions to the red-line drawings are required to address any review comments.

.4 Upon the Municipality's acceptance of the proposed changes, one copy of the requested change will be signed and returned to the Developer, accompanied by a letter authorizing the changes to be made on the original accepted detailed design drawings.

.5 No changes are to be made to any original accepted drawings without following this procedure.

A2.13 Record Drawings and Other Documents

A2.13.1 General Requirements for Record Drawings

.1 The Developer shall submit to the Municipality Record Drawings and other related information giving detailed measurements of the Municipal Improvements constructed.

.1 Every effort must be made to submit the Record Drawings to the Municipality within 6 months of execution of the Construction Completion Certificate; however, in no case can a Final Acceptance Inspection be requested prior to the Municipality receiving the Record Drawings.

.2 The submission of all other data for record purposes is a condition of the execution of Construction Completion Certificates by the Municipality.

.2 Within 6 months of completion of construction of the Municipal Improvements, the Developer shall submit to the Municipality one (1) full-sized set of as-constructed drawings, one (1) electronic copy (PDF), and one (1) electronic copy (shapefiles) stamped "For Record". The date, Prime Contractor, and subcontractors shall be indicated on Record Drawings.

.3 The Developer's Consultant shall certify that all work has been completed in accordance with the plans, specifications, and REDS, and that all work has been completed and all deficiencies have been rectified.

.4 Upon completion of construction of the Municipal Improvements, and in one (1) complete submission, the Developer shall submit the following documentation. The Municipality's acceptance of the supporting documentation is required prior to issuance of a Construction Completion Certificate.

- Lot service records;
- Valve reports;
- Hydrant reports;
- Compaction test results;
- Pressure and leakage testing results;
- Chlorine residual test results;
- Bacteriological test results;
- CCTV inspection report for sanitary and storm sewers (required at CCC and FAC);

- Infiltration or exfiltration test results for sanitary and storm sewers;
- Concrete and asphalt mix designs;
- Density test results;
- Deflection test results;
- Concrete strength test results;
- Materials testing results;
- Asphalt core results;
- Operation and Maintenance manuals (if required); and
- An accurate as-constructed bill of materials (quantities and costs) for the Region's TCA database.

.5 Incomplete submissions will be returned to the Developer.

A2.13.2 Record Drawing Requirements for Surface Improvements

.1 All data shown on the construction drawings shall be updated to as-constructed information, in red, including:

- Elevations of catch basin grates, manhole covers, and curb returns on the plan/profile drawings, as well as any grade changes which exceed the design grade by more than 0.1% (or 25 mm);
- Curve radii, distances from back of walk to property line, and sidewalk widths on the plan/profile drawings;
- Type of curb, whether rolled face or straight face, on an overall plan;
- Elevations at either the roadway crown or lip of gutter; and
- Design lot corner elevations, swale centreline elevations at beginning and end as well as at property line crossings and any changes in alignment of the swale.

.2 If the cross-section design has changed in width or structure, as accepted by the Municipality during construction, then this shall be indicated on the typical cross-section(s).

A2.13.3 Record Drawing Requirements for Underground Improvements

1. All data shown on the construction drawings shall be updated to as-constructed information, in red, including:

- Location of drainage facilities; for example, manholes, catch basins, and the end of pipe stubs;
- Size of manholes, inverts and slopes of all pipes entering/exiting manholes;
- Updated pipe capacity calculations based on the as-constructed pipe slopes;
- Horizontal alignments, sizes, and grades of sanitary and storm sewers;
- Horizontal and vertical alignments and sizes of watermains;
- Locations of valves, hydrants, curb stops, and horizontal and vertical bends;
- Elevations of pond/wetland bottom, normal water level, high water level, and freeboard;
- Area at pond/wetland bottom, normal water level, high water level, and freeboard;
- Notation indicating the elevation of the lowest allowable building opening for lots abutting the stormwater management facility;
- Measurements to locate submerged inlets, outlets, and sediment traps referenced to identifiable permanent features which are not submerged at normal water level; and
- Location, material, diameter, inverts, and slope of culverts.

2. Where the water table is located above the fire hydrant drain, the hydrant drain ports may require plugging. Hydrants with plugged drain ports must be clearly identified on the Record Drawings.

A2.14 CCC and FAC Inspections

A2.14.1 Seasonal Conditions

.1 Should seasonal conditions not permit the CCC or FAC inspection, execution of the CCC or FAC by the Municipality will be delayed until appropriate conditions exist.

.2 The Municipality is not responsible for notifying the Developer when inclement weather will delay the CCC or FAC inspection.

.3 Examples of inclement weather which will delay inspections until appropriate conditions exist include snow, ice, and freezing conditions.

A2.14.2 CCC Inspection

.1 Prior to a construction completion inspection, the Developer's Consultant shall conduct a pre-inspection.

.2 Any deficiencies identified at the pre-inspection are to be noted on a Pre-Inspection Checklist.

.1 Major deficiencies (as determined by the Developer's Consultant) shall be rectified prior to the municipal inspection.

.2 Effort is to be made to rectify minor deficiencies (as determined by the Developer's Consultant) prior to the municipal inspection.

.3 The Pre-Inspection Checklist is to be submitted to the Municipality at least 72 hours prior to the construction completion inspection.

.4 The Developer's Consultant shall take the lead role in the construction completion inspection. The Municipality (or their representative) will observe the inspection and provide comments only when necessary.

.5 The Developer's Consultant is responsible to confirm that the project has been constructed in general conformance to the accepted drawings, specifications, and REDS.

A2.14.3 FAC Inspection

.1 Prior to a final acceptance inspection, the Developer's Consultant shall conduct a pre-inspection.

.2 Any deficiencies identified at the pre-inspection are to be noted on a Pre-Inspection Checklist.

.1 Major deficiencies (as determined by the Developer's Consultant) shall be rectified prior to the municipal inspection.

.2 Effort is to be made to rectify minor deficiencies (as determined by the Developer's Consultant) prior to the municipal inspection.

.3 The Pre-Inspection Checklist is to be submitted to the Municipality at least 72 hours prior to the final acceptance inspection.

.4 The Developer's Consultant shall take the lead role in the final acceptance inspection. The Municipality (or their representative) will observe the inspection and provide comments only when necessary.

.5 The Developer's Consultant is responsible to confirm that all deficiencies have been rectified, and that repairs or replacements made to rectify deficiencies were constructed in general conformance to the accepted drawings, specifications, and REDS, prior to the issuance of the Final Acceptance Certificate.

A2.14.4 CCC and FAC Inspection Costs

.1 The Developer will be responsible for any inspection costs deemed appropriate by the Municipality.

.2 Costs may include:

- Consulting expertise required by the Municipality for specialized inspection needs; or
- When excessive deficiencies are present and re-inspections are required.

.3 Inspection costs may take several forms, including:

- A lump sum fee charged to the Developer; or
- An invoiced cost by specialized consultant, plus mark-up for handling and administration.

A2.15 Construction Completion Certificate (CCC)

.1 Upon satisfactory completion of the project, a satisfactory construction completion inspection, and after all deficiencies have been corrected and submissions received, the Municipality shall execute the Construction Completion Certificate submitted by the Developer or Developer's Consultant, notifying:

- Acceptance of the work by the Municipality; and
- The commencement date of the Warranty Period.

.2 A copy of the Construction Completion Certificate is included in **Section A3** for execution by the Developer and the Developer's Consultant.

.3 If provided for in the Development Agreement, separate Construction Completion inspections and commencement of Warranty Periods shall be issued for the following:

- Underground utilities; and
- Surface works and landscaping.

A2.16 Warranty Period

.1 Subject to **Clause A2.15.3**, the Warranty Period shall commence after the last Construction Completion Certificate is issued, except in those instances when Seasonal Deficiencies result in multiple Construction Completion Certificates.

.2 The construction cut-off date for underground and surface improvements, with the exception of landscape improvements, shall be as directed by the Municipality, but generally shall be no later than October 15.

.3 The Developer shall be responsible for any defect, fault, or deficiency in the completed work during a minimum two (2) year Warranty Period and shall remedy it at their own expense. A record of Maintenance performed during the Warranty Period, in the form of a report, shall be provided to the Municipality at the Final Acceptance Inspection. The report shall outline all Maintenance activities completed and third party damages incurred during the Warranty Period, including landscaping items.

.4 The Municipality shall be notified prior to any repairs during the Warranty Period and shall be given the opportunity to inspect the deficiency to determine if there is an underlying issue that needs to be addressed. All repairs shall be to the Municipality's satisfaction.

.5 Municipality take-over is subject to a walk-through inspection jointly conducted with the Developer (or their representative) and the Municipality.

.1 The purpose of this inspection is to review the safety and cleanliness of the streets for public operations.

.2 This inspection will only be scheduled between the period of May 15 and October 15 on an annual basis, subject to seasonal conditions.

.6 The Developer shall remain responsible for all other Maintenance and repair items, Maintenance of street signs, flushing of sewer lines, thawing, and flushing of watermains, and Maintenance of the landscaping up until the issuance of the Final Acceptance Certificate.

.7 Third party damage occurring during the Warranty Period will be reviewed by the Municipality on a case-by-case basis; upon review and consideration by the Municipality, the Developer may be held responsible for the third-party damage.

A2.17 Final Acceptance Certificate (FAC)

.1 Prior to the expiration of the Warranty Period, the Developer shall request, in writing, a final inspection and, within fifteen (15) business days of receipt of such request, the Municipality will carry out an inspection.

.2 Final Acceptance shall include underground improvements, surface improvements, and facilities (if applicable).

.3 Upon correction of all deficiencies, one combined Final Acceptance Certificate will be issued encompassing all Municipal Improvements, with the exception of landscape improvements, which may be approved under a separate Final Acceptance Certificate.

.4 A copy of the certificate is included in **Section A3** for execution by the Developer and the Developer's Consultant.

.5 The Warranty Period shall remain in effect until the Final Acceptance Certificate is issued by the Municipality.

.6 Should seasonal conditions not permit the inspection, execution of the Final Acceptance Certificate by the Municipality will be delayed until appropriate conditions for inspection exist.

A2.18 Endorsement

.1 The Municipality will endorse the Subdivision Plan following the issuance of the CCC(s).

.2 In the absence of the issuance of the CCC, the Municipality may endorse a Subdivision Plan if the Developer increases the Security from 100% to 120% for any Municipal Improvements which have not yet been completed and accepted.

A2.19 Development, Building, and Occupancy Permits

.1 This section outlines which Municipal Improvements are required to be completed prior to the issuance of Development, Building, and/or Occupancy Permits.

.2 The Development Officer shall have the authority to waive any of these requirements, on a case-by-case basis.

.3 No Development Permits shall be issued until:

- Construction Completion Certificate(s) has/have been executed for the underground utilities (if applicable);
- All curbs and gutters are installed (if applicable); and
- The roads have a compacted gravel base and are considered all-weather roads.

.4 No Building or Occupancy Permits shall be issued until Construction Completion Certificate(s) has/have been executed for the surface works (including roads and sidewalks but excluding landscaping).

.5 No Development, Building, or Occupancy Permits shall be issued until:

- The Subdivision Plan, complete with Easements, is registered; and
- The franchise utilities (including streetlights) are installed and energized/activated.

A2.20 List of Submittals

.1 The following lists outline the general submission requirements throughout the duration of a development project. These lists do not waive the Developer's responsibility to ensure that all submittals are complete.

.2 It is recommended that submittal requirements be discussed with the Municipality at the pre-application meeting.

.3 **At Outset of Project:**

- Conceptual Engineering Design Report
- Pre-application Meeting Request

.4 **At Preliminary Design:**

- Preliminary engineering design drawings
- Preliminary landscape plans
- Preliminary design calculations
- Preliminary geotechnical investigation
- Preliminary clearing, stripping, and rough grading plans *
- Wildfire Risk Assessment *
- Environmental Impact Assessment *
- Historical Resources Review *

.5 **At Detailed Design:**

- Detailed engineering design drawings
- Detailed landscape plans
- Design specifications
- Geotechnical Report
- Request for Variance(s) – *if applicable*
- Detailed design calculations
- Copy(ies) of any environmental approvals
  - *Fisheries Act*
  - *Canadian Navigable Waters Act*
  - *Environmental Protection and Enhancement Act*

Items denoted with an asterisk may not be required for small scale developments (less than 4 ha).

Confirm the necessity of these items with the Municipality.

    - *Water Act*
    - *Historical Resources Act*
    - *Public Lands Act*
- Intersection designs, with consideration of emergency response vehicle movements *
- Traffic Impact Assessment *
- Water Network Analysis *
- Sanitary sewer analysis
- Stormwater management plan
- Detailed clearing, stripping, and grading plans
- Snow storage considerations *
- Copy(ies) of any Crossing/Proximity Agreements issued by third party pipeline companies
- Copy(ies) of permissions for crossing of railways, highways, and/or other facilities – *if applicable*
- Cost estimates for over-sized and/or cost-shared infrastructure *
- Development Agreement application
- Estimated cost of all underground deep utilities and surface improvements/facilities for calculation of Security
- Easement/Right-of-Way documents prepared by an Alberta Land Surveyor
- AT Roadside Development Permit – *if applicable*

.6 **Prior to Construction:**

- Municipality acceptance of relevant applications:
    - Clearing and Grading
    - Temporary Road Closure
    - Service Connections
    - Third Party Pipeline crossings of municipal infrastructure/Government Road Allowance(s)
    - Shallow Utility
- Site Management Plan for staged construction activities
- Proposed stockpile locations
- ESC Plan
- ESC Report – *if required by Municipality*
- Detour Plan
- Filling and flushing plans

.7 **During Construction:**

- Red-line drawings – *if applicable*
- ESC Inspection/Maintenance Reports
- Notices to adjacent property owners (to inform of upcoming paving operations, utility shut-downs, road closures, etc.)
- Noise and Vibration Control Study – *if required by Municipality*
- Meeting Minutes (pre-construction meeting, progress meetings, etc.)

.8 **At Construction Completion:**

- Record drawings and the following supporting documentation:
  - Service Reports
  - Valve Reports
  - Hydrant Reports
  - Compaction test results
  - Pressure and leakage testing results
  - Chlorine residual test results
  - Bacteriological test results
  - CCTV inspection reports (sanitary and storm sewers)
  - Infiltration or exfiltration test results (storm and sanitary sewers)
  - Concrete mix design
  - Asphalt mix design
  - Density test results
  - Deflection test results
  - Concrete strength test results
  - Materials testing results
  - Asphalt core results
  - O&M manuals – *if applicable*
  - Accurate as-constructed bill of materials (quantities and costs) for TCA database
- CCC pre-inspection checklist, with any deficiencies identified
- CCC inspection report
- CCC application

.9 **At Completion of Warranty Period:**

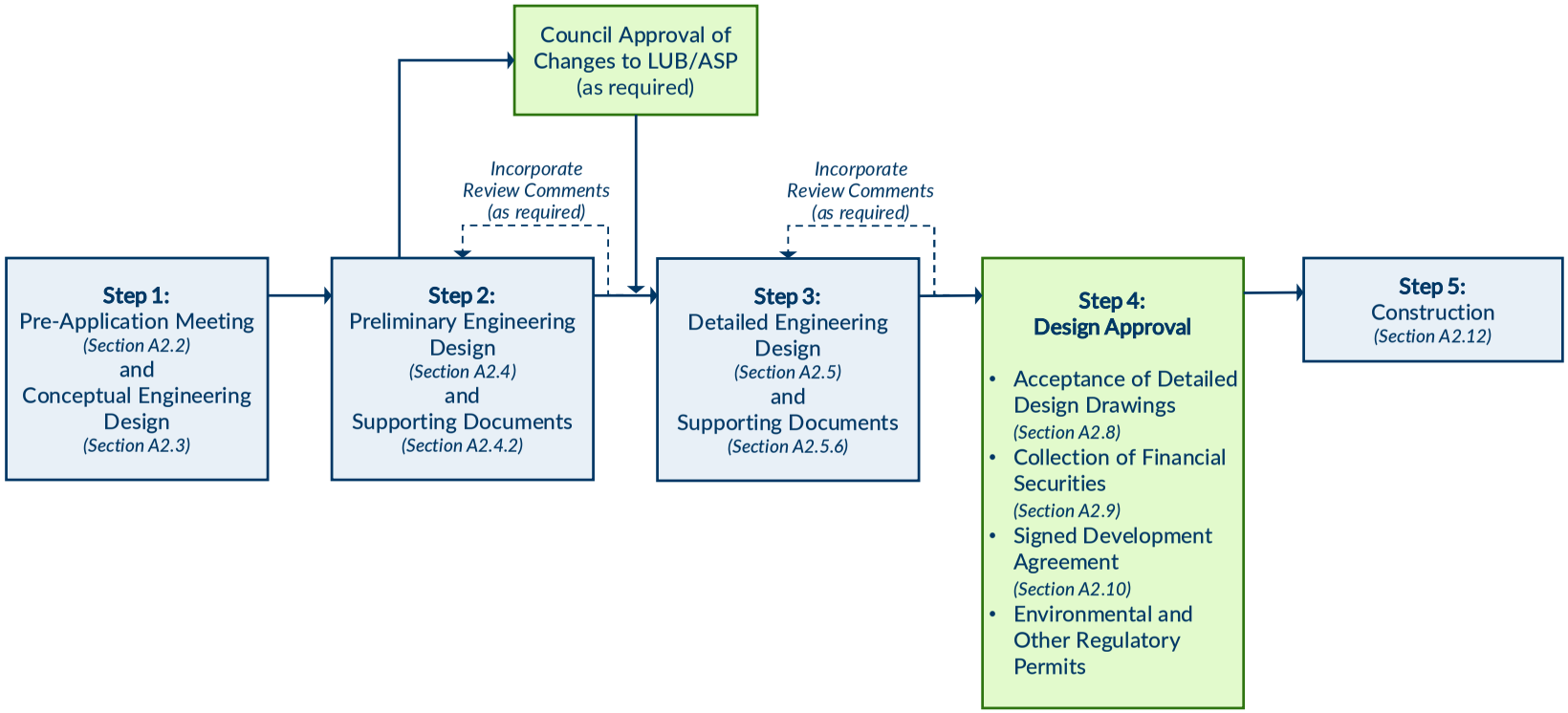
- FAC pre-inspection checklist, with any deficiencies identified
- FAC inspection report
- FAC application

.10 **Prior to Site Development:**

- Development Permit application
- Building Permit application
- Occupancy Permit application

DEVELOPMENT APPROVAL PROCESS

SUBMISSION, REVIEW, AND APPROVAL



Smoky Lake County

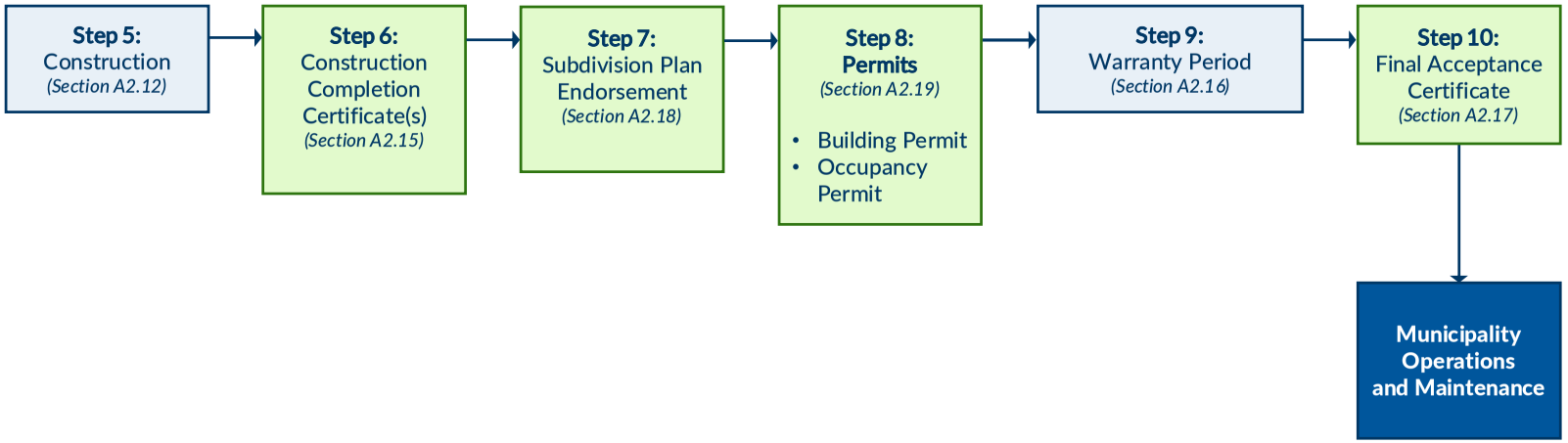
TOWN OF SMOKY LAKE 1923-2023

HISTORIC VILNA
A true Alberta boomtown...

VILLAGE OF WASKATENAU

DEVELOPMENT APPROVAL PROCESS

CONSTRUCTION, CCC, PERMITS, AND FAC



Smoky Lake County

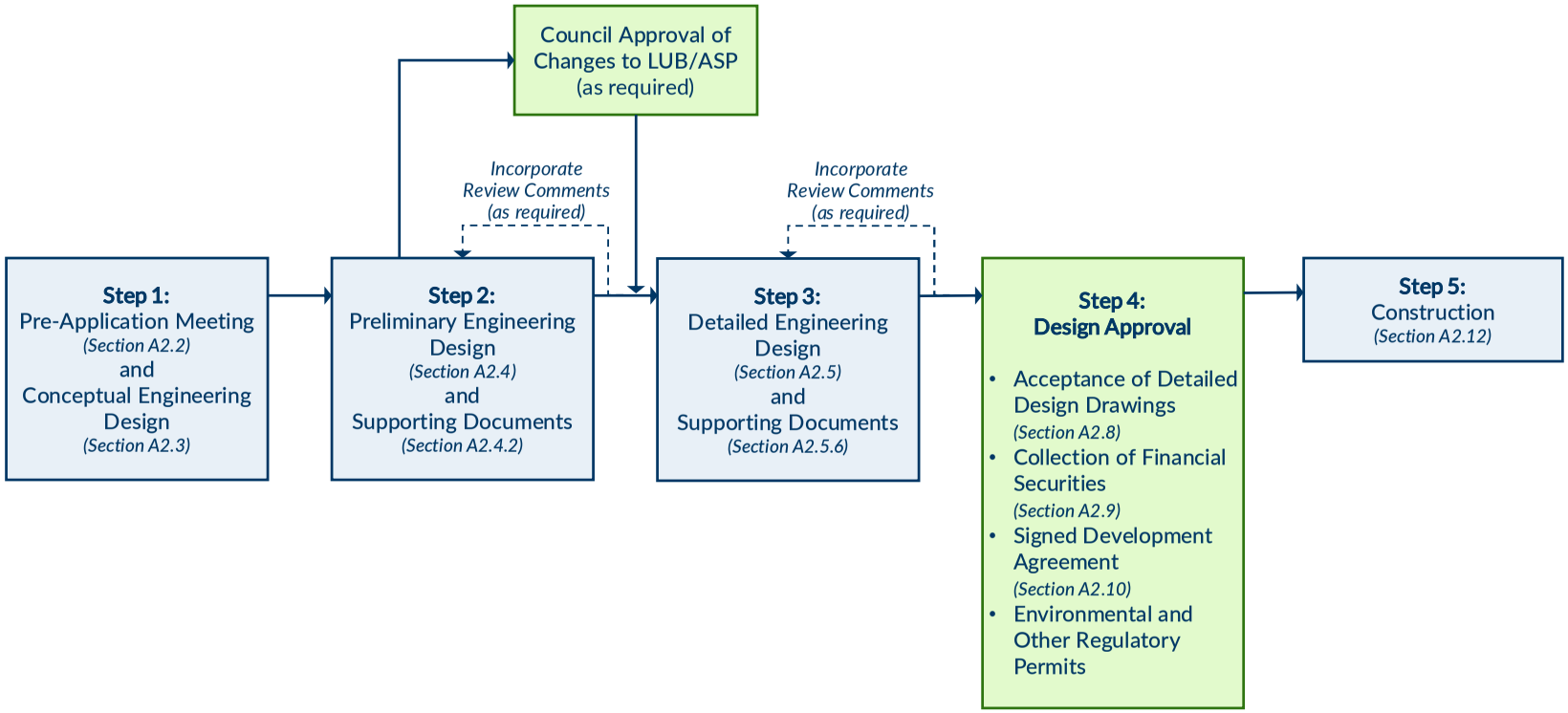
Town of Smoky Lake 1923-2023

Historic Vilna
A true Alberta boomtown...

Village of Waskatenau

DEVELOPMENT APPROVAL PROCESS

SUBMISSION, REVIEW, AND APPROVAL



Smoky Lake County

TOWN OF SMOKY LAKE 1923-2023

HISTORIC VILNA
A true Alberta boomtown...

VILLAGE OF WASKATENAU

A3 CHECKLISTS AND FORMS

.1 The following checklists and forms, referenced throughout the Regional Engineering Design Standards, are provided in this section for completion by the Developer's Consultant.

- Engineering Standards Deviation Form;
- ESC Inspection/Maintenance Checklist;
- Engineering Pre-Inspection Checklist;
- Landscape Pre-Inspection Checklist;
- Fence Pre-Inspection Checklist;
- Service Report;
- Hydrant Report;
- Valve Report;
- Construction Completion Certificate; and
- Final Acceptance Certificate.

ENGINEERING STANDARDS DEVIATION FORM

Deviation No.: _____

Development Project: _____

Capital Project: _____

TO BE COMPLETED BY APPLICANT

To: Planning & Development Manager
Smoky Lake County
4612 McDougall Drive
Smoky Lake, AB T0A 3C0

Applicant Name: _____

Company Name: _____

Phone: _____

Email: _____

Mailing Address: _____

_____

_____

Signature: _____ Date: _____

Engineering Standards (REDS) Article: _____ Page No: _____

Deviation Request Description:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

TO BE COMPLETED BY SMOKY LAKE COUNTY

Reviewed by:

☐ Planning & Development ☐ Emergency Services

☐ Public Works

Comments:

Signature: _____ Date: _____

Deviation Request:

☐ Accepted ☐ Rejected

Operations and Maintenance Impact:

☐ Yes ☐ No

If yes, please provide reason:

Reason for Rejection:
(Attach additional pages, if necessary.)

Sigature: _____ **Date:** _____
(Planning & Development Manager)

Notes:

1) All applications for deviation shall be supported with a stamped letter of recommendation from an Engineer.
2) Any supporting documentation justifying the requested deviation shall be submitted with the letter of recommentation and Engineering Standards Deviation Form.
3) Incomplete submissions will be rejected.

ENGINEERING STANDARDS DEVIATION FORM

Deviation No.: _____

Development Project: _____

Capital Project: _____

TO BE COMPLETED BY APPLICANT

To: Development Officer
Town of Smoky Lake
56 Wheatland Avenue
Smoky Lake, AB T0A 3C0

Applicant Name: _____

Company Name: _____

Phone: _____

Email: _____

Mailing Address: _____

_____

_____

Signature: _____ Date: _____

Engineering Standards (REDS) Article: _____ Page No: _____

Deviation Request Description:

_____

_____

_____

_____

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_____

_____

TO BE COMPLETED BY THE TOWN OF SMOKY LAKE

Reviewed by:

☐ Development Officer ☐ Emergency Services

☐ Public Works

Comments:

Signature: _____ Date: _____

Deviation Request:

☐ Accepted ☐ Rejected

Operations and Maintenance Impact:

☐ Yes ☐ No

If yes, please provide reason:

Reason for Rejection:
(Attach additional pages, if necessary.)

Sigature: _____ **Date:** _____
(Development Officer)

Notes:

1) All applications for deviation shall be supported with a stamped letter of recommendation from an Engineer.
2) Any supporting documentation justifying the requested deviation shall be submitted with the letter of recommentation and Engineering Standards Deviation Form.
3) Incomplete submissions will be rejected.

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ENGINEERING STANDARDS DEVIATION FORM

Deviation No.: _____

Development Project: _____

Capital Project: _____

TO BE COMPLETED BY APPLICANT

To: Development Officer
Village of Vilna
5135 - 50 Street
Vilna, AB T0A 3L0

Applicant Name: _____

Company Name: _____

Phone: _____

Email: _____

Mailing Address: _____

_____

_____

Signature: _____ Date: _____

Engineering Standards (REDS) Article: _____ Page No: _____

Deviation Request Description:

_____

_____

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_____

TO BE COMPLETED BY THE VILLAGE OF VILNA

Reviewed by:

☐ Development Officer ☐ Emergency Services

☐ Public Works

Comments:

Signature: _____ Date: _____

Deviation Request:

☐ Accepted ☐ Rejected

Operations and Maintenance Impact:

☐ Yes ☐ No

If yes, please provide reason:

Reason for Rejection:
(Attach additional pages, if necessary.)

Sigature: _____ **Date:** _____
(Development Officer)

Notes:

1) All applications for deviation shall be supported with a stamped letter of recommendation from an Engineer.
2) Any supporting documentation justifying the requested deviation shall be submitted with the letter of recommentation and Engineering Standards Deviation Form.
3) Incomplete submissions will be rejected.

VILLAGE OF
WASKATENAU

ENGINEERING STANDARDS DEVIATION FORM

Deviation No.: _____

Development Project: _____

Capital Project: _____

TO BE COMPLETED BY APPLICANT

To: Development Officer
Village of Waskatenau
5008 - 51 Street
Waskatenau, AB T0A 3P0

Applicant Name: _____

Company Name: _____

Phone: _____

Email: _____

Mailing Address: _____

_____

_____

Signature: _____ Date: _____

Engineering Standards (REDS) Article: _____ Page No: _____

Deviation Request Description:

TO BE COMPLETED BY THE VILLAGE OF WASKATENAU

Reviewed by:

☐ Development Officer ☐ Emergency Services
☐ Public Works

Comments:

Signature: _____ Date: _____

Deviation Request:

☐ Accepted ☐ Rejected

Operations and Maintenance Impact:

☐ Yes ☐ No

If yes, please provide reason:

Reason for Rejection:
(Attach additional pages, if necessary.)

Sigature: _____ **Date:** _____
(Development Officer)

Notes:
1) All applications for deviation shall be supported with a stamped letter of recommendation from an Engineer.
2) Any supporting documentation justifying the requested deviation shall be submitted with the letter of recommentation and Engineering Standards Deviation Form.
3) Incomplete submissions will be rejected.

ESC INSPECTION / MAINTENANCE REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	Weather Forecast:
mm of rain in last week:	mm of rain in last 24 hrs:
Stage of Construction:	
Contractor(s) on Site:	
Construction Activities on Site:	
Heavy Equipment on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has stripping and grading been phased where possible?			
Have stripped areas / exposed soils / steep slopes been protected and stabilized?			
Have waterways and drainage ways been protected and stabilized?			
Are perimeter controls in place and functioning adequately?			
Are off-site / downstream properties / waterways protected?			
Are construction entrances stabilized to minimize tracking of soil and mud off-site?			
Are Sedimentation Control BMPs in place and functioning adequately?			
Are Transport Control BMPs in place and functioning adequately?			
Are Erosion Control BMPs in place and functioning adequately?			

Note:
BMP: Best Management Practice.

ESC INSPECTION / MAINTENANCE REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	Weather Forecast:
mm of rain in last week:	mm of rain in last 24 hrs:
Stage of Construction:	
Contractor(s) on Site:	
Construction Activities on Site:	
Heavy Equipment on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has stripping and grading been phased where possible?			
Have stripped areas / exposed soils / steep slopes been protected and stabilized?			
Have waterways and drainage ways been protected and stabilized?			
Are perimeter controls in place and functioning adequately?			
Are off-site / downstream properties / waterways protected?			
Are construction entrances stabilized to minimize tracking of soil and mud off-site?			
Are Sedimentation Control BMPs in place and functioning adequately?			
Are Transport Control BMPs in place and functioning adequately?			
Are Erosion Control BMPs in place and functioning adequately?			

Note:
BMP: Best Management Practice.

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ESC INSPECTION / MAINTENANCE REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	Weather Forecast:
mm of rain in last week:	mm of rain in last 24 hrs:
Stage of Construction:	
Contractor(s) on Site:	
Construction Activities on Site:	
Heavy Equipment on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has stripping and grading been phased where possible?			
Have stripped areas / exposed soils / steep slopes been protected and stabilized?			
Have waterways and drainage ways been protected and stabilized?			
Are perimeter controls in place and functioning adequately?			
Are off-site / downstream properties / waterways protected?			
Are construction entrances stabilized to minimize tracking of soil and mud off-site?			
Are Sedimentation Control BMPs in place and functioning adequately?			
Are Transport Control BMPs in place and functioning adequately?			
Are Erosion Control BMPs in place and functioning adequately?			

Note:
BMP: Best Management Practice.

VILLAGE OF WASKATENAU

ESC INSPECTION / MAINTENANCE REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	Weather Forecast:
mm of rain in last week:	mm of rain in last 24 hrs:
Stage of Construction:	
Contractor(s) on Site:	
Construction Activities on Site:	
Heavy Equipment on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has stripping and grading been phased where possible?			
Have stripped areas / exposed soils / steep slopes been protected and stabilized?			
Have waterways and drainage ways been protected and stabilized?			
Are perimeter controls in place and functioning adequately?			
Are off-site / downstream properties / waterways protected?			
Are construction entrances stabilized to minimize tracking of soil and mud off-site?			
Are Sedimentation Control BMPs in place and functioning adequately?			
Are Transport Control BMPs in place and functioning adequately?			
Are Erosion Control BMPs in place and functioning adequately?			

Note:
BMP: Best Management Practice.

ENGINEERING PRE-INSPECTION CHECKLIST (CCC/FAC)

SANITARY SEWER

		COMMENTS
Manholes		
Channel	☐	
Base	☐	
Joints	☐	
Cover	☐	
Grade Rings	☐	
Clean	☐	
Main Line		
Compaction Tests	☐	
CCTV Report	☐	
CCTV Review	☐	
Exfiltration / Infiltration Test	☐	
Mandrel Test	☐	

STORM SEWER

		COMMENTS
Manholes		
Channel	☐	
Base	☐	
Joints	☐	
Cover	☐	
Grade Rings	☐	
Clean	☐	
Main Line		
Compaction Tests	☐	
CCTV Report	☐	
CCTV Review	☐	
Exfiltration / Infiltration Test	☐	
Mandrel Test	☐	
Catch Basins		
Sump	☐	
Base	☐	
Joints	☐	
Grate	☐	
Location	☐	
Clean	☐	
SWMFs		
Flared Ends (Inlet)	☐	
Flared Ends (Outlet)	☐	
Trash Rack	☐	
Rip Rap (Class, Size)	☐	
Topsoil	☐	
Seeding	☐	
Control Structure	☐	
General Clean-up	☐	

WATERMAINS

		COMMENTS
Compaction Tests	☐	
Hydrant Operation & Reports	☐	
Valve Operation & Reports	☐	
Pressure / Leakage Test	☐	
Chlorine Residual Test	☐	
Bacteriological Test	☐	

SERVICES

Compaction Tests	☐	
CC Operation	☐	
Sanitary	☐	
Storm	☐	
Water	☐	
Marker Stakes	☐	
Service Reports	☐	

CONCRETE

Curb and Gutter	☐	
Sidewalk	☐	
Expansion Joints	☐	
Concrete Tests	☐	
Mix Design	☐	
CC Stamps	☐	
Backfill	☐	
Clean	☐	

ASPHALT

Asphalt Surface Uniformity	☐	
Subgrade Compaction Tests	☐	
GBC Compaction Tests	☐	
Proofrolls	☐	
Asphalt Core Results	☐	
Mix Design	☐	
Thickness	☐	
Density	☐	
Clean	☐	

SITE GRADING

Ditches	☐	
Culverts	☐	
Swales	☐	
Clean	☐	
Lots Rough-Graded to Ensure Positive Drainage	☐	

I, _____ (Consultant's Name) of _____ (Consultant's Firm) certify that _____ (Project Name) has been preinspected and is ready for a _____ (CCC / FAC) inspection of the _____ (Underground / Surface / Landscape) works.

Signature: _____ Date: _____

ENGINEERING PRE-INSPECTION CHECKLIST (CCC/FAC)

SANITARY SEWER

		COMMENTS
Manholes		
Channel	☐	
Base	☐	
Joints	☐	
Cover	☐	
Grade Rings	☐	
Clean	☐	
Main Line		
Compaction Tests	☐	
CCTV Report	☐	
CCTV Review	☐	
Exfiltration / Infiltration Test	☐	
Mandrel Test	☐	

STORM SEWER

		COMMENTS
Manholes		
Channel	☐	
Base	☐	
Joints	☐	
Cover	☐	
Grade Rings	☐	
Clean	☐	
Main Line		
Compaction Tests	☐	
CCTV Report	☐	
CCTV Review	☐	
Exfiltration / Infiltration Test	☐	
Mandrel Test	☐	
Catch Basins		
Sump	☐	
Base	☐	
Joints	☐	
Grate	☐	
Location	☐	
Clean	☐	
SWMFs		
Flared Ends (Inlet)	☐	
Flared Ends (Outlet)	☐	
Trash Rack	☐	
Rip Rap (Class, Size)	☐	
Topsoil	☐	
Seeding	☐	
Control Structure	☐	
General Clean-up	☐	

WATERMAINS

		COMMENTS
Compaction Tests	☐	
Hydrant Operation & Reports	☐	
Valve Operation & Reports	☐	
Pressure / Leakage Test	☐	
Chlorine Residual Test	☐	
Bacteriological Test	☐	

SERVICES

Compaction Tests	☐	
CC Operation	☐	
Sanitary	☐	
Storm	☐	
Water	☐	
Marker Stakes	☐	
Service Reports	☐	

CONCRETE

Curb and Gutter	☐	
Sidewalk	☐	
Expansion Joints	☐	
Concrete Tests	☐	
Mix Design	☐	
CC Stamps	☐	
Backfill	☐	
Clean	☐	

ASPHALT

Asphalt Surface Uniformity	☐	
Subgrade Compaction Tests	☐	
GBC Compaction Tests	☐	
Proofrolls	☐	
Asphalt Core Results	☐	
Mix Design	☐	
Thickness	☐	
Density	☐	
Clean	☐	

SITE GRADING

Ditches	☐	
Culverts	☐	
Swales	☐	
Clean	☐	
Lots Rough-Graded to Ensure Positive Drainage	☐	

I, _____ (Consultant's Name) of _____ (Consultant's Firm) certify that _____ (Project Name) has been preinspected and is ready for a _____ (CCC / FAC) inspection of the _____ (Underground / Surface / Landscape) works.

Signature: _____ Date: _____

ENGINEERING PRE-INSPECTION CHECKLIST (CCC/FAC)

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SANITARY SEWER

		COMMENTS
Manholes		
Channel	☐	
Base	☐	
Joints	☐	
Cover	☐	
Grade Rings	☐	
Clean	☐	
Main Line		
Compaction Tests	☐	
CCTV Report	☐	
CCTV Review	☐	
Exfiltration / Infiltration Test	☐	
Mandrel Test	☐	

STORM SEWER

		COMMENTS
Manholes		
Channel	☐	
Base	☐	
Joints	☐	
Cover	☐	
Grade Rings	☐	
Clean	☐	
Main Line		
Compaction Tests	☐	
CCTV Report	☐	
CCTV Review	☐	
Exfiltration / Infiltration Test	☐	
Mandrel Test	☐	
Catch Basins		
Sump	☐	
Base	☐	
Joints	☐	
Grate	☐	
Location	☐	
Clean	☐	
SWMFs		
Flared Ends (Inlet)	☐	
Flared Ends (Outlet)	☐	
Trash Rack	☐	
Rip Rap (Class, Size)	☐	
Topsoil	☐	
Seeding	☐	
Control Structure	☐	
General Clean-up	☐	

WATERMAINS

		COMMENTS
Compaction Tests	☐	
Hydrant Operation & Reports	☐	
Valve Operation & Reports	☐	
Pressure / Leakage Test	☐	
Chlorine Residual Test	☐	
Bacteriological Test	☐	

SERVICES

Compaction Tests	☐	
CC Operation	☐	
Sanitary	☐	
Storm	☐	
Water	☐	
Marker Stakes	☐	
Service Reports	☐	

CONCRETE

Curb and Gutter	☐	
Sidewalk	☐	
Expansion Joints	☐	
Concrete Tests	☐	
Mix Design	☐	
CC Stamps	☐	
Backfill	☐	
Clean	☐	

ASPHALT

Asphalt Surface Uniformity	☐	
Subgrade Compaction Tests	☐	
GBC Compaction Tests	☐	
Proofrolls	☐	
Asphalt Core Results	☐	
Mix Design	☐	
Thickness	☐	
Density	☐	
Clean	☐	

SITE GRADING

Ditches	☐	
Culverts	☐	
Swales	☐	
Clean	☐	
Lots Rough-Graded to Ensure Positive Drainage	☐	

I, _____ (Consultant's Name) of _____ (Consultant's Firm) certify that _____ (Project Name) has been preinspected and is ready for a _____ (CCC / FAC) inspection of the _____ (Underground / Surface / Landscape) works.

Signature: _____ Date: _____

ENGINEERING PRE-INSPECTION CHECKLIST (CCC/FAC)

VILLAGE OF WASKATENAU

SANITARY SEWER

		COMMENTS
Manholes		
Channel	☐	
Base	☐	
Joints	☐	
Cover	☐	
Grade Rings	☐	
Clean	☐	
Main Line		
Compaction Tests	☐	
CCTV Report	☐	
CCTV Review	☐	
Exfiltration / Infiltration Test	☐	
Mandrel Test	☐	

STORM SEWER

		COMMENTS
Manholes		
Channel	☐	
Base	☐	
Joints	☐	
Cover	☐	
Grade Rings	☐	
Clean	☐	
Main Line		
Compaction Tests	☐	
CCTV Report	☐	
CCTV Review	☐	
Exfiltration / Infiltration Test	☐	
Mandrel Test	☐	
Catch Basins		
Sump	☐	
Base	☐	
Joints	☐	
Grate	☐	
Location	☐	
Clean	☐	
SWMFs		
Flared Ends (Inlet)	☐	
Flared Ends (Outlet)	☐	
Trash Rack	☐	
Rip Rap (Class, Size)	☐	
Topsoil	☐	
Seeding	☐	
Control Structure	☐	
General Clean-up	☐	

WATERMAINS

		COMMENTS
Compaction Tests	☐	
Hydrant Operation & Reports	☐	
Valve Operation & Reports	☐	
Pressure / Leakage Test	☐	
Chlorine Residual Test	☐	
Bacteriological Test	☐	

SERVICES

Compaction Tests	☐	
CC Operation	☐	
Sanitary	☐	
Storm	☐	
Water	☐	
Marker Stakes	☐	
Service Reports	☐	

CONCRETE

Curb and Gutter	☐	
Sidewalk	☐	
Expansion Joints	☐	
Concrete Tests	☐	
Mix Design	☐	
CC Stamps	☐	
Backfill	☐	
Clean	☐	

ASPHALT

Asphalt Surface Uniformity	☐	
Subgrade Compaction Tests	☐	
GBC Compaction Tests	☐	
Proofrolls	☐	
Asphalt Core Results	☐	
Mix Design	☐	
Thickness	☐	
Density	☐	
Clean	☐	

SITE GRADING

Ditches	☐	
Culverts	☐	
Swales	☐	
Clean	☐	
Lots Rough-Graded to Ensure Positive Drainage	☐	

I, _____ (Consultant's Name) of _____ (Consultant's Firm) certify that _____ (Project Name) has been preinspected and is ready for a _____ (CCC / FAC) inspection of the _____ (Underground / Surface / Landscape) works.

Signature: _____ Date: _____

LANDSCAPE PRE-INSPECTION REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	Maintenance Logs:
Stage of Construction:	
Contractor(s) on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has planting been completed? Are the counts correct?			
Are trees staked and tied?			
Are trees straight/ aligned/ and at the proper planting height?			
Are the trees healthy and watered in the last 48 hours?			
Are tree soil/ mulch rings in place?			
Has seeding/ sodding been completed? Has it been maintained recently?			
Are there any bare/ damaged sections of turf which need to be replaced/ overseeded?			
Has the site been weeded/ sprayed?			
Have all site amenities been installed as per plan?			
Are there any damages to site amenities which require touch-up or replacement?			
Have construction debris/ stockpiles been removed from site?			

TOWN OF SMOKY LAKE
1923-2023

LANDSCAPE PRE-INSPECTION REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	Maintenance Logs:
Stage of Construction:	
Contractor(s) on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has planting been completed? Are the counts correct?			
Are trees staked and tied?			
Are trees straight/ aligned/ and at the proper planting height?			
Are the trees healthy and watered in the last 48 hours?			
Are tree soil/ mulch rings in place?			
Has seeding/ sodding been completed? Has it been maintained recently?			
Are there any bare/ damaged sections of turf which need to be replaced/ overseeded?			
Has the site been weeded/ sprayed?			
Have all site amenities been installed as per plan?			
Are there any damages to site amenities which require touch-up or replacement?			
Have construction debris/ stockpiles been removed from site?			

HISTORIC VILNA

A true Alberta boomtown...

LANDSCAPE PRE-INSPECTION REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	Maintenance Logs:
Stage of Construction:	
Contractor(s) on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has planting been completed? Are the counts correct?			
Are trees staked and tied?			
Are trees straight/ aligned/ and at the proper planting height?			
Are the trees healthy and watered in the last 48 hours?			
Are tree soil/ mulch rings in place?			
Has seeding/ sodding been completed? Has it been maintained recently?			
Are there any bare/ damaged sections of turf which need to be replaced/ overseeded?			
Has the site been weeded/ sprayed?			
Have all site amenities been installed as per plan?			
Are there any damages to site amenities which require touch-up or replacement?			
Have construction debris/ stockpiles been removed from site?			

VILLAGE OF
WASKATENAU

LANDSCAPE PRE-INSPECTION REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	Maintenance Logs:
Stage of Construction:	
Contractor(s) on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has planting been completed? Are the counts correct?			
Are trees staked and tied?			
Are trees straight/ aligned/ and at the proper planting height?			
Are the trees healthy and watered in the last 48 hours?			
Are tree soil/ mulch rings in place?			
Has seeding/ sodding been completed? Has it been maintained recently?			
Are there any bare/ damaged sections of turf which need to be replaced/ overseeded?			
Has the site been weeded/ sprayed?			
Have all site amenities been installed as per plan?			
Are there any damages to site amenities which require touch-up or replacement?			
Have construction debris/ stockpiles been removed from site?			

FENCE PRE-INSPECTION REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	
Stage of Construction:	
Contractor(s) on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has all fencing been completed as per plans?			
Has the fence alignment/ offset been verified?			
Are all posts straight and firmly set in the ground?			
Are all panels securely fastened to posts?			
Are there any damages which require touch-up or replacement?			
Are all gates installed as per plans?			
Do all gates swing into lots without impediment & latch properly?			
Is the bottom of the fence a minimum of 75 mm above final grade? (N/A to Noise Fence)			
Have construction debris/ stockpiles been removed from site?			

TOWN OF SMOKY LAKE
1923-2023

FENCE PRE-INSPECTION REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	
Stage of Construction:	
Contractor(s) on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has all fencing been completed as per plans?			
Has the fence alignment/ offset been verified?			
Are all posts straight and firmly set in the ground?			
Are all panels securely fastened to posts?			
Are there any damages which require touch-up or replacement?			
Are all gates installed as per plans?			
Do all gates swing into lots without impediment & latch properly?			
Is the bottom of the fence a minimum of 75 mm above final grade? (N/A to Noise Fence)			
Have construction debris/ stockpiles been removed from site?			

HISTORIC VILNA

A true Alberta boomtown...

FENCE PRE-INSPECTION REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	
Stage of Construction:	
Contractor(s) on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has all fencing been completed as per plans?			
Has the fence alignment/ offset been verified?			
Are all posts straight and firmly set in the ground?			
Are all panels securely fastened to posts?			
Are there any damages which require touch-up or replacement?			
Are all gates installed as per plans?			
Do all gates swing into lots without impediment & latch properly?			
Is the bottom of the fence a minimum of 75 mm above final grade? (N/A to Noise Fence)			
Have construction debris/ stockpiles been removed from site?			

VILLAGE OF
WASKATENAU

FENCE PRE-INSPECTION REPORT

Project Name	**File No.** **Contract No.**
Inspection Date: Time:	Date of Last Inspection:
Inspected By:	
Current Weather:	
Stage of Construction:	
Contractor(s) on Site:	

INSPECTION CHECKLIST	YES / NO	COMMENTS	ACTION REQUIRED
Has all fencing been completed as per plans?			
Has the fence alignment/ offset been verified?			
Are all posts straight and firmly set in the ground?			
Are all panels securely fastened to posts?			
Are there any damages which require touch-up or replacement?			
Are all gates installed as per plans?			
Do all gates swing into lots without impediment & latch properly?			
Is the bottom of the fence a minimum of 75 mm above final grade? (N/A to Noise Fence)			
Have construction debris/ stockpiles been removed from site?			

SMOKY LAKE COUNTY

SERVICE REPORT

Street _____

Lot _____ Civic No. _____

Development Permit No: _____

PUBLIC

	Water	Sanitary	Storm
Length:			
Material:			
Diameter:			
Colour:			
Depth @ Main (m):			
Depth @ PL (m):			
T.O.P. Elev. @ Main:			
T.O.P. Elev. @ PL:			
Main Diameter:			
Curb Stop to PL (m):			
PL to Stub (m):			

Contractor: _____

Inspected By: _____

Date: _____

Record Drawing #: _____

Insulation? ☐ Yes ☐ No

Anode? ☐ Yes ☐ No

RURAL DEVELOPMENTS

Driveway Culvert? ☐ Yes ☐ No

Precast Headwalls? ☐ Yes ☐ No

Driveway Culvert Diameter: _____

Material: _____

Additional Notes & Comments:

PRIVATE

	Water	Sanitary	Storm
Length:			
Material:			
Diameter:			
Colour:			
Depth @ Bldg.:			

Contractor: _____

Inspected By: _____

Date: _____

Insulation? ☐ Yes ☐ No

Rock? ☐ Yes ☐ No

Sump Pump Connected to Foundation Drain? ☐ Yes ☐ No

Sanitary Service Type? ☐ Gravity ☐ Pressure

Private Pump Station Info Lift: _____

Distance: _____

Additional Notes & Comments:

SEE REVERSE FOR SKETCH

SMOKY LAKE COUNTY

SERVICE REPORT

Street _____

Lot _____ Civic No. _____

PRIVATE

PUBLIC

SEE REVERSE FOR DETAILS

TOWN OF SMOKY LAKE

SERVICE REPORT

Street _____

Lot _____ Civic No. _____

Development Permit No: _____

PUBLIC

	Water	Sanitary	Storm
Length:			
Material:			
Diameter:			
Colour:			
Depth @ Main (m):			
Depth @ PL (m):			
T.O.P. Elev. @ Main:			
T.O.P. Elev. @ PL:			
Main Diameter:			
Curb Stop to PL (m):			
PL to Stub (m):			

Contractor: _____

Inspected By: _____

Date: _____

Record Drawing #: _____

Insulation? ☐ Yes ☐ No

Anode? ☐ Yes ☐ No

RURAL DEVELOPMENTS

Driveway Culvert? ☐ Yes ☐ No

Precast Headwalls? ☐ Yes ☐ No

Driveway Culvert Diameter: _____

Material: _____

Additional Notes & Comments:

PRIVATE

	Water	Sanitary	Storm
Length:			
Material:			
Diameter:			
Colour:			
Depth @ Bldg.:			

Contractor: _____

Inspected By: _____

Date: _____

Insulation? ☐ Yes ☐ No

Rock? ☐ Yes ☐ No

Sump Pump Connected to Foundation Drain? ☐ Yes ☐ No

Sanitary Service Type? ☐ Gravity ☐ Pressure

Private Pump Station Info Lift: _____

Distance: _____

Additional Notes & Comments:

SEE REVERSE FOR SKETCH

TOWN OF SMOKY LAKE

SERVICE REPORT

Street _____

Lot _____ Civic No. _____

PRIVATE

PUBLIC

SEE REVERSE FOR DETAILS

VILLAGE OF VILNA

SERVICE REPORT

HISTORIC VILNA
A true Alberta boomtown...

Street _____

Lot _____ **Civic No.** _____

Development Permit No: _____

PUBLIC

	Water	Sanitary	Storm
Length:			
Material:			
Diameter:			
Colour:			
Depth @ Main (m):			
Depth @ PL (m):			
T.O.P. Elev. @ Main:			
T.O.P. Elev. @ PL:			
Main Diameter:			
Curb Stop to PL (m):			
PL to Stub (m):			

Contractor: _____
Inspected By: _____
Date: _____
Record Drawing #: _____

Insulation? ☐ Yes ☐ No
Anode? ☐ Yes ☐ No

RURAL DEVELOPMENTS

Driveway Culvert? ☐ Yes ☐ No
Precast Headwalls? ☐ Yes ☐ No

Driveway Culvert **Diameter:** _____
Material: _____

Additional Notes & Comments:

PRIVATE

	Water	Sanitary	Storm
Length:			
Material:			
Diameter:			
Colour:			
Depth @ Bldg.:			

Contractor: _____
Inspected By: _____
Date: _____

Insulation? ☐ Yes ☐ No
Rock? ☐ Yes ☐ No
Sump Pump Connected to Foundation Drain? ☐ Yes ☐ No

Sanitary Service Type? ☐ Gravity ☐ Pressure

Private Pump Station Info **Lift:** _____
Distance: _____

Additional Notes & Comments:

SEE REVERSE FOR SKETCH

VILLAGE OF VILNA

SERVICE REPORT

HISTORIC VILNA

A true Alberta boomtown...

Street _____

Lot _____ Civic No. _____

PRIVATE

PUBLIC

SEE REVERSE FOR DETAILS

VILLAGE OF WASKATENAU

SERVICE REPORT

VILLAGE OF WASKATENAU

Street _____

Lot _____ Civic No. _____

Development Permit No: _____

PUBLIC

	Water	Sanitary	Storm
Length:			
Material:			
Diameter:			
Colour:			
Depth @ Main (m):			
Depth @ PL (m):			
T.O.P. Elev. @ Main:			
T.O.P. Elev. @ PL:			
Main Diameter:			
Curb Stop to PL (m):			
PL to Stub (m):			

Contractor: _____

Inspected By: _____

Date: _____

Record Drawing #: _____

Insulation? ☐ Yes ☐ No

Anode? ☐ Yes ☐ No

RURAL DEVELOPMENTS

Driveway Culvert? ☐ Yes ☐ No

Precast Headwalls? ☐ Yes ☐ No

Driveway Culvert Diameter: _____

Material: _____

Additional Notes & Comments:

PRIVATE

	Water	Sanitary	Storm
Length:			
Material:			
Diameter:			
Colour:			
Depth @ Bldg.:			

Contractor: _____

Inspected By: _____

Date: _____

Insulation? ☐ Yes ☐ No

Rock? ☐ Yes ☐ No

Sump Pump Connected to Foundation Drain? ☐ Yes ☐ No

Sanitary Service Type? ☐ Gravity ☐ Pressure

Private Pump Station Info Lift: _____

Distance: _____

Additional Notes & Comments:

SEE REVERSE FOR SKETCH

VILLAGE OF WASKATENAU

SERVICE REPORT

VILLAGE OF
WASKATENAU

Street _____

Lot _____ Civic No. _____

PRIVATE

PUBLIC

SEE REVERSE FOR DETAILS

Hydrant Report

HYDRANT NO. _____

DRAWING NO.: _____

OWNER: _____ OPERATOR: _____

Valve Position from Hydrant: _____

HYDRANT LOCATION

CONTROL VALVE NO.: _____

Nearest Intersection: _____

Alignment Street: _____

X Coordinate: _____ Y Coordinate: _____

Z Coordinate: (Ground Elevation) _____ Z Coordinate: (Hydrant Flange Elevation) _____ Depth: _____

HYDRANT INFORMATION

Manufacturer: _____ Model: _____

Installation Date: _____ Type: _____ Drain Holes: (Plugged? Y/N) _____

Barrel / Cap Colour: _____ No. of Hose Connections: _____ No. of Bollards: _____

Barrel Diameter: _____ Pumper Connection (Y/N): _____ Anode (Y/N): _____

HYDRANT LEAD INFORMATION

Lead Alignment: _____ Diameter: _____ Material: _____

Manufacturer: _____ Model: _____

HYDRANT STATUS - Operator to keep up-to-date

Current Status: _____ Date Status Changed: _____

WATERMAIN INFORMATION

Alignment: _____ Manufacturer: _____

Diameter: _____ Material: _____ Make: _____

PROJECT INFORMATION

Project No.: _____ Year: _____ Work Order: _____ Year: _____

Contractor: _____ Construction Foreman: _____

FIELD SKETCH AND COMMENTS: (NOTE: Provide sketch if detail is not included in the Record Drawings)

Hydrant Report

TOWN OF SMOKY LAKE 1923-2023

HYDRANT NO. _____

DRAWING NO.: _____

OWNER: _____ OPERATOR: _____

Valve Position from Hydrant: _____

HYDRANT LOCATION **CONTROL VALVE NO.:** _____

Nearest Intersection: _____

Alignment Street: _____

X Coordinate: _____ Y Coordinate: _____

Z Coordinate: (Ground Elevation) _____ Z Coordinate: (Hydrant Flange Elevation) _____ Depth: _____

HYDRANT INFORMATION

Manufacturer: _____ Model: _____

Installation Date: _____ Type: _____ Drain Holes: (Plugged? Y/N) _____

Barrel / Cap Colour: _____ No. of Hose Connections: _____ No. of Bollards: _____

Barrel Diameter: _____ Pumper Connection (Y/N): _____ Anode (Y/N): _____

HYDRANT LEAD INFORMATION

Lead Alignment: _____ Diameter: _____ Material: _____

Manufacturer: _____ Model: _____

HYDRANT STATUS - Operator to keep up-to-date

Current Status: _____ Date Status Changed: _____

WATERMAIN INFORMATION

Alignment: _____ Manufacturer: _____

Diameter: _____ Material: _____ Make: _____

PROJECT INFORMATION

Project No.: _____ Year: _____ Work Order: _____ Year: _____

Contractor: _____ Construction Foreman: _____

FIELD SKETCH AND COMMENTS: (NOTE: Provide sketch if detail is not included in the Record Drawings)

Hydrant Report

HISTORIC VILNA
A true Alberta boomtown...

HYDRANT NO. _____

DRAWING NO.: _____

OWNER: _____ OPERATOR: _____

Valve Position from Hydrant: _____

HYDRANT LOCATION

CONTROL VALVE NO.: _____

Nearest Intersection: _____

Alignment Street: _____

X Coordinate: _____ Y Coordinate: _____

Z Coordinate: (Ground Elevation) _____ Z Coordinate: (Hydrant Flange Elevation) _____ Depth: _____

HYDRANT INFORMATION

Manufacturer: _____ Model: _____

Installation Date: _____ Type: _____ Drain Holes: (Plugged? Y/N) _____

Barrel / Cap Colour: _____ No. of Hose Connections: _____ No. of Bollards: _____

Barrel Diameter: _____ Pumper Connection (Y/N): _____ Anode (Y/N): _____

HYDRANT LEAD INFORMATION

Lead Alignment: _____ Diameter: _____ Material: _____

Manufacturer: _____ Model: _____

HYDRANT STATUS - Operator to keep up-to-date

Current Status: _____ Date Status Changed: _____

WATERMAIN INFORMATION

Alignment: _____ Manufacturer: _____

Diameter: _____ Material: _____ Make: _____

PROJECT INFORMATION

Project No.: _____ Year: _____ Work Order: _____ Year: _____

Contractor: _____ Construction Foreman: _____

FIELD SKETCH AND COMMENTS: (NOTE: Provide sketch if detail is not included in the Record Drawings)

Hydrant Report

VILLAGE OF WASKATENAU

HYDRANT NO. _____

DRAWING NO.: _____

OWNER: _____ OPERATOR: _____

Valve Position from Hydrant: _____

HYDRANT LOCATION

CONTROL VALVE NO.: _____

Nearest Intersection: _____

Alignment Street: _____

X Coordinate: _____ Y Coordinate: _____

Z Coordinate: (Ground Elevation) _____ Z Coordinate: (Hydrant Flange Elevation) _____ Depth: _____

HYDRANT INFORMATION

Manufacturer: _____ Model: _____

Installation Date: _____ Type: _____ Drain Holes: (Plugged? Y/N) _____

Barrel / Cap Colour: _____ No. of Hose Connections: _____ No. of Bollards: _____

Barrel Diameter: _____ Pumper Connection (Y/N): _____ Anode (Y/N): _____

HYDRANT LEAD INFORMATION

Lead Alignment: _____ Diameter: _____ Material: _____

Manufacturer: _____ Model: _____

HYDRANT STATUS - Operator to keep up-to-date

Current Status: _____ Date Status Changed: _____

WATERMAIN INFORMATION

Alignment: _____ Manufacturer: _____

Diameter: _____ Material: _____ Make: _____

PROJECT INFORMATION

Project No.: _____ Year: _____ Work Order: _____ Year: _____

Contractor: _____ Construction Foreman: _____

FIELD SKETCH AND COMMENTS: (NOTE: Provide sketch if detail is not included in the Record Drawings)

VALVE REPORT

VALVE NO. _____

DRAWING NO: _____

OWNER: _____ OPERATOR: _____

VALVE PURPOSE: MAIN CONTROL, HYDRANT CONTROL, SERVICE CONTROL, AIR VENT, BLOW OFF CONTROL, PRESSURE REDUCER, SURGE PROTECTION, FLUSH POINT CONTROL,
ZONE SEPARATION: (Please choose one) _____

VALVE LOCATION

Nearest Intersection: _____

Alignment Street: _____

X Coordinate: _____ Y Coordinate: _____

Z Coordinate: (Ground Elevation) _____ Z Coordinate: (Invert Elevation) _____ Depth: _____

WATERMAIN INFORMATION

Alignment: _____

Diameter: _____ Material: _____

VALVE STATUS - Operator to keep up-to-date

Current Status: (Open, Close-Stop, Other) _____ Date Status Changed: _____ Reason Changed: _____

VALVE INFORMATION

Installation Date: _____ Diameter: _____ Actuator (Y/N): _____ Anode (Y/N): _____

Manufacturer: _____ Model: _____

Type (Gate, Butterfly, Ball, Check, PRV, Ball-CC): _____

Casing (Y/N): _____ Geared (Y/N): _____ Direction to Open (L/R): _____

Installation Method (TVS, In Chamber, Direct Bury): _____

SERVICE MAIN INFORMATION (if Applicable)

Alignment: _____

Diameter: _____ Material: _____ Make: _____

IF VALVE IS FOR SERVICE CONTROL, SELECT THE APPLICABLE SERVICES

Domestic (Y/N): _____ Fire Hose (Y/N): _____ Hydrant (Y/N): _____

Sprinkler (Y/N): _____ Critical Service (Y/N): _____ Commercial (Y/N): _____

PROJECT INFORMATION

Project No.: _____ Year: _____ Work Order: _____ Year: _____

Contractor: _____ Construction Foreman: _____

FIELD SKETCH AND COMMENTS: (NOTE: Provide sketch if detail is not included in the Record Drawings)

VALVE REPORT TOWN OF SMOKY LAKE 1923-2023

VALVE NO. _____

DRAWING NO: _____

OWNER: _____ OPERATOR: _____

VALVE PURPOSE: MAIN CONTROL, HYDRANT CONTROL, SERVICE CONTROL, AIR VENT, BLOW OFF CONTROL, PRESSURE REDUCER, SURGE PROTECTION, FLUSH POINT CONTROL,
ZONE SEPARATION: (Please choose one) _____

VALVE LOCATION

Nearest Intersection: _____

Alignment Street: _____

X Coordinate: _____ Y Coordinate: _____

Z Coordinate: (Ground Elevation) _____ Z Coordinate: (Invert Elevation) _____ Depth: _____

WATERMAIN INFORMATION

Alignment: _____

Diameter: _____ Material: _____

VALVE STATUS - Operator to keep up-to-date

Current Status: (Open, Close-Stop, Other) _____ Date Status Changed: _____ Reason Changed: _____

VALVE INFORMATION

Installation Date: _____ Diameter: _____ Actuator (Y/N): _____ Anode (Y/N): _____

Manufacturer: _____ Model: _____

Type (Gate, Butterfly, Ball, Check, PRV, Ball-CC): _____

Casing (Y/N): _____ Geared (Y/N): _____ Direction to Open (L/R): _____

Installation Method (TVS, In Chamber, Direct Bury): _____

SERVICE MAIN INFORMATION (if Applicable)

Alignment: _____

Diameter: _____ Material: _____ Make: _____

IF VALVE IS FOR SERVICE CONTROL, SELECT THE APPLICABLE SERVICES

Domestic (Y/N): _____ Fire Hose (Y/N): _____ Hydrant (Y/N): _____

Sprinkler (Y/N): _____ Critical Service (Y/N): _____ Commercial (Y/N): _____

PROJECT INFORMATION

Project No.: _____ Year: _____ Work Order: _____ Year: _____

Contractor: _____ Construction Foreman: _____

FIELD SKETCH AND COMMENTS: (NOTE: Provide sketch if detail is not included in the Record Drawings)

VALVE REPORT

HISTORIC VILNA
A true Alberta boomtown...

VALVE NO. _____

DRAWING NO: _____

OWNER: _____ OPERATOR: _____

VALVE PURPOSE: MAIN CONTROL, HYDRANT CONTROL, SERVICE CONTROL, AIR VENT, BLOW OFF CONTROL, PRESSURE REDUCER, SURGE PROTECTION, FLUSH POINT CONTROL,
ZONE SEPARATION: (Please choose one) _____

VALVE LOCATION

Nearest Intersection: _____

Alignment Street: _____

X Coordinate: _____ Y Coordinate: _____

Z Coordinate: (Ground Elevation) _____ Z Coordinate: (Invert Elevation) _____ Depth: _____

WATERMAIN INFORMATION

Alignment: _____

Diameter: _____ Material: _____

VALVE STATUS - Operator to keep up-to-date

Current Status: (Open, Close-Stop, Other) _____ Date Status Changed: _____ Reason Changed: _____

VALVE INFORMATION

Installation Date: _____ Diameter: _____ Actuator (Y/N): _____ Anode (Y/N): _____

Manufacturer: _____ Model: _____

Type (Gate, Butterfly, Ball, Check, PRV, Ball-CC): _____

Casing (Y/N): _____ Geared (Y/N): _____ Direction to Open (L/R): _____

Installation Method (TVS, In Chamber, Direct Bury): _____

SERVICE MAIN INFORMATION (if Applicable)

Alignment: _____

Diameter: _____ Material: _____ Make: _____

IF VALVE IS FOR SERVICE CONTROL, SELECT THE APPLICABLE SERVICES

Domestic (Y/N): _____ Fire Hose (Y/N): _____ Hydrant (Y/N): _____

Sprinkler (Y/N): _____ Critical Service (Y/N): _____ Commercial (Y/N): _____

PROJECT INFORMATION

Project No.: _____ Year: _____ Work Order: _____ Year: _____

Contractor: _____ Construction Foreman: _____

FIELD SKETCH AND COMMENTS: (NOTE: Provide sketch if detail is not included in the Record Drawings)

VALVE REPORT

VILLAGE OF WASKATENAU

VALVE NO. _____

DRAWING NO: _____

OWNER: _____ OPERATOR: _____

VALVE PURPOSE: MAIN CONTROL, HYDRANT CONTROL, SERVICE CONTROL, AIR VENT, BLOW OFF CONTROL, PRESSURE REDUCER, SURGE PROTECTION, FLUSH POINT CONTROL,
ZONE SEPARATION: (Please choose one) _____

VALVE LOCATION

Nearest Intersection: _____

Alignment Street: _____

X Coordinate: _____ Y Coordinate: _____

Z Coordinate: (Ground Elevation) _____ Z Coordinate: (Invert Elevation) _____ Depth: _____

WATERMAIN INFORMATION

Alignment: _____

Diameter: _____ Material: _____

VALVE STATUS - Operator to keep up-to-date

Current Status: (Open, Close-Stop, Other) _____ Date Status Changed: _____ Reason Changed: _____

VALVE INFORMATION

Installation Date: _____ Diameter: _____ Actuator (Y/N): _____ Anode (Y/N): _____

Manufacturer: _____ Model: _____

Type (Gate, Butterfly, Ball, Check, PRV, Ball-CC): _____

Casing (Y/N): _____ Geared (Y/N): _____ Direction to Open (L/R): _____

Installation Method (TVS, In Chamber, Direct Bury): _____

SERVICE MAIN INFORMATION (if Applicable)

Alignment: _____

Diameter: _____ Material: _____ Make: _____

IF VALVE IS FOR SERVICE CONTROL, SELECT THE APPLICABLE SERVICES

Domestic (Y/N): _____ Fire Hose (Y/N): _____ Hydrant (Y/N): _____

Sprinkler (Y/N): _____ Critical Service (Y/N): _____ Commercial (Y/N): _____

PROJECT INFORMATION

Project No.: _____ Year: _____ Work Order: _____ Year: _____

Contractor: _____ Construction Foreman: _____

FIELD SKETCH AND COMMENTS: (NOTE: Provide sketch if detail is not included in the Record Drawings)

CONSTRUCTION COMPLETION CERTIFICATE

The following certificate shall be prepared and executed by the Developer and Developer's Consultant for submission to Smoky Lake County.

Date: _____

Brief Project Description:

_____

_____

_____

Developer:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

Developer's Consultant:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

The CCC inspection was performed on _____ and all noted deficiencies have been rectified.

I, _____ of _____
(Consultant's Name) (Consultant's Firm)

hereby certify that the contract for the above described project has been completed in general conformance with the Contract Documents and the Smoky Lake Regional Engineering Design Standards.

Engineer's Seal

Company Permit Stamp

Smoky Lake County

Based on the above certification, Smoky Lake County accepts that the project is complete and that the warranty period as it affects the County will commence on _____

Name: _____ Signature: _____

Date: _____

CONSTRUCTION COMPLETION CERTIFICATE

The following certificate shall be prepared and executed by the Developer and Developer's Consultant for submission to the Town of Smoky Lake.

Date: _____

Brief Project Description:

_____

_____

_____

Developer:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

Developer's Consultant:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

The CCC inspection was performed on _____ and all noted deficiencies have been rectified.

I, _____ of _____
(Consultant's Name) (Consultant's Firm)

hereby certify that the contract for the above described project has been completed in general conformance with the Contract Documents and the Smoky Lake Regional Engineering Design Standards.

Engineer's Seal

Company Permit Stamp

Town of Smoky Lake

Based on the above certification, the Town of Smoky Lake accepts that the project is complete and that the warranty period as it affects the Town will commence on _____

Name: _____ Signature: _____

Date: _____

HISTORIC VILNA

A true Alberta boomtown...

CONSTRUCTION COMPLETION CERTIFICATE

The following certificate shall be prepared and executed by the Developer and Developer's Consultant for submission to the Village of Vilna.

Date: _____

Brief Project Description:

_____

_____

_____

Developer:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

Developer's Consultant:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

The CCC inspection was performed on _____ and all noted deficiencies have been rectified.

I, _____ of _____
(Consultant's Name) (Consultant's Firm)

hereby certify that the contract for the above described project has been completed in general conformance with the Contract Documents and the Smoky Lake Regional Engineering Design Standards.

Engineer's Seal

Company Permit Stamp

Village of Vilna

Based on the above certification, the Village of Vilna accepts that the project is complete and that the warranty period as it affects the Village will commence on _____

Name: _____ Signature: _____

Date: _____

VILLAGE OF WASKATENAU

CONSTRUCTION COMPLETION CERTIFICATE

The following certificate shall be prepared and executed by the Developer and Developer's Consultant for submission to the Village of Waskatenau.

Date: _____

Brief Project Description:

_____

_____

_____

Developer:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

Developer's Consultant:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

The CCC inspection was performed on _____ and all noted deficiencies have been rectified.

I, _____ of _____
(Consultant's Name) (Consultant's Firm)

hereby certify that the contract for the above described project has been completed in general conformance with the Contract Documents and the Smoky Lake Regional Engineering Design Standards.

Engineer's Seal

Company Permit Stamp

Village of Waskatenau

Based on the above certification, the Village of Waskatenau accepts that the project is complete and that the warranty period as it affects the Village will commence on _____

Name: _____ Signature: _____

Date: _____

FINAL ACCEPTANCE CERTIFICATE

The following certificate shall be prepared and executed by the Developer and Developer's Consultant for submission to Smoky Lake County.

Date: _____

Brief Project Description:

_____

_____

_____

Developer:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

Developer's Consultant:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

The FAC inspection was performed on _____ and all noted deficiencies have been rectified.

I, _____ of _____
(Consultant's Name) (Consultant's Firm)

hereby certify that the contract for the above described project has been completed in general conformance with the Contract Documents and the Regional Engineering Design Standards and that all deficiencies have been rectified to the County's satisfaction.

Engineer's Seal

Company Permit Stamp

Smoky Lake County

Based on the above certification, Smoky Lake County accepts that the warranty period has expired effective _____ and that the County assumes responsibility for the development as it concerns the County.

Name: _____ Signature: _____

Date: _____

FINAL ACCEPTANCE CERTIFICATE

The following certificate shall be prepared and executed by the Developer and Developer's Consultant for submission to the Town of Smoky Lake.

Date: _____

Brief Project Description:

_____

_____

_____

Developer:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

Developer's Consultant:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

The FAC inspection was performed on _____ and all noted deficiencies have been rectified.

I, _____ of _____
(Consultant's Name) (Consultant's Firm)

hereby certify that the contract for the above described project has been completed in general conformance with the Contract Documents and the Regional Engineering Design Standards and that all deficiencies have been rectified to the Town's satisfaction.

Engineer's Seal

Company Permit Stamp

Town of Smoky Lake

Based on the above certification, the Town of Smoky Lake accepts that the warranty period has expired effective _____ and that the Town assumes responsibility for the development as it concerns the Town.

Name: _____ Signature: _____

Date: _____

HISTORIC VILNA

A true Alberta boomtown...

FINAL ACCEPTANCE CERTIFICATE

The following certificate shall be prepared and executed by the Developer and Developer's Consultant for submission to the Village of Vilna.

Date: _____

Brief Project Description:

_____

_____

_____

Developer:

Name: _____

Address: _____

_____

_____

Phone: _____

Fax: _____

Developer's Consultant:

Name: _____

Address: _____

_____

_____

Phone: _____

Fax: _____

The FAC inspection was performed on _____ and all noted deficiencies have been rectified.

I, _____ of _____

(Consultant's Name) (Consultant's Firm)

hereby certify that the contract for the above described project has been completed in general conformance with the Contract Documents and the Regional Engineering Design Standards and that all deficiencies have been rectified to the Village's satisfaction.

Engineer's Seal

Company Permit Stamp

Village of Vilna

Based on the above certification, the Village of Vilna accepts that the warranty period has expired effective _____ and that the Village assumes responsibility for the development as it concerns the Village.

Name: _____ Signature: _____

Date: _____

VILLAGE OF
WASKATENAU

FINAL ACCEPTANCE CERTIFICATE

The following certificate shall be prepared and executed by the Developer and Developer's Consultant for submission to the Village of Waskatenau.

Date: _____

Brief Project Description:

_____

_____

_____

Developer:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

Developer's Consultant:

Name: _____
Address: _____
_____
_____
Phone: _____
Fax: _____

The FAC inspection was performed on _____ and all noted deficiencies have been rectified.

I, _____ of _____
(Consultant's Name) (Consultant's Firm)

hereby certify that the contract for the above described project has been completed in general conformance with the Contract Documents and the Regional Engineering Design Standards and that all deficiencies have been rectified to the Village's satisfaction.

Engineer's Seal

Company Permit Stamp

Village of Waskatenau

Based on the above certification, the Village of Waskatenau accepts that the warranty period has expired effective _____ and that the Village assumes responsibility for the development as it concerns the Village.

Name: _____ Signature: _____

Date: _____

Part B
URBAN

B1 ROADWAY SYSTEMS

B1.1 General

.1 **Section B1** covers the general design and construction of roads, alleys, trails, curbs, gutters, sidewalks, boulevards, and accessories to be built or re-built within Urban areas in the Smoky Lake Region.

.2 For requirements pertaining to roadways with a Rural cross-section (i.e., gravel roads), refer to **Section C1**.

.3 **Typical Details** relating to Urban roadway design and construction are provided at the end of **Section B1**.

.4 Specific construction requirements, construction materials, and procedures are not included in the REDS.

B1.2 Traffic and Transportation

.1 **Section B1** covers the transportation and traffic engineering aspects of Urban roadway and walkway design in the Smoky Lake Region.

.2 These standards are the minimum requirements for Urban roadway and walkway facilities.

.3 Changes in the design values may be considered, provided that the changes are justified and the added benefits provided by the Developer's Consultant are to the Municipality's satisfaction.

.4 All designs shall conform to the relevant Area Structure Plan (if available), the Transportation Master Plan (if available), and shall ensure the safe and efficient movement of traffic and pedestrians.

.5 Sufficient access points to Rural and Urban collectors shall be provided to the satisfaction of the Municipality.

.6 Roadway capacity and safety can be affected by the following factors:

- **Roadway Geometrics** - Road right-of-way, road width, lane width, storage turn bay lengths and geometrics, grade and curvature, intersection configuration, etc.
- **Traffic Characteristics** - Traffic volume, speed, traffic composition, traffic fluctuations, saturation flow, etc.
- **Road "Frictions"** - Traffic control measures, parking conditions, access locations and numbers, driver sight distance, street furniture, etc.

B1.3 Road Classification and Geometric Standards

.1 The classification and designation of roads and walkways shall be undertaken during the subdivision planning stages; it shall commence with conceptual planning, to ensure road, walkway, utility, and right-of-way requirements can be coordinated, established, and accepted in the design stages of subdivision development.

B1.3.1 General

.1 Roads are classified based on a functional hierarchy. The road classifications are local, collector, and arterial.

.2 The design standards for Urban roads shall be in accordance with the geometric design standards outlined in "Geometric Design Guide for Canadian Roads" published by TAC. Alberta Transportation's Highway Geometric Design Guide may also be applicable.

.3 Typical cross-sections are included with the **Typical Details** at the end of **Section B1**.

.1 The Town and Villages have unique "Main Street" cross-sections; refer to the **Typical Details** in **Part D – Special Provisions** for more information.

.4 **Table B1-1** provides a summary of the geometric guidelines for Urban Residential local roadways; refer to the end of **Section B1.3**.

B1.3.2 Arterial Roadways

.1 Arterial roadways generally serve to carry traffic between activity centres; i.e., connecting with collectors, other arterials, or freeways, but not local streets.

.2 On-street parking is not permitted on arterial roadways.

.3 The Region does not contain many municipally owned arterial roadways. Should an arterial roadway be required in the future, consult with the Municipality to confirm right-of-way and design requirements.

B1.3.3 Collector Roadways

.1 Collector roadways provide local access to frontage developments and collect traffic from several local streets or from an Industrial area, and channel it towards the arterial roadway system.

.2 A collector street can connect with local streets, other collectors, or intermittently with arterial roadways; however, their location should minimize the potential for use as a short-cut between arterial roadways.

.3 Parallel parking may be allowed on collector roadways.

.4 The Region does not contain many municipally owned collector roadways. Should a collector roadway be required in the future, consult with the Municipality to confirm right-of-way and design requirements.

B1.3.4 Local Roadways

.1 Local roadways are intended solely to provide access to individual properties.

.2 The level of traffic on a local roadway is not generally a problem; however, the volume can be controlled if the maximum length is set at 600 m and traffic calming considerations are incorporated into the design.

.3 Local roadways should only be permitted to connect with other local roadways or with collector roadways.

.4 All sites should provide sufficient on site parking to meet demands.

.5 The majority of roadways within the Region have been developed to a local standard. These standards focus on the requirements for local roadways.

DID YOU KNOW?

Waskatenau has unique requirements for local roadways.

Refer to Section D4 – Special Provisions for the Village of Waskatenau.

B1.3.5 Angled Parking

.1 The construction of new angled parking is generally not permitted.

.1 Angled parking along extensions of a Municipality's Main Street, which already provides for angled parking, may by acceptable to the Municipality upon submittal of appropriate design parameters.

Table B1-1
Urban Road Classification and Geometric Guidelines

Design Criteria	Urban Residential Local Roadway
Parking	Permitted
Service	Access
Flow Characteristic	Interrupted Flow
Design Speed (km/hr)	50
Posted Speed (km/hr)	30
Road Width (m) [1]	11.0 m
Travel Lanes (m)	2 @ 3.5 m
Parking Lanes (parallel)	2 @ 2.0 m
Curb and Gutter (mm)	400
Curb Type	Rolled Face [2] (see Note 2)
Radii (m) for Cul-de-Sac	14.0 m to FOC [3] (see Note 3)
Sidewalk	Separate/Mono, Both Sides
Sidewalk Width (m)	1.5 m
Right-of-Way Width (m)	20 m
Max./Min. Gradient (%) [5]	8/0.6
Min. Stop Sight Distance (m)	65
K, Crest (m)	7
K, Sag (m)	6
Max. Superelevation (m/m)	crowned
Typical Detail No.	B1-100

Notes:

[1] Road width dimension is face of curb to face of curb

[2] Curb and gutter are not required in areas without storm sewer (i.e., in areas with grassed swales for conveyance of surface runoff)

[3] FOC = face of curb

[4] Parking restrictions shall be applied on all residential cul-de-sacs from 7:30 am to 4:30 pm on the scheduled garbage collection day in the subject area

[5] Minimum grade along linear curb and gutter is to be 0.6%. Minimum grade along curved curb and gutter, including curb returns and cul-de-sac bulbs, is to be 1.0%

[6] Minimum radii for horizontal curves shall be as per the TAC Geometric Design Guide for Canadian Roads

B1.4 Pavement Structures

.1 A geotechnical investigation and independent pavement design are required for all developments and shall be based on a 20-year design life for in situ conditions and projected traffic volume.

.1 Additional pavement structure strengths and/or materials may be required in areas with poor subgrade materials, for areas with trucked water and sanitary service, and for heavy Industrial applications, pending the results of the geotechnical investigation.

.2 Where road use is mixed (i.e., Commercial and Residential), the pavement structure shall meet the higher load criteria.

.2 Roadways in all Urban subdivision developments shall be surfaced with asphaltic concrete pavement (hot mix asphalt).

.3 Good roadway industry construction practices and techniques shall be employed.

.4 In the case of a final lift being provided in the second year or later, the first lift shall be designed to withstand the expected loads due to construction activity and the final lift shall be placed after all roadway deficiencies (asphalt, road base, and concrete) have been rectified.

.5 An additional one (1) year of warranty may be required on materials and workmanship for the final lift (after FAC is issued for surface improvements) if the final lift does not comply fully with the REDS.

B1.5 Road Construction Requirements

B1.5.1 General

.1 Roadway construction shall be in accordance with the detailed design drawings, specifications, and REDS, and accepted by the Municipality.

.2 The work shall be carried out in an efficient manner with acceptable equipment and capable personnel.

.3 The Municipality or an appointed representative shall have access to the site at all times and shall promptly be provided with all test results and information necessary to assess the Contractor's performance.

.4 The Municipality must be notified prior to and have the option to be present at any proof rolls (pre- and post-cement-stabilization), concrete pours, backfilling operations, or paving operations.

B1.5.2 Clearing and Grubbing

.1 The Developer shall locate all underground utilities and protect all survey control monuments prior to construction.

.2 The surface of the ground within the clearing limits shall be cleared of all trees, logs, stumps, roots, undergrowth, rocks, boulders, structures, debris, and rubbish of any nature. Roots and stumps shall be removed to a minimum depth of 0.6 m below rough grade.

.3 All material cleared and grubbed shall be disposed off-site at a location acceptable to the Municipality.

.4 Burning of debris on site is not permitted.

.5 The Developer shall ensure positive drainage is maintained throughout all stages of site clearing.

B1.5.3 Topsoil Stripping

.1 Topsoil shall be stripped to full depth.

.2 Topsoil shall not be used as backfill.

.3 Topsoil may be stockpiled for use on other parts of the project.

B1.5.4 Excavation and Earthwork

.1 All excavation shall be carried out within the limits of the proposed work.

.2 For road construction, the right-of-way shall be graded to tie into the existing or proposed lot elevations at the property line and shall be left in a neat and tidy condition.

.3 The Developer shall ensure positive drainage is maintained throughout all stages of rough grading.

B1.5.5 Embankment Construction

.1 Native backfill deemed suitable for embankment construction, as per the geotechnical investigation, shall be used; otherwise, imported material shall be used for embankment construction.

.2 Material shall be placed in lifts not exceeding 300 mm in uncompacted depth and shall be compacted in accordance with the requirements outlined in the geotechnical investigation.

B1.5.6 Temporary Roads and Accesses

.1 Plans for temporary roads, accesses, and detours shall be approved by the Municipality.

.2 All-weather type construction will be required, and the Developer is responsible for all Maintenance of temporary roads, accesses, and detours.

.3 All signage, channelization, detours, closures, etc., shall be in accordance with the Manual of Uniform Traffic Control Devices for Canada as published by TAC.

B1.5.7 Snow Removal

.1 The Municipality shall be responsible for snow removal once the first lift of asphalt has been installed and a Construction Completion Certificate has been executed.

B1.5.8 Maintenance of Existing Facilities

.1 The existence and location of underground utilities indicated on the plans that have been determined from the Municipality's records are not guaranteed.

.2 The Developer is responsible to ensure that existing services, such as sewer mains, watermains, roadways, and landscaped areas, are not disturbed or become inoperable as a result of actions by the Developer, their agents, or Contractors.

.3 Existing services shall not be exposed to loadings beyond their design capacities.

.4 Existing services shall continuously be maintained and cleaned by the Developer where their actions are cause for additional Maintenance.

B1.5.9 Staged Construction

.1 Staged construction shall be to the satisfaction of the Municipality.

.2 The Developer shall meet with the Municipality, prior to the submission of the detailed engineering drawings, to confirm the approach for staged construction.

.3 The Developer is responsible for all Maintenance of partially completed works which have been opened for use. All partially completed works shall be completed prior to commencing with the next stage of construction.

.4 Temporary turnarounds are required and shall have an adequately designed pavement structure, signage, jersey barriers, and/or other requirements the Municipality deems necessary for future Maintenance and in the event that the temporary turnaround becomes permanent and shall satisfy any requirements the Fire Department may have.

B1.6 Materials

B1.6.1 General

.1 Materials used in roadway construction shall be from sources acceptable to the Municipality.

.2 Manufactured goods shall meet the standard manufacturer's specifications and the accepted roadway specifications.

.3 Under no circumstances shall defective, rejected, or substandard materials be used in the construction of roadways.

B1.6.2 Fill

.1 Trench backfill under roadways shall be as follows:

- **Class I** – use of imported granular backfill; or
- **Class II** – use of native backfill (granular material no greater than 63.5 mm); and
- **Class III** – under landscaped areas within the road right-of-way.

.2 Trench backfill for rehabilitation projects under existing roadways shall be approved granular material, compacted to 100% SPMDD.

.3 Fill areas under the subgrade shall be compacted to a minimum of 97% SPMDD.

.4 All materials shall be compacted in layers such that a uniform compaction is obtained.

B1.6.3 Subgrade

.1 Subgrade under the roadway structure shall be constructed of suitable soils, free from organic and frost susceptible materials.

.2 Subgrade preparation shall typically include scarification to a minimum depth of 300 mm, windrowing material to the side, compaction of exposed surface to 97% SPMDD (at optimum moisture content), replacement of windrowed material to line/grade and compacted to 100% SPMDD (at optimum moisture content).

.3 Cement-stabilization of the subgrade may be required; if so, the type of cement, depth of stabilization, and rate of cement to be used shall be as specified in the geotechnical report.

.4 A subgrade drainage system may also be required, pending the results of the geotechnical investigation. Refer to **Section B3** for wick drain requirements.

.5 The prepared subgrade shall be proof rolled and witnessed by the Developer's Representative and the Municipality.

.1 The Municipality shall be notified at least one (1) week prior to the proof roll.

.2 If possible, the Developer's Geotechnical Engineer shall be present at the proof roll.

.3 The recommended vehicle to be used for proof roll testing is a loaded tandem axle, dual wheel dump truck, with axle loads equivalent to the maximum legal highway limit. A water truck or a motor grader with equivalent axle loads may also be used in lieu of a dump truck. The tire pressure of the vehicle should be inflated to a minimum of 90% of the manufacturer's recommended inflation pressure.

.4 Obtain written acceptance from the Municipality to use non-standard proof rolling equipment.

.5 The proof roll testing procedure is to be performed in a pattern to load all areas of the subgrade. It requires a minimum of two complete passes in one direction. In the case of parking lot pavement areas or building footprints, a second series of at least two complete passes is also required, perpendicular to the first series.

.6 The equipment is to travel at the approximate speed of a comfortable walking pace. Qualified personnel are required to walk behind or beside the rear axles of the equipment while the passes are being made, to monitor for failures. Any areas that appear soft, display rutting, are displaced, or show deflections that are visually apparent is to be delineated and considered to be failed areas.

.7 Methods to correct failed areas may include moisture conditioning, and recompacting with additional fill, cement-stabilization, or removing the soft material and replacing with better quality material.

.8 When remedial work is performed to correct failed areas identified by the proof roll testing, a final proof roll test must be performed on the repaired and recompacted areas.

.6 Under no circumstance shall the subgrade be covered with the granular base course until the Developer's Representative has received test results indicating the requirements for density and moisture content have been met and a successful proof roll has been attained.

B1.6.4 Granular Road Base

.1 Granular road base materials shall be compacted to 100% SPMDD.

.2 **Granular base course materials** shall be Alberta Transportation Designation 2 meeting the following gradation:

Metric Sieve µm	Percent %
20 000	100
16 000	84 - 94
10 000	63 - 86
5 000	40 - 67
1 250	20 - 43
630	14 - 34
400	11 - 28
315	9 - 26
160	5 - 18
80	2 - 10

.3 **Granular subbase materials** shall be Alberta Transportation Designation 6 meeting the following gradation:

Metric Sieve µm	Percent %
80 000	100
50 000	55 – 100
25 000	38 - 100
16 000	32 - 85
5 000	20 - 65
315	6 - 30
80	2 - 10

.4 Granular base course and granular subbase course materials shall have the following properties:

Property	Granular Base Course	Granular Subbase Course
+5,000 µm with ≥ 2 fractured faces (% mass)	60 min.	
Plasticity Index	NP-6	NP-8
LA abrasion wear (% mass)	50 max.	

.5 The Developer shall retain a materials testing firm to establish the following for the aggregate proposed to be used:

- Sieve analysis;
- Crush count;
- Optimum moisture content; and
- Minimum dry density.

.6 The results of the materials testing shall be submitted to the Municipality for acceptance at least 3 business days prior to the granular material being used. A minimum of one set of tests shall be submitted for each 500 tonnes of aggregate used.

B1.6.5 Concrete

.1 Concrete for roadways (including sidewalks, walkways, and structures) shall have the following properties:

Property	Value
Minimum 28 day compressive strength	30 MPa
Slump (mm)	60 ± 20
Entrained air limits (% by volume)	5.5 – 8.0
Maximum aggregate size (mm)	20
Maximum water to cementing materials ratio (by mass)	0.45
Minimum Portland cement content (kg/m^3) – Spring and Fall mixes	335
Minimum Portland cement content (kg/m^3) – Summer mixes	302
Cement Type	GU

.2 **Seasonal considerations:**

.1 **Spring mixes** shall be used from the commencement of the construction season to May 15, or as directed by the Municipality. No replacement of the minimum cement content with fly ash is permitted for Spring mixes.

.2 **Summer mixes** shall be used from May 16 to September 30. No more than 10% of the specified minimum cement content may be replaced with fly ash for Summer mixes.

.3 **Fall mixes** shall be used from October 1 to October 15. No replacement of the minimum cement content with fly ash is permitted for Fall mixes and Type HS (sulphate-resistant) may not be used.

.3 The use of calcium chloride in concrete is discouraged.

.1 The use of calcium chloride in concrete may be permitted on a case-by-case basis, at the discretion of the Municipality, provided that the concrete in question will not require reinforcing steel.

.2 In the event that calcium chloride is accepted for use in concrete, its use shall conform to ASTM D98, the maximum amount permitted will be 2% by weight of cement, and Type 10 Normal Portland Cement shall be used.

.3 Calcium chloride shall not be used in concrete made using Type 50 Sulphate Resistant Cement.

.4 Concrete mix designs shall be made available to the Municipality (or their representative) for review upon request.

.5 Place hot and cold weather concrete to CSA A23.1.

.1 For cold weather concrete:

- Protection shall be provided when there is a probability of the air temperature falling below 5°C within 24 h of placing, as forecast by the nearest meteorological office.
- Adequate protection of the concrete shall be provided that will maintain the concrete temperature at a minimum of 10°C for the duration of the required curing period.

- Protection shall be provided by means of heated enclosures, coverings, insulation, or a suitable combination of these methods.
- To avoid cracking of the concrete due to a sudden temperature change near the end of the curing period, the protection shall not be completely removed until the concrete has cooled to a temperature in accordance with CSA A23.1.

B1.6.6 Asphalt

.1 Hot mix asphalt concrete shall conform to the Alberta Transportation Highway Geometric Design Guide.

.2 Asphalt mix designs shall be made available to the Municipality (or their representative) for review upon request.

.3 Production, placement, compaction, and quality assurance of the hot-mix asphalt should be pursuant to the requirements of TB-1 "Hot Mix Asphalt Materials, Mixture Design and Construction" as prepared by the National Centre for Asphalt Technology (NCAT) and published by the National Asphalt Pavement Association (NAPA), for guidance in good practices of handling materials and hot-mix production.

.4 Refer to the latest edition of the "Construction of Hot Mix Asphalt Pavements", Asphalt Institute Manual Series No. 22 (MS-22), for guidance in good paving practice.

.5 Refer to **Figure B1-1** for Air Temperature and Wind Limitations on Paving.

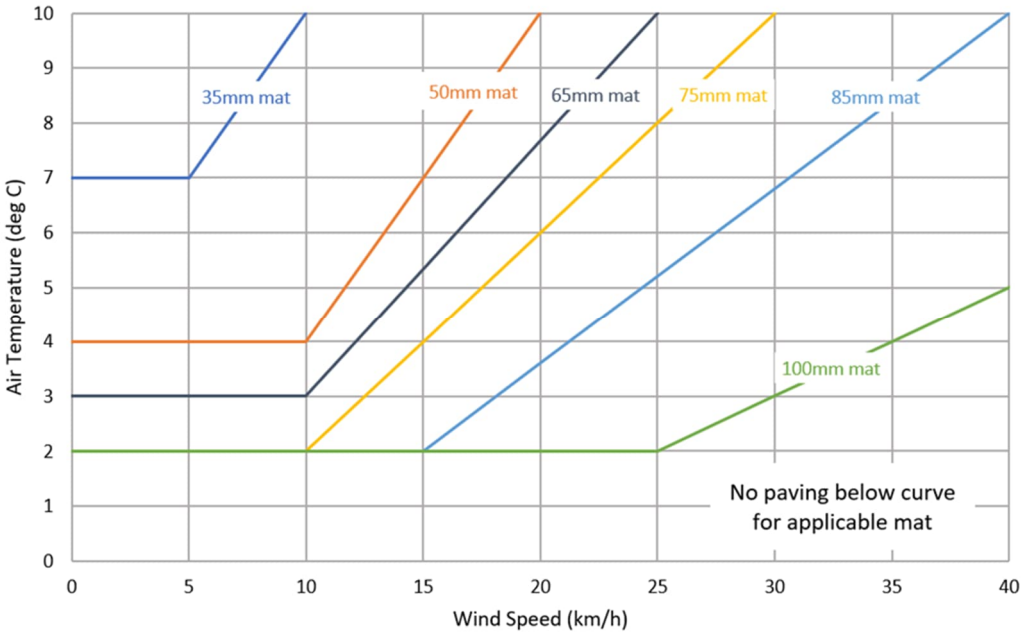


Figure B1-1
Air Temperature and Wind Limitations on Paving

.6 Refer to **Table B1-2** for traffic patterns to be considered for pavement design. Pavement structures shall be as per the geotechnical investigation and shall conform to Alberta Transportation's H, M, L, and S mixes where practical. The geotechnical report shall outline the recommended pavement structures as well as the design parameters used (e.g., traffic count, percentage of types of vehicles, CBR, etc.).

Table B1-2
Traffic Patterns for Pavement Design

Roadway Classification	Design Traffic Number, DTN	Equivalent Single Axle Load, ESAL
Local Residential	4.1	30,000
Industrial/Commercial Local	20.5	150,000
Minor Collector	13.7	100,000
Major Collector	27.5	200,000
Minor Arterial	135	1,000,000
Major Arterial	410	3,000,000

Note:
1. To convert DTN to ESAL: DTN x 365 days/yr x 20 years (design period) = ESAL

.7 Asphalt shall not be placed if any of the following conditions exist:

- Rain or snow is imminent, or the surface to be paved is wet, icy, snow-covered, or frozen.
- Air temperature and wind speed conditions are below the appropriate mat curve shown in **Figure B1-1**.

.8 Final lift shall not be placed until the base lift has been inspected and accepted by the Municipality.

B1.6.7 Recommended Pavement Structure

.1 A geotechnical investigation and independent pavement design is to be performed for all developments and shall be based on a 20-year design life for in-situ conditions and projected traffic volumes.

.2 A typical pavement structure for a Residential local roadway, based on Transportation Association of Canada guidelines for traffic loadings ($9x10^4$ design ESALs) and an assumed subgrade resilient modulus of 30 MPa, is as follows:

- **Asphalt Concrete (FAC):** 40 mm minimum layer thickness
- **Asphalt Concrete (Interim):** 65 mm minimum layer thickness
- **Crushed Granular Base:** 250 mm minimum layer thickness
- **Prepared Subgrade:** 150 mm minimum layer thickness

Note: ESALs = equivalent single axle loads

.3 The thickness of the pavement layers may need to be increased in areas with poor subgrade conditions and/or areas with higher traffic loading conditions. The more stringent of the above typical pavement structure and the recommended pavement structure in the geotechnical investigation shall govern.

B1.7 Construction Standards

B1.7.1 General

.1 Construction standards used for roadways shall generally be as accepted in the construction industry and as specifically set out in the construction specifications, procedures and methods set out by the Asphalt Institute and the Portland Cement Association.

B1.7.2 Competent Labour

.1 The Developer shall at all times employ skilled and competent labour for all construction operations.

.2 The Municipality shall retain the right to require the removal of incompetent labour.

B1.7.3 Equipment

.1 The construction equipment shall be maintained in proper operating conditions.

.2 The Municipality shall retain the right to order the removal or repair of improperly maintained equipment.

.3 Equipment shall be used in accordance with the manufacturer's recommendations and within the rated capacities specified.

B1.7.4 Asphalt Thickness Pay Factors

.1 If a core thickness is deficient, the affected area of asphalt pavement will be assessed a pay factor according to **Table B1-3** which will be applied to the price of the quantity of asphalt in that mat area.

.2 Asphalt pavement with excess thickness may be accepted with no extra payment if surface and grade tolerances and texture are met.

Table B1-3
Asphalt Thickness Pay Factors

Thickness Deficiency (%)	Pay Factor (%)
10.0	100.0
11.0	97.0
12.0	93.7
13.0	90.0
14.0	85.5
15.0	80.5
16.0	75.0
17.0	68.0
18.0	60.0
19.0	50.0
> 19.0	Grind and Resurface

B1.7.5 Asphalt Density Pay Factors

.1 Each mat of asphalt placed shall be compacted to the minimum density (Percent of Marshall Density) for the type of paving, as indicated in **Table B1-4**.

Table B1-4
Asphalt Density Requirements

Minimum Density	Type of Paving
98%	All stages for staged paving of roadways, excluding Residential FAC overlays
97%	Overlay greater than 40 mm thick
97%	Alley paving
96%	Residential FAC overlay – maximum 40 mm thick
96%	Rehabilitation overlay (mill and overlay locations)
96%	Asphalt walkway

.2 If a core density is less than specified, the affected area of mat may be accepted, subject to a pay factor according to **Table B1-5** which will be applied to the price of the quantity of asphalt in that mat area.

Table B1-5
Asphalt Density Pay Factors

98% Required		97% Required		96% Required	
Actual Density (%)	Pay Factor (%)	Actual Density (%)	Pay Factor (%)	Actual Density (%)	Pay Factor (%)
98.0	100.0	97.0	100.0	96.0	100.0
97.9	99.9	96.9	99.9	95.9	99.7
97.8	99.8	96.8	99.7	95.8	99.3
97.7	99.6	96.7	99.4	95.7	98.9
97.6	99.4	96.6	99.1	95.6	98.4
97.5	99.1	96.5	98.7	95.5	97.8
97.4	98.7	96.4	98.2	95.4	97.1
97.3	98.3	96.3	97.7	95.3	96.4
97.2	97.8	96.2	97.1	95.2	95.6
97.1	97.2	96.1	96.3	95.1	94.6
97.0	96.5	96.0	95.5	95.0	93.4
96.9	95.8	95.9	94.6	94.9	92.2
96.8	95.0	95.8	93.6	94.8	90.7
96.7	94.2	95.7	92.5	94.7	89.1
96.6	93.3	95.6	91.3	94.6	87.3
96.5	92.3	95.5	89.9	94.5	85.1
96.4	91.1	95.4	88.4	94.4	82.6
96.3	89.8	95.3	86.7	94.3	79.5
96.2	88.5	95.2	84.8	94.2	75.5
96.1	87.1	95.1	82.7	94.1	69.7
96.0	85.5	95.0	80.3	94.0	60.0
95.9	83.8	94.9	77.6	< 94.0	Reject
95.8	82.0	94.8	74.3		
95.7	80.0	94.7	70.6		
95.6	77.7	94.6	66.0		
95.5	75.4	94.5	60.0		
95.4	73.0	< 94.5	Reject		
95.3	70.3				
95.2	67.2				
95.1	63.7				
95.0	60.0				
< 95.0	Reject				

Note:

1. Actual Density = % of Marshall Density

B1.8 Traffic Control Devices, Street Signs, and Pavement Markings

.1 Traffic control devices, street signs, and pavement markings shall be installed by the Developer and shall be in accordance with the "Manual of Uniform Traffic Control Devices for Canada," issued by TAC.

.2 Traffic control devices, street signs, and pavement markings are the primary means of regulating, warning, and guiding all traffic. These devices, signs, and markings should fulfill a need, command attention, convey a clear and simple meaning, command respect, and give adequate time for proper response.

.3 Street name signs and traffic control signs shall be installed as per the TAC "Manual of Uniform Traffic Control Devices for Canada" and as per **Typical Detail B1-400**.

.4 **Street name blades:**

.1 3M™ Diamond Grade™ DG³ reflective sheeting shall be used for street name signs.

.2 Street name blades for local streets shall be 150 mm, double-sided, colour to be confirmed with Municipality.

.3 Street name blades for collector and arterial streets shall be 225 mm, double-sided, colour to be confirmed with Municipality.

.4 Street name signs shall be installed by the Developer as per the accepted Traffic Control Devices and Street Signs plan.

.5 The use of dual-purpose signs (street name over stop sign, or street name over yield sign) is to be limited, wherever feasible.

.5 **Pavement markings:**

.1 Pavement markings, including lane markings, stop lines, and pedestrian crossings, shall be provided by the Developer at their own expense.

.2 Pavement markings shall be water-based paint placed on the top course of asphaltic concrete at the time of construction.

.6 Pedestrian crossing signals shall be provided by the Developer at their own expense where required. All stop lines shall be perpendicular to the curb line.

B1.9 Roadway Illumination

B1.9.1 General Street Lighting Requirements

.1 Street lighting shall be arranged for and coordinated by the Developer.

.2 Streetlight cables shall be installed underground with an acceptable type of corrosion resistant steel post streetlights, complete with LED fixtures. The Developer shall consult with the Municipality regarding Dark Sky preferences for light fixtures.

.3 Street lighting shall be installed in all new subdivisions. The Developer shall install all streetlight infrastructure at the time of development at the Developer's cost and as per ATCO Electric (or service provider) requirements.

.4 Street lighting design shall be in accordance with the TAC Guide for the Design of Roadway Lighting, Illuminating Engineering Society (IES) standards, and in accordance with ATCO Electric (or service provider) requirements.

.5 No capital costs are to be amortized; the Developer is to pay all capital contribution.

B1.9.2 Urban Street Lighting Requirements

.1 The street lighting layout and location of the buried lines shall be as shown on the **Typical Details** and as accepted by the Municipality.

.2 Streetlights shall be provided for each internal park area that does not abut onto a lit street. A streetlight shall be located at the point where each walkway opens out onto the park area.

.3 Streetlights shall be placed at locations not interfering with proposed driveways or water and sewer services and in general shall be located in line with the extension of common property lines between two lots.

B1.10 Sound Abatement

.1 A noise impact assessment may be required for new developments.

.2 Berms or elevated contoured embankments shall be used for sound abatement along arterial roadways, highways, and/or railways as required by the regulatory authorities and the Municipality.

.3 The subdivision side of the embankment shall include gentle slopes of no more than 4H:1V.

.4 Rights-of-way may require widening to accommodate sound abatement berms/embankments.

.5 Sound barrier fences may also be accepted by the Municipality upon submission of an acceptable design.

B1.11 Alleys

.1 In general, the following design standards should be followed; refer to **Typical Detail B1-102**.

- .1 Minimum 6.0 m right-of-way with a minimum 4 m driving surface.
- .2 Alleys shall be gravel or asphalt, at the discretion of the Municipality, with centreline swale and 2% cross fall.
- .3 Where alley traffic is expected to be high, such as for certain Commercial developments, a wider driving surface and right-of-way may be required, at the Municipality's discretion.
- .4 Alley road structure shall match the road structure of the adjoining roadway(s), or as recommended in the geotechnical report.
- .5 Dead-end alleys must be terminated with a means to turn around.
- .6 Maximum length of an alley between streets shall not exceed 350 m. Alley layouts should not encourage possible short-cutting between streets.
- .7 Maximum length of drainage in alleys shall be 150 m to any one catch basin. Catch basins to be provided prior to tie-ins with adjacent streets.
- .8 Maximum alley grade shall be 6.0%.
- .9 Minimum alley grade shall be consistent with the parallel roadway.
- .10 Alley grades are to tie to the back of walk/gutter elevation of the intersecting street.
- .11 It may be necessary to remove sidewalk crossings and replace with depressed crossings.
- .12 Property line elevations are to be a minimum of 100 mm above design centerline alley grade for drainage purposes.

.2 Alleys shall be provided for Residential lots or when required for shallow utility infrastructure (for example, gas mains).

B1.12 Service Roads

.1 Service roads may be acceptable to the Municipality for highway Commercial access.

.2 Design of service roads shall satisfy all requirements of Alberta Transportation and shall be subject to approval by Alberta Transportation and acceptance by the Municipality.

B1.13 Haul Routes

.1 The Town and Villages may require a Haul Road Agreement in order to establish a method of protecting municipally controlled roads and to facilitate a reasonable and effective maintenance of roads used for heavy hauling.

.2 The Haul Road Agreement provides the Municipality with the ability to give permission to use roads for a Major Hauling Activity.

.3 Major Hauling Activity is defined as heavy and multiple loads carried out over a relatively long period of time which may, at the discretion of the Municipality, be subject to a Haul Road Agreement. Refer to the Haul Road Agreement for more information.

.4 Minor Hauling Activity is defined as any hauling which, at the discretion of the Municipality, is of such nature as to not conform to the definition of a Major Haul Activity. Refer to the Haul Road Agreement for more information.

.5 The Municipality shall be notified prior to the start of any hauling activity and shall be notified when the project is started and completed.

.6 The Municipality will advise of any weight restrictions or other road restrictions/bans.

.7 The cost of meeting the conditions of the Haul Road Agreement will be borne by the party responsible for the hauling activity.

.8 Dust control is to be maintained at all times, per the requirements outlined in the Haul Road Agreement.

.9 The Municipality may inspect the designated haul road prior, during, and after the completion of the project, or at any time during the term of the Haul Road Agreement.

    .1 The Municipality will stop the project if the Municipality, in its sole discretion, judges that the conditions of permission are not being fulfilled satisfactorily.

.10 The terms and conditions in the Haul Road Agreement will take precedence over the Clauses in **Section B1.13** of this document.

B1.14 Dead-End Roads

.1 Other than for staged development, dead-end roads shall not be allowed in Industrial subdivisions.

.2 In Residential subdivisions, all dead-end roads shall be provided with a cul-de-sac or turnaround consistent with the requirements outlined in the **Typical Details** and TAC requirements.

.1 "Hammerhead" turnarounds are not permitted.

.3 Contact the Municipality for requirements for dead-end roads, including maximum lengths and populations served.

.4 Reflectorized barricades shall be provided at all dead-end roads.

B1.15 Approaches and Driveways

.1 Approaches and driveways shall be in accordance with the geometric standards of the TAC Geometric Design Guide for Canadian Roads and as modified herein as well as the requirements of the Municipality's Land Use Bylaw.

.2 All residential driveways shall be constructed to the same structure as the adjoining roadway with the same surfacing extending to the property line.

.3 Commercial crossings/driveways shall be concrete, with a thickness of 175 mm, as per **Typical Detail B1-305**.

B1.15.1 Private Driveways

.1 All driveways shall be constructed to provide a minimum 1.5 m clearance from any structure such as hydrants, light standards, service pedestals, transformers, manholes, and catch basins.

.2 Driveways on corner lots shall be located to provide a minimum of 6.0 m clearance from the lot property line adjacent to the intersection and access shall be from the street with lesser traffic.

.3 When the locations of driveways are known, the driveways shall be clearly shown on the design drawings and the driveway aprons shall be installed at the time of sidewalk construction.

B1.15.2 Commercial/Industrial Driveways

.1 The edge of a driveway shall be a minimum horizontal distance of 10 m from the end of the curb return of an intersection and shall be designed to accommodate the types of vehicles the business/industry will generate.

B1.15.3 Driveway Widths

.1 Driveway widths shall be site-specific, to meet the needs of the development, at the discretion of the Municipality.

B1.16 Curb and Gutter

.1 When a street with straight face curb intersects a street with rolled face curb, the Developer's Consultant shall provide details on the transition between curb types to the Municipality for review and acceptance.

.2 The use of concrete swales at intersections is to be limited to Residential local streets and shall be avoided where possible.

.1 Concrete swales shall be 0.5 m wide and 225 mm thick, with steel reinforcement.

DID YOU KNOW?

The Town and Villages have unique requirements for curb and gutter.

Refer to Sections D2, D3, and D4 – Special Provisions for these communities.

B1.17 Pedestrian Pathways

B1.17.1 Sidewalks

.1 Concrete sidewalks measuring 1.5 m in width will be required in the following instances:

- On both sides of Residential roadways.
- Where there is a possibility of a requirement to provide continuity of sidewalks to future development.
- Where linkage is required to maintain continuity of the pedestrian network.

.2 Refer to **Typical Details** for typical layouts and dimensions.

DID YOU KNOW?

Vilna has unique sidewalk requirements.

Refer to Section D3 – Special Provisions for the Village of Vilna.

.3 **Curb ramps:**

.1 Curb ramps shall be provided on sidewalks at all roadway intersections and at all pedestrian crossings in accordance with the **Typical Details**.

.2 Curb ramps shall be aligned with one another, with the tooled grooves matching up congruently to facilitate those persons with disabilities to cross the intersection safely.

.4 At the time of sidewalk construction, the letters "CC" shall be stamped into the plastic concrete, in line with each service box (curb stop).

.5 Sidewalks shall have a minimum cross-slope of 2% and a maximum cross-slope of 4%.

B1.17.2 Trails

.1 Pedestrian trails shall generally be asphalt or gravel, except in cases where shallow utilities are located beneath a multi-use trail; in these cases, multi-use trail shall be concrete.

.2 Refer to **Typical Details**.

.3 The location of pedestrian trails shall conform to the current Parks, Open Spaces and Trails Master Plan (if available) and relevant Area Structure Plan (if available).

.4 Trails shall have a minimum cross-slope of 2% and a maximum cross-slope of 4%.

B1.17.3 Walkways

.1 Walkways provided within utility rights-of-way shall have a minimum width of 3 m.

B1.18 Community Mailboxes

.1 The Developer shall accommodate community mailbox locations when community mailbox locations are identified as being required.

.2 In general, community mailbox location criteria and requirements are as follows:

- .1 Along flankage (sideyard) of corner lots, between the front and rear property lines
- .2 Provide additional 0.5 m x 5.0 m Easement if encroaching on private property
- .3 Next to an Open Space or playground
- .4 On the predominantly homecoming side of the street
- .5 Adjacent to the sidewalk
- .6 Not along arterial roadways
- .7 Not closer than 10 m to a fire hydrant
- .8 Not within a utility Easement or above a utility
- .9 The location shall not impede pedestrian and vehicle sight distances

.3 Mailboxes shall be placed on a concrete pad of a thickness matching the adjacent sidewalk; bricks/paving stones are not permitted.

B1.19 Mid-block Crosswalks and Illumination

.1 Based on TAC, and subject to Crosswalk Warrant and Illumination Warrant Analyses, mid-block crossings, including pedestrian-controlled traffic signals, shall be installed at locations where a high volume of pedestrian traffic is expected to cross. Refer to TAC's Pedestrian Crossing Control Guide.

.2 Crosswalk illumination shall be based on TAC's Guide for the Design of Roadway Lighting.

.3 Pedestrian crossing signs are to have a white background with black legend, double-mounted back-to-back at crossing locations. Place advanced warning signs for pedestrian crossings as warranted by sight line conditions or traffic characteristics.

B1.20 Roadways CCC/FAC and Deficiency Repair Requirements

B1.20.1 Inspection Requirements

.1 The surface improvement being inspected is to be clean and free of debris.

.2 The Developer's Representative/Contractor has inspected the site and verified that all improvements are in satisfactory condition.

.3 All roads and gutters to be flushed with water immediately prior to inspection.

.4 Noncompliance with any of the above is sufficient reason to cancel the inspection.

.5 Deficient areas to be marked with spray paint and cross-referenced to the numbers used on the written deficiency list and index map.

B1.20.2 General Repair Requirements

.1 All Maintenance and repair work is to be carried out in accordance with the REDS, except as herein noted.

.2 Provide verbal notice to the Municipality at least 72 hours prior to commencement of repair work.

.3 Contractor to provide written notice to occupants of affected and/or adjoining properties at least 72 hours prior to commencement of repair work.

.4 All concrete works, curb, gutter, paved roads, boulevards, landscaped areas, private walks, and driveways shall be cleaned of any repair debris within 24 hours of completion.

.5 Materials, placement, and testing must conform to the requirements of the REDS, or as required by Municipality.

.6 All coordination and costs of barricading and materials testing shall be the responsibility of the Developer.

B1.20.3 Concrete Deficiencies

.1 Concrete may be required to be replaced, at the discretion of the Municipality, if one or more of the following exist:

- .1 If a crack is greater than 2 mm in width in curb and gutter or any crack in sidewalk
- .2 Cracks with chipped or spalled edges
- .3 Any longitudinal crack
- .4 Random or multiple cracks of any size or more than one crack between any two contraction joints
- .5 Segregation when forms are removed
- .6 Loss of surface mortar and/or aggregate
- .7 Sidewalk with less than 15 mm/m of crossfall (slope toward curb unless specifically noted otherwise)
- .8 Sidewalk with more than 25 mm/m of crossfall (slope toward curb unless specifically noted otherwise)
- .9 Vertical differential displacements greater than 5 mm
- .10 Joint separation greater than 10 mm
- .11 Settlements greater than 10 mm over a 3 m length or that cause retention of water
- .12 Settlements causing retention of water in front of driveways or curb ramps
- .13 Concrete that has been disfigured by extraneous means
- .14 Notable ponding is observed. Ponding shall be limited to within the gutter; notable ponding includes ponding extending beyond the lip of gutter

.2 The use of route and seal will only be permitted at the Municipality's discretion.

B1.20.4 Concrete Repair Requirements

.1 Concrete sections shall be removed at a contraction, expansion, or surface joint. If warranted, a 1.5 m minimum length of curb and gutter section may be replaced. All concrete repairs are to be joint to joint.

.2 Where curb and gutter or sidewalk deficiencies exist, the entire mono curb, gutter, and sidewalk shall be replaced.

.3 Existing private walkways and driveways must be adjusted to match repaired concrete sidewalks. The Municipality may require the replacement of existing private walkways and/or driveways to provide a satisfactory tie-in.

.4 Where there is less than 8 m of concrete sidewalk, monolithic sidewalk or curb and gutter between repairs, the remaining concrete must be replaced.

.5 When replacing separate sidewalks, positive drainage from the front of sidewalk to the curb must be maintained throughout the boulevard.

B1.20.5 Asphalt Deficiencies

.1 Manholes and valves are to be adjusted to final asphalt grade (+0 mm, -6 mm).

.2 Asphalt adjacent to curb and gutter must be less than 10 mm above the lip of gutter except in the case of structural overlay or rehabilitation of roads where no new curb and gutter has been placed.

.3 Localized areas of settlement which cause water ponding shall be repaired at the discretion of the Municipality.

.4 A repair is required if the asphalt surface has a coarse and open texture resulting from, for example, clay tracking, segregations, or petroleum spillage.

B1.20.6 Asphalt Repair Requirements

.1 Asphalt repairs are to be rectangular or square. Grind existing asphalt adjacent to gutter lines and at butt joints to allow for a minimum of 50 mm of asphalt overlay. Grinding shall extend to the full width of the lane from lip of gutter or lane line. Grind seams shall not be allowed in the wheel path.

.2 Place a levelling course on all settlements greater than 50 mm.

.3 Edges of existing asphalt to be ground or cut vertically (minimum 50 mm). No feathering of patches is allowed.

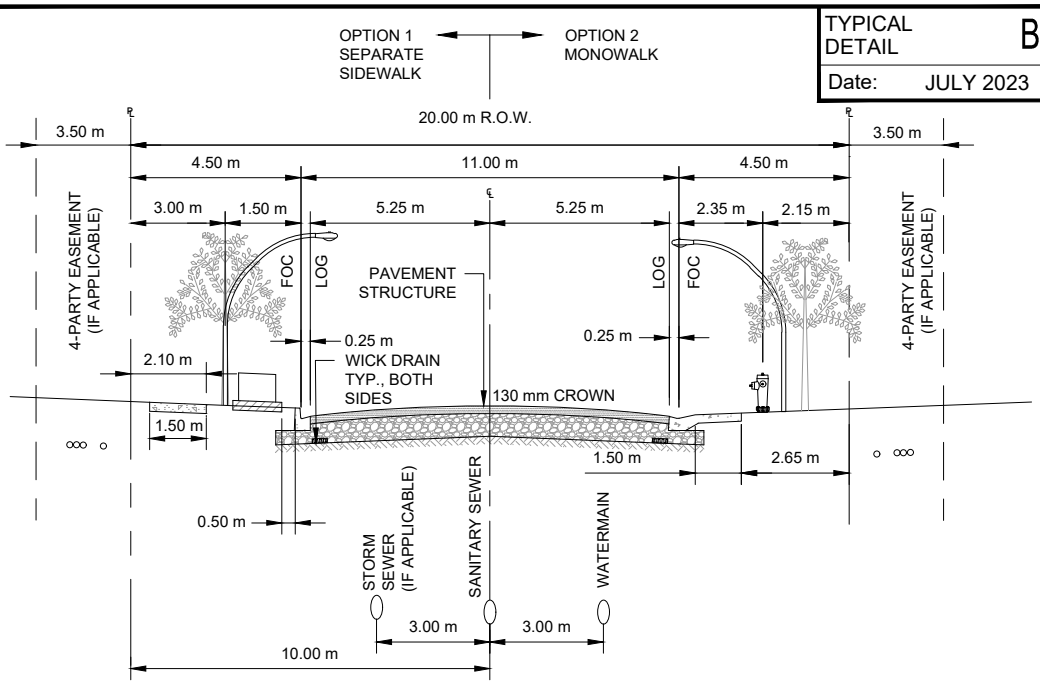
.4 To repair asphalt surface failure, cut out failed road structure and replace.

.5 Cracks and joints between 2 mm and 15 mm wide are to be routed and sealed.

B1.21 Typical Details – Urban Roadway Systems

Standard Detail No.	Title
B1-100	Urban Residential Local Roadway
B1-101	Urban Residential Cul-de-Sac
B1-102	Urban Alley Cross-section
B1-200	Rolled Face Curb and Gutter
B1-205	Rolled Face Monolithic Curb, Gutter, and Sidewalk
B1-210	Straight Face Curb and Gutter
B1-215	Straight Face Monolithic Curb, Gutter, and Sidewalk
B1-220	Sidewalk Joint and Finishing Details
B1-225	Separate Sidewalk
B1-300	Residential Driveway Ramp for Straight Face Curb and Gutter
B1-305	Commercial or Alley Crossing for Straight Face Curb and Gutter
B1-310	Curb Ramp Type “A” (Corner; Monowalk)
B1-311	Curb Ramp Type “B” (Corner; Separate Sidewalk)
B1-312	Curb Ramp Type “C” (Mid-block; Monowalk)
B1-313	Curb Ramp Type “D” (Mid-block; Separate Sidewalk)
B1-400	Sign Installation
B1-500	Asphalt Trail
B1-510	Gravel Trail

TYPICAL DETAIL	B1-100
Date: JULY 2023	Rev. 0



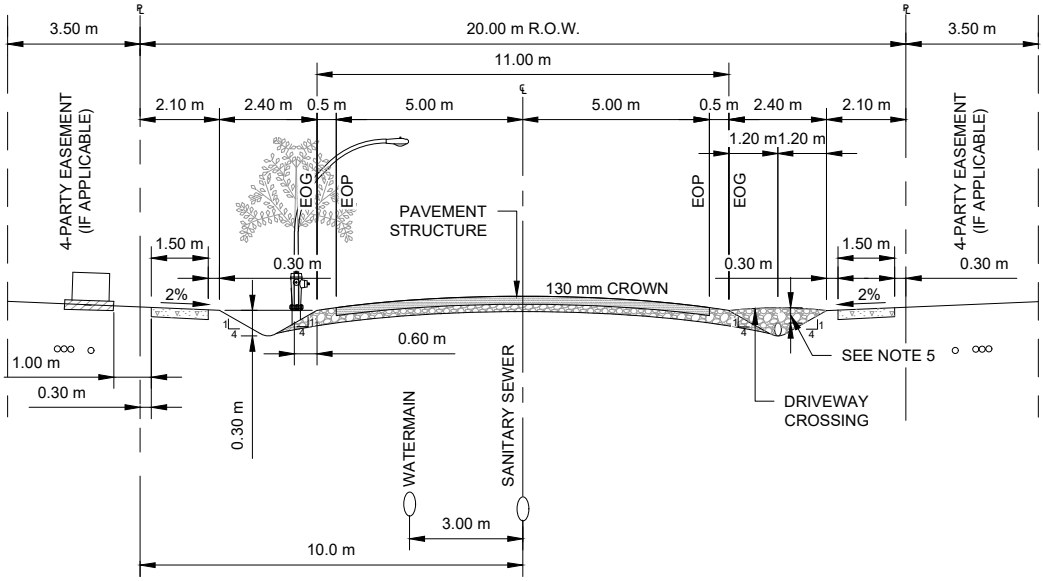
NOTES:

20 m LOCAL ROADWAY WITH CURB AND GUTTER

(1) STRAIGHT FACE CURB REQUIRED WHERE LOTS ARE ACCESSED BY REAR ALLEY.

(2) LOG = LIP OF GUTTER.

(3) FOC = FACE OF CURB.



NOTES:

20 m LOCAL ROADWAY WITH GRASS SWALES

(1) THE DEVELOPER IS RESPONSIBLE TO DETERMINE IF THE SWALE CONFIGURATION SHOWN HAS SUFFICIENT CAPACITY TO CONVEY SURFACE FLOWS. SHOULD AN ALTERNATE SWALE CONFIGURATION BE REQUIRED, THE DEVELOPER SHALL COORDINATE WITH THE MUNICIPALITY TO CONFIRM ROW REQUIREMENTS.

(2) EOP = EDGE OF PAVEMENT.

(3) EOG = EDGE OF GRAVEL.

(4) 200 mm PVC DR35 DRIVEWAY CULVERT WITH 150 mm COVER, OR AS REQUIRED BY THE PIPE MANUFACTURER.

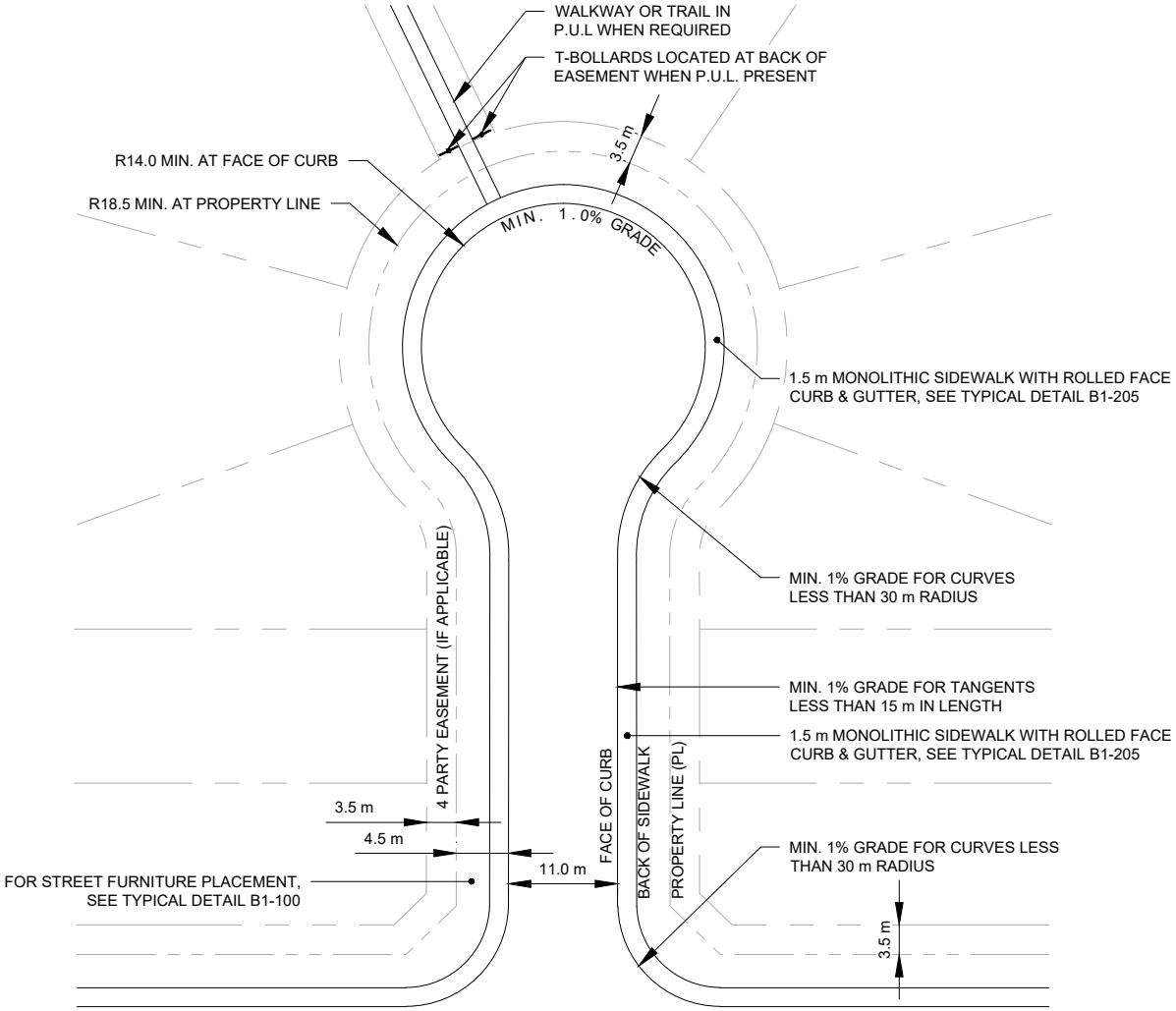
(5) STREET FURNITURE LOCATIONS ARE SHOWN ON THE LEFT SIDE OF THIS CROSS-SECTION (FOR ILLUSTRATION ONLY). A DRIVEWAY CROSSING IS SHOWN ON THE RIGHT SIDE OF THIS CROSS-SECTION (FOR ILLUSTRATION ONLY).

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Urban Residential Local Roadway

TYPICAL DETAIL	B1-101	
Date:	JULY 2023	Rev. 0



NOTES:

(1) THE MINIMUM CROWN SLOPE WITHIN THE CUL-DE-SAC SHALL BE 2.5%.

(2) POSITIVE DRAINAGE IS TO BE MAINTAINED AT ALL LOCATIONS.

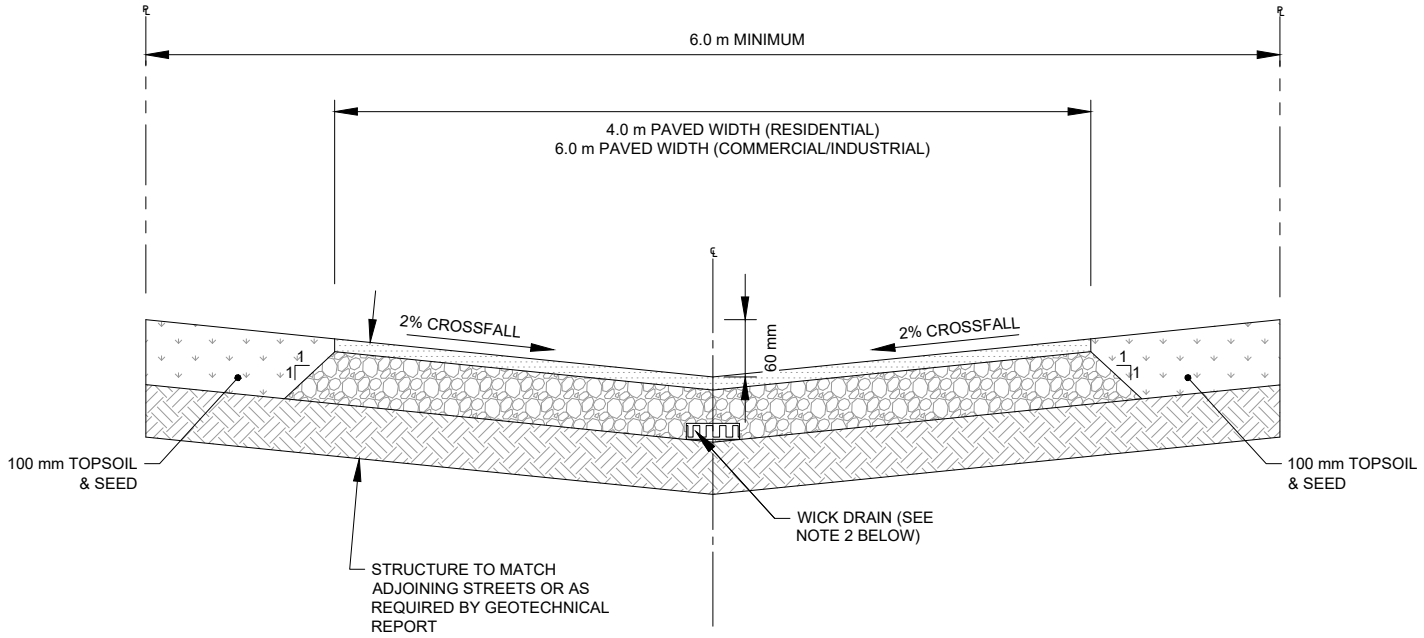
(3) DIMENSIONS ARE IN METRES, UNLESS NOTED OTHERWISE.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Urban Residential Cul-de-Sac

TYPICAL DETAIL	B1-102
Date: JULY 2023	Rev. 0

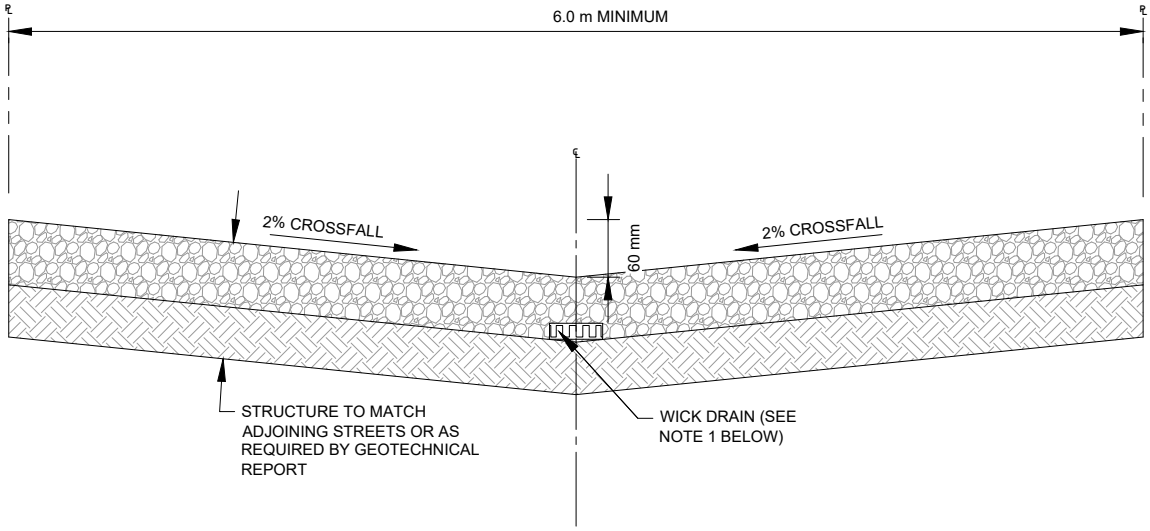


NOTES:

(1) PROVIDE FULL DEPTH ASPHALT PAVEMENT STRUCTURE TO ADJACENT HARD SURFACED PARKING AREAS.

(2) WICK DRAIN APPLICABLE WHERE STORM SEWER EXISTS ON ADJACENT ROADWAY AND SOIL TYPE IS PREDOMINANTLY CLAY.

ASPHALT ALLEY



NOTES:

(1) WICK DRAIN APPLICABLE WHERE STORM SEWER EXISTS ON ADJACENT ROADWAY AND SOIL TYPE IS PREDOMINANTLY CLAY.

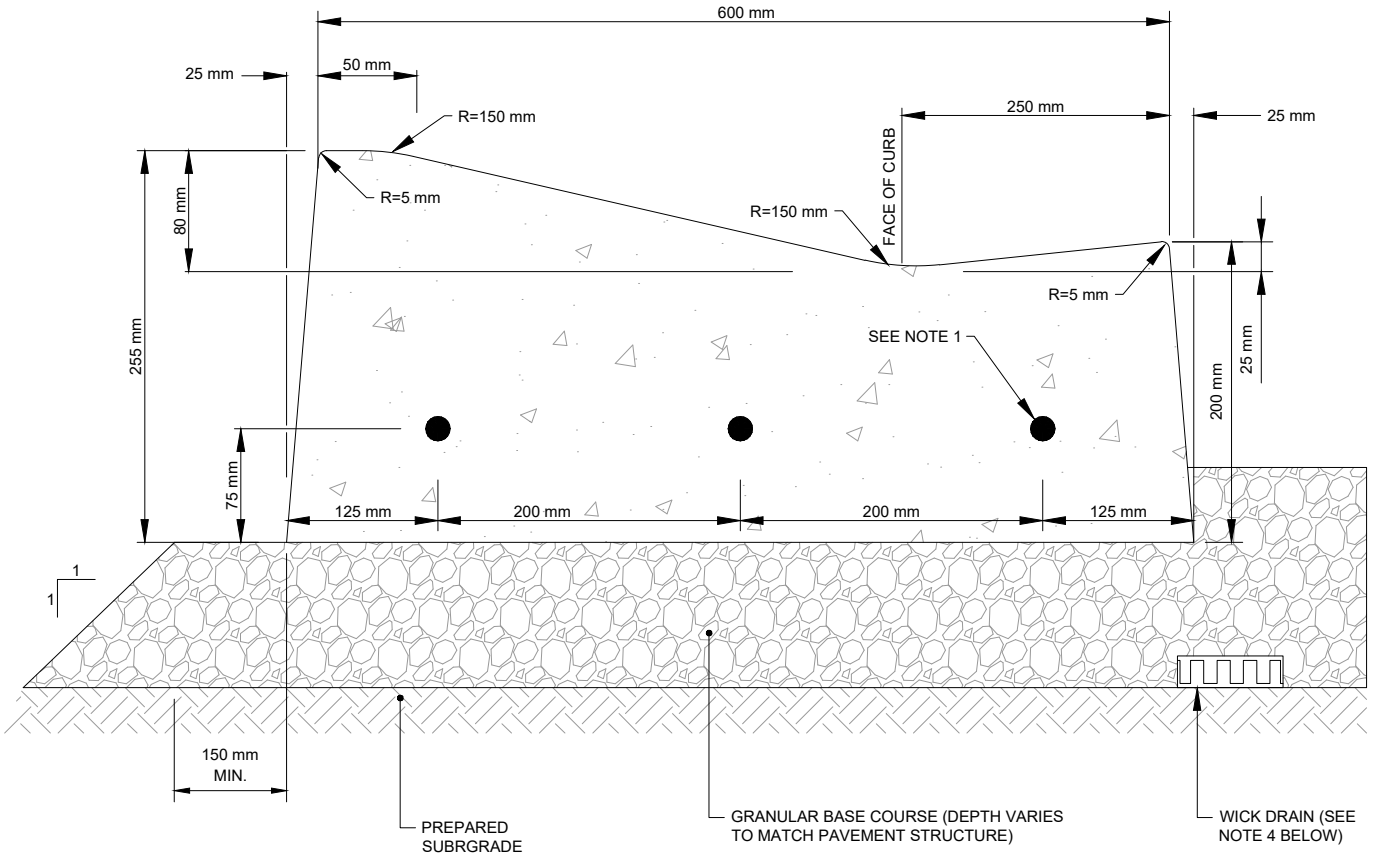
GRAVEL ALLEY

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Urban Alley Cross - Section

TYPICAL DETAIL	B1-200
Date: JULY 2023	Rev. 0



NOTES:

(1) 3-10M REINFORCING BARS AT ALL ALLEYS, CURB RAMPS, AND COMMERCIAL, INDUSTRIAL AND APARTMENT DRIVEWAY ENTRANCES.

(2) CONCRETE TO BE TYPE HS, 30 MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH 5.5% TO 8.0% AIR ENTRAINMENT.

(3) BACKFILL WITH SUITABLE CLAY MATERIAL AND COMPACT TO 95% FOR 500 mm FROM BACK OF CURB.

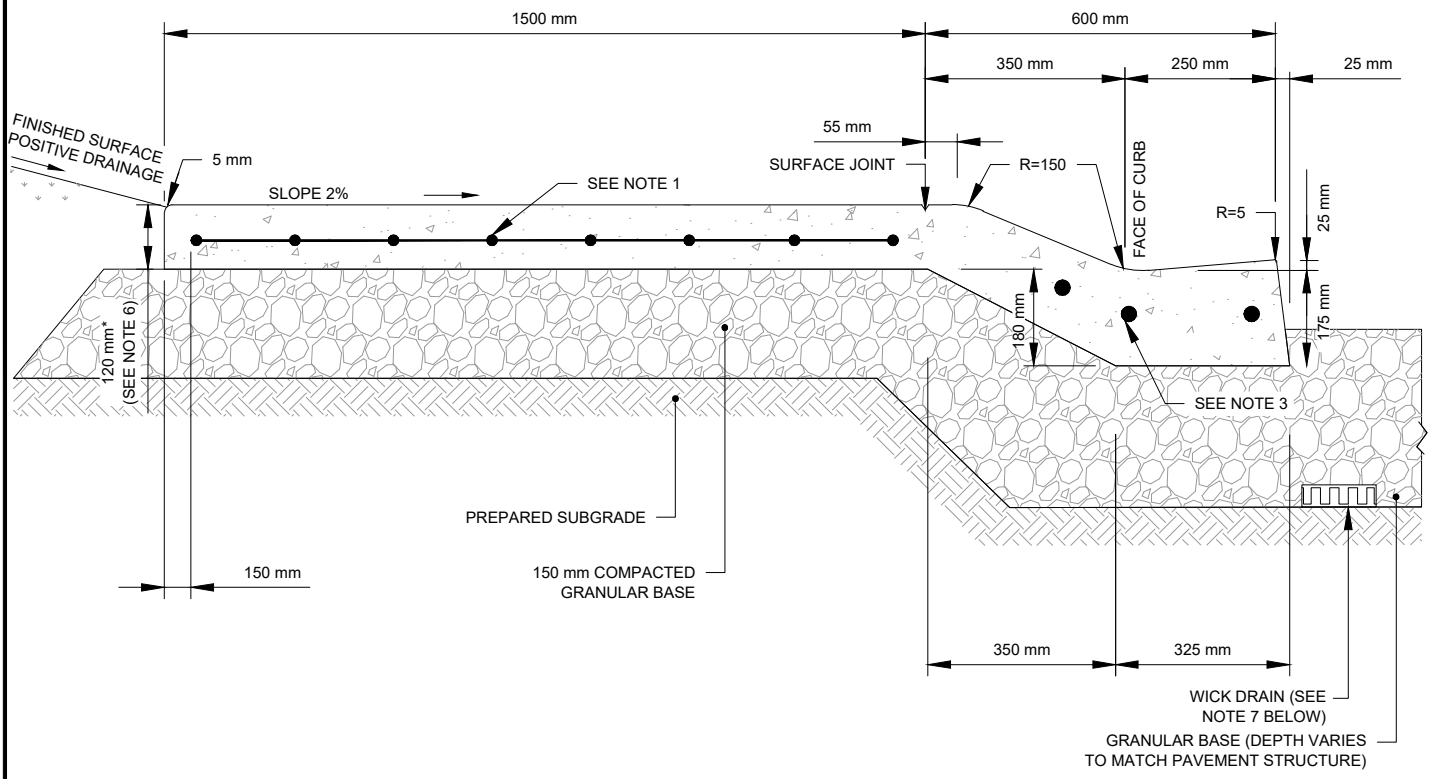
(4) WICK DRAIN APPLICABLE WHERE STORM SEWER EXISTS.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Rolled Face Curb and Gutter

TYPICAL DETAIL	B1-205
Date: JULY 2023	Rev. 0



NOTES:

(1) 150X150 PI8/PI8 GAUGE WIRE MESH TO BE PLACED IN SIDEWALK ACROSS ALL ALLEYS AND APARTMENT BUILDING DRIVEWAY ENTRANCES.

(2) CONCRETE TO BE TYPE HS, 30MPa. COMPRESSIVE STRENGTH AT 28 DAYS WITH 5.5% TO 8.0% AIR ENTRAINMENT.

(3) 3-10M REINFORCEMENT BARS AT ALL ALLEYS AND APARTMENT BUILDING DRIVEWAY ENTRANCES.

(4) SEE TYPICAL DETAIL B1-200 FOR ADDITIONAL REQUIREMENTS FOR ROLLED FACE CURB & GUTTER.

(5) SEE TYPICAL DETAIL B1-220 FOR JOINT DETAILS.

(6) 175 mm AT ALL ALLEYS, CURB RAMPS, AND COMMERCIAL, INDUSTRIAL, AND APARTMENT BUILDING DRIVEWAY ENTRANCES.

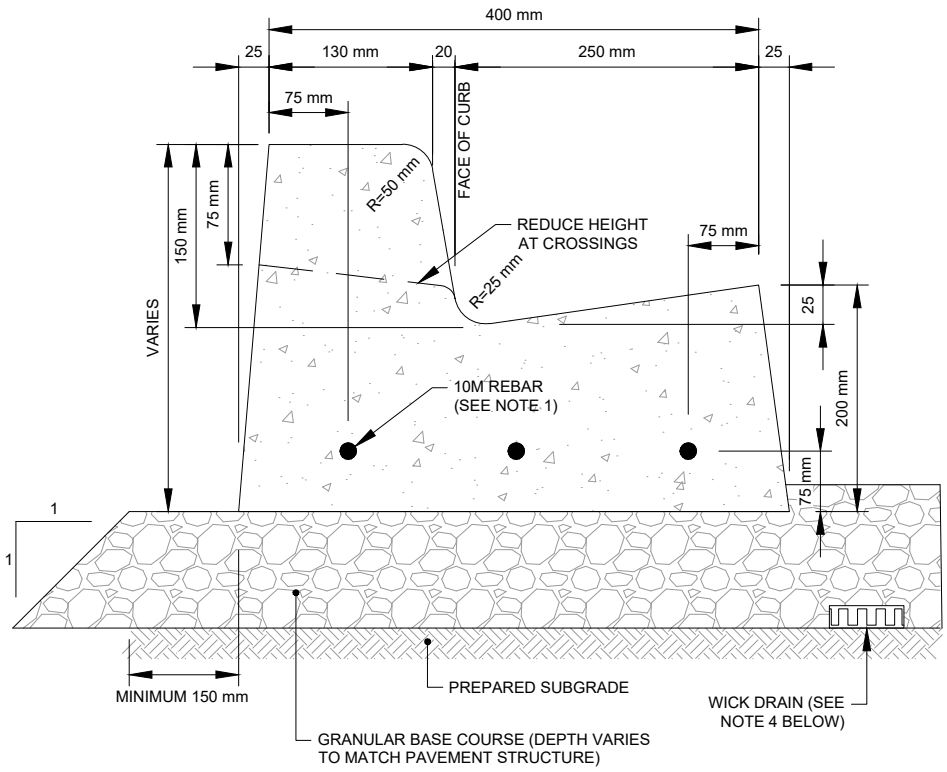
(7) WICK DRAIN APPLICABLE WHERE STORM SEWER EXISTS.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Rolled Face Monolithic Curb, Gutter, and Sidewalk

TYPICAL DETAIL	B1-210	
Date: JULY 2023		Rev. 0



NOTES:

(1) 3-10M REINFORCING BARS AT ALL ALLEYS, CURB RAMPS, AND COMMERCIAL, INDUSTRIAL AND APARTMENT DRIVEWAY ENTRANCES

(2) CONCRETE TO BE TYPE HS, 30 MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH 5.5% TO 8.0% AIR ENTRAINMENT.

(3) BACKFILL WITH SUITABLE CLAY MATERIAL AND COMPACT TO 95% FOR 500 mm FROM BACK OF CURB.

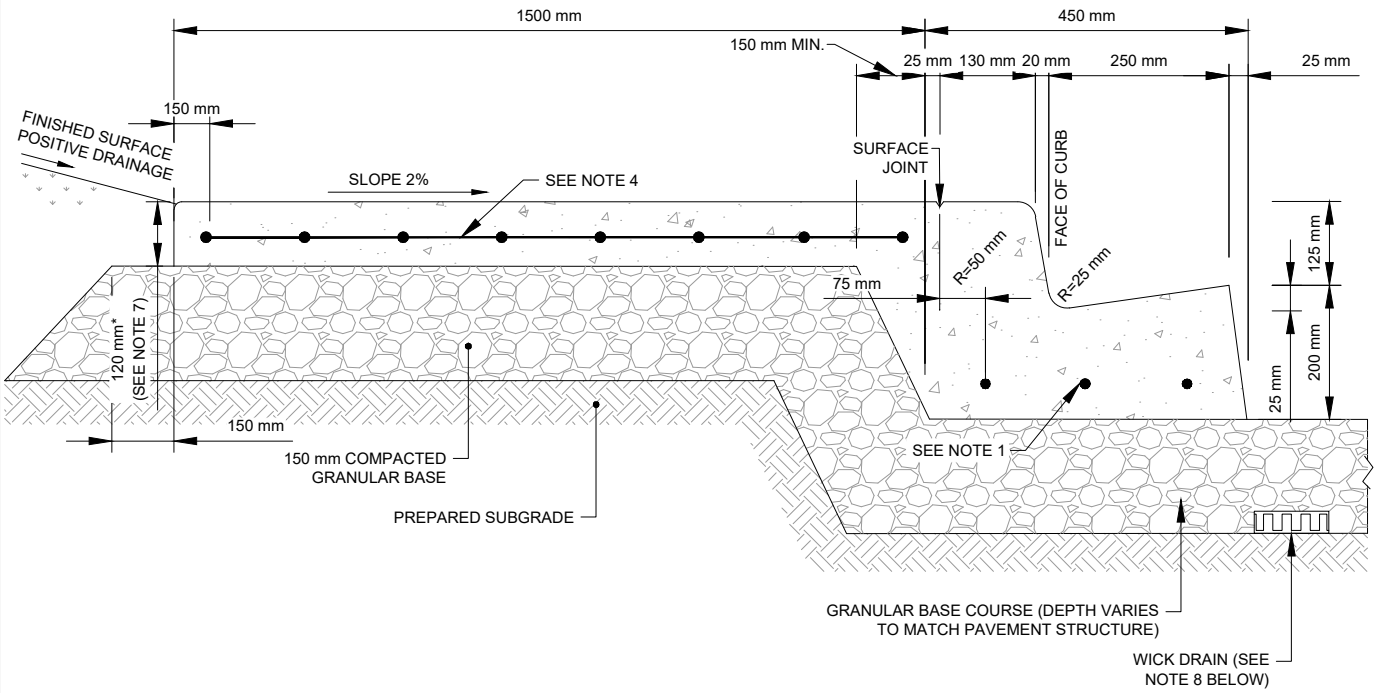
(4) WICK DRAIN APPLICABLE WHERE STORM SEWER EXISTS.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Straight Face Curb and Gutter

TYPICAL DETAIL	B1-215
Date: JULY 2023	Rev. 0



NOTES:

(1) 3 - 10M REINFORCING BARS AT ALL COMMERCIAL, INDUSTRIAL, ALLEYS AND APARTMENT DRIVEWAY ENTRANCES.

(2) CONCRETE TO BE TYPE HS, 30 MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH 5.5% TO 8.0% AIR ENTRAINMENT.

(3) BACKFILL WITH SUITABLE MATERIAL AND COMPACT TO 95% FOR 500 mm FROM BACK OF WALK.

(4) 150 x 150 PI8 / PI8 GAUGE WIRE MESH TO BE PLACED IN SIDEWALK ACROSS ALL COMMERCIAL, INDUSTRIAL, ALLEYS AND APARTMENT BUILDING DRIVEWAY ENTRANCES.

(5) SEE TYPICAL DETAIL B1-210 FOR A MORE DETAILED STRAIGHT FACED CURB & GUTTER.

(6) SEE TYPICAL DETAIL B1-220 FOR JOINT DETAILS.

(7) 175 mm AT ALL ALLEYS, CURB RAMPS, AND COMMERCIAL, INDUSTRIAL, AND APARTMENT BUILDING DRIVEWAY ENTRANCES.

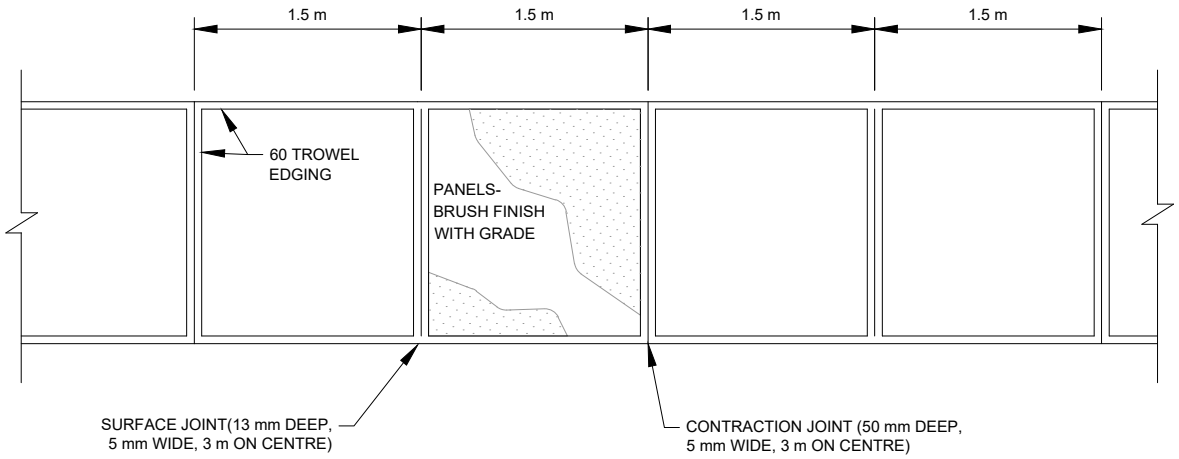
(8) WICK DRAIN APPLICABLE WHERE STORM SEWER EXISTS.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

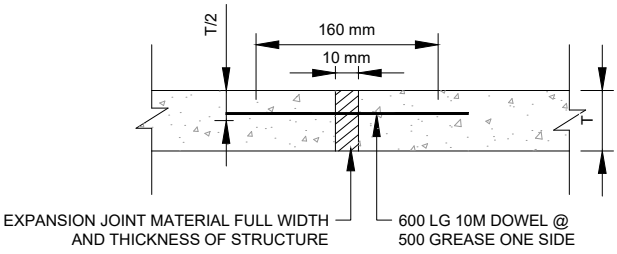
SMOKY LAKE REGION

Straight Face Monolithic Curb, Gutter, and Sidewalk

TYPICAL DETAIL	B1-220	
Date: JULY 2023		Rev. 0



PLAN



EXPANSION JOINT DETAIL

NOTES:

(1) EXPANSION JOINTS TO BE PROVIDED WHERE NEW SIDEWALKS ABUT EXISTING CONCRETE STRUCTURES AND EVERY 100 METERS MINIMUM.

(2) EXPANSION JOINTS TO BE PROVIDED AT INTERFACE BETWEEN PRIVATE WALKS AND MUNICIPAL WALKS. DOWELS ARE NOT REQUIRED IN THESE LOCATIONS.

(3) AT REPAIR LOCATIONS, SAW CUTS ARE REQUIRED AT JOINTS. DOWELS ARE REQUIRED IN THESE LOCATIONS, BUT EXPANSION JOINTS ARE NOT.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

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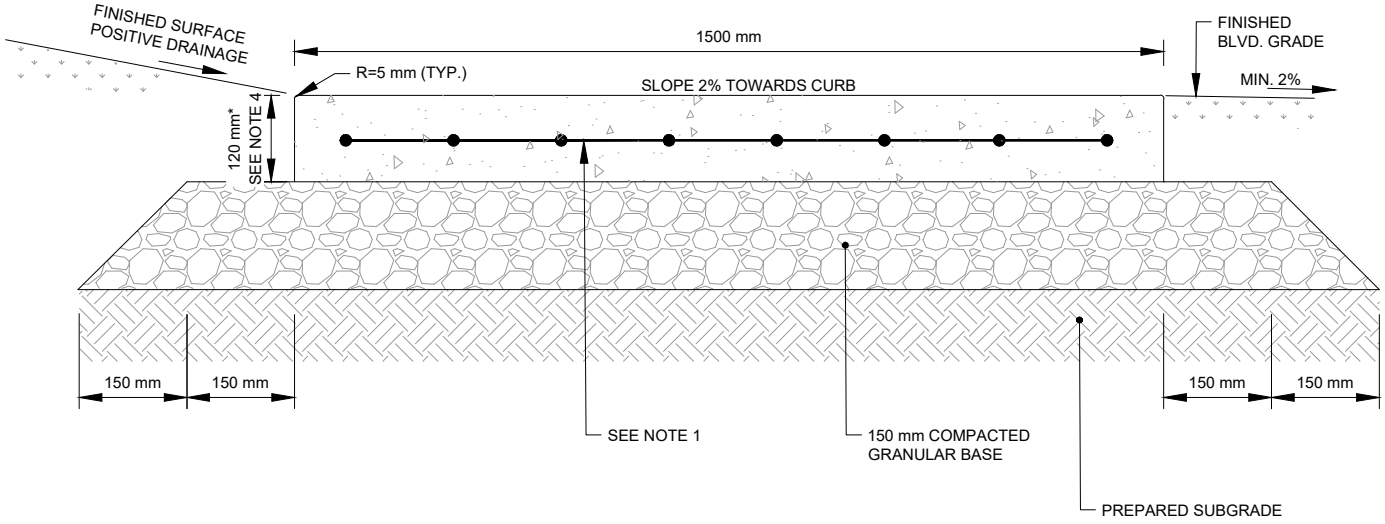
SMOKY LAKE REGION

Sidewalk Joint and Finishing Details

TYPICAL DETAIL	B1-225	
Date: JULY 2023		Rev. 0



NOTES:

(1) 150 x 150 PI8 / PI8 GAUGE WIRE MESH OR 10M REBAR ON 300 mm GRID WITH 75 mm COVER (TOP AND SIDE OF SLAB) TO BE PLACED IN SIDEWALK PRIOR TO PLACING CONCRETE ACROSS ALL ALLEYS, CURB RAMPS, AND COMMERCIAL, INDUSTRIAL AND APARTMENT BUILDING DRIVEWAY ENTRANCES.

(2) ELEVATION OF FRONT OF WALK TO BE SET SUCH THAT A MINIMUM SLOPE OF 2% IS MAINTAINED ACROSS BOULEVARD BETWEEN FRONT OF WALK AND TOP OF CURB.

(3) CONCRETE TO BE TYPE HS, 30 MPa. COMPRESSIVE STRENGTH AT 28 DAYS WITH 5.5% TO 8.0% AIR ENTRAINMENT.

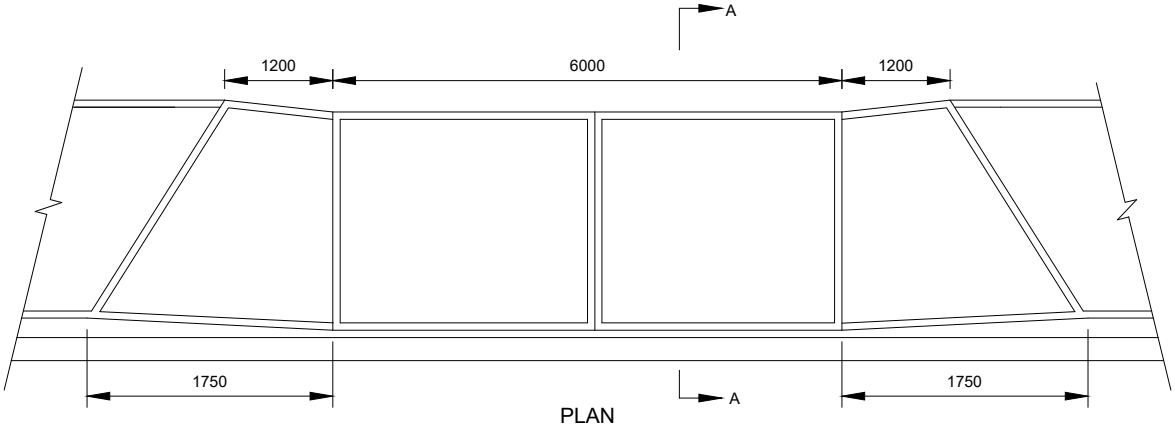
(4) 175 mm AT ALL ALLEYS, CURB RAMPS, AND COMMERCIAL, INDUSTRIAL AND APARTMENT BUILDING DRIVEWAY ENTRANCES. REQUIRES GRANULAR BASE TO ALLEY STANDARD.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

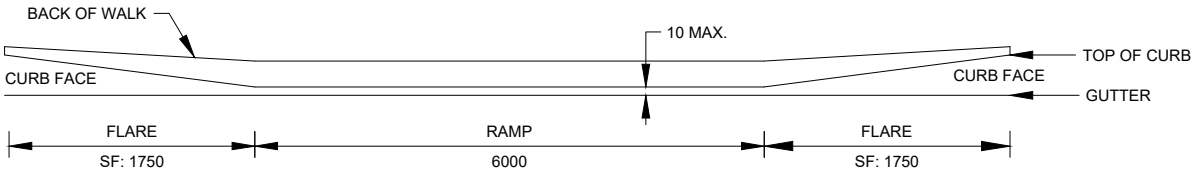
SMOKY LAKE REGION

Separate Sidewalk

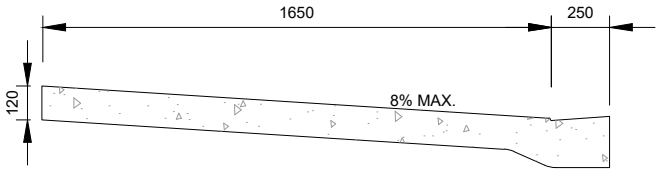
TYPICAL DETAIL	B1-300	
Date: JULY 2023		Rev. 0



PLAN



ELEVATION



SECTION A-A

NOTES:

(1) CONCRETE TO BE TYPE HS, 30 MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH 5.5% TO 8.0% AIR ENTRAINMENT.

(2) SIMILAR FOR SEPARATE WALKS WITH THE EXCEPTION OF THE FLARES (400 mm).

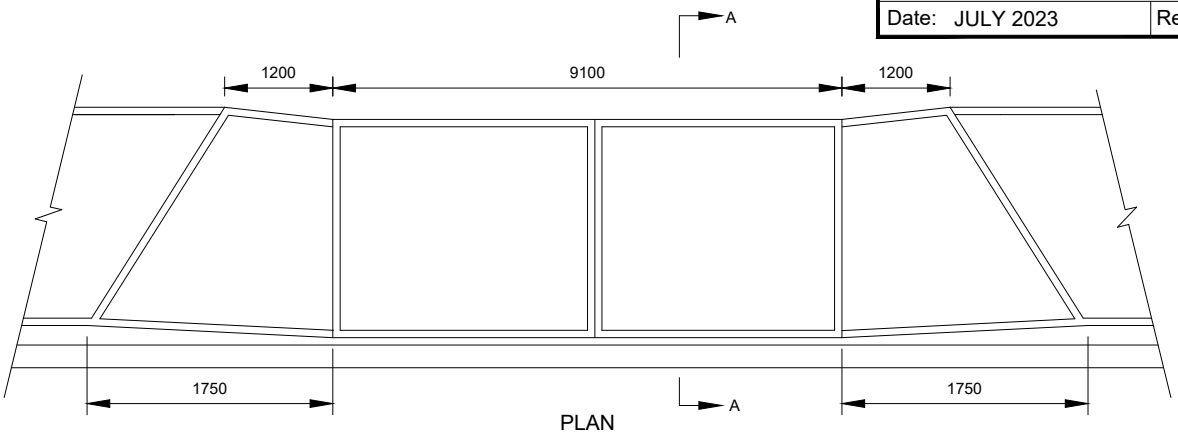
(3) DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

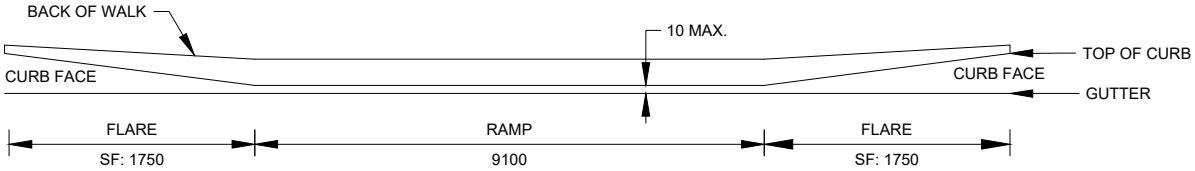
SMOKY LAKE REGION

Residential Driveway Ramp
For Straight Face Curb and Gutter

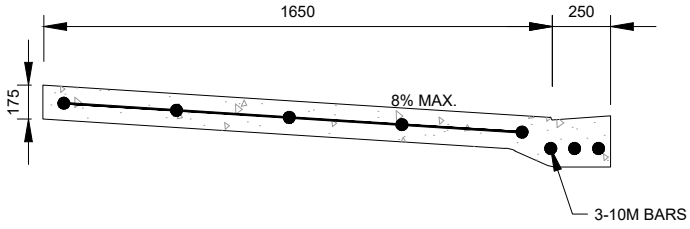
TYPICAL DETAIL	B1-305
Date: JULY 2023	Rev. 0



PLAN



ELEVATION



SECTION A-A

NOTES:

(1) 150 x 150 P18 / P18 GAUGE WIRE MESH OR 10M REBAR ON 300 mm GRID WITH 75 mm COVER (TOP AND SIDE OF SLAB) TO BE PLACED IN SIDEWALK. CURB AND GUTTER SECTION REQUIRES 3-10M.

(2) CONCRETE TO BE TYPE HS, 30 MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH 5.5% TO 8.0% AIR ENTRAINMENT.

(3) SIMILAR FOR SEPARATE WALKS WITH THE EXCEPTION OF THE FLARES (400 mm).

(4) DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

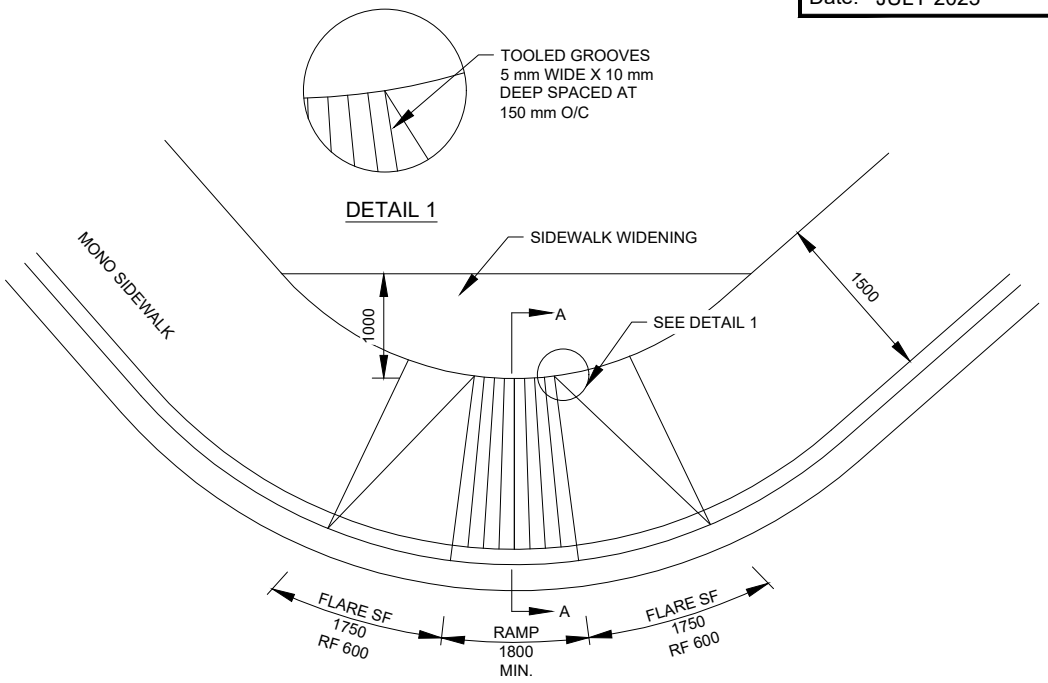
Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

HISTORIC VILNA
SMOKY LAKE COUNTY
VILLAGE OF WASKATENAU
TOWN OF SMOKY LAKE 1923-2023

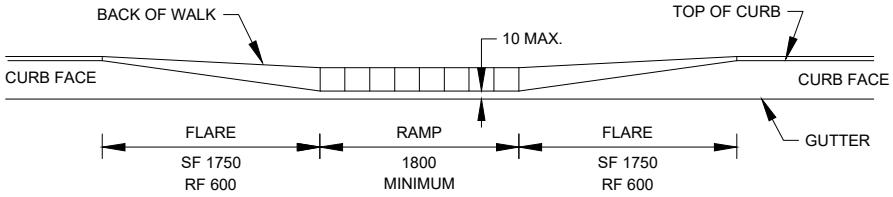
SMOKY LAKE REGION

Commercial or Alley Crossing for Straight Face Curb and Gutter

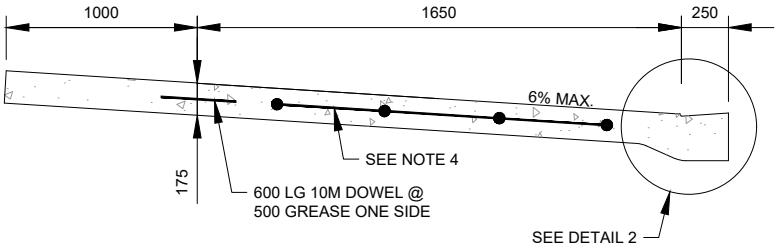
TYPICAL DETAIL	B1-310	
Date: JULY 2023		Rev. 0



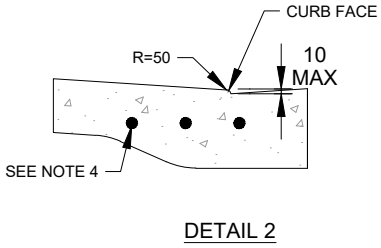
PLAN VIEW



ELEVATION



SECTION A-A



DETAIL 2

NOTES:

(1) MAXIMUM SLOPE ON CURB RAMP AND TAPER TO BE 6%.

(2) CURB AND GUTTER TO BE POURED MONOLITHICALLY WITH CURB RAMP.

(3) CENTRE CURB RAMP WITH CENTRE OF PEDESTRIAN CROSSWALK.

(4) 150 x 150 P18 / P18 GAUGE WIRE MESH OR 10M REBAR ON 300 mm GRID WITH 75 mm COVER (TOP AND SIDE OF SLAB) TO BE PLACED IN SIDEWALK. CURB AND GUTTER SECTION REQUIRES 3-10M.

(5) DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

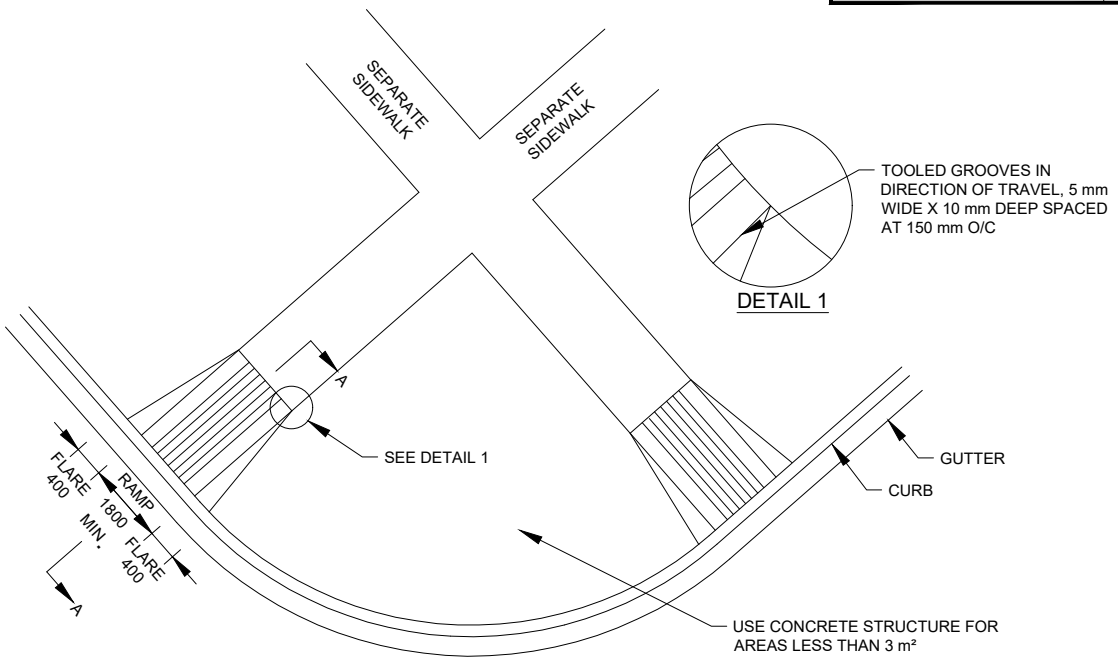
Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

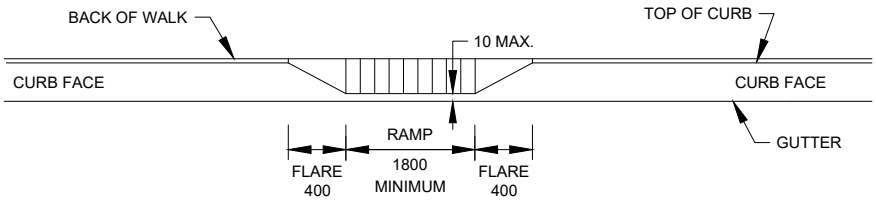
SMOKY LAKE REGION

Curb Ramp Type 'A'
(Corner; Monowalk)

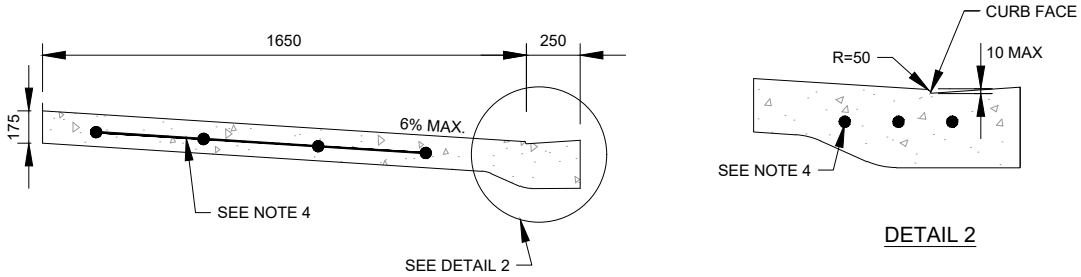
TYPICAL DETAIL	B1-311	
Date: JULY 2023		Rev. 0



PLAN VIEW



ELEVATION



SECTION A-A

NOTES :

(1) MAXIMUM SLOPE ON CURB RAMP TO BE 6%.

(2) CURB AND GUTTER TO BE POURED MONOLITHICALLY WITH CURB RAMP.

(3) CENTRE CURB RAMP WITH CENTRE OF PEDESTRIAN CROSSWALK.

(4) 150 x 150 P18 / P18 GAUGE WIRE MESH OR 10M REBAR ON 300 mm GRID WITH 75 mm COVER (TOP AND SIDE OF SLAB) TO BE PLACED IN SIDEWALK. CURB AND GUTTER SECTION REQUIRES 3-10M.

(5) DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

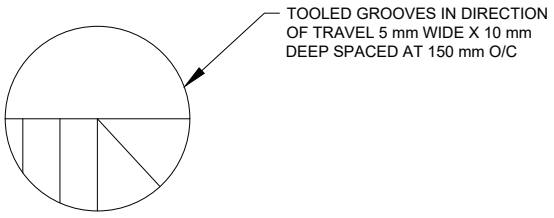
Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

HISTORIC VILNA
Smoky Lake County
VILLAGE OF WASKATENAU
TOWN OF SMOKY LAKE 1923-2023

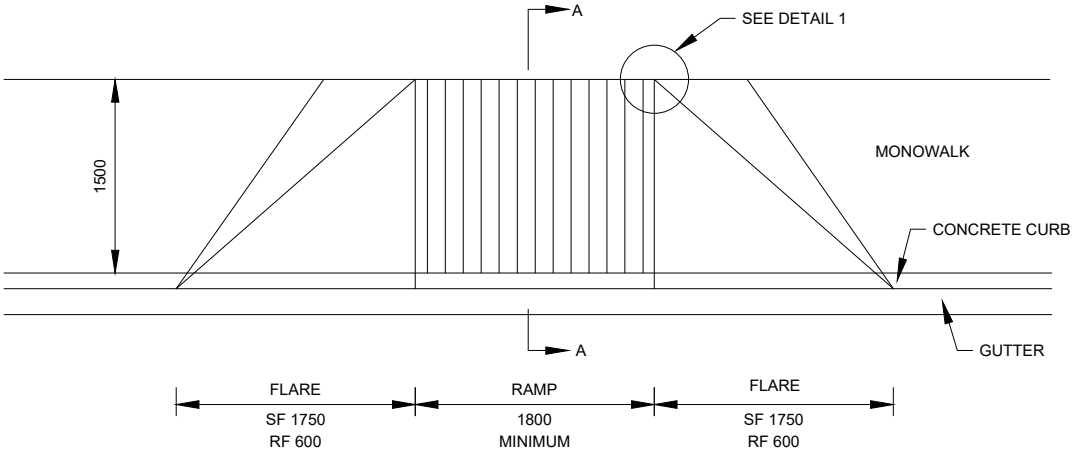
SMOKY LAKE REGION

Curb Ramp Type 'B'
(Corner; Separate Sidewalk)

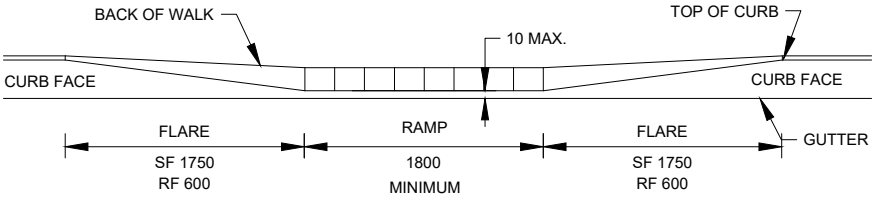
TYPICAL DETAIL	B1-312
Date: JULY 2023	Rev. 0



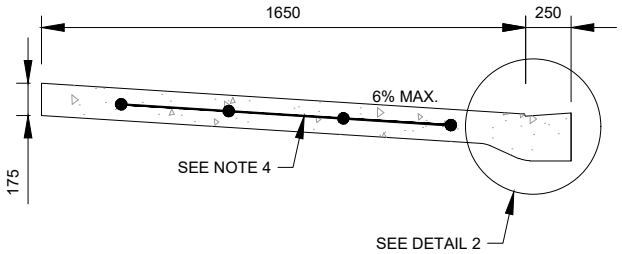
DETAIL 1



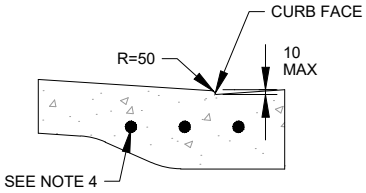
PLAN VIEW



ELEVATION



SECTION A-A



DETAIL 2

NOTES :

(1) MAXIMUM SLOPE ON CURB RAMP TO BE 6%.

(2) CURB AND GUTTER TO BE POURED MONOLITHICALLY WITH CURB RAMP.

(3) CENTRE CURB RAMP WITH CENTRE OF PEDESTRIAN CROSSWALK.

(4) 150 x 150 P18 / P18 GAUGE WIRE MESH OR 10M REBAR ON 300 mm GRID WITH 75 mm COVER (TOP AND SIDE OF SLAB) TO BE PLACED IN SIDEWALK. CURB AND GUTTER SECTION REQUIRES 3-10M.

(5) DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

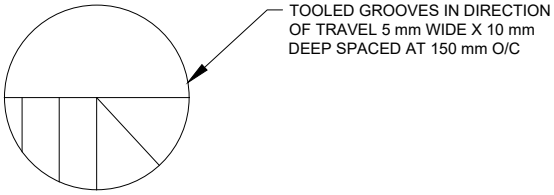
Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

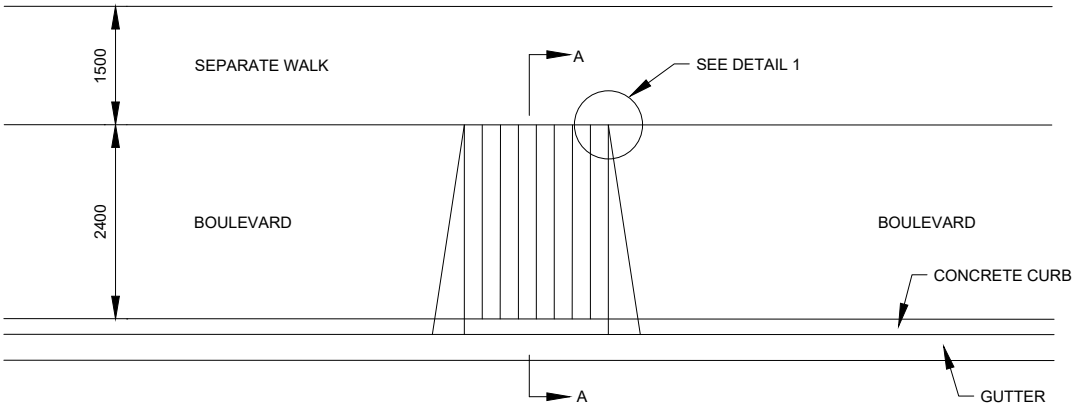
SMOKY LAKE REGION

Curb Ramp Type 'C'
(Midblock; Monowalk)

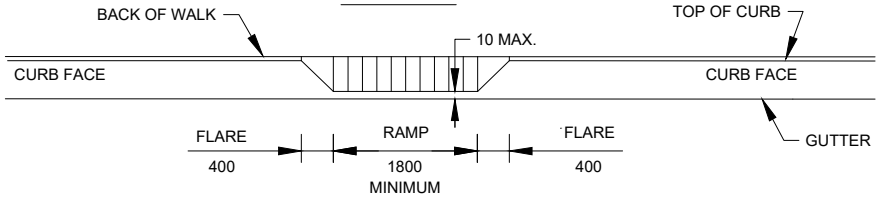
TYPICAL DETAIL	B1-313	
Date: JULY 2023		Rev. 0



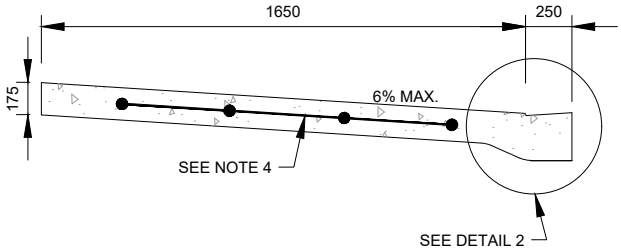
DETAIL 1



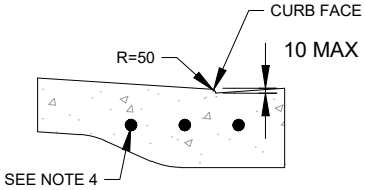
PLAN VIEW



ELEVATION



SECTION A-A



DETAIL 2

NOTES :

(1) MAXIMUM SLOPE ON CURB RAMP TO BE 6%.

(2) CURB AND GUTTER TO BE POURED MONOLITHICALLY WITH CURB RAMP.

(3) CENTRE CURB RAMP WITH CENTRE OF PEDESTRIAN CROSSWALK.

(4) 150 x 150 P18 / P18 GAUGE WIRE MESH OR 10M REBAR ON 300 mm GRID WITH 75 mm COVER (TOP AND SIDE OF SLAB) TO BE PLACED IN SIDEWALK. CURB AND GUTTER SECTION REQUIRES 3-10M.

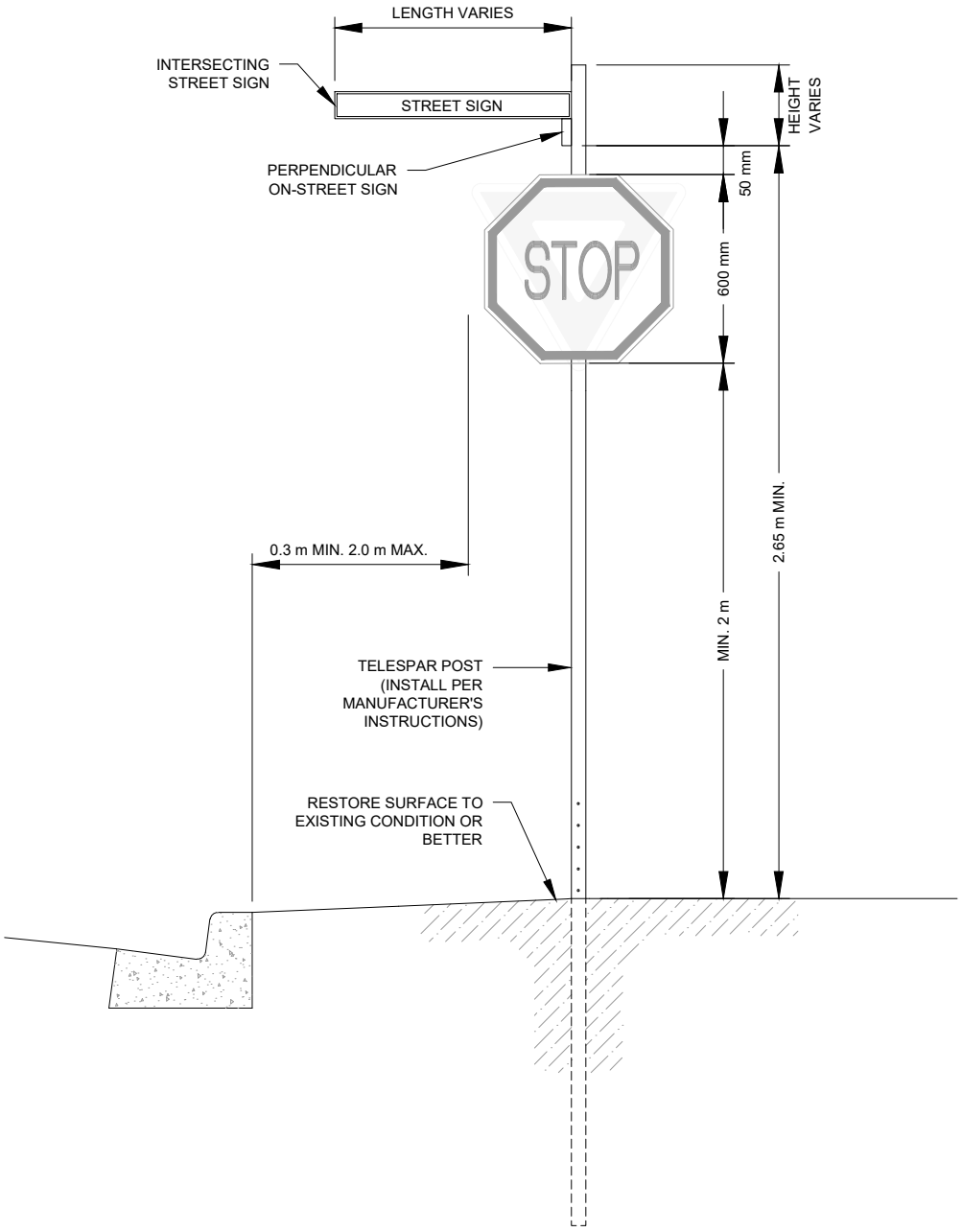
(5) DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Curb Ramp Type 'D'
(Midblock; Separate Sidewalk)

TYPICAL DETAIL	B1-400	
Date: JULY 2023		Rev. 0



NOTE:

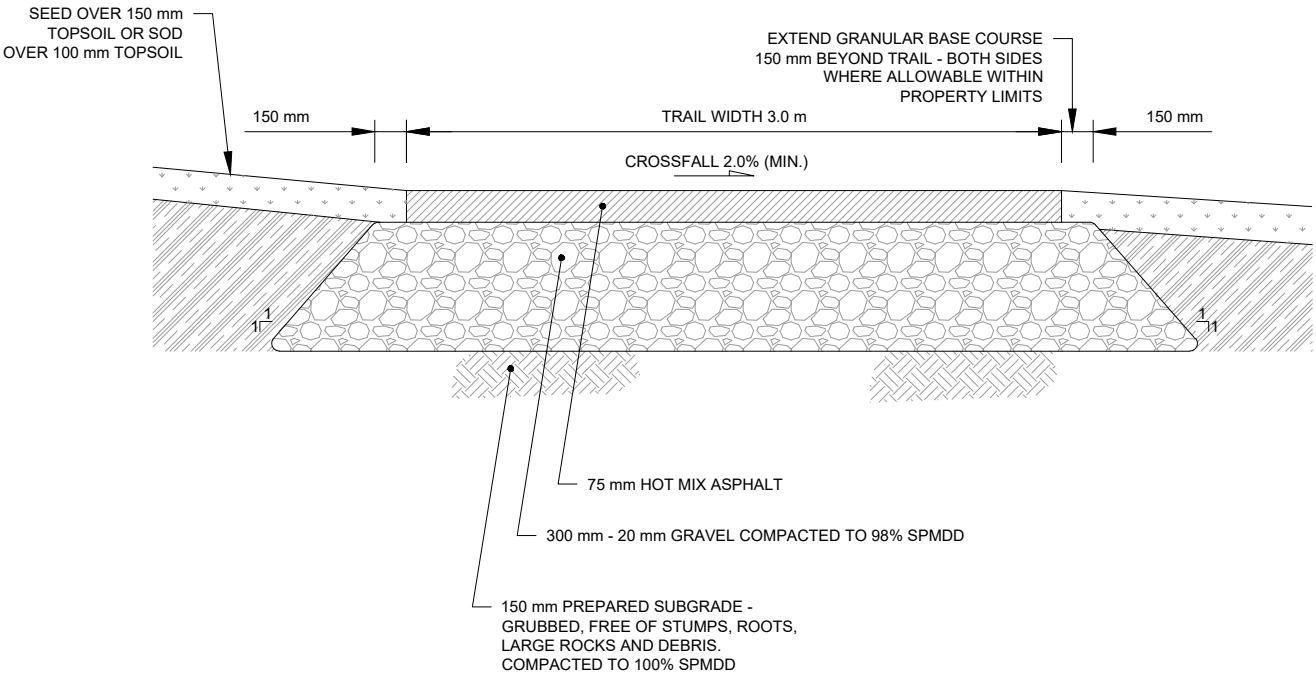
(1) IN LOCATIONS WHERE A STOP OR YIELD SIGN IS NOT CURRENTLY REQUIRED, THE STREET NAME SIGNAGE IS TO BE INSTALLED TO PROVIDE A SPACE FOR A STOP OR YIELD SIGN SHOULD THEY BE REQUIRED IN THE FUTURE.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Sign Installation

TYPICAL DETAIL	B1-500	
Date: JULY 2023		Rev. 0



NOTE:

(1) WHEN SHALLOW UTILITIES ARE LOCATED BENEATH A MULTI-USE TRAIL, THE MULTI-USE TRAIL SHALL BE CONCRETE.

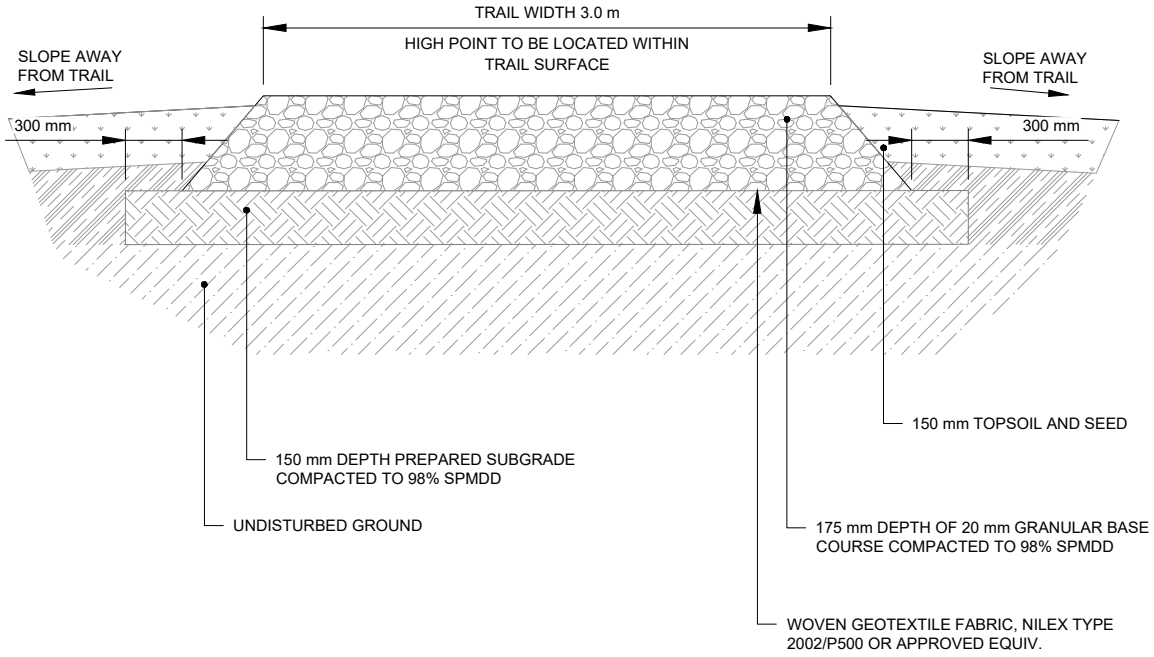
(2) USE THE INDICATED PAVEMENT STRUCTURE, OR AS PER GEOTECHNICAL RECOMMENDATIONS, WHICHEVER IS MORE STRINGENT.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Asphalt Trail

TYPICAL DETAIL	B1-510	
Date: JULY 2023		Rev. 0



NOTES

(1) ALL DISTURBANCE ALONG TRAIL EDGE TO BE REHABILITATED WITH TOPSOIL AND APPROVED SEED MIX.

(2) COMPACTION REQUIREMENTS MAY BE MODIFIED ACCORDING TO SITE CONDITIONS.

(3) TRAIL CROSS FALL: MAX 3% / MIN 1%.

(4) TRAIL TO BE 50 mm ABOVE ADJACENT GROUND (FOR DRAINAGE).

(5) ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

(6) WHEN SHALLOW UTILITIES ARE LOCATED BENEATH A MULTI-USE TRAIL, THE MULTI-USE TRAIL SHALL BE CONCRETE.

(7) USE THE INDICATED TRAIL STRUCTURE, OR AS PER GEOTECHNICAL RECOMMENDATIONS, WHICHEVER IS MORE STRINGENT.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

HISTORIC VILNA
Smoky Lake County
VILLAGE OF WASKATENAU
TOWN OF SMOKY LAKE 1923-2023

SMOKY LAKE REGION

Gravel Trail

B2 SANITARY SEWER SYSTEMS

B2.1 General

.1 **Section B2** covers the design and construction of Urban sanitary sewer mains and appurtenances to be built or re-built in the Smoky Lake Region.

.2 For requirements pertaining to low pressure sanitary sewer design, refer to **Section C2.**

.3 **Typical Details** relating to Urban sanitary sewer system construction are provided at the end of **Section B2**.

.4 This section provides the minimum design criteria, general construction requirements, and construction materials for consulting Engineers to use in their preparation of specifications and drawings.

.1 These standards may be exceeded if warranted by the design consultant.

.2 Good engineering practices and designs must prevail on all projects.

B2.2 Design Flow

.1 Sanitary sewer systems shall be designed on the population density basis of either the ultimate subdivision design population in the Area Structure Plan (if available) or Land Use Bylaw or as follows; whichever is greater:

Type of Residential Development	Population Density
Single Family	30 people/ha
Low Density	30 people/ha
Medium Density	75 people/ha
High Density	150 people/ha
Commercial/Institutional	25 equivalent people/ha
Industrial	20 equivalent people/ha

.2 Commercial and Industrial design flows will be based on the gross developed area or the specific application; refer to **Section B2.2.2**.

.3 The sewer main capacity shall be designed to convey the peak sewage contribution plus infiltration, without the use of holding tanks, and shall be based on the following:

B2.2.1 Residential Contribution

.1 Minimum average contribution of 300 litres per capita per day.

.2 Peak hourly flow for each contributing area calculated at an average flow multiplied by a peaking factor:

$Q_{PDW} = (G * P * PF)/86{,}400$

Where: Q_{PDW} = Peak dry weather flow (L/s)
G = Average daily per capita contribution, 300 L/c/d
P = Design population
PF = Peaking factor, calculated using Harmon's Formula

$= 1 + (14/(4 + P_{pf}^{0.5}))$

Where: P_{pf} = design population, in thousands
The maximum peaking factor shall be 3.8.

B2.2.2 Non-Residential Contribution

.1 For high level planning purposes, when the specific type(s) of Commercial/Industrial/Institutional uses are unknown, the following flow generation rates can be used:

- Commercial/institutional 7,500 L/ha/day (based on an equivalent population of 25 people/ha)
- Industrial 6,000 L/ha/day (based on an equivalent population of 20 people/ha)

.2 For design purposes, when the specific Industrial, Commercial, and Institutional uses are known, **Table B2-1** may be used unless the development has higher or specialized flow generation.

Table B2-1
Commercial, Institutional, and Industrial Sanitary Flow Generation Factors Based on Land Use

Type of Establishment	Average Flow Generation (L/day/m^2 of Floor Area)
Office Buildings	8
Restaurants	20
Bars and Lounges	12
Hotels and Motels	14
Neighbourhood/Department Stores	8
Shopping Centres	4
Laundries and Dry Cleaning	41
Banks and Financial Buildings	12
Medical Buildings and Clinics	12
Warehouses	4
Meat and Food Processing Plants	115
Car Washes	77
Service Stations	8
Auto Dealers, Repair and Service	6
Super Market	8
Trade Businesses - Plumbers, Exterminators, etc.	8
Mobile Home Dealer, Lumber Co., Drive-In Movies, Flea Market	7
Places of Assembly - Churches, Schools, Libraries, Theatres	24
Factories - Manufacturing raw products into finished products	33
Hospitals	1,700 L/bed/day

.3 The peak flow, Q_{PDW}, in litres per second, for each contributing area shall be calculated based on the average flow, Q_{AVG}, in litres per second, multiplied by a peaking factor:

Q_{AVG} = (average flow generation from **Table B2-1**) x (floor area)/86,400
$Q_{PDW} = Q_{AVG} \times PF$

The peaking factor shall be calculated as described in **Section B2.2.1**, by converting Q_{AVG} to an equivalent population: ep = Q_{AVG} (L/s) * 86,400 (s/d)/G (L/c/d)

B2.2.3 Infiltration

.1 Roof leaders and weeping tiles shall not be connected to the sanitary sewer system.

.1 In existing areas where roof leaders and weeping tiles are connected to the sanitary system, an allowance for roof leader/weeping tile contribution of 0.6 litres per second per gross hectare shall be provided.

.2 The sanitary sewer and manhole system shall be watertight; however, an infiltration allowance of 0.28 litres per second per gross hectare shall be used.

.3 Any existing manholes located in sags (low areas subject to inundation during major rainfall events) are subject to an additional allowance of 0.4 litres per second per manhole. Every effort is to be made to ensure new manholes are not located in sags or else inflow/infiltration reduction features shall be installed.

B2.3 Pipe Flow Formula

B2.3.1 Gravity Sewers

.1 Required full flow sewer capacity = (estimated peak wet weather flow rate)/0.86

.2 Manning's formula shall be used to calculate pipe capacity:

$Q = (AR^{(2/3)}s^{0.5})/n$

Where: Q = Pipe capacity (m^3/s)
A = Cross-sectional area of pipe (m^2)
R = Hydraulic radius (area/wetted perimeter) (m)
s = Slope of hydraulic grade line (m/m)
n = Roughness coefficient = 0.013 for smooth-walled pipe (for example, PVC)
= 0.015 for older pipe (for assessment purposes)

B2.3.2 Sewage Force Mains

.1 Use Hazen-Williams formula:

$Q = CD^{2.63}s^{0.54} * 278.5$

Where: Q = Rate of flow (L/s)
D = Internal pipe diameter (m)
s = Slope of hydraulic grade line (m/m)
C = Roughness coefficient = 120 for all mains

B2.4 Velocity

.1 Pipes shall be designed such that the velocity falls within ranges identified below.

Type of Sewer	Minimum Velocity	Maximum Velocity
Gravity	0.6 m/s	3.0 m/s
Force Main	0.76 m/s	1.5 m/s

B2.5 Minimum Pipe Diameter for Gravity Sewers

B2.5.1 Mains

Type of Development	Minimum Diameter
Single Family Residential Areas	200 mm
Multi-Family Residential Areas	250 mm
Non-Residential Areas	250 mm

B2.5.2 Services

Type of Building	Minimum Diameter
Single Family Dwellings	150 mm
Multi-Family Dwellings	150 mm*
Non-Residential Buildings	150 mm*

Note:
* Multi-family and non-residential services shall be sized based on the anticipated peak wet weather flow for the development; however, in no case shall the services for these types of developments be less than 150 mm in diameter.

B2.6 Minimum Pipe Grade

.1 Minimum pipe grades for sewers along a straight alignment are indicated in **Table B2-2**; however, steeper grades are preferred.

Table B2-2
Minimum Pipe Grades

Nominal Pipe Diameter (mm)	Minimum Grade [1] (%)
200	0.40
250	0.28
300	0.22
375	0.15
450	0.12
525 and larger	0.10

Note:
[1] Pipe grades shall be increased to 1.0% for each upstream leg of the system.

.2 For curved sewers, the minimum grade shall be 50% greater than the above values.

B2.7 Minimum Depth of Cover

.1 Sanitary sewers require a minimum cover of 3 m from finished surface to pipe crown and shall be of sufficient depth to satisfy the following criteria:

- Permit all buildings to drain by gravity to the sewer main;
- Prevent freezing;
- Clear other underground utilities; and
- Prevent damage from surface loading.

.2 When it is not feasible to provide 3 m cover from finished surface to pipe crown, the sewer shall be insulated as per **Typical Detail B4-600**.

B2.8 Manhole Spacing

.1 Manholes shall be provided at the end of each line and at all changes in pipe sizes, grades, or alignment and at the beginning and end of curved sections.

.2 The maximum allowable distances between manholes for sewers along a **straight alignment** shall be 120 m.

.3 The maximum allowable distances between manholes for sewers along a **curved alignment** shall be 90 m.

B2.9 Curved Sewers

.1 Maximum joint deflection shall be as recommended by the pipe manufacturer.

.2 Curved sewers shall be aligned parallel to the road centreline.

B2.10 Hydraulic Losses Across Manholes

.1 Generally, for increasing pipe diameters, the crown of the upstream pipe shall match crown of the downstream pipe; however, the upstream 0.8 depth point shall not be below the downstream 0.8 depth point.

.2 The minimum drop in invert elevations across manholes shall be as follows:

.1 Straight runs and deflections up to 45°: 30 mm

.2 Deflections between 45° and 90°: 60 mm

.3 Deflections greater than 90° shall be accommodated using two or more manholes.

B2.11 Pipe Location

.1 Sanitary sewer mains shall be located within the municipal road right-of-way as per the typical cross-sections (**Typical Details B1-100, D2-100, D3-100**, and **D4-100**).

.2 Utility rights-of-way shall be provided for all utilities not located within road rights-of-way or PULs.

- Minimum width of 6 m is required for one or two utilities
- Minimum width of 8 m is required for three utilities

.3 Single family Residential sanitary services shall be installed in a common trench with the water and storm services.

.1 Services shall be located under landscape areas, offset from property line as per **Typical Detail B2-300**.

.2 Multi-family Residential and non-residential sanitary and water services require 3 m horizontal separation.

.4 Sanitary sewer mains shall maintain the following clearances from watermains, storm sewers, and power/telephone/cable infrastructure:

- Minimum 3.0 m horizontal clearance unless sewer depth requires increased spacing; and
- Minimum 0.5 m vertical clearance above or below at crossings; however, sanitary sewer mains shall cross under watermains wherever possible.

B2.12 Manhole Details

.1 Refer to **Typical Detail B2-200** at the end of **Section B2**.

.2 Manhole frames and covers shall not be located within sidewalks.

.3 Manhole frames and covers shall be exposed when located in landscape areas.

.4 To abandon a manhole, plug all pipes with non-shrink grout, remove and dispose the manhole to 1.0 m below ground and fill remainder with fillcrete.

B2.13 Service Connections

.1 Refer to **Typical Details B2-300, B2-310**, and **B2-320** at the end of **Section B2**.

.2 Sanitary sewer services for Commercial, Industrial, multi-family, or Institutional areas, unless otherwise accepted by the Municipality, shall only be made after the service requirements have been determined and a permit, approving the installation, is issued by the Municipality.

.3 Sanitary sewer services shall be designed as a single connection from the main to the property line.

.4 Sanitary sewer services shall terminate 1 m past the property line or 1 m past the shallow utility Easement.

.5 Services shall be located offset from property line as per **Typical Detail B2-300**; dual servicing shall be implemented where possible.

.6 All sanitary sewer services shall be designed for gravity flow with a minimum grade of 2.0% and require a minimum of 2.8 m of cover at property line, from finished surface to pipe crown.

.7 Sanitary sewer services which are 150 mm in diameter shall be PVC DR28 building service pipe conforming to CSA specification B182.2.

.8 Sanitary sewer services 200 mm in diameter and larger shall be PVC DR35 conforming to CSA specification B182.2.

.9 Single family Residential sanitary service connections shall be via the use of in-line tees. Residential sanitary service connections to manholes are not permitted.

.10 Manholes for sanitary sewer service connections to the main are required for all multi-family, Commercial, Industrial, or Institutional lots.

.11 Pipe saddles shall be used to connect sanitary sewer services to mains only in instances where retrofit work is undertaken.

.12 Risers shall be employed where the service connection at the main is 4.0 m or deeper. The Developer's Consultant is responsible to determine if thrust blocking is required.

.13 An inspection/sampling manhole, located at 0.6 m inside the municipal right-of-way, may be required for all Industrial and Commercial sanitary sewer service connections, at the discretion of the Municipality.

.14 The end of sanitary sewer services shall be adequately capped or plugged to prevent the entry of earth, water, or other deleterious material into the pipe.

.1 Furthermore, the end of the pipe shall be marked by a vertical, nominal size 2" x 4" timber set at the service invert and extending 0.5 m above the ground surface.

.2 The top 300 mm of the exposed portion of this marker shall be painted red.

.3 These marker stakes are required prior to issuance of a Construction Completion Certificate for the development.

.15 Roof leaders and building foundation drain sump pumps shall not be connected to the sanitary sewer system; refer to **Section B3** of these Regional Engineering Design Standards (REDS).

.16 Grease, suspended solids, and sediment traps shall be provided at all food processing establishments, shopping centres, service stations, car washes, hotels/motels, manufacturing, equipment servicing and cleaning facilities, institutions (churches, schools, etc.) and any other facility that is anticipated to discharge sediment and/or grease.

.17 The Developer is to coordinate with the Municipality to determine servicing requirements for park spaces.

B2.14 Service Abandonment

.1 Sanitary services are to be abandoned by installing a plug in the sanitary service at the connection to the main.

B2.15 Service Connection Records

.1 The Developer's Consultant shall provide detailed service reports for all installed services.

.2 Service reports shall provide information related to pipe diameter, invert elevations at the property line, location of services relative to property line(s), manholes or watermain valves, and lot number.

.3 A sample service report is provided in **Section A3**.

B2.16 Special Conditions

.1 Special design requirements such as pipe foundations, special bedding, anchors, etc., may be required for certain soil conditions.

.2 All special designs are subject to acceptance by the Municipality.

B2.17 Materials and Specifications

B2.17.1 Pipe

.1 Pipe materials shall be selected using a rational design method, with the following information as a guide.

.2 The Developer's Consultant is responsible to ensure that the selected pipe material and class is suitable for the proposed application (site conditions, depth of installation, etc.).

.3 Alternative pipe materials will be evaluated through a variance request submitted by the Developer's Consultant. Developer's Consultant shall provide a justification for the request for variance.

.4 Alternative pipe materials shall not be installed without receiving written authorization from the Municipality.

Table B2-3
Acceptable Pipe Materials for Sanitary Sewers

Material	Specification
Polyvinyl Chloride (PVC)	ASTM D3034, SDR 35 (CSA B182.2)
Casing Pipe (Steel)	CAN3-Z245.1, Grade 241*
High Density Polyethylene (HDPE)	AWWA C906, DR11 or approved

* or higher as required by crossing owner.

B2.17.2 Manholes

.1 Precast manhole sections and grade rings shall conform to CAN/CSA A257.4 and shall be manufactured using sulphate-resistant Type 50 cement.

.2 Manhole sections shall be precast reinforced concrete sections conforming to ASTM C478 and CSA A257.4. All precast units shall be marked with manufacturer's identification, date of casting, type of cement, and CSA standard.

.3 Manhole steps shall be standard safety type, aluminium forged of 6061-T6 alloy having a minimum tensile strength of 260 MPa.

.4 All manhole sections shall have flexible watertight joints sealed with rubber gaskets conforming to ASTM C443 and grouted inside and outside with non-shrink grout.

.5 Manholes shall be fitted with the appropriate cast iron frame and cover conforming to Class 35B ASTM A48. All castings shall be true to form and dimension, and shall be free from faults, sponginess, cracks, blowholes, or other defects affecting their strength.

.6 Pre-benched manhole bases shall be used wherever possible with pre-cored connection holes and watertight Duraseal or A-Lok joints or approved equal.

.7 Perched manholes are required when adding a manhole along an existing sanitary sewer.

B2.17.3 Pipe Bedding

.1 Granular material for bedding of pipes in sound dry soils shall be Class B sand (refer to **Typical Detail B2-100**) conforming to **Table B2-4**:

Table B2-4
Class B Sand Bedding Material Gradation

Standard Sieve Size (µm)	% Passing
10 000	100
5 000	70 - 100
1 600	5 - 20
80	0 - 12

.2 Washed rock wrapped in filter cloth shall be used in areas with high water table.

.1 Washed rock shall consist of washed, crushed, or screened stone or gravel consisting of hard and durable particles meeting the gradation limits specified in **Table B2-5** and shall be free from sand, clay, cementitious, organic, and other deleterious material.

Table B2-5
Washed Rock Bedding Material Gradation

Standard Sieve Size (µm)	% Passing
25 000	100
5 000	10 (max.)
80	2 (max.)

B2.17.4 Trench Section

.1 For trenching and bedding details, refer to **Typical Detail B2-150** provided at the end of **Section B2**.

B2.17.5 Corrosion Protection

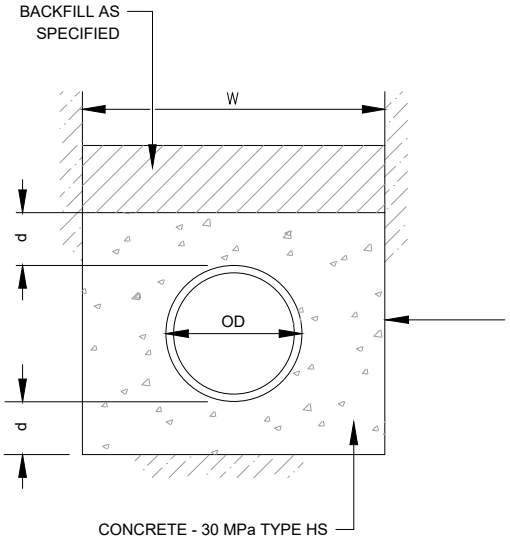
.1 All concrete used in a sanitary sewer system shall be made with sulphate-resistant cement.

.2 One (1) digital (PDF) copy of a specialist's evaluation of cathodic protection requirements shall be supplied to the Municipality for all steel applications.

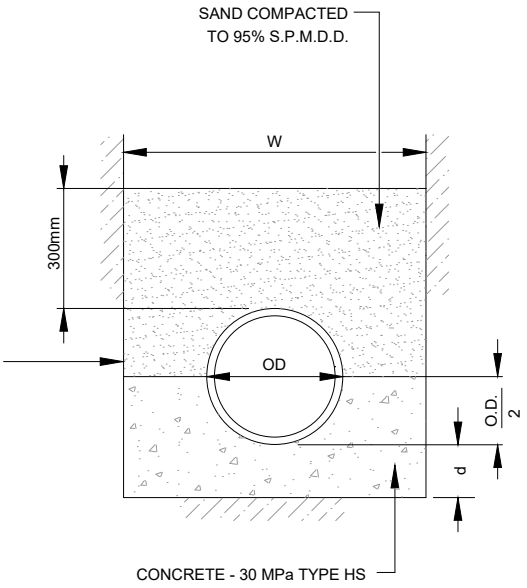
B2.18 Typical Details – Urban Sanitary Sewer Systems

Standard Detail No.	Title
B2-100	Pipe Zone Bedding Details (Class A, A-1, B)
B2-150	Trench Backfill
B2-200	1200 mm Diameter Precast Manhole
B2-250	Perched Manhole
B2-300	Residential Single Service Layout
B2-310	Residential Dual Service Layout
B2-320	Sanitary Service Connection
B2-330	Sanitary Inspection Chamber

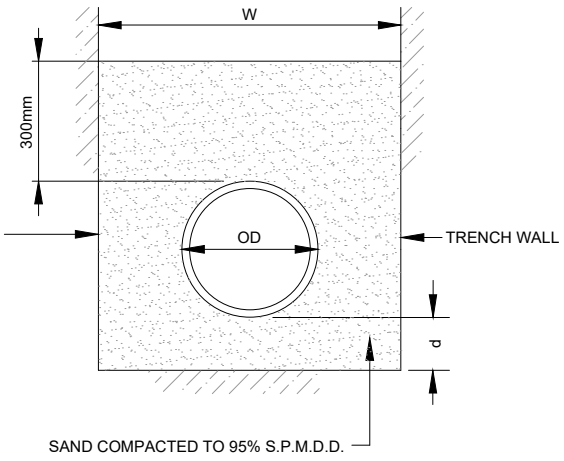
TYPICAL DETAIL	B2-100	
Date: JULY 2023		Rev. 0



CLASS A



CLASS A-1



CLASS B

PIPE SIZE	d MIN.(mm)
675mm OR SMALLER	75
750mm TO 1500mm	100
1650mm AND LARGER	150

LEGEND:
d = DEPTH OF BEDDING MATERIAL BELOW PIPE
W = TRENCH WIDTH = 2 x OD (MIN.)
OD = OUTSIDE DIAMETER OF PIPE

NOTES:

(1) ADD 100mm TO d IN ROCK EXCAVATION.

(2) IN AREAS WITH HIGH WATER TABLE, CLASS B PIPE ZONE MATERIAL SHALL BE WASHED ROCK AS PER SECTION B2.17.3 AND SHALL BE WRAPPED IN NON-WOVEN GEOTEXTILE (NILEX 4551 OR APPROVED EQUAL).

(3) THESE BEDDING TYPES APPLY ONLY WHERE SUITABLE SOIL CONDITIONS EXIST. IN AREAS WITH UNSUITABLE SOIL CONDITIONS, SPECIAL BEDDING & PIPE FOUNDATION DESIGNS ARE REQUIRED

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

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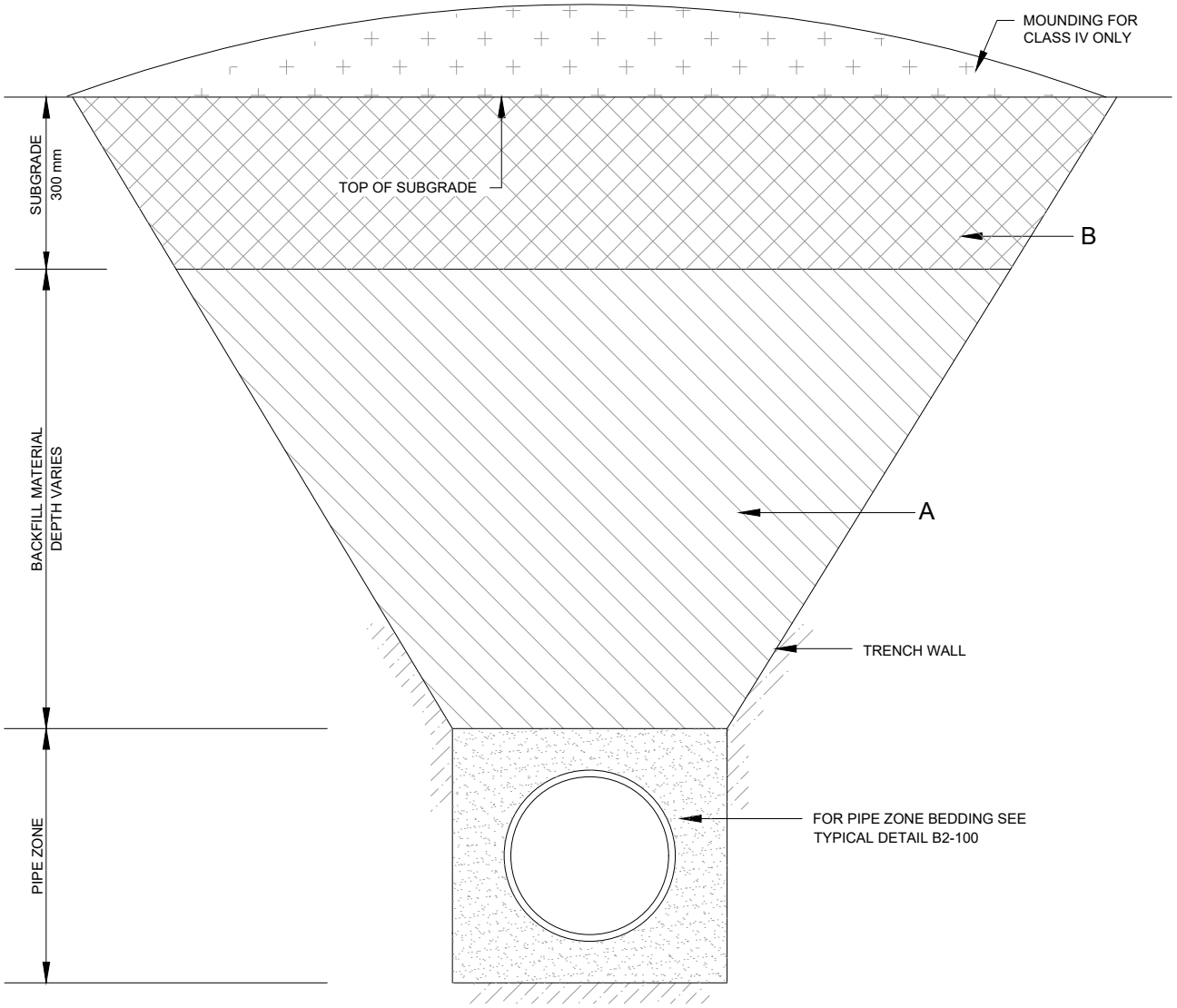
SMOKY LAKE REGION

Pipe Zone Bedding Details
(Class A, A-1, B)

TYPICAL DETAIL	B2-150	
Date: JULY 2023		Rev. 0



CLASS	USE	A			B		
		MATERIAL	MAX LIFT	% SPMDD	MATERIAL	MAX LIFT	% SPMDD
I	UNDER ROADS	IMPORTED GRANULAR	200	97	IMPORTED GRANULAR	150	100
II	UNDER ROADS	NATIVE SOIL	200	97	NATIVE SOIL	150	100
III	LANDSCAPED AREAS	NATIVE SOIL	200	95	NATIVE SOIL	200	95
IV	OPEN FIELD	NATIVE SOIL	300	95	NATIVE SOIL	300	95

NOTES:

(1) ALL TRENCH WALLS SHALL BE SLOPED OR SHORED IN CONFORMANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY REGULATIONS CURRENTLY IN EFFECT, OR AS PER GEOTECHNICAL RECOMMENDATIONS, WHICHEVER IS MORE STRINGENT

(2) SUBGRADE TO BE SPECIFIED WITH COMPLETE ROADWAY STRUCTURE DESIGN.

(3) SURFACE DRAINAGE TO BE RECTIFIED FOR IMMEDIATE AREA IF CLASS IV BACKFILL IS USED.

(4) FILLCRETE MAY BE REQUIRED AS BACKFILL FOR EXISTING ROADWAYS, AT THE DISCRETION OF THE MUNICIPALITY.

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Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

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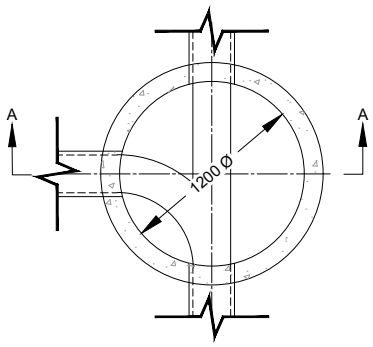
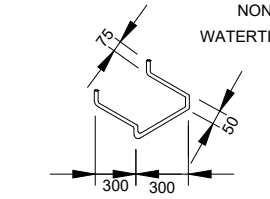
SMOKY LAKE REGION

Trench Backfill

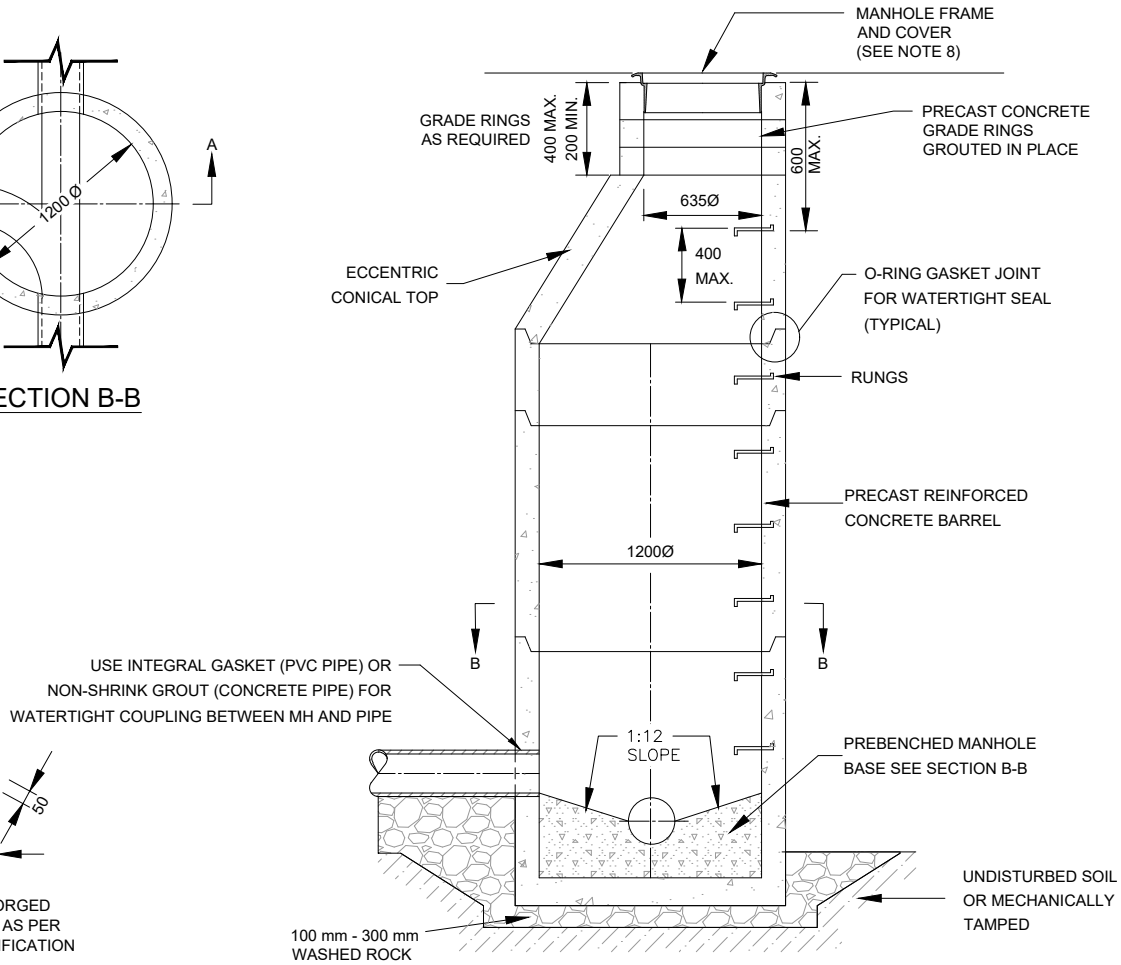
TYPICAL DETAIL	B2-200	
Date: JULY 2023		Rev. 0



SECTION B-B



20 mm ALUMINUM FORGED MANHOLE RUNGS OR AS PER MANUFACTURER SPECIFICATION



SECTION A-A

NOTES:

(1) PRECAST RINGS, CONES AND BARRELS TO MEET CURRENT A.S.T.M. C478 AND CSA A257.4 STANDARDS.

(2) SPECIAL BASE DESIGN REQUIRED FOR DEPTHS OVER 9.0 m.

(3) CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.

(4) CONICAL TOP TO BE USED WHERE DISTANCE FROM BENCH TO MH COVER EXCEEDS 2 m.

(5) VERTICAL SIDE OF CONICAL TOP TO BE SITUATED TO ALLOW ACCESS WITHOUT CONFLICTING WITH FLOW CHANNEL.

(6) BENCHING CONCRETE SHALL BE A MINIMUM OF 30MPa COMPRESSIVE STRENGTH, TYPE HS.

(7) RETROFIT RUNGS TO BE EPOXIED IN PLACE (NO PLASTIC SLEEVES)

(8) F-80 FRAME AND COVER FOR ASPHALT AREAS.
F-39 FRAME AND COVER FOR OFF ROAD AREAS.
F-90 FRAME AND COVER WITH GASKET FOR SANITARY MANHOLES IN SAG LOCATIONS

(9) DIMENSIONS ARE IN MILLIMETRES UNLESS SPECIFIED OTHERWISE

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

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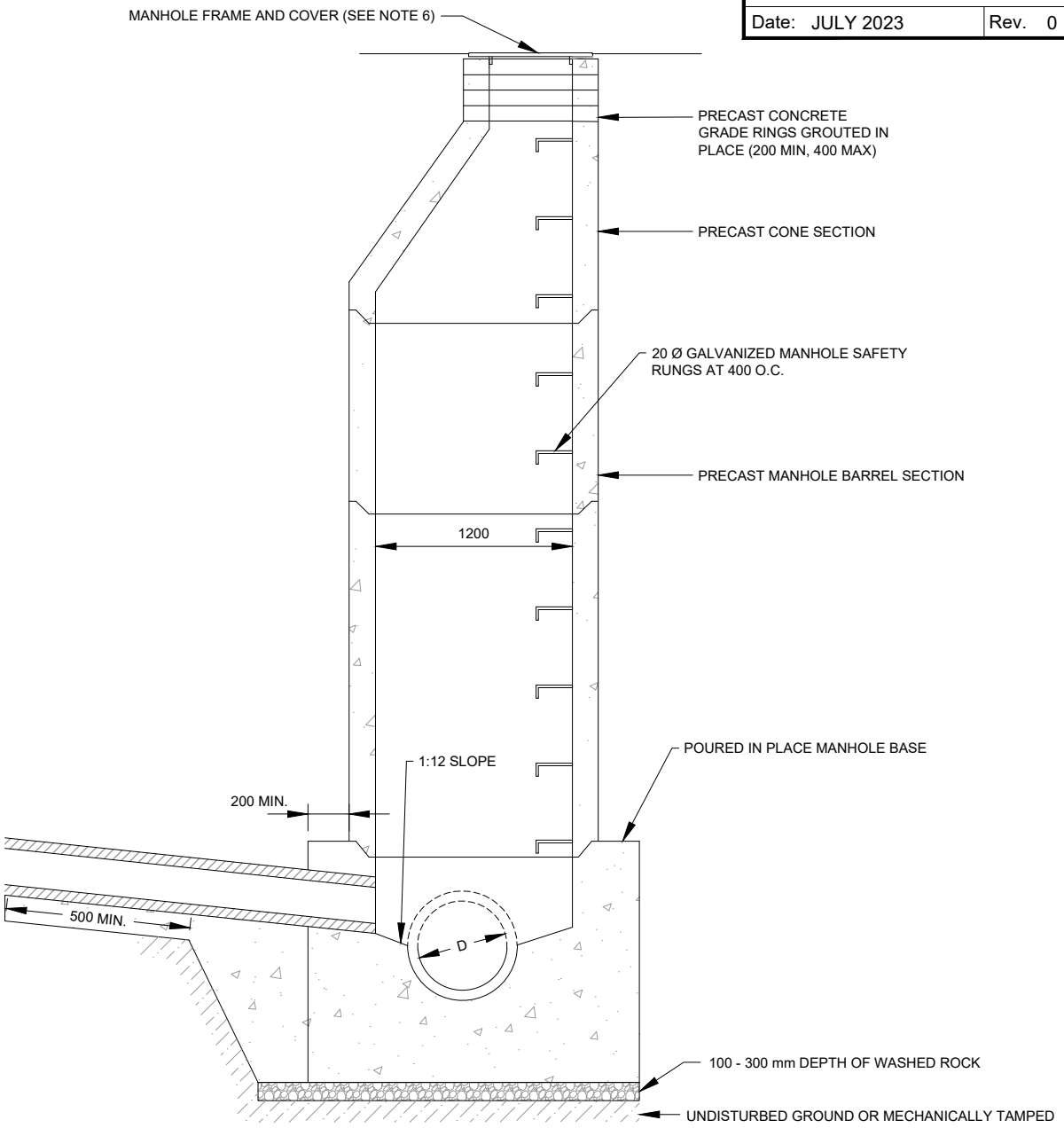
SMOKY LAKE REGION

1200 mm Diameter Precast Manhole

Time: 10:15am
Date: Jul 17, 2023
File: \\ae.ca\data\working\edm\2022-3451-00\civil\model\Revised_Typical_Details\B2\3451-00_B2-200.dwg by
Xrefs:

TYPICAL DETAIL	B2-250
Date: JULY 2023	Rev. 0



NOTES:

(1) ALL PRECAST CONCRETE TO MEET CURRENT ASTM C478 AND CSA A257.4 STANDARDS.

(2) ALL POUR-IN PLACE CONCRETE TO BE 30MPa AT 28 DAYS.

(3) CONICAL TOP TO BE USED WHERE DISTANCE FROM BENCH TO MH COVER EXCEEDS 2 m.

(4) VERTICAL SIDE OF CONICAL TOP TO BE SITUATED TO ALLOW ACCESS WITHOUT CONFLICTING WITH FLOW CHANNEL.

(5) CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.

(6) F-80 FRAME AND COVER FOR ASPHALT AREAS.
F-39 FRAME AND COVER FOR OFF ROAD AREAS.
F-90 FRAME AND COVER WITH GASKET IN SAG LOCATIONS

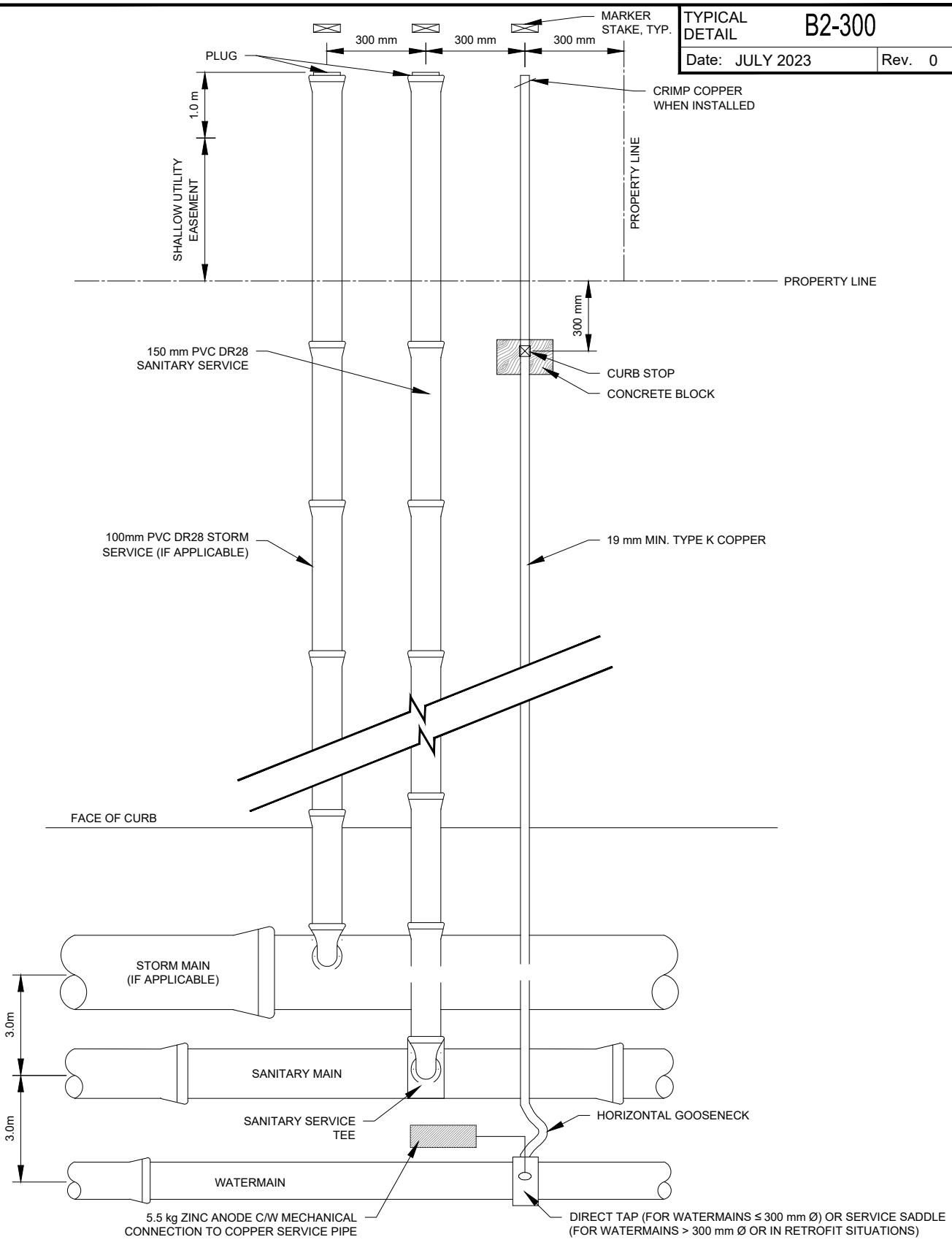
(7) ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Perched Manhole

TYPICAL DETAIL	B2-300
Date: JULY 2023	Rev. 0



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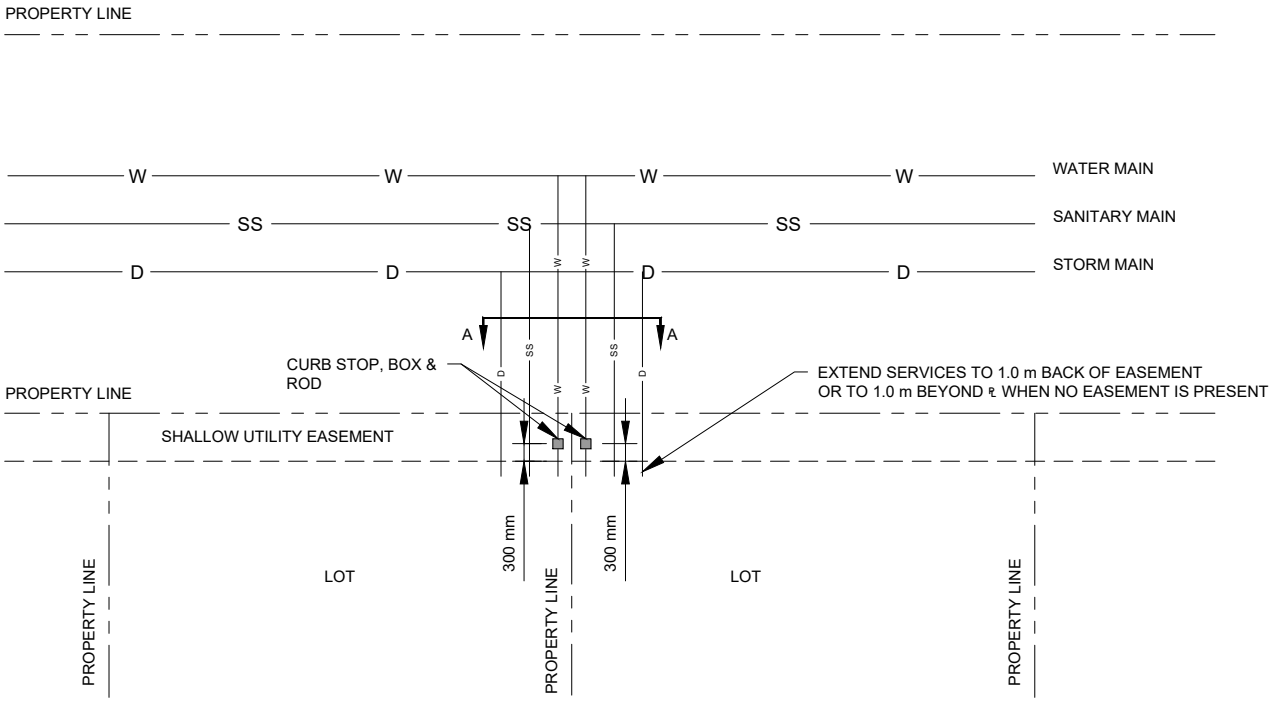
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

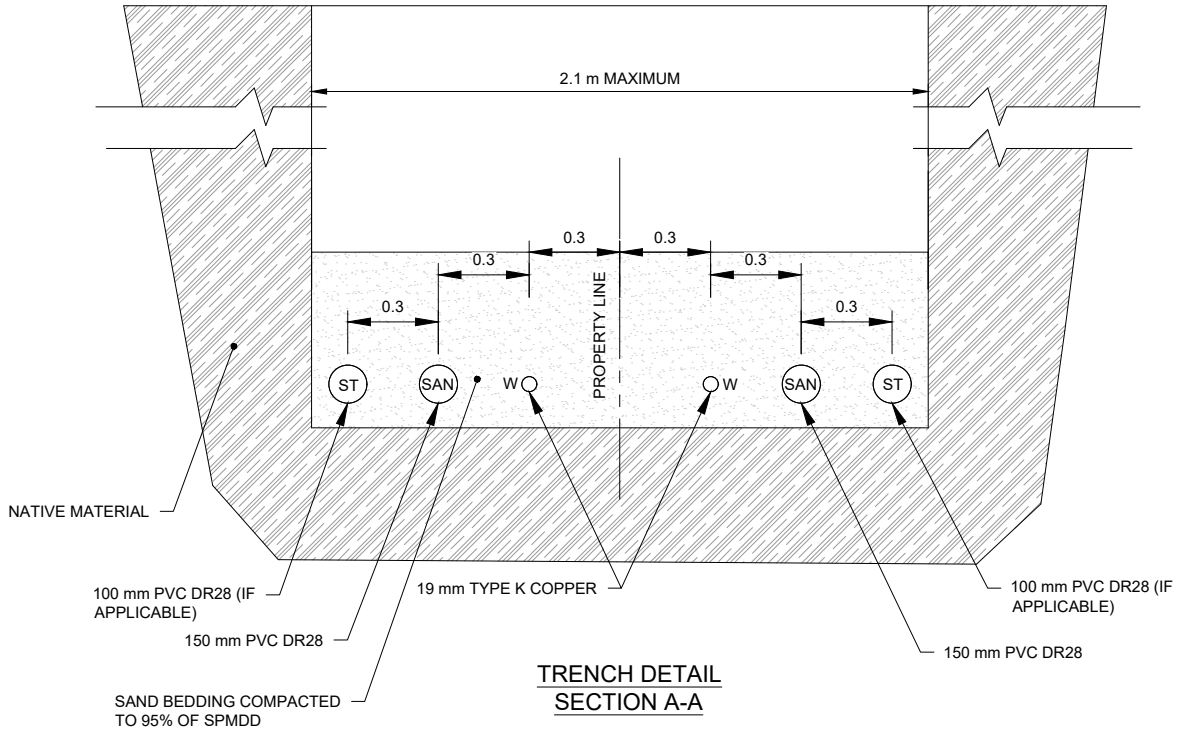
SMOKY LAKE REGION

Residential Single Service Layout

TYPICAL DETAIL	B2-310	
Date: JULY 2023		Rev. 0



TYPICAL DUAL SERVICE LAYOUT FOR RESIDENTIAL LOTS



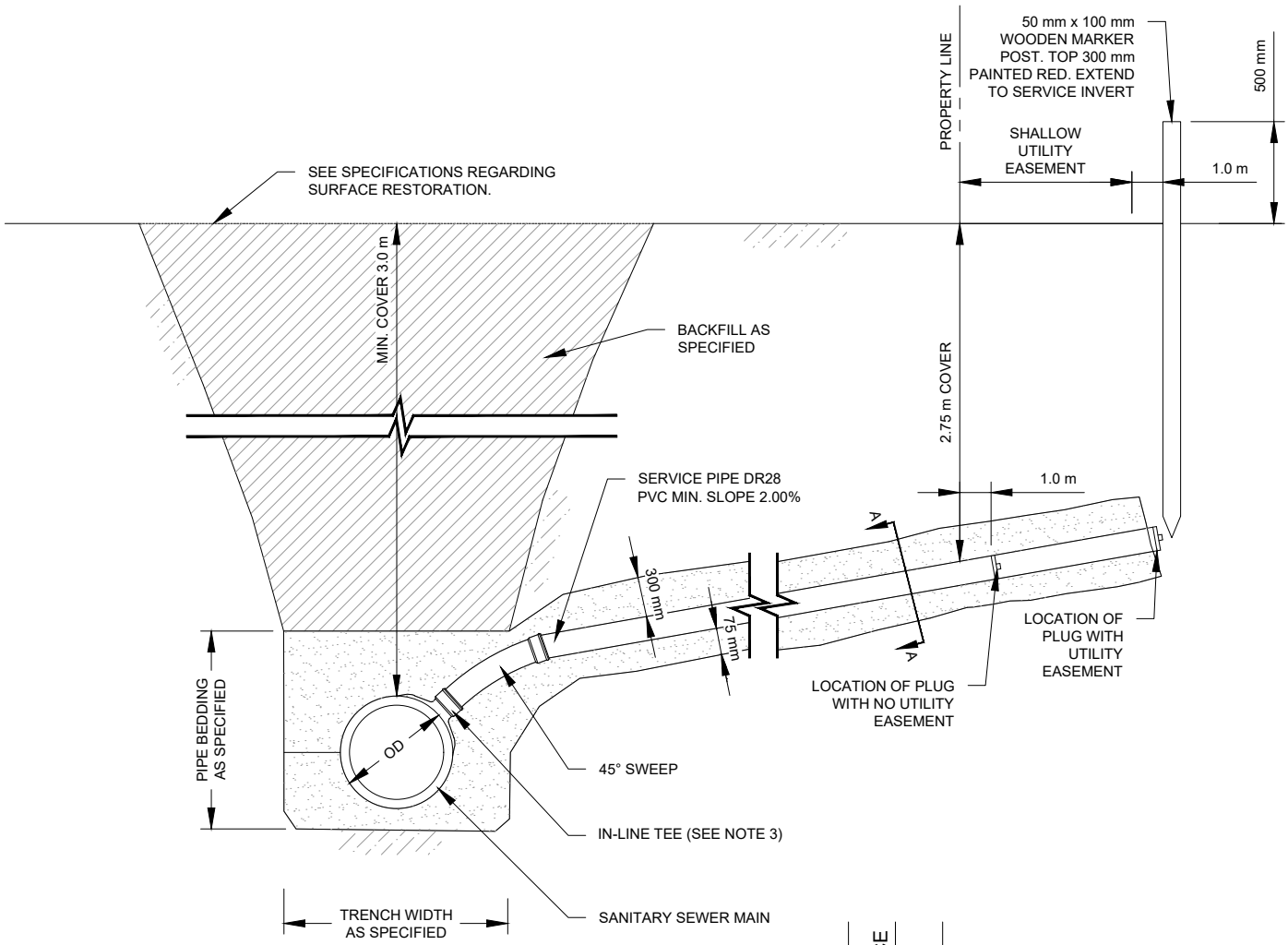
TRENCH DETAIL
SECTION A-A

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Residential Dual Service Layout

TYPICAL DETAIL	B2-320	
Date: JULY 2023		Rev. 0



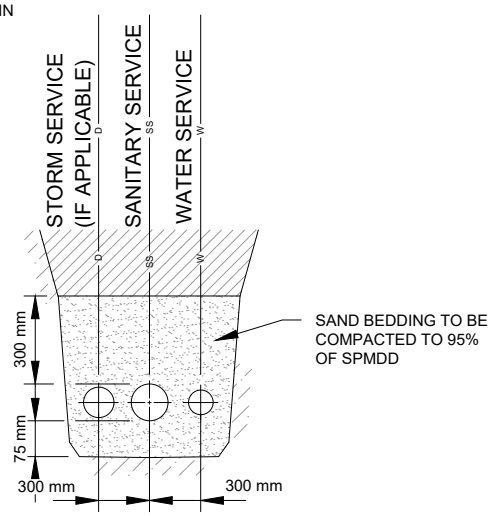
NOTES:

(1) ALL TRENCH WALLS SHALL BE SLOPED OR SHORED IN CONFORMANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY REGULATIONS CURRENTLY IN EFFECT, OR AS PER GEOTECHNICAL RECOMMENDATIONS, WHICHEVER IS MORE STRINGENT.

(2) OD = OUTSIDE PIPE DIAMETER.

(3) SERVICE CONNECTIONS TO BE MADE AT THE 10:00 AND 2:00 POSITIONS.

(4) RISERS FOR SERVICE LINES ARE REQUIRED WHEN SEWER MAINS EXCEED 4.0 m IN DEPTH.



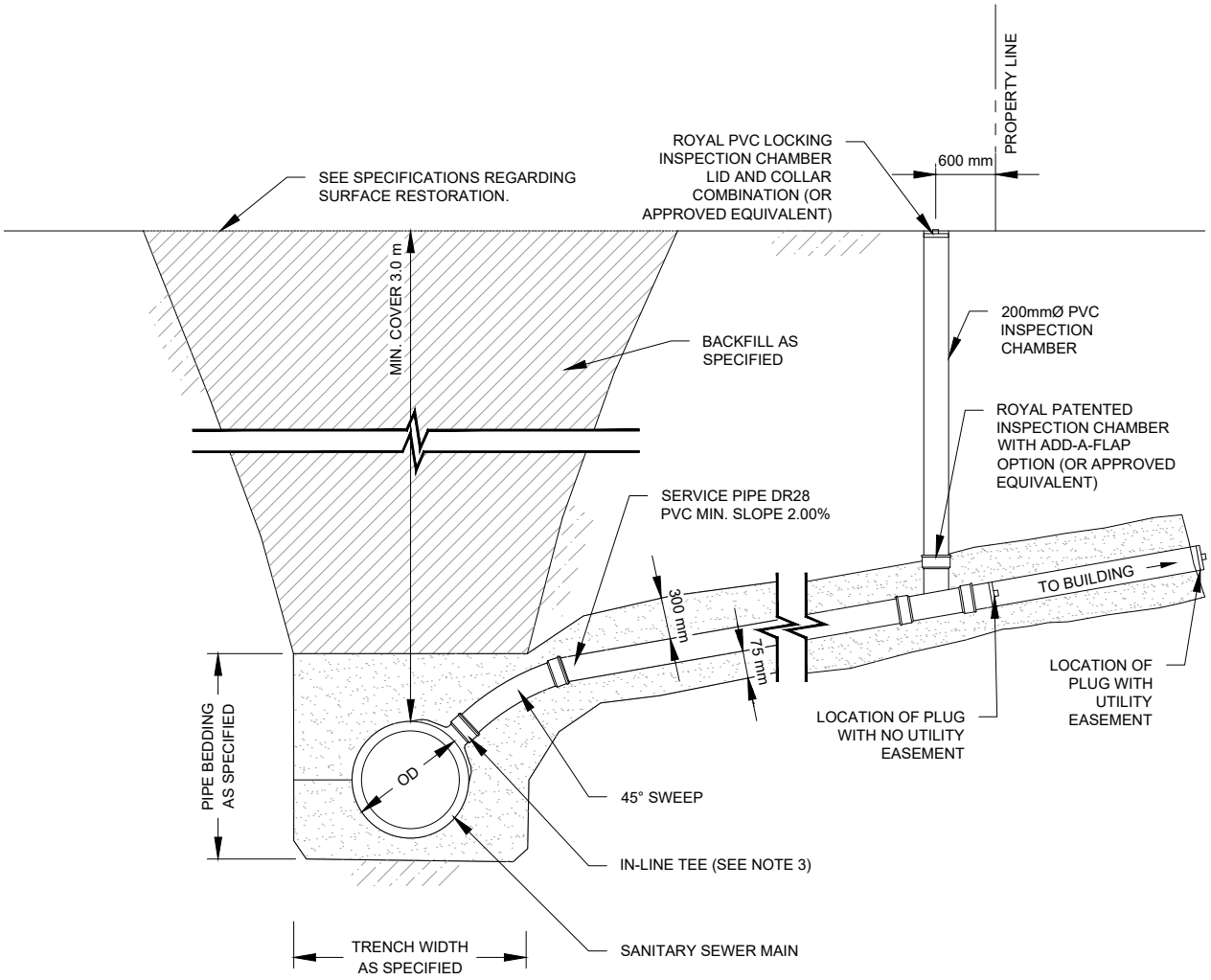
SECTION A-A

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Sanitary Service Connection

TYPICAL DETAIL	B2-330	
Date: JULY 2023		Rev. 0



NOTES:

(1) ALL TRENCH WALLS SHALL BE SLOPED OR SHORED IN CONFORMANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY REGULATIONS CURRENTLY IN EFFECT, OR AS PER GEOTECHNICAL RECOMMENDATIONS, WHICHEVER IS MORE STRINGENT.

(2) OD = OUTSIDE PIPE DIAMETER.

(3) SERVICE CONNECTIONS TO BE MADE AT THE 10:00 AND 2:00 POSITIONS. NEW COMMERCIAL/ INDUSTRIAL SERVICES TO BE CONNECTED TO A MANHOLE AT THE MAINLINE.

(4) RISERS FOR SERVICE LINES ARE REQUIRED WHEN SEWER MAINS EXCEED 4.0m IN DEPTH.

(5) SANITARY INSPECTION CHAMBERS ARE ONLY TO BE USED AT THE DISCRETION OF THE MUNICIPALITY.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Sanitary Inspection Chamber

B3 STORM DRAINAGE SYSTEMS

B3.1 General

.1 **Section B3** covers the design and construction of Urban storm drainage systems and appurtenances to be built or re-built in the Smoky Lake Region.

.2 For requirements pertaining to Rural storm drainage systems, refer to **Section C3**.

.3 **Typical Details** relating to Urban storm drainage system construction are provided at the end of **Section B3**.

.4 This section provides the minimum design criteria, general construction requirements, and construction materials for consulting Engineers to use in their preparation of specifications and drawings.

.1 These standards may be exceeded if warranted by the design consultant.

.2 Good engineering practices and designs must prevail on all projects.

B3.2 Stormwater Management Plan

.1 Stormwater runoff generated from within the subdivision shall be routed through a stormwater management facility as required to regulate the rate of outflow prior to discharge, unless otherwise accepted by the Municipality.

.2 Stormwater management facilities shall be designed in accordance with the "Stormwater Management Guidelines" prepared by Alberta Environment and in accordance with good engineering practice.

.1 Evaporation ponds are not permitted and will not be accepted by the Municipality.

.3 A phased construction approach to match the expected development sequence may be acceptable to the Municipality, provided the requirements of this guideline are met.

.1 Temporary ponds and structures, without the required facilities and design components per this guideline, are not acceptable.

.4 Prior to submission of any detailed design, a stormwater management plan shall be prepared by the Developer and submitted to the Municipality for acceptance.

.5 The stormwater management plan shall be consistent with the standards outlined herein and shall:

.1 Identify the impact of the proposed development on the watershed;

.2 Identify and quantify the amount of upstream drainage entering the proposed development lands, including all points of entry;

.3 Identify all existing flow channels, drainage patterns or routes, and containment areas;

.4 Identify the point(s) of discharge from the lands, as well as the type and calculated capacity of the receiving drainage facility(ies), whether natural, man-made, or a combination of both;

.5 Provide details of required stormwater retention/detention facilities;

.6 Provide details of water quality enhancement facilities; and

.7 Identify all licensing requirements and/or approvals as may be required by Provincial or Federal environmental acts.

B3.3 Minor and Major System Definitions

.1 Each drainage system shall consist of the following components:

.1 **Minor System:** pipes, open channels, and water courses which convey flows of a 5-year return frequency, without surcharging; and

.2 **Major System:** surface flood paths, roadways, and water courses which convey flows of a 100-year return frequency. The major system shall include culverts crossing roadways.

B3.4 Design Flows

.1 Design flows shall be computed using one or more of the following methods:

B3.4.1 Rational Method

.1 $Q = CIA/360$

Where: Q = Design flow (m^3/s)
A = Drainage area (ha)
I = Rainfall intensity (mm/hr)
C = Runoff coefficient

.2 The Rational Method is applicable for minor system storm sewer main design for watersheds (less than 65 ha) which discharge into detention facilities or other outlets acceptable to the Municipality.

B3.4.2 Hydrograph Methods

.1 Computer modelling shall be used for stormwater drainage design for:

- Residential and Commercial/Industrial development areas greater than 65 ha in size.
- Any development requiring storage or detention facilities.
- Alternatively, computer modelling may be used for areas smaller than those outlined above.

.2 The 4-hour Chicago distribution hyetographs should be used for analysis of major and minor conveyance systems by computer simulation.

.3 When the design of stormwater management is involved, the 24-hour Huff distribution design hydrographs should be used.

.4 Contact the Municipality prior to design to confirm the type of modelling software to be used in the design.

B3.5 Runoff Coefficient, C

.1 Runoff coefficients for storm events with return periods of up to 10-years shall be taken from **Table B3-1**.

Table B3-1
Runoff Coefficients for 5-Year and 10-Year Event Return Periods

Description	Runoff Coefficient		
	Minimum	Average	Maximum
Pavement (Asphalt or Concrete)		0.95	
Roofs		0.95	
Business			
Downtown	0.70	0.83	0.95
Neighbourhood	0.50	0.60	0.70
Industrial			
Light	0.50	0.65	0.80
Heavy	0.60	0.75	0.90
Residential			
Low Density Residential	0.40	0.50	0.60
Medium Density Residential	0.60	0.68	0.75
High Density Residential	0.50	0.60	0.70
Rural	0.25	0.33	0.40
Parks/Cemeteries	0.10	0.18	0.25
Playgrounds	0.20	0.28	0.35
Railroad Yards	0.20	0.28	0.35
Unimproved	0.10	0.20	0.30

Notes:

1. Values within the range specified depend on the soil type if the watershed is significantly unpaved (sand is minimum, clay is maximum) and on the nature of the development.
2. For storms with return periods of more than 10 years, increase the specified values as follows, up to a maximum coefficient of 0.95:
   - 25-Year: Add 10%
   - 50-Year: Add 20%
   - 100-Year: Add 25%

B3.6 Rate of Precipitation

.1 The most up to date Intensity-Duration-Frequency (IDF) curves published by EPCOR Drainage shall be used for design purposes, unless otherwise requested by the Development Officer. The Development Officer may require that the Developer review data from other nearby climate stations and provide a comparison to the EPCOR Drainage IDF curves to justify which shall be used in the design.

.1 The 5-year IDF curve shall be used for the design of minor systems.

.2 The 100-year IDF curve shall be used for the design of major systems.

.2 The time of concentration is the sum of the inlet time and travel time.

.1 Inlet time is the time required for runoff to become established and drain to the inlet of the storm sewer system.

.2 The inlet time shall be as per **Table B3-2**.

Table B3-2
Design Inlet Time

Catchment Area	Imperviousness (%)		
	30	50	>70
8 ha or less	8 mins	8 mins	5 mins
Between 8 ha and 40 ha	9.2 mins	9.2 mins	6 mins
40 ha or greater	10.4 mins	10.4 mins	7.25 mins

.3 Travel time is the time required for the flow to travel within the storm sewer system to the design location. Travel time shall be determined based on the part-full velocity in each pipe upstream of the design location.

B3.7 Rough Grading

.1 To provide basic positive drainage until a lot is developed, the lot(s) shall be rough graded, allowing for earth balancing of future basement excavation and landscaping.

.2 Rough grading shall ensure positive drainage is maintained in the interim; the Developer shall be responsible to remove and properly dispose of standing water on lots.

.1 Rough grading of lots to ensure positive drainage is required prior to requesting a CCC inspection.

.3 Rough grading shall be carried out without damage to the root and branch systems of existing plant material to be retained.

.4 All sites requiring topsoil shall be rough graded to within 150 mm of final grade (in areas to be seeded) or to within 100 mm of final grade (in areas to be sodded).

.5 At the toes of slopes and banks, grades shall be smoothly rounded to a minimum slope of 8H:1V. All slopes, banks and disturbed areas, as a result of the development, are to be feathered to meet with existing grades.

.6 The maximum allowable slope for berms shall be 4H:1V, unless otherwise acceptable to the Municipality.

.1 Slopes of 3H:1V may be acceptable in areas of minimal pedestrian traffic and for the side slopes of drainage swales.

.2 The use of slopes of 3H:1V must be accepted by the Municipality prior to implementation.

.7 All fill material required for rough grading shall be free of sticks, stones, and debris greater than 7 cm and any other material which may be subject to rot or corrosion.

.8 The Developer shall be responsible for clean up after rough grading operations; the area around the lot being graded shall be left in a developable condition.

B3.8 Final Site and Lot Grading

.1 Each lot shall be graded to drain to the municipal storm drainage system. Cross-lot drainage is not permitted.

.2 Where feasible, lot grading plans shall be prepared such that rear to front drainage is provided throughout the subdivision.

.3 Split drainage or front-to-back drainage is only permitted when the lot is located such that there is a roadway, alley, public right-of-way, or stormwater management facility at both the front and back of the lot.

.4 Front-to-back drainage shall slope from the property line; i.e., drainage within a municipal right-of-way shall be contained within the municipal right-of-way and shall not drain through private property.

.5 Areas around buildings shall be graded away from the foundations to prevent flooding. Refer to **Typical Details B3-300** and **B3-350** for typical grading requirements.

.6 Lots lower than adjacent roadways shall be avoided.

.7 Building foundations shall be above the major system hydraulic grade line for a 100-year storm event, plus a minimum of 0.3 m freeboard.

- .1 This requirement may not apply to replacement of structures/developments within existing flood plains.
- .2 In these areas, suitable precautions, such as mounting electrical panels above the 1:100-year hydraulic grade line, shall be taken.

.8 Reserves and public lands shall be graded to drain towards developed streets, alleys, and/or the storm drainage system.

B3.9 Lot Grading Tolerances

.1 The Developer shall ensure that all lots are graded in accordance with the accepted lot grading plan.

.2 Rough grading tolerance: 150 mm below finished grade.

.3 Final grading tolerance: ±25 mm from finished grade.

B3.10 Foundation Drains

.1 Foundation drain sewers are required in all areas without a storm sewer and shall discharge to the nearest downstream storm sewer.

.2 The system shall be dedicated to the collection of foundation drain flows produced from basement sump pump discharge only.

.3 Roof drains shall discharge to surface and shall not be connected to the foundation drain sewer.

.4 A sump pump, in the basement, with a pressure discharge connection to a foundation drain service riser pipe on the outside of the building foundation, and a foundation drain service connection pipe from the riser connection at the house to the property line are required (refer to **Typical Detail B3-200**).

.5 The pressure discharge connection to the gravity foundation drain service riser pipe shall be provided with a cleanout and an overflow discharge to a concrete splash pad.

.6 Installation and maintenance of on-lot components are the responsibility of the homeowner.

.7 The remainder of the system components are to be located within a road right-of-way or a PUL and shall consist of:

.1 Foundation drain service from the property line to the storm sewer, or

.2 Where there is no storm sewer in the street, a foundation drain sewer shall be installed to permit connection of foundation drain services to the nearest downstream storm sewer. Manholes shall be provided for the foundation drain sewer at a maximum spacing of 120 m.

.8 Under no circumstances shall a foundation drain service be discharged to the sanitary system.

.9 The depth of the foundation drain service shall be 2.4 m from the finished grade to the crown of the service at the property line.

.1 In areas where it is not feasible to provide a minimum depth of cover of 2.4 m, evaluate alternative solutions with the Municipality.

.10 The depth of the foundation drain sewer shall be adequate to receive the drainage from the foundation drain service such that the service can be connected to the sewer above its mid-diameter, within 45 degrees of the pipe crown.

.1 A minimum of 2.4 m of cover, measured from the finished grade to the crown of the sewer, must be provided.

.2 In areas where it is not practical to provide a minimum depth of cover of 2.4 m, evaluate alternative solutions with the Municipality.

.11 Size the foundation drain sump pump discharge collection system to provide the capacity in free flow based on all connected sump pumps operating simultaneously.

.12 The minimum size and grade of the foundation drain sewer shall be 200 mm and 0.60%, respectively.

.13 The respective minimum size and grade of the foundation drain service shall be 100 mm and 1.0%, respectively.

.14 The Developer's Consultant shall estimate weeping tile flows as part of the detailed geotechnical investigation.

.1 The geotechnical investigation shall include an assessment of the pre-development subsurface soil and groundwater, and the anticipated post-development conditions.

.2 The geotechnical investigation shall estimate weeping tile flows and define any special design and construction measures to be taken for foundations or other infrastructure that may be impacted by weeping tile flows.

.3 Where significant flows are anticipated from the foundation drain sewer system, these flows shall be added to the flows used to size the storm sewers to ensure an adequate level of service is provided by the storm system.

.4 Where high flows are expected such that sump pumps will be required to pump continuously, or run excessively, the Developer shall present alternative solution(s) to the Municipality.

B3.11 Roof Drainage

.1 Roof drainage from single family and duplex dwellings shall be discharged to the ground and dispersed via splash pads at the downspouts.

.1 The point of discharge shall be a minimum of 1.2 m away from the building (including downspout extensions) to ensure positive drainage.

.2 Roof drainage from multi-family, Commercial, and Industrial areas may discharge to the storm sewer where the new and existing systems are designed to accommodate the direct discharge and only if acceptable to the Municipality.

B3.12 Flow Capacities

B3.12.1 Storm Sewers and Open Channels

.1 Manning's formula shall be used to calculate pipe capacity:

$Q = (AR^{(2/3)}s^{0.5})/n$

Where: Q = Pipe capacity (m^3/s)
A = Cross-sectional area of pipe (m^2)
R = Hydraulic radius (area/wetted perimeter) (m)
s = Slope of hydraulic grade line (m/m)
n = Roughness coefficient = 0.013 for smooth-walled pipe (for example: PVC, concrete)
= 0.024 for corrugated steel pipe (unpaved)
= 0.020 for corrugated steel pipe (invert paved)
= 0.033 for gravel lined channels
= 0.020 for concrete or asphalt lined channels
= 0.05 for natural streams and grassed channels

B3.12.2 Culverts

.1 Use the inlet control and outlet control methods referred to in:

- The Handbook of Steel Drainage and Highway Construction Products, by the Corrugated Steel Pipe Institute
- The Handbook of Concrete Culvert Pipe Hydraulics, by the Portland Cement Association
- Design Guidelines for Bridge Size Culverts, by Alberta Transportation

B3.13 Pipe Location

.1 Storm sewer mains shall be located within the municipal road right-of-way as per the typical cross-sections (**Typical Details B1-100**, **D2-100**, and **D3-100**).

.2 Utility rights-of-way shall be provided for all utilities not located within road rights-of-way or PULs.

- Minimum width of 6 m is required for one or two utilities
- Minimum width of 8 m is required for three utilities

.3 Service connections, if accepted, should be located adjacent to sanitary service connections at property line and shall be as shown on **Typical Detail B2-300**.

DID YOU KNOW?

Waskatenau has unique requirements for storm sewer piping.

Refer to Section D4 – Special Provisions for the Village of

.4 Services shall be located under landscape areas, offset from property line as per **Typical Detail B2-300**.

.5 Storm sewer mains shall maintain the following clearances from watermains, sanitary sewers, and power/telephone/cable infrastructure:

- Minimum 3.0 m horizontal clearance unless sewer depth requires increased spacing; and
- Minimum 0.5 m vertical clearance above or below at crossings.

B3.14 Minimum Depth of Cover

.1 The minimum depth of cover, to pipe crown, shall be as follows:

Storm Sewer Infrastructure/Location	Minimum Depth of Cover
Storm sewers in roads	Minimum 2.4 m
Culverts crossing roads	Greater of half the culvert diameter or 500 mm
Catch basin leads at the catch basin	Minimum 1.8 m
Landscaped areas	Minimum 2.1 m

B3.15 Minimum Pipe Diameter

Storm Sewer Infrastructure	Minimum Diameter
Storm sewers	300 mm
Culverts crossing roads	600 mm
Catch basin leads	250 mm
Foundation drain sewers	200 mm
Foundation drain services	100 mm

B3.16 Minimum Velocity

.1 All storm sewers shall be designed with velocities ranging from 0.90 m/s to 1.0 m/s where feasible, based on Manning's formula, when flowing at the design (part-full) flow.

.2 Velocities below 0.60 m/s will not be allowed.

.3 Special design considerations are required when velocities exceed 3.0 m/s.

B3.17 Minimum Grade

.1 Minimum pipe grades for sewers along a straight alignment are indicated in **Table B3-3**; however, steeper grades are preferred.

Table B3-3
Minimum Grade for Storm Sewers Along a Straight Alignment

Pipe Size (mm)	Minimum Grade
200	0.60% [1]
250	0.60% [1]
300	0.22%
375	0.15%
450	0.12%
525 and larger	0.10%

Note:
[1] Foundation drain sewers only.

B3.18 Curved Sewers

.1 Minimum grades of sewers along a curved alignment shall be 50% greater than the minimum grades in **Table B3-3**.

.2 Maximum joint deflections shall be as recommended by the pipe manufacturer.

.3 Curved sewers shall be aligned parallel to the road centreline.

B3.19 Manhole Spacing

.1 Manholes shall be provided at the end of each line and at all changes in pipe sizes, grades, or alignment and at the beginning and end of curved sections.

.2 The maximum allowable distances between manholes for sewers along a **straight alignment** shall be 120 m.

.3 The maximum allowable distances between manholes for sewers along a **curved alignment** shall be 90 m.

B3.20 Hydraulic Losses Across Manholes

.1 Generally, for increasing pipe diameters, the crown of the upstream pipe shall match the crown of the downstream pipe; however, in no case shall the upstream 0.8 depth point be below the downstream 0.8 depth point.

.2 A smooth transition shall be provided between the inverts of incoming sewers and the outlet sewer and extreme changes in elevation at manholes should be avoided wherever possible.

.3 The minimum drop in invert elevations across manholes shall be as follows:

.6 Straight runs and deflections up to 45°: 30 mm

.7 Deflections between 45° and 90°: 60 mm

.8 Deflections greater than 90° shall be accommodated using two or more manholes

B3.21 Manhole Abandonment

.1 To abandon a manhole, plug all pipes with non-shrink grout, remove and dispose of manhole to 1.0 m below ground and fill remainder with fillcrete.

B3.22 Catch Basins

.1 Catch basins shall be of sufficient number and have sufficient inlet capacities and adequate catch basin leads to receive and convey the calculated stormwater flow.

.2 Catch basins shall be provided to intercept surface runoff and shall be spaced a maximum of every 120 m. The maximum flow distance to first catch basin shall be 150 m.

.3 Wherever possible, catch basins shall be installed upstream of crosswalks.

.4 All catch basin bodies shall be precast concrete sections conforming to the most recent ASTM specifications and constructed to provide a 500 mm sump to trap rocks and gravel.

.5 All catch basin sections shall have flexible watertight joints sealed with rubber gaskets conforming to ASTM C443.

.6 Precast catch basins shall have pre-cored connection holes and watertight Duraseal or A-Lok joints or approved equal.

.7 Catch basin leads shall be installed to provide a minimum depth of cover of 1.8 m, measured from finished grade to pipe crown, unless otherwise accepted.

.8 The minimum slope of catch basin leads shall be 2%.

.9 Catch basin leads shall generally discharge directly into stormwater manholes.

.10 Catch basins may be connected in series, provided that the downstream catch basin is a catch basin manhole which discharges into a stormwater manhole.

.11 The maximum length of a catch basin lead shall be 18 m.

.1 Where catch basin leads in excess of 18 m in length are required, a catch basin manhole must be installed to intercept surface runoff.

.12 To abandon a catch basin, follow the procedure for the abandonment of manholes as outlined in **Section B3.21**.

.13 Catch basin grade rings and the catch basin frame shall be installed within 50 mm of plumb with catch basin shaft. A clear distance of 810 mm must be provided within the catch basin.

B3.23 Roadway Base Drainage

.1 All streets shall be constructed to have continuous longitudinal subgrade drainage (wick drains).

.2 Wick drains shall be Nilex Nudrain MD7407, or approved equal, and shall be installed adjacent to the curb line (or edge of asphalt, for roadways without curb) at the bottom of the granular base course, on both sides of all roads or along the centreline of alleys.

.3 Wick drains shall generally be installed at the same longitudinal grade as the curb and gutter (or edge of asphalt); in no case shall the grade of the wick drain be less than 0.6%.

.4 Wick drains shall be connected to catch basins.

B3.24 Side/Rear Yard Swales and French Drains

.1 Swales are required to intercept runoff between adjacent private properties where the overall gradient of the land is perpendicular to the property lines.

.2 Swales servicing three or more lots must be within a registered drainage easement.

.3 Grass swales may be used for longitudinal slopes of at least 2%, with provision for erosion protection.

.1 Concrete swales shall be used where the longitudinal slope of the swale is less than 2%.

.4 Drainage easements of a minimum width of 3.0 m are to be registered with the Plan of Subdivision.

.5 Restrictive covenants are required to be registered on titles of private properties where drainage easements and related infrastructure are installed.

.6 Design consideration shall be given to the proper interception of lateral flow into the swale, and the discharge of the flow across sidewalks at the ends of the swale.

.7 Concrete swales are required when the length of a grass swale would exceed 100 m, and for all swales designed to accommodate flows from three or more lots.

B3.25 Culverts

.1 Culverts shall be designed to convey the 1:100 year flow.

.2 Culvert size requirements shall be determined through the stormwater drainage analysis; however, the minimum size of culverts shall be as follows, and in no case shall a culvert less than 400 mm diameter be installed, except in retrofit situations, at the discretion of the Development Officer and subject to acceptance by the Municipality.

Location/Application of Culvert	Minimum Diameter
Roadway cross culvert	600 mm
Residential driveway culvert	600 mm
Industrial driveway culvert	600 mm

.3 Culverts shall be new galvanized CSP (corrugated steel pipe) with a minimum wall thickness of 1.6 mm, or as required by the loading criteria, and a profile of 68 mm x 13 mm.

.1 Another acceptable material for culverts is concrete.

.4 All culverts shall be installed in accordance with the manufacturer's recommendations and shall be installed complete with bevelled end sections, on both the inlet and outlet ends, with the invert extended to the toe of the side slope.

.5 Marker posts shall be installed at culvert ends, for location purposes, and shall extend to 1 m above road centreline elevation. Marker posts shall meet Alberta Transportation standards.

.6 Box culverts may also be acceptable to the Municipality, provided that the Developer’s Consultant provides sufficient supporting documentation outlining the design and construction considerations.

.7 Culverts shall be installed to provide a minimum depth of cover of 500 mm or one-half (½) the culvert diameter, whichever is greater, as measured from finished grade to the top of the culvert.

.8 Riprap shall be placed around the inlet and outlet of all culverts; refer to **Typical Detail B3-500** at the end of **Section B3**.

.1 Generally, Alberta Transportation Class 1M riprap conforming to **Table B3-4** shall be used; however, the Developer's Consultant is responsible for selecting a class of riprap appropriate to the site and flow conditions.

Table B3-4
Class 1M Riprap Requirements

Criteria	Value
Nominal Mass	7 kg
Nominal Diameter	175 mm
None greater than	40 kg 300 mm
20% to 50%	10 kg 200 mm
50% to 80%	7 kg 175 mm
100% greater than	3 kg 125 mm

.9 Geotextile filter fabric shall be a non-woven fabric with the following minimum properties:

Property	Value
Grab Strength	650 N
Elongation (Failure)	50%
CBR Puncture Strength	1,800 N
Burst Strength	2.1 MPa
Trapezoidal Tear	250 N
Minimum Fabric Overlap	300 mm

B3.26 Materials and Specifications

B3.26.1 Pipe

.1 Pipe materials shall be selected using a rational design method, with the following information as a guide.

.2 The Developer's Consultant is responsible to ensure that the selected pipe material and class are suitable for the proposed application (site conditions, depth of installation, etc.).

.3 Alternative pipe materials will be evaluated through a variance request submitted by the Developer's Consultant. Developer's Consultant shall provide a justification for the request for variance.

.4 Alternative pipe materials shall not be installed without receiving written authorization from the Municipality.

Table B3-5
Acceptable Pipe Materials for Storm Sewers

Material	Specifications
Reinforced Concrete	CAN/CSA A257.2
PVC	ASTM D3034, CSA B182.2, Class DR35
Corrugated Steel Pipe (culverts only)	CSA-G401, stiffness AASHO-M-36

B3.26.2 Manholes

.1 Precast manhole sections and grade rings shall conform to CAN/CSA A257.4 and shall be manufactured using sulphate-resistant Type 50 cement; refer to **Typical Detail B2-200**.

.2 Manhole sections shall be precast reinforced concrete sections conforming to ASTM C478 and CSA A257.4.

.1 All precast units shall be marked with manufacturer's identification, date of casting, type of cement, and CSA standard.

.3 Manhole steps shall be standard safety type, aluminium forged of 6061-T6 alloy having a minimum tensile strength of 260 MPa.

.4 All manhole sections shall have flexible watertight joints sealed with rubber gaskets conforming to ASTM C443 and grouted inside and outside with non-shrink grout.

.5 Manholes shall be fitted with the appropriate cast iron frame and cover conforming to Class 35B ASTM A48. All castings shall be true to form and dimension, and shall be free from faults, sponginess, cracks, blowholes, or other defects affecting their strength.

.6 Pre-benched manhole bases shall be used wherever possible with pre-cored connection holes and watertight Duraseal or A-Lok joints or approved equal.

.7 Perched manholes are required when adding a manhole along an existing storm sewer.

B3.26.3 Bedding Materials

.1 Bedding material shall be in accordance with **Section B2.17.3**.

B3.26.4 Trench Section

.1 Trench section material shall be in accordance with **Section B2.17.4**.

B3.27 Outfall Structures

.1 A hydraulic analysis is required for outfalls, to ensure that exit velocities will not negatively impact natural watercourses.

.2 Appropriate erosion control measures, including energy dissipaters, are to be provided downstream of the outfall.

.3 All storm sewer outfalls shall be constructed with lockable grates to allow maintenance but prevent entrance of unauthorized personnel. Where required, guardrails, and/or fences shall be installed to provide fall protection.

.4 Outfall structures shall be designed with consideration of aesthetics as they are generally located within parks, ravines, and on riverbanks. Concrete end treatment is recommended.

B3.28 Major Systems

B3.28.1 Roadways and Overland Flow Routes

.1 Ponding at sag locations along roadways shall not exceed 300 mm. The sag shall spill at a depth of 250 mm to allow for 50 mm of flow depth at the spill point from the sag during the maximum ponding of 300 mm.

.2 Continuity of overland flow routes between adjacent developments shall be maintained.

.3 The lowest building opening adjacent to roadways or overland flow routes shall be a minimum of 300 mm above the maximum water elevation.

B3.28.2 Stormwater Management Facilities

.1 Stormwater management facilities shall be designed to meet Alberta Environment guidelines and the following sections.

B3.28.2.1 General Stormwater Management Facility Requirements

.1 Stormwater management facilities shall be sized such that there will be storage for a 1:100-year storm event (using Huff distribution design hydrographs), plus adequate freeboard to contain the maximum historical event.

.2 Stormwater management facilities shall control the release rate to the pre-development flow rate. Contact the Municipality for a copy of the current Regional Stormwater Management Plan to confirm the release rate required for the development area.

.1 Should the downstream infrastructure or water body(ies) be unable to accommodate the restricted release rate, the release rate shall be further restricted based on the available downstream capacity.

.3 The preference is that a maximum of two stormwater management facilities be used to manage the runoff from a single quarter section.

.1 The Municipality may approve a variance from this criterion if suitable justification is provided by the Developer's Consultant.

.4 All outflow piping shall be sized for a flow twice that of the maximum designed control flow.

.5 Water release shall be controlled via an orifice or other accepted means and shall include provisions for increasing the release rate in an emergency.

.6 The minimum floor elevation for lots surrounding a stormwater management facility shall be 0.3 m above the high water level.

.7 The lowest building opening for lots surrounding a stormwater management facility shall be 0.5 m above the high water level.

.8 An emergency overland drainage swale shall be provided from the downstream end of the stormwater management facility to the receiving stream with capacity to transport storm runoff should a downstream malfunction occur.

.9 If an emergency overland flow path to the receiving channel is not feasible, the stormwater management facility shall be sized to be able to accommodate two back-to-back 1:100-year storm events.

.1 This may be achieved by proving that the combined available storage in the active zone and freeboard zone are sufficient to store the second 1:100-year storm event after 96 hours.

.2 If the drawdown time from the first 1:100-year storm event is longer than 96 hours, the Developer's Consultant shall take into consideration that the full active storage zone is not available for the second storm event, which may result in additional freeboard being required.

.10 Wet ponds and constructed wetlands require warning signs, posted along the perimeter of the PUL, to prohibit activities that may present a danger to public health and safety or interfere with the operation of the facility; refer to **Typical Detail B3-600**.

.11 Stormwater management facilities require an outlet control structure.

.12 The Developer's Consultant shall submit a design for all outlet control structures, detailing:

- Size and configuration of concrete chamber;
- Types of hatches (must be lockable);
- How the structure will be accessed for maintenance (all-weather access suitable for a hydro-vac truck is required);
- Locations of safety railings around the hatches;
- Provision for kickplates at the base of railings;
- Locations and models of davit bases (if required – Developer's Consultant to discuss this requirement with the Municipality);
- Locations and models of water level control gates (if required); and
- Location and size of orifice and provisions for increasing the release rate for rapid drawdown.

.13 Discharge from stormwater management facilities shall be by gravity; no pumped discharge shall be permitted.

B3.28.2.2 Design of Dry Ponds

.1 **Dry ponds** (detention storage) temporarily store stormwater runoff to promote the settlement of runoff pollutants and to restrict discharge to predetermined levels to reduce downstream flooding and erosion potentials.

.1 They are often designed as two-stage facilities: the upper stage (flood fringe area) is designed to store large, infrequent storms; the lower stage (extended detention stage) is designed to store and promote sedimentation of smaller, more frequent storms.

.2 Unlike a wet pond; however, the lower stage is designed to empty completely between storm events. Low flows are not usually detained.

.2 Dry ponds should only be used when topographical or planning constraints exist which limit the use of wet ponds or constructed wetlands.

.3 All dry ponds shall be offline storage. A low flow bypass shall direct storm runoff around the dry pond during minor rain events.

.4 Dry ponds shall be located in a PUL which covers up to the 5-year water level.

.5 Side slopes shall not be steeper than 5H:1V within public property and shall not be steeper than 7H:1V within private property.

.6 The pond bottom shall be graded to provide positive drainage to the outlet, with a minimum longitudinal slope of 2% and minimum lateral slope of 1.5%.

.1 A French drain may be required below the invert of the longitudinal slope, depending on the intended recreational use of the dry pond.

.7 All surfaces, including the bottom, shall be topsoiled and seeded with approved materials, except for the low flow channel which can be either aquatic type plants or a riprapped channel.

.8 The maximum storage depth shall be 3 m, as measured from the invert of the outlet pipe.

.9 Provide a landscaped or riprapped channel to accommodate the 1:5-year event and low flow condition.

.10 Dry ponds shall be designed as an amenity to the development with Open Space for passive play and links to pedestrian walkways for use by the public.

B3.28.2.3 Design of Wet Ponds

.1 **Wet ponds** (retention storage) temporarily store stormwater runoff to promote the settlement of runoff pollutants and to restrict discharge to predetermined levels to reduce downstream flooding and erosion potentials.

.1 They are often designed as two-stage facilities: the upper stage (flood fringe area) is designed to store large, infrequent storms; the lower stage (extended detention stage) is designed to store and promote sedimentation of smaller, more frequent storms.

.2 Wet ponds shall have a minimum surface area at normal water level (NWL) of 2 ha.

.1 If a wet pond is not to become a publicly owned and maintained facility, a surface area of less than 2 ha may be permitted, upon acceptance by the Municipality and Alberta Environment.

.3 The active storage depth shall be as required to provide storage for a 1:100-year storm event.

.4 An impervious pond bottom shall be constructed of material with a permeability coefficient in the order of $1x10^{-6}$ cm/s.

.5 A minimum pond depth of 2 m, from pond bottom to NWL, shall be required; however, a 3 m depth is preferred.

.6 Dead bay areas are not permitted.

.7 All inlet and outlet pipes shall be submerged a minimum of 1 m below NWL and shall be marked by a post at the surface. Inlet and outlet pipe inverts shall be a minimum of 150 mm above the pond bottom.

.8 Inlets and outlets shall be located to maximize the detention time and circulation within the wet pond.

.9 The side slopes of the pond shall, generally, not be steeper than 7H:1V from free board elevation to 1 m below NWL; however, when space limitations exist, side slopes of 5H:1V may be permitted. Side slopes of 3H:1V are permitted from pond bottom to 1 m below NWL.

.10 The normal water elevation shall be such that the collection system shall not surcharge to an elevation greater than the lowest catch basin invert in the collection system during a 1:5-year storm.

.11 The shoreline treatment of the pond shall consist of a band of granular material, from 0.3 m above to 0.3 m below NWL, on top of woven polypropylene geotextile fabric. The granular material shall be chemically sterilized, shall be 75 mm minimum size, and shall be installed in a 250 mm thick layer. An evaluation of wave action shall be made and, if necessary, additional bank protection shall be provided.

.12 A buffer strip shall be provided between NWL and the 1:25-year flood level. The difference between the NWL and the 1:25-year flood level shall be limited to 1 m of vertical rise.

B3.28.2.4 Design of Constructed Wetlands

.1 **Constructed wetlands** (retention storage) improve water quality and control peak discharge rates by retaining runoff for a prolonged period.

.1 Relatively deep permanent pools are maintained at the inlet and outlet and along low flow paths to minimize resuspension of settled pollutants.

.2 Relatively shallow extended detention storage areas with extensive plantings (submergent and emergent) make up the majority of the permanent storage.

.2 The size of a constructed wetland should be approximately 5% of the watershed area that it will be servicing.

.3 Approximately 25% of the surface area at NWL should consist of deep pools (at inlets(s) and the outlet) which are 2.4 m to 3.0 m deep to allow for settleable solids removal.

.4 Average permanent wetland water depth shall be 0.3 m with 1 m deep zones for flow redistribution and for fish and submerged or floating aquatic vegetation habitat.

.5 The normal water elevation shall be such that the collection system shall not surcharge to an elevation greater than the lowest catch basin invert in the collection system during a 1:5-year storm.

.6 Active storage shall be 0.3 m to 0.6 m deep. Fluctuation in excess of 1 m above NWL should be infrequent to avoid killing vegetation.

.7 The side slopes shall generally be no steeper than 7H:1V; however, where space limitations exist, the side slopes may be as steep as 5H:1V.

.8 A length to width ratio of 3:1 is preferred; however, if space limitations exist, the length to width ratio can be as low as 1:1, provided that additional considerations are made to maximize the travel time through the wetland for treatment and to prevent short-circuiting.

.9 The deep zone shall be sloped at 1.0% from inlet to outlet and the shallow marshy areas are to have a smooth bottom to promote sheet flow through the system.

.10 An impervious pond bottom shall be constructed of material with a permeability coefficient in the order of $1x10^{-6}$ cm/s.

.11 Dead bay areas are not permitted.

.12 All inlet and outlet pipes shall be submerged a minimum of 1 m below NWL and shall be marked by a post at the surface. Inlet and outlet pipe inverts shall be a minimum of 150 mm above the wetland bottom.

.13 Design with the landscape, not against it; take advantage of natural topography and drainage patterns.

.14 Incorporate as much "edge" as possible and design in conjunction with a buffer and the surrounding land and aquatic systems.

.15 Design to protect the wetland from any potential high flows and sediment loads.

.16 Design for self-sustainability and to minimize maintenance; however, an all-weather maintenance access is required to all deep pool areas for sediment removal.

B3.28.2.5 Recreation

.1 Recreational use of wet and dry ponds will be regulated by the Municipality. Recreational uses are not permitted for constructed wetlands.

.2 Suitable recreational facilities such as bicycle trails, benches, trees, etc. shall be provided for stormwater management facilities.

.3 Primary recreational activities will not be allowed on or in wet ponds. Signage will be posted, prohibiting primary recreational activities, i.e., all water-based activities where there is body contact with the water, such as swimming and wading.

B3.28.2.6 Erosion

.1 Construction of new developments shall be undertaken in a manner such that erosion of the site and sediment discharge via runoff to the receiving stream are minimized.

.2 The Developer's Consultant shall be required to submit a formal erosion and sedimentation control plan to the Municipality.

.3 Adequate erosion protection will be required for all natural and man-made water courses within the new development.

.4 Outfalls of storm sewers shall be designed to control local erosion to the conveyance channel or receiving stream and shall not change the hydraulic characteristics of the receiving stream.

B3.28.2.7 Maintenance

.1 The Developer shall be responsible for any defects of the works and lands associated with the stormwater management facility, including adjacent park lands, for the duration of the Warranty Period.

.2 The Developer shall assume full responsibility with respect to the operation and Maintenance of the stormwater management facility(ies) in all aspects relating to flows, water volumes, surface debris, aeration, hydrological cycle, hydraulic performance, utility devices such as outlet structures, vegetation control, insect control, and on-shore facilities until issuance of a Final Acceptance Certificate (FAC).

.3 The Developer will be responsible for siltation and debris problems which are caused due to poor erosion control for the development. Should siltation and debris problems occur in the stormwater management facility(ies) that are the result of stormwater draining lands beyond the Developer's control, the Municipality shall assume responsibility for any necessary remedial actions.

.4 The monitoring and Maintenance of water quality to eliminate any nuisance factors and to protect against health hazards shall be the responsibility of the Developer during the Warranty Period.

B3.28.2.8 Boundary Control and Use

.1 All stormwater management facility and shoreline areas must be sufficient to accommodate the 1:100-year design event and will be retained in public ownership (i.e., within a PUL).

.2 Land above the 1:100-year design flood level within lots that back onto a stormwater management facility, when no overflow is provided, shall be protected by a restrictive covenant registered against the title of the property.

.1 The restrictive covenant shall indicate that the land is subject to flooding and that the owner will not construct any permanent structures susceptible to flood damage.

.3 If the provision of public access to the shoreline is being considered, fencing of a uniform type shall be constructed by the Developer along the 100-year event elevation to separate public from private lands.

.4 Noxious Industrial land uses are considered unacceptable adjacent to or upstream of stormwater management facilities.

.5 Minimum lot dimensions and rear yard depths, as measured from the property line, shall conform to the requirements of the Municipality's Land Use Bylaw and relevant Area Structure Plan (if available).

B3.28.2.9 Legal Liability and Safety

.1 Given that primary water contact (i.e., swimming and wading) will be forbidden, supervision will not be provided.

.2 Proper and adequate signage to alert people to the potential hazards ("No Swimming – Deep Water", "Subject to Flooding", etc.) shall be provided by the Developer; refer to **Typical Detail B3-600**.

.3 Fencing of municipal park areas shall be determined during the detailed design stage in consultation with the Municipality and shall be provided by the Developer.

.4 Lighting, in accordance with ATCO Electric (or service provider) requirements, shall be provided by the Developer at the interface between the stormwater management facility and the adjacent land. Additional lighting requirements are to be determined at the detailed design stage in consultation with the Municipality.

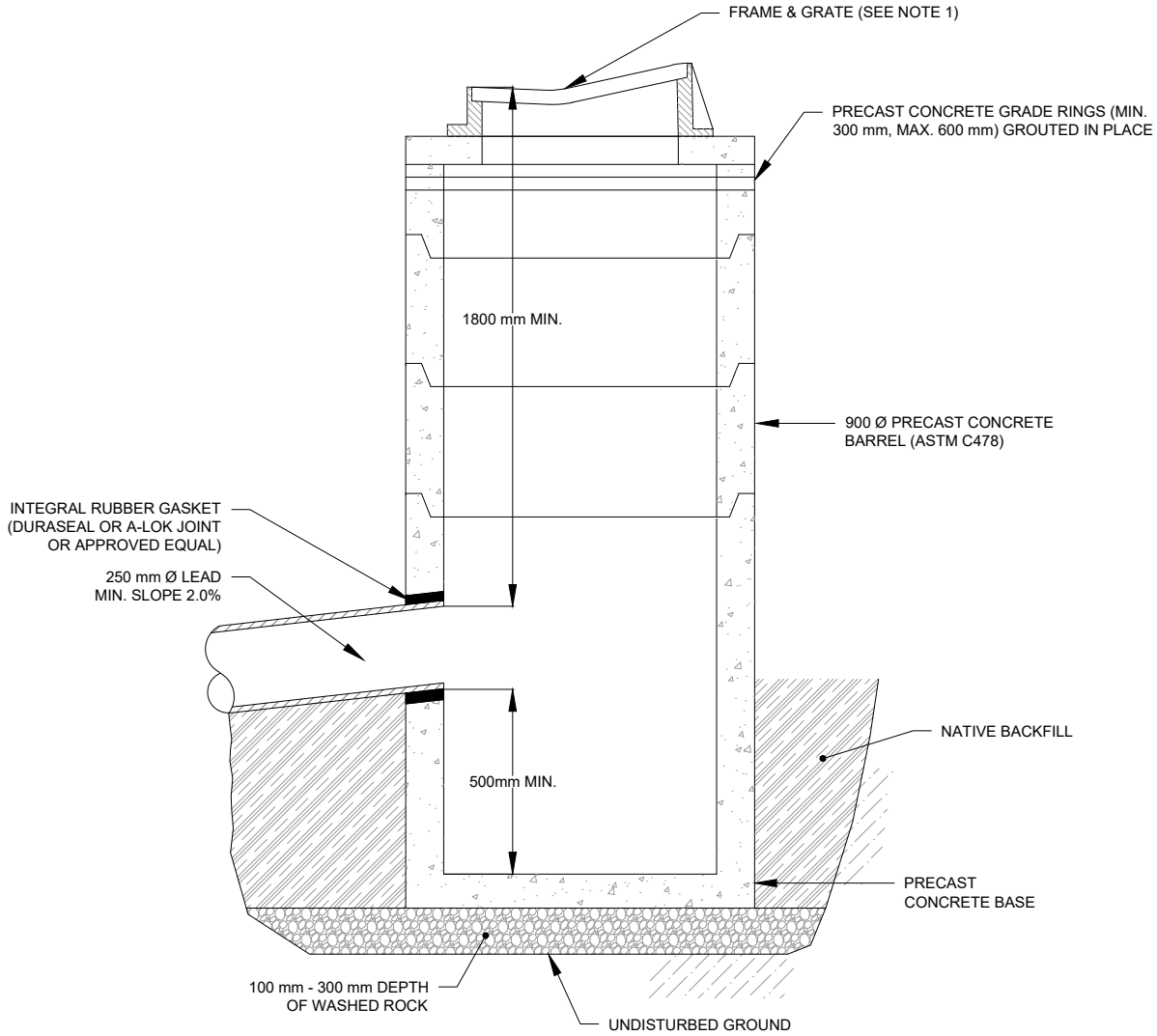
B3.29 Erosion Control

.1 All storm drainage systems, including pipe outlets and other drainage channel outlets or overflows, shall be designed to control erosion that may result from piped or overland stormwater flows and discharge into the storm drainage system.

B3.30 Typical Details – Urban Storm Drainage Systems

Standard Detail No.	Title
B3-100	900 mm Diameter Catch Basin
B3-110	1200 mm Diameter Catch Basin Manhole
B3-120	Type F-51 Catch Basin Curb Finishing Detail
B3-130	Wick Drain Connection to Catch Basin
B3-200	Foundation Drain and Sump Pump Discharge
B3-300	Rear to Front Lot Grading
B3-350	Split Lot Grading
B3-500	Rock Riprap for Culverts
B3-600	Stormwater Management Facility Caution Sign
B3-610	Wet Pond
B3-620	Constructed Wetland
B3-700	Sideyard/Rearyard Swales

TYPICAL DETAIL	B3-100	
Date: JULY 2023		Rev. 0



NOTE:

(1) FOR ROLLED FACE CURB AND GUTTER: USE DK-7 FRAME AND GRATE
FOR STRAIGHT FACE CURB AND GUTTER: USE F-51 FRAME AND GRATE.
FOR OFF-ROAD/LANDSCAPE AREA: USE F-38 FRAME AND GRATE

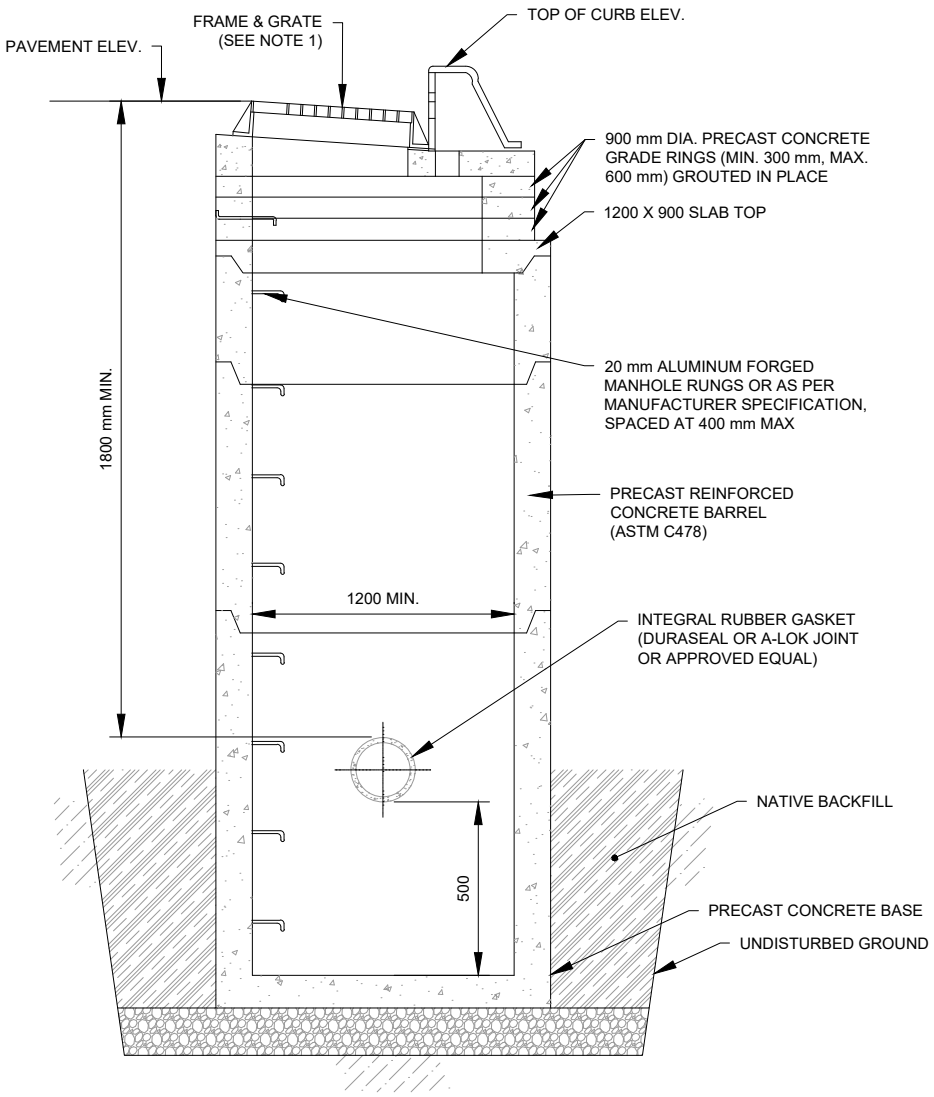
(2) ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SPECIFIED OTHERWISE.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

900 mm Diameter Catch Basin

TYPICAL DETAIL	B3-110	
Date: JULY 2023		Rev. 0



NOTES:

(1) FOR ROLLED FACE CURB AND GUTTER: USE DK-7 FRAME AND GRATE.
FOR STRAIGHT FACE CURB AND GUTTER: USE F-51 FRAME AND GRATE.

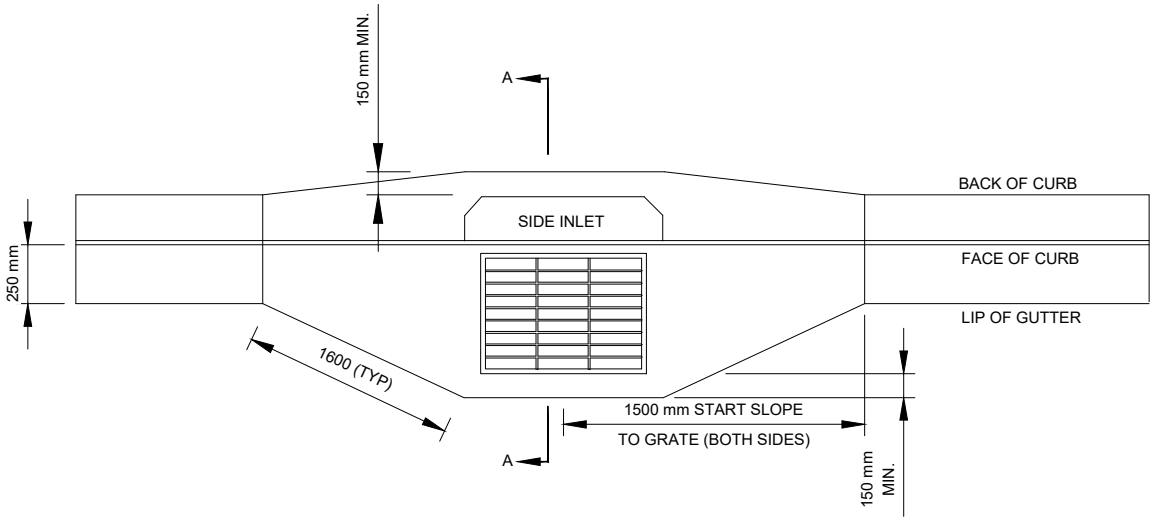
(2) ALL DIMENSIONS ARE IN MILLETRES UNLESS SPECIFIED OTHERWISE.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

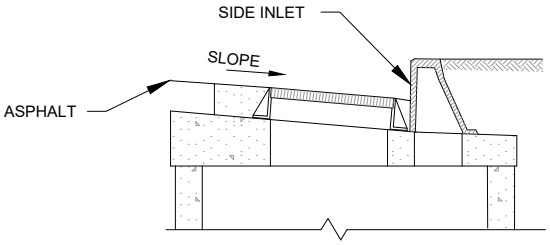
SMOKY LAKE REGION

1200 mm Diameter Catch Basin Manhole

TYPICAL DETAIL	B3-120	
Date: JULY 2023		Rev. 0



PLAN - F-51 SIDE INLET, FRAME AND GRATE SET IN 150 mm CURB WITH 250 mm GUTTER



SECTION A-A

NOTE:

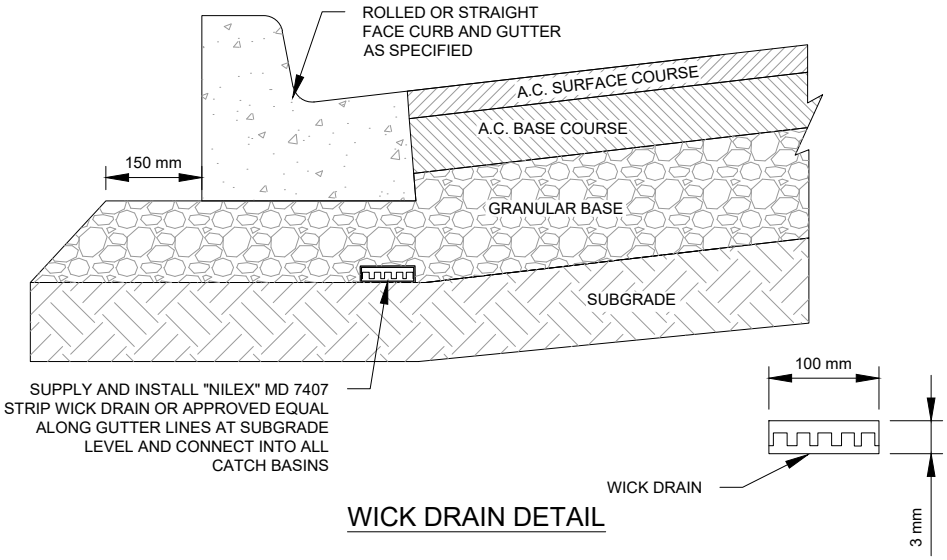
(1) ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SPECIFIED OTHERWISE.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

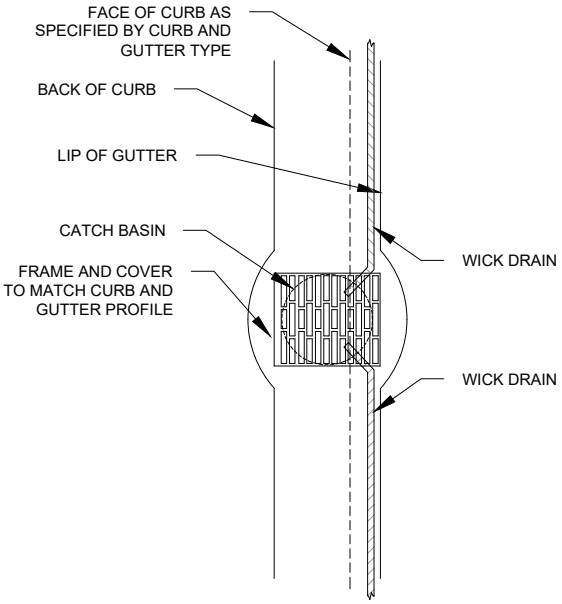
SMOKY LAKE REGION

Type F-51 Catch Basin Curb Finishing Detail

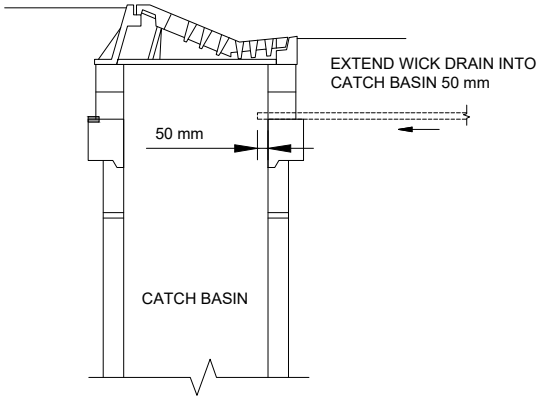
TYPICAL DETAIL	B3-130	
Date: JULY 2023		Rev. 0



WICK DRAIN DETAIL



PLAN VIEW



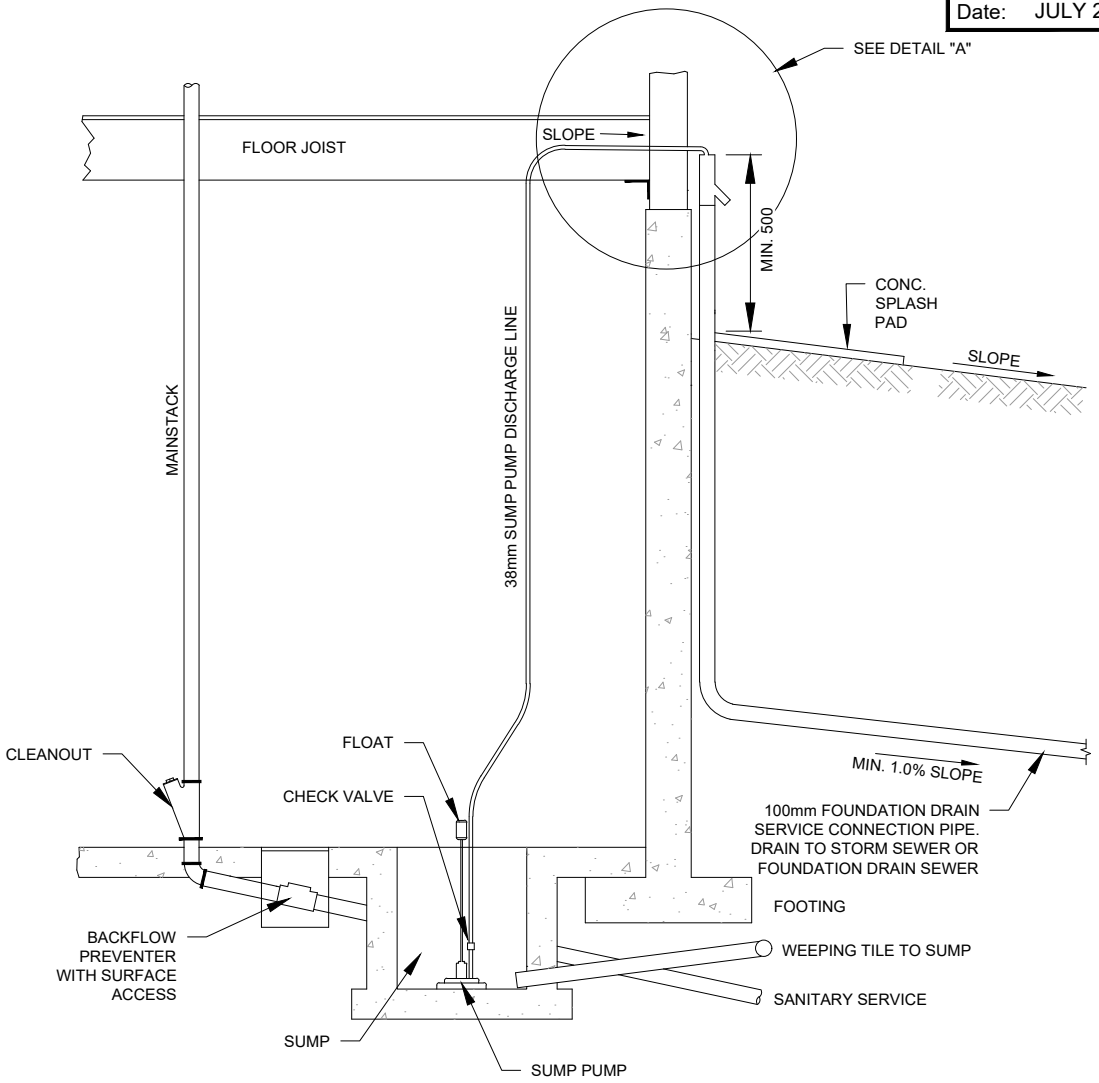
ELEVATION VIEW

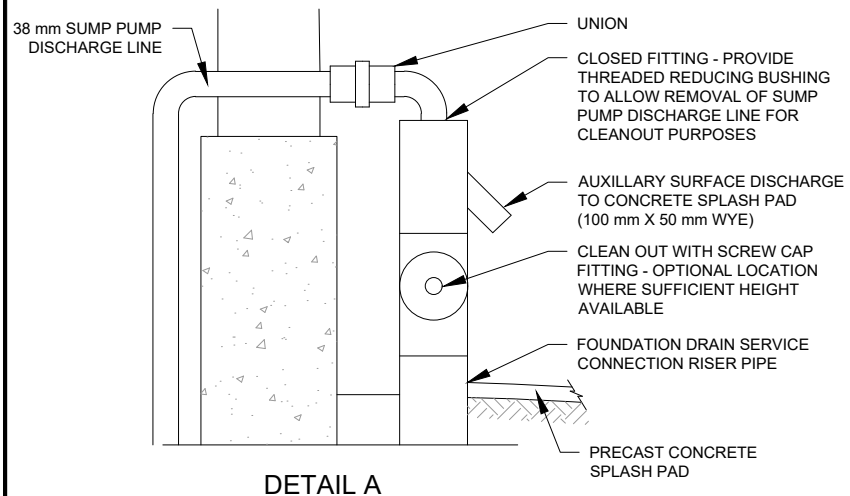
Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Wick Drain Connection to Catch Basin

TYPICAL DETAIL	B3-200	
Date: JULY 2023		Rev. 0





DETAIL A

NOTES:

(1) ROOF LEADERS (DOWNSPOUTS) OR ANY OTHER STORM WATER SOURCE MUST NOT BE CONNECTED TO THE FOUNDATION DRAIN DISCHARGE COLLECTION SYSTEM

(2) THE AUXILIARY SURFACE DISCHARGE MUST BE INSTALLED TO PROVIDE AN OVERFLOW IN THE EVENT THAT THE STORM DRAINAGE SYSTEM CANNOT ACCOMMODATE FLOWS DUE TO CAPACITY, FREEZING, BLOCKAGE OR OTHER PROBLEMS.

(3) EVERY PART OF THE PLUMBING SYSTEM SHALL BE PROTECTED FROM FREEZING THROUGH THE USE OF AN APPROVED METHOD.

(4) WEEPING TILES SHALL NOT BE CONNECTED TO THE SANITARY SYSTEM.

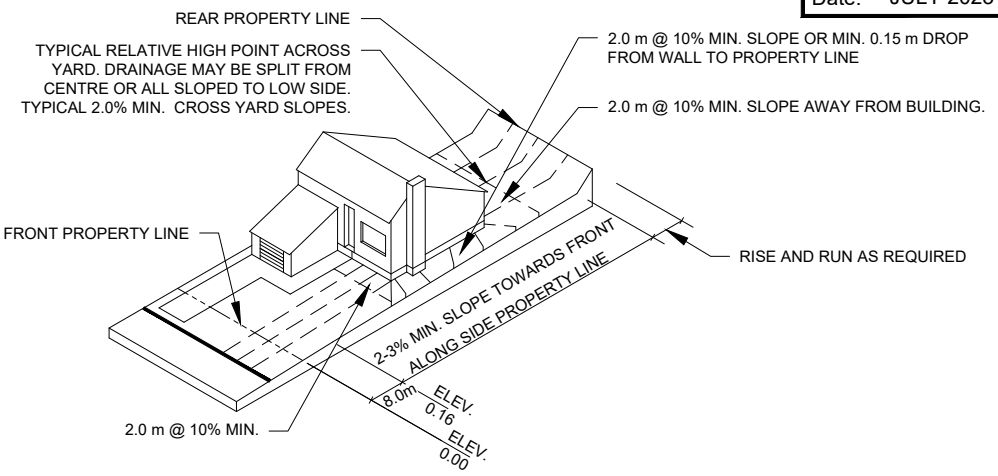
(5) BACKFLOW PREVENTORS SHALL BE INSTALLED BY LOT OWNERS ON ALL STORM SERVICES.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

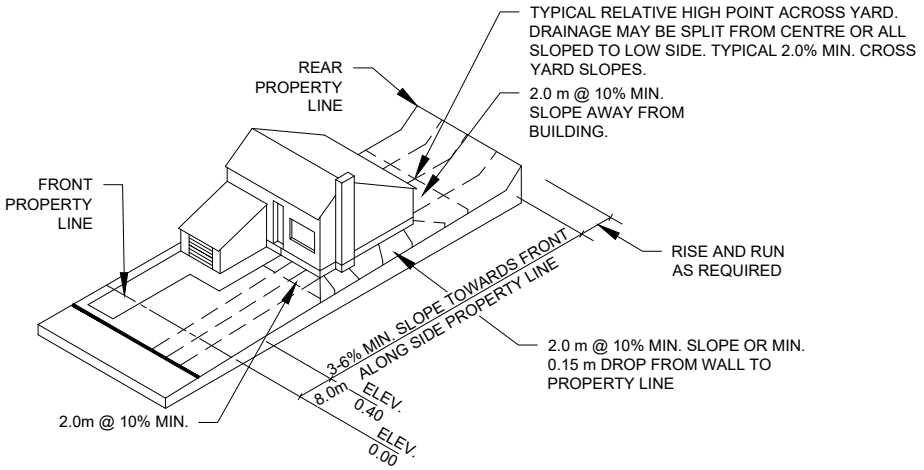
SMOKY LAKE REGION

Foundation Drain and Sump Pump Discharge

TYPICAL DETAIL	B3-300	
Date: JULY 2023		Rev. 0



LOT GRADING TYPE "A"



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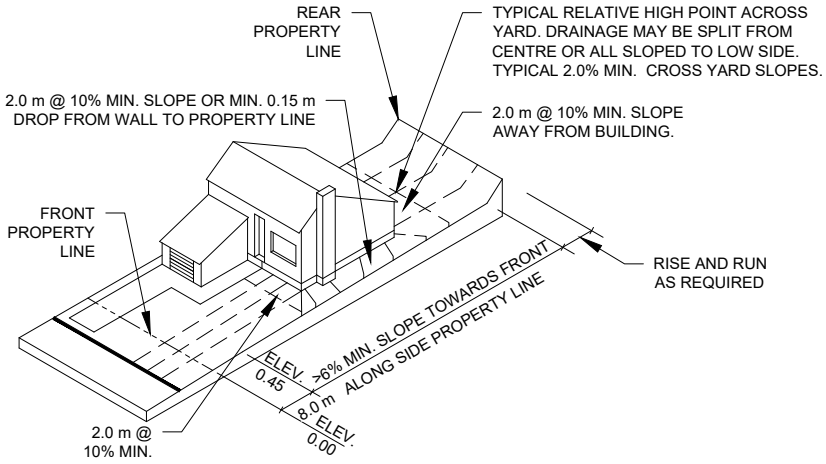


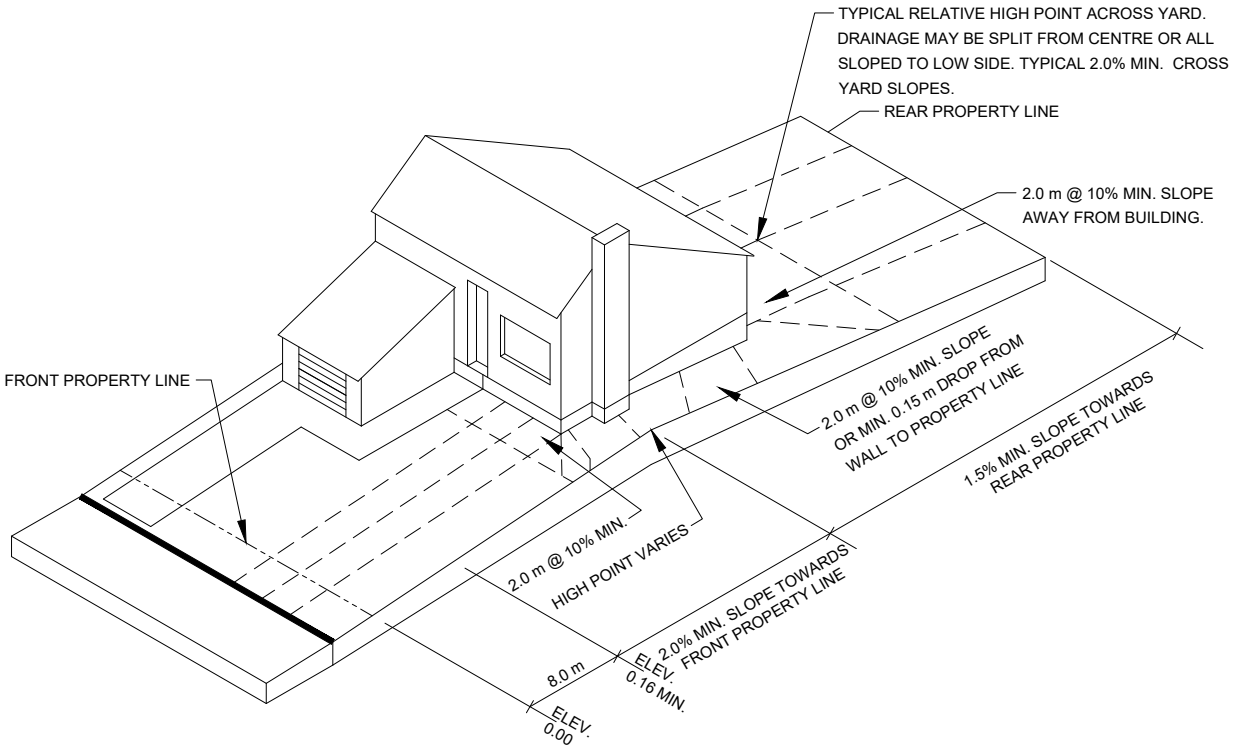
LOT GRADING TYPE "C"

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

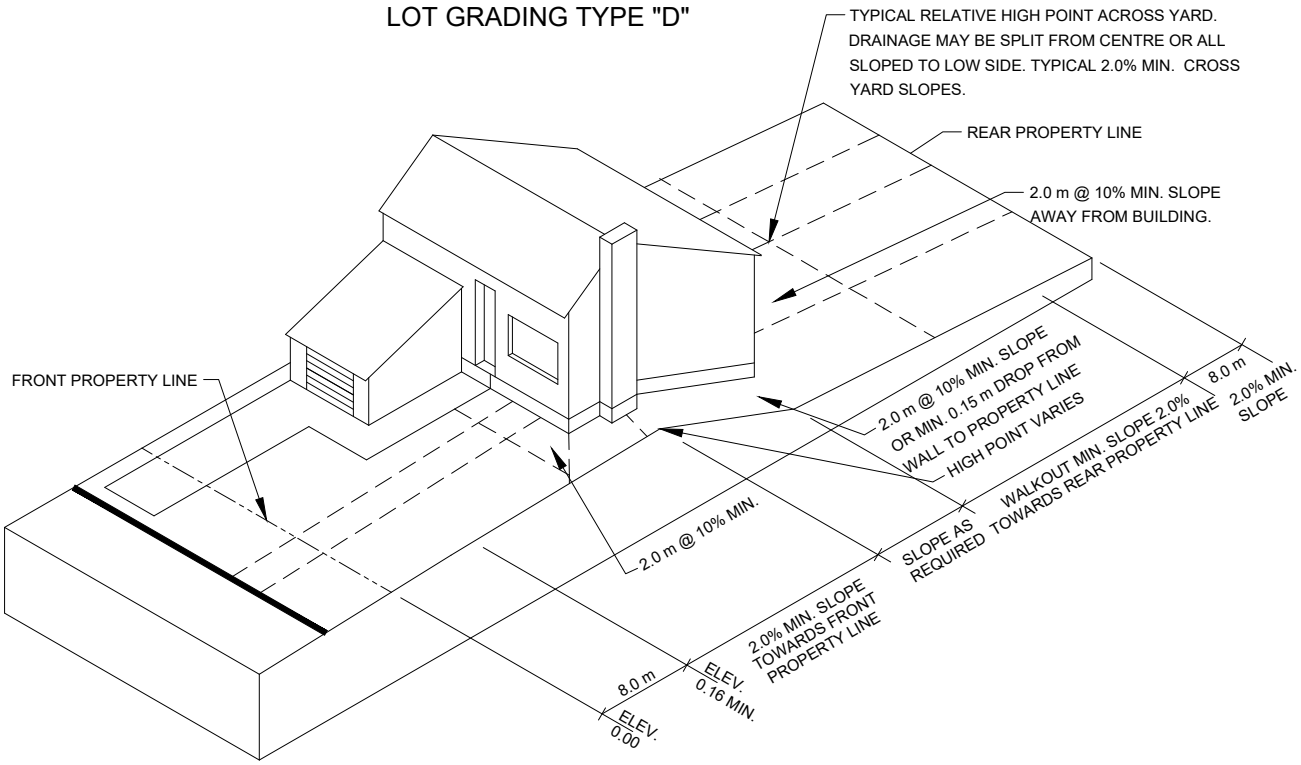
SMOKY LAKE REGION

Rear to Front Lot Grading

TYPICAL DETAIL	B3-350	
Date: JULY 2023		Rev. 0



LOT GRADING TYPE "D"



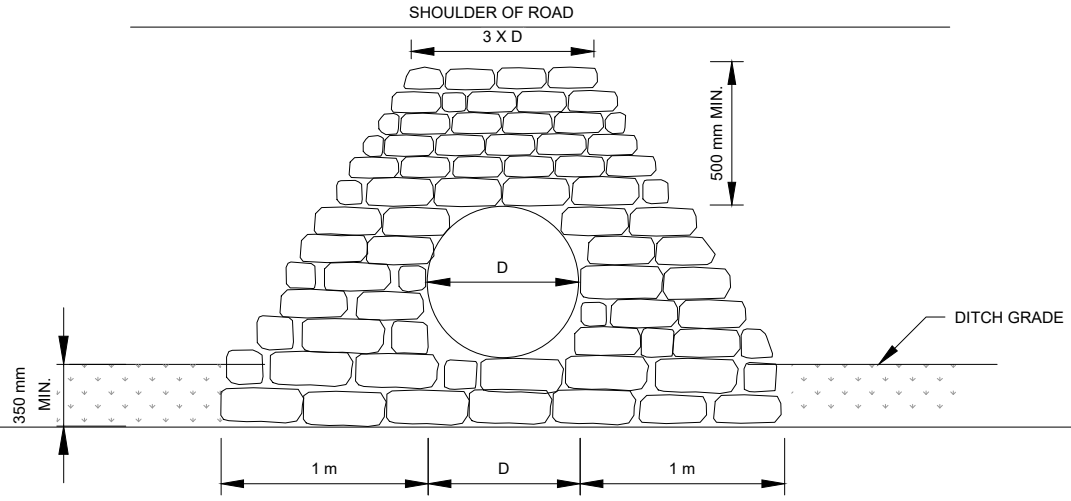
LOT GRADING TYPE "W"

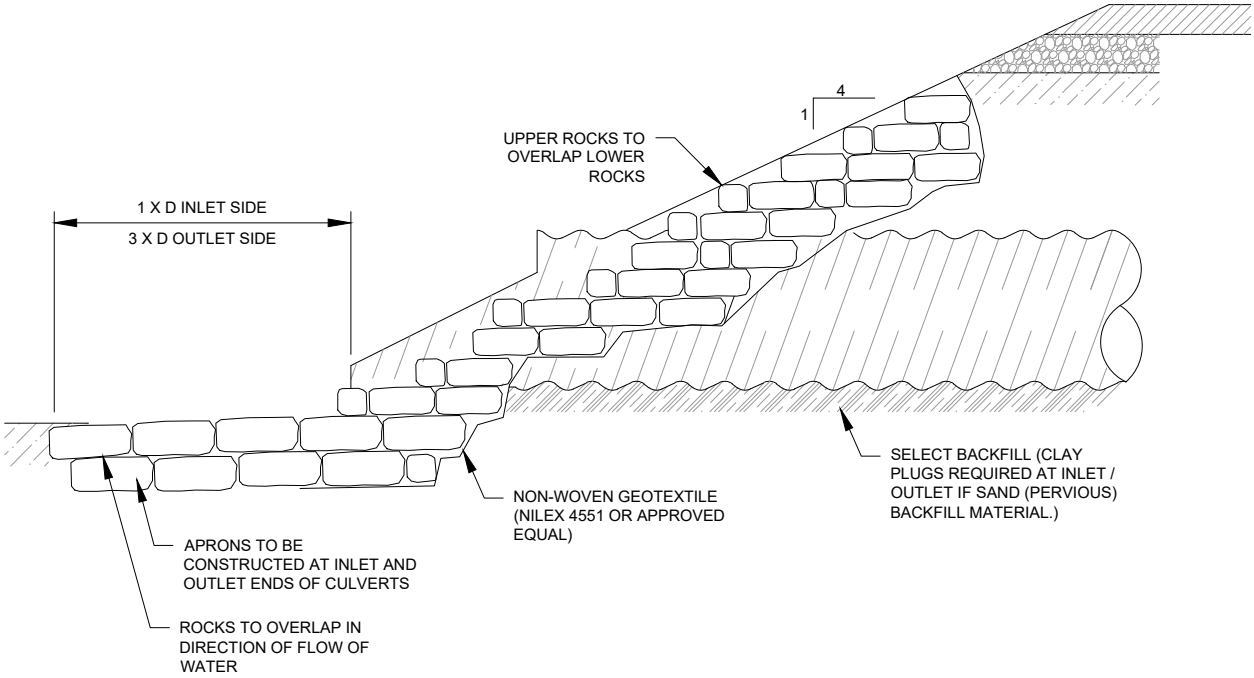
Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Split Lot Grading

TYPICAL DETAIL	B3-500	
Date: JULY 2023		Rev. 0





NOTES:

(1) ROCKS AND BOULDERS SHALL BE SELECTED AS NEARLY CUBICAL IN FORM AS PRACTICAL AND OF A SIZE GREATER THAN 150 mm. REFER TO SECTION B3.25.8.

(2) THE STONES SHALL BE PLACED WITH THEIR BEDS AT RIGHT ANGLES TO THE SLOPE, THE LARGER STONES BEING USED IN THE BOTTOM COURSE AND THE SMALLER STONES AT THE TOP.

(3) THE STONES SHALL BE LAID IN CLOSE CONTACT SO AS TO BREAK JOINTS AND IN SUCH MANNER THAT THE WEIGHT OF THE STONES IS CARRIED BY THE EARTH AND NOT BY THE ADJACENT STONES.

(4) DIMENSIONS ARE IN MILLIMETRES UNLESS SPECIFIED OTHERWISE.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

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SMOKY LAKE REGION

Rock Riprap for Culverts

TYPICAL DETAIL	B3-600	
Date: JULY 2023		Rev. 0

STORMWATER FACILITY

CAUTION

THIS IS A MAN-MADE FACILITY DESIGNED TO HELP CONTROL FLOODING DURING RAINSTORMS AND SNOW MELT. WATER LEVELS, WATER QUALITY AND ICE THICKNESS CAN CHANGE SUDDENLY WITHOUT NOTICE. FOR YOUR SAFETY, RECREATION IS NOT ALLOWED.

NO SWIMMING OR WADING | NO DUMPING FISH | NO PETS IN WATER | NO BOATING

KEEP OFF ICE | NO SKATING | NO SLEDDING | NO THROWING ROCKS

NOTE:

(1) SIGN TO BE A MINIMUM OF 1400 mm HIGH AND 600 mm WIDE WITH ENGINEER GRADE REFLECTIVE VINYL.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

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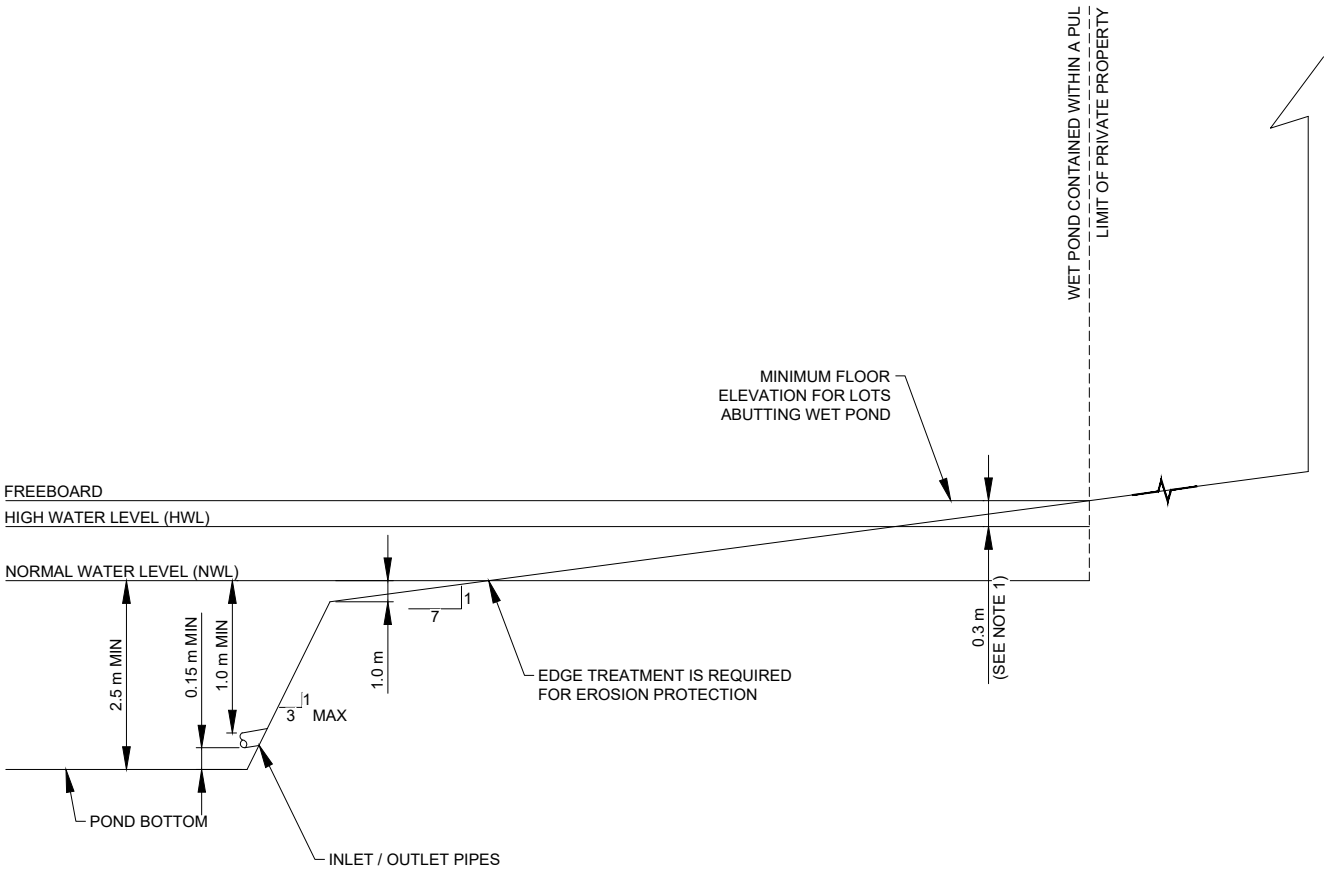
SMOKY LAKE REGION

Stormwater Management Facility
Caution Sign

Time: 6:32pm
Date: Jul 11, 2023
File: \\ae.ca\data\working\edm\2022-3451-00\civl\model\Revised_Typical_Details\B3-C3\3451-00_B3-600.dwg by
Xrefs:

TYPICAL DETAIL	B3-610	
Date: JULY 2023		Rev. 0



NOTES:

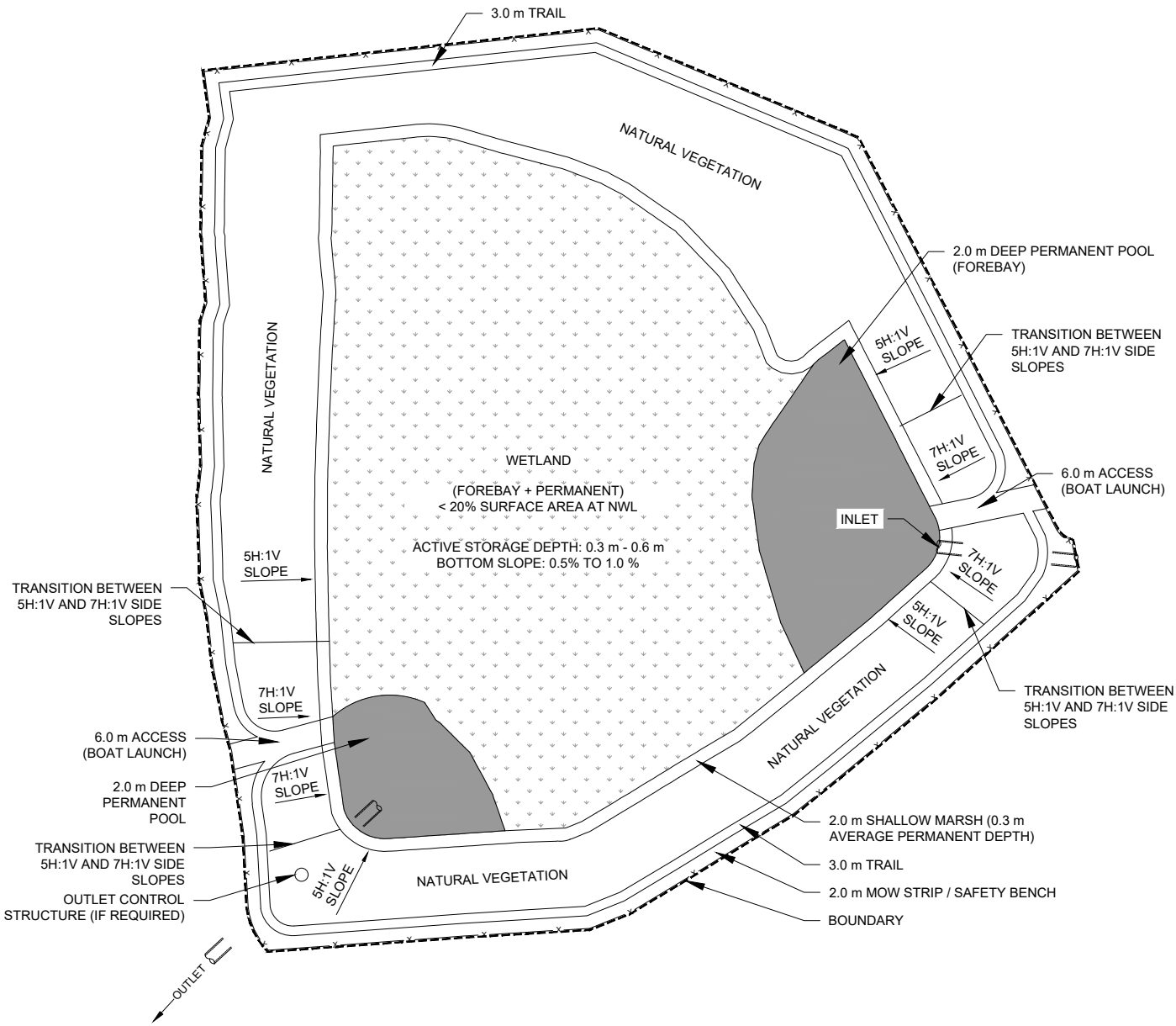
(1) FREEBOARD REQUIREMENTS ARE TO BE DETERMINED AS PART OF THE STORAGE FACILITY DESIGN, AND MAY VARY IN CONSIDERATION OF THE FACILITY DESIGN BASIS. WHERE AN EMERGENCY OVERFLOW IS NOT FEASIBLE, A DEPTH OF FREEBOARD OF 0.5 m IS REQUIRED.
(2) RESTRICTIVE COVENANT REQUIRED FOR ALL LOTS ADJACENT TO POND.
(3) IF GROUND WATER LEVEL IS BELOW NORMAL WATER LEVEL, IMPERVIOUS MATERIAL IS REQUIRED FOR POND BOTTOM.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Wet Pond

TYPICAL DETAIL	B3-620	
Date: JULY 2023		Rev. 0



NOTES:

(1) FREEBOARD REQUIREMENTS ARE TO BE DETERMINED AS PART OF THE STORAGE FACILITY DESIGN, AND MAY VARY IN CONSIDERATION OF THE FACILITY DESIGN BASIS. WHERE AN EMERGENCY OVERFLOW IS NOT FEASIBLE, A DEPTH OF FREEBOARD OF 0.5 m IS REQUIRED.

(2) THIS DETAIL IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE-SPECIFIC DESIGN IS REQUIRED FROM DESIGNER / ENGINEER.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

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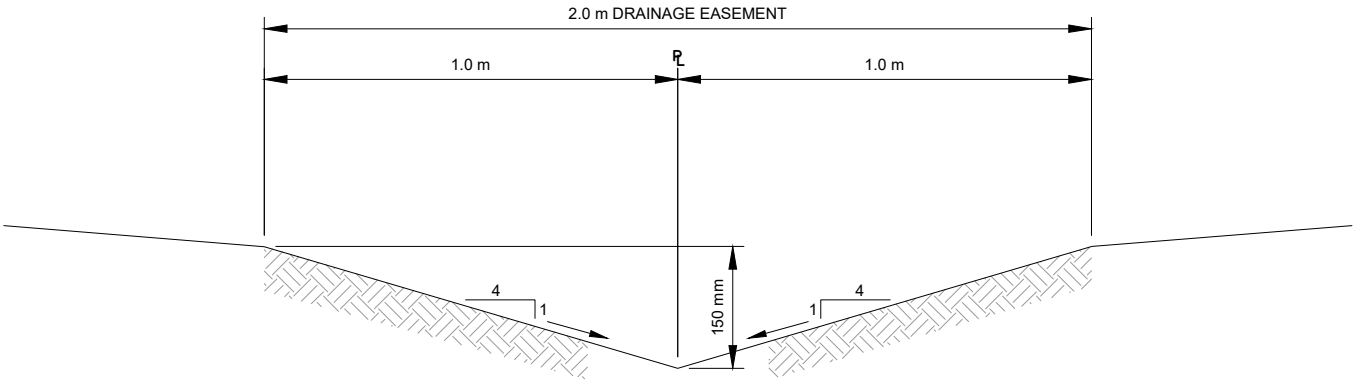
SMOKY LAKE REGION

Constructed Wetland

TYPICAL DETAIL	B3-700	
Date: JULY 2023		Rev. 0



TYPICAL GRASS SWALE SECTION

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Sideyard and Rearyard Swales

B4 WATER DISTRIBUTION SYSTEM

B4.1 General

.1 **Section B4** covers the design and construction of Urban watermains and appurtenances to be built or re-built in the Smoky Lake Region.

.2 For requirements pertaining to trickle fill water distribution systems, refer to **Section C4**.

.3 Refer to the **Typical Details** at the end of **Section B4** for details relating to the construction of Urban water distribution systems.

.4 This section provides the minimum design criteria, general construction requirements, and construction materials for consulting Engineers to use in their preparation of specifications and drawings.

.1 These standards may be exceeded if warranted by the design consultant.

.2 Good engineering practices and designs must prevail on all projects.

B4.2 Design Flow

.1 The water distribution system shall be designed in accordance with the design manual of the American Water Works Association (AWWA) as part of the overall municipal distribution system.

.2 The system shall be capable of delivering the peak day demand plus fire flow, or the peak hour flow, whichever is greater.

.3 Velocities shall not exceed 1.5 m/s during normal operation or 3.0 m/s during a fire event.

.4 The rate of water demand is based on Residential population or based on area for non-residential land uses. The water demand shall be based on the ultimate subdivision design population in the Area Structure Plan or, if the ultimate subdivision design population is unknown, based on the following:

Type of Residential Development	Population Density
Single Family	30 people/ha
Low Density	30 people/ha
Medium Density	75 people/ha
High Density	150 people/ha
Commercial/Institutional	25 equivalent people/ha
Industrial	20 equivalent people/ha

.5 The minimum per capita water demands for the Smoky Lake Region are as follows:

Land Use	Water Demand
Average Day Demand (ADD) – Residential	340 L/c/d
Average Day Demand (ADD) – Commercial/Institutional	8,500 L/ha/d (based on 25 people/ha)
Average Day Demand (ADD) - Industrial	6,800 L/ha/d (based on 20 people/ha)
Peak Day Demand (PDD)	2.5 times ADD
Peak Hour Demand (PHD)	4.0 times ADD

.6 Fire flows shall be in accordance with the Fire Underwriters Survey; typical requirements follow in **Table B4-1**.

Table B4-1
Fire Flow Requirements based on Land Use

Land Use/Description of Development	Fire Flows
Residential	
Single Family	83 L/s
Multi-family	133 L/s
High Density (walk-up apartments)	200 L/s
Commercial	
Standard	183 L/s
Up to 2,900 m^2 (strip mall, health centre, etc.)	233 L/s
Industrial	183 L/s
Schools	
Elementary	167 L/s
High School	183 L/s
Institutional	
Churches	100 L/s

.7 The Developer's Consultant shall confirm the required flows for these and other types of construction with the latest edition of Fire Underwriters Survey, "Water Supply for Public Fire Protection."

.8 In instances where automatic sprinkler systems are to be installed in residences, the distribution and/or storage systems must consider the additional demand resulting from these fixtures.

B4.3 Design Computations

.1 Use Hazen-Williams formula:

$Q = CD^{2.63}s^{0.54} * 278.5$

Where: Q = Rate of flow (L/s)
D = Internal pipe diameter (m)
s = Slope of hydraulic grade line (m/m)
C = Roughness coefficient, as per **Table B4-2**

Table B4-2
Hazen-Williams Roughness Coefficients for Watermains

Pipe Material	Roughness Coefficient, C
PVC	130
Asbestos Cement (AC) [1]	110
Cast Iron [1]	100
Steel [1]	120
Ductile Iron [1]	120

Note:
[1] These materials are not accepted pipe materials. Roughness coefficients have been provided for assessment of the existing system only.

.2 Network analysis shall be by the Hardy-Cross method or a suitable computer program.

B4.4 Pressure Requirements

.1 Pressures within the water distribution system shall be in accordance with the following:

Scenario	Pressure
Minimum pressure at peak demand	280 kPa
Minimum pressure with automatic sprinklers	350 kPa
Maximum allowable pressure	550 kPa
Minimum pressure at main during a fire (at demand hydrant)	140 kPa
Minimum zone pressure during a fire event	280 kPa

B4.5 Minimum Main Pipe Diameter

.1 Watermain size requirements shall be confirmed by a Water Network Analysis (WNA) and may be increased, as considered necessary by the Municipality, to accommodate future development.

Type of Development	Minimum Diameter
Single Family Residential	200 mm
Multi-Family Development	250 mm
Industrial/Commercial/Institutional/High Density Residential	300 mm

B4.6 Dead Ends

.1 Every effort is to be made to minimize the occurrence of dead-end watermains. Except in cul-de-sacs of less than 120 m length, all watermains shall be looped.

.2 All dead-end watermains shall be provided with a hydrant.

B4.7 Pipe Location

.1 Watermains shall be located within the municipal road right-of-way as per the typical cross-sections (**Typical Details B1-100, D2-100, D3-100,** and **D4-100**).

.2 Utility rights-of-way shall be provided for all utilities not located within road rights-of-way or PULs.

- Minimum width of 6 m is required for one or two utilities
- Minimum width of 8 m is required for three utilities

.3 Services shall be located under landscape areas, offset from property line as per **Typical Detail B2-300**.

.4 Watermains shall maintain the following clearances from other infrastructure:

- Minimum 3.0 m horizontal clearance from sanitary and storm sewers, unless sewer depth requires increased spacing;
- Minimum 2.0 m horizontal clearance from power/telephone/cable infrastructure (including services, streetlights, and power poles);
- Minimum 0.5 m vertical clearance above or below utilities at crossings;
- Minimum 3.5 m horizontal clearance from trees;
- Minimum 1.5 m horizontal clearance between watermains and catch basins; and
- Minimum 3.0 m horizontal clearance between water services and catch basins.

B4.8 Minimum Depth of Cover

.1 Minimum depth of cover shall be 3 m from finished grade to pipe crown, unless otherwise recommended by the geotechnical report or the Engineer of Record, and shall be sufficient to:

- Prevent freezing; and
- Clear other underground utilities.

.2 When it is not feasible to provide 3 m depth of cover from finished surface to pipe crown, the watermain shall be insulated as per **Typical Detail B4-600**.

B4.9 Valving

.1 In general, valves shall be located as follows:

.1 Outside of intersections, in line with the corner cuts of the street:

- 3 valves at cross intersections; and
- 2 valves at tee intersections.

.2 Valves shall be located a minimum of 30 m from arterial intersections.

.3 Valves shall be provided at both ends of PULs, walkways, and easements, located 0.5 m from the property line, inside municipal right-of-way.

.4 Not more than 2 hydrants shall be isolated during a watermain break or shutdown for maintenance purposes.

.5 A maximum of 4 valves shall be closed to isolate any one section of watermain.

.2 Hot-tapped connections shall follow the valving notes outlined above. In addition, hot-tap valves shall be located a minimum of 1.5 m from joints.

B4.10 Hydrant Location

.1 Fire hydrants shall generally be located at street intersections and shall be spaced as follows:

.1 Not more than 150 m apart within single family Residential areas and not more than 90 m apart in all other areas.

.2 For cul-de-sacs less than 90 m in length, hydrants shall be placed along the intersecting street, at the intersection with the cul-de-sac.

.3 In accordance with "Water Supply for Public Fire Protection", published by Fire Underwriters Survey.

.4 Refer to **Typical Details B1-100, D2-100, D3-100**, and to **D4-100** for locations of hydrants within the road cross-section, in addition to the following requirements:

- Hydrant valves shall be strapped to the hydrant tee; in no case shall a hydrant valve be located in a sidewalk.
- Hydrants require 3.0 m separation from franchise utilities (pedestals, transformers, streetlights, etc.).
- A 1.5 m clear distance is required around all hydrants.

B4.11 Service Connections

.1 Refer to **Typical Details B2-300** and **B4-500** for service connection installation details.

.2 A water service for a single family residence shall have a minimum diameter of 19 mm.

.3 Water services for multi-family and non-residential uses shall be sized by the Developer's Consultant based on the calculated water demand.

.4 Water, sanitary, and storm services shall have the following minimum horizontal separation from each other:

- **50 mm diameter or smaller:** 0.3 m (installed in a common service trench)
- **100 mm diameter or greater:** 3.0 m

.5 Water services shall have a minimum depth of cover of 2.75 m at the property line, measured from finished grade to pipe crown.

.1 Services with less than 2.75 m of cover shall be insulated.

.6 Services shall terminate 1 m past the property line or 1 m past the shallow utility Easement.

.7 Services shall be located offset from property line as per **Typical Detail B2-300**; dual servicing shall be implemented where possible.

.8 Curb stops shall be a minimum of 1.8 m from power infrastructure located in the shallow utility Easement.

.9 The minimum distance between corporation (main) stops shall be 600 mm.

.10 The Developer is to coordinate with the Municipality to determine the servicing requirements for park spaces.

B4.12 Thrust Blocking

.1 Concrete thrust blocking shall be provided at bends, tees, wyes, reducers, plugs, caps, hydrants, valves, dead ends, and transition couplings, as per the **Typical Details**.

.2 Thrust blocks shall be installed against undisturbed native ground, where possible, or embedded to provide sufficient thrust restraint.

.3 It is recommended that mechanical restraints be used in conjunction with thrust blocks in areas where thrust blocks are being installed in fill material, or in previously disturbed ground.

B4.13 Chamber Drainage

.1 Chambers or manholes containing valves, blow-offs, meters, or other appurtenances shall not be connected directly to a storm or sanitary sewer by gravity, nor shall blow-offs or air release valves be connected to any sewer.

.2 Such chambers or manholes shall be:

- Drained to absorption pits underground where they are above the groundwater table; or
- Pumped to a storm or sanitary sewer.

.3 Chambers shall be insulated to prevent freezing where necessary.

B4.14 Service Connection Abandonment

.1 If an existing service connection is to be abandoned, the main stop shall be closed and the service pipe shall be cut at the goose neck and removed.

B4.15 Materials and Specifications

B4.15.1 Pipe

.1 Pipe materials shall be selected using a rational design method, with the following information as a guide.

.2 The Developer's Consultant is responsible to ensure that the selected pipe material and class is suitable for the proposed application (site conditions, depth of installation, etc.).

.3 Alternative pipe materials will be evaluated through a variance request submitted by the Developer's Consultant. Developer's Consultant shall provide a justification for the request for variance.

.4 Alternative pipe materials shall not be installed without receiving written authorization from the Municipality.

Table B4-3
Acceptable Pipe Materials for Watermains

Material	Specification	Manufacturer	Model/Type
Polyvinyl Chloride (PVC)	AWWA C900, DR18	IPEX	Blue Brute
Polyvinyl Chloride (PVC)	AWWA C900, DR25	IPEX	Centurion

B4.15.2 Fittings and Hardware

Table B4-4
Acceptable Materials for Fittings and Hardware

Type of Fitting/Hardware	Specifications
Cast Iron Fittings	AWWA C110, 1.03 MPa working pressure
PVC Fittings	CSA B137.2 (Class 150); AWWA C907 CSA B137.3 (Class 150); AWWA C900
Flanged Joints	Class 150, ASME B16.5, flat-faced
Bolts and Nuts	Stainless Steel, Type 304, wrapped with Denso paste and tape

B4.15.3 Cathodic Protection

.1 Cathodic protection for buried **non-steel metallic fittings, valves, and hydrants**:

.1 All buried non-steel metallic fittings and valves shall be cathodically protected with 2.3 kg zinc anodes.

.2 All hydrants shall be cathodically protected with 5.5 kg zinc anodes.

.3 Zinc anodes shall conform to ASTM B418.

.4 Refer to **Typical Details B4-400** and **B4-401** for typical anode installation.

.2 Cathodic protection for **water services**:

.1 All copper services 50 mm diameter and smaller shall have a 5.5 kg zinc anode attached to the copper service.

.2 Zinc anode wire shall be clamped to the copper service within 1.0 m of curb stop, within road right-of-way.

.3 An all-brass clamp shall be used.

.4 Refer to **Typical Detail B4-400** for typical anode installation.

.3 Cathodic protection for buried **steel pipe and fittings** (retrofit work only):

.1 All steel pipe and fittings require cathodic protection with high-potential magnesium anodes.

.2 A soil resistivity analysis shall be conducted along the pipeline to calculate the weight and spacing of anodes.

.3 A cathodic protection report shall be provided to the Municipality in conjunction with the detailed design.

.4 Cathodic protection design shall be undertaken by a corrosion specialist.

.4 **Anode Requirements**:

.1 Zinc anodes shall be Type II in accordance with ASTM B418.

.2 The anode container shall consist of a water permeable cardboard tube or bag.

.3 The anode shall be centered in the tube and backfilled with material sufficient to cover all parts of the anode to a minimum thickness of 25 mm.

.4 The backfill material shall possess a maximum resistivity of 50 ohm-cm when wet and as measured by the soil box method in ASTM G57.

.5 The water used for wetting the backfill should be distilled or demineralised and no more than 15% - 20% water by weight should be added.

B4.15.4 Bedding Materials

.1 Bedding material for pipes shall conform to **Typical Detail B2-100** and the gradation identified in **Section B2.17.3**.

B4.15.5 Trench Section

.1 Trench section material shall be in accordance with **Section B2.17.4**.

B4.15.6 Fire Hydrants

.1 Approved materials for fire hydrants shall be at the discretion of the Municipality.

.2 Hydrants are to be complete with a breakaway flange and a 300 mm (maximum) spool piece; refer to **Typical Detail B4-200**.

.3 The minimum hydrant connection size shall be a 150 mm hub end.

.4 The minimum cover over hydrant leads shall be 3 m, as measured from finished grade to the pipe crown.

.5 Drain outlets shall be provided and the Developer's Consultant shall confirm the level of the groundwater table, as identified in the Geotechnical Report, to determine whether to plug drain ports.

.1 All hydrants with drain ports plugged shall be identified on the Record Drawings and shall be painted in the field as per the requirements of the Municipality.

.6 Hydrants shall have two 63.5 mm hose connections and one pumper connection (size as required by the Municipality).

.7 Threads on hose and pumper connections to be standard AMA thread or as required by the Municipality.

.8 Operating nuts shall be hexagon or as required by the Municipality.

.9 Hydrant main spindles shall turn to the left (counterclockwise) to open.

.10 A gate valve, located 1 m from the watermain, shall be provided on each connection between a hydrant and watermain and shall be located in the asphalt.

.11 Hydrants shall be enamel painted to CAN/CGSB-1.59.

.1 The colour that municipal hydrant bodies are to be painted shall be at the discretion of the Municipality

.2 Bonnet and cap colours for **municipal** hydrants are to be painted as per NFPA (National Fire Protection Association) standards:

Colour Name	Code	Colour	Available Flow
Red	C		Less than 31.5 L/s
Orange	B		31.5 to 63.0 L/s
Green	A		63.1 to 94.5 L/s
Light Blue	AA		94.6 L/s and above

.12 All bolts and nuts shall be stainless steel, type 304, and wrapped with Denso paste and tape.

.13 Hydrants shall be cathodically protected; refer to **Typical Detail B4-401**.

.14 Ensure concrete for thrust blocking does not interfere with the operation of flange bolts and nuts, nor prevent proper operation of the drain outlets.

B4.15.7 Gate Valves

.1 Gate valves shall be in accordance with AWWA C509 and the following:

.1 Gate valves shall have an epoxy-coated iron body, bronze mounted, and are to be cathodically protected. Refer to **Typical Details**.

.2 Bolts shall be wrapped with Denso paste and tape.

.3 Valves shall be resilient seat gates with non-rising stem, to open by turning in a counterclockwise direction.

.4 The position of the valve in line shall be vertical.

.5 Stem seals shall be O-ring.

.6 Valve boxes with operating stem and 50 mm square operating nut are required on all valves. All valve boxes shall be sliding Norwood Type A or approved equivalent.

.7 All gate valves larger than 350 mm shall have a bypass built into the body of the valve.

B4.15.8 Service Connections

.1 **Water Service Pipe**:

.1 Approved materials for water services and associated appurtenances are listed in **Tables B4-6** through **B4-11**.

.2 Services shall be Type K copper for services 50 mm and smaller and PVC DR18 for services 100 mm and greater.

.3 Kitec service piping is prohibited.

.4 Plastic service tubing is prohibited.

.5 Couplings shall be Standard Brass, compression type.

.6 Minimum pipe size:

.1 **Non-sprinklered dwelling (copper service):** 19 mm

.2 **Sprinklered dwelling:** 38 mm

.3 **Multi-family/Commercial/Industrial/Institutional:** Sized appropriately

.2 **Water Service Fittings**:

.1 Curb stop shall be copper to copper invert and key stop and drain.

.2 Non-draining curb stops are to be provided in areas with high water table.

.3 All fittings shall be able to withstand a test pressure of 1,035 kPa.

Table B4-6
Acceptable Materials for Service Saddles

Manufacturer	Model/Type
Robar	2606

Table B4-7
Acceptable Materials for Corporation (Main) Stops

Manufacturer	Model/Type	Comments
Cambridge Brass	E17073	Compression End
Cambridge Brass	E17076	Compression End
Mueller	H-15008	Compression End

Table B4-8
Acceptable Materials for Water Service Unions

Manufacturer	Model/Type	Comments
Cambridge Brass	E17084	Compression Ends
Cambridge Brass	E17087	Compression Ends
Cambridge Brass	E17088	Compression Ends
Mueller	H-15403	Compression Ends

Table B4-9
Acceptable Materials for Curb Stops

Manufacturer	Model/Type	Comments
Cambridge Brass	E17403	Compression Ends
Cambridge Brass	E17030	Compression Ends
Cambridge Brass	E17040	Compression Ends
Mueller	H-15209	Compression Ends

Table B4-10
Acceptable Materials for PVC Services

Manufacturer	Model/Type	Specifications
IPEX	Blue Brute	AWWA C900, DR18

Note:

1. **Table B4-10** is for large diameter water services (100 mm and larger).

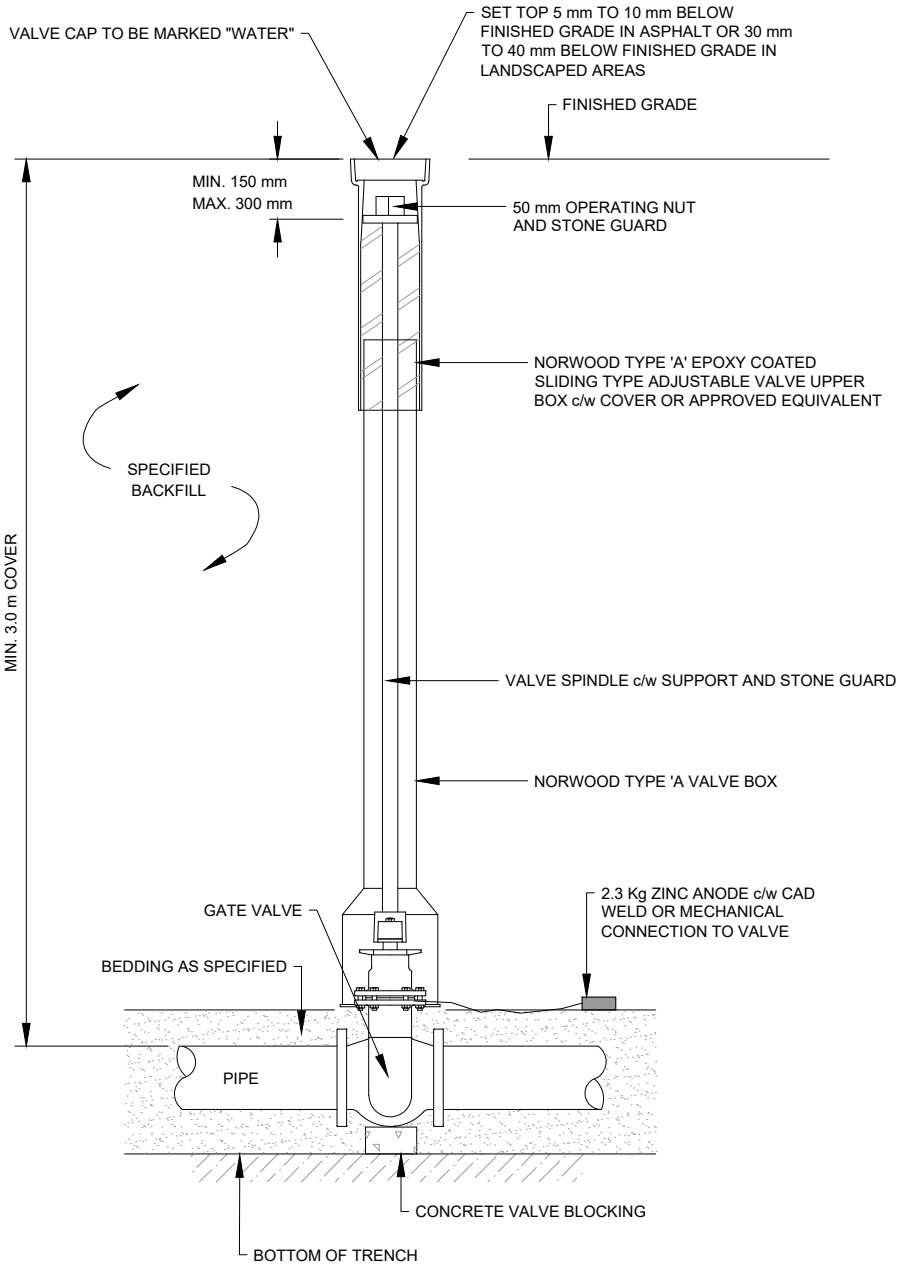
Table B4-11
Acceptable Pipe Materials for Services

Material	Manufacturer	Model/Type
Copper	Wolverine	Type K
Copper	Cerro	Type K
Copper	Halstead	Type K

B4.16 Typical Details – Urban Water Distribution Systems

Standard Detail No.	Title
B4-100	Valve Installation
B4-200	Hydrant Installation
B4-300	Poured Concrete Thrust Blocks for Horizontal Tees and Bends
B4-301	Poured Concrete Thrust Blocks for Vertical Bends (Downward Thrust)
B4-302	Poured Concrete Thrust Blocks for Vertical Bends (Upward Thrust)
B4-303	Poured Concrete Thrust Blocks for Dead Ends
B4-400	Anode Installation for Iron Fittings Used with PVC Watermains
B4-401	Anode Installation at Hydrants
B4-500	Water Service Connection
B4-600	Pipe Insulation
B4-700	Air Release/Air Vacuum Valve Chamber

TYPICAL DETAIL	B4-100	
Date: JULY 2023		Rev. 0



NOTES:

(1) VALVES REQUIRE THRUST BLOCKS. DEVELOPER'S CONSULTANT TO REVIEW AND PROVIDE RECOMMENDATIONS FOR MECHANICAL JOINT RESTRAINTS IN AREAS OF UNSUITABLE SOIL CONDITIONS.

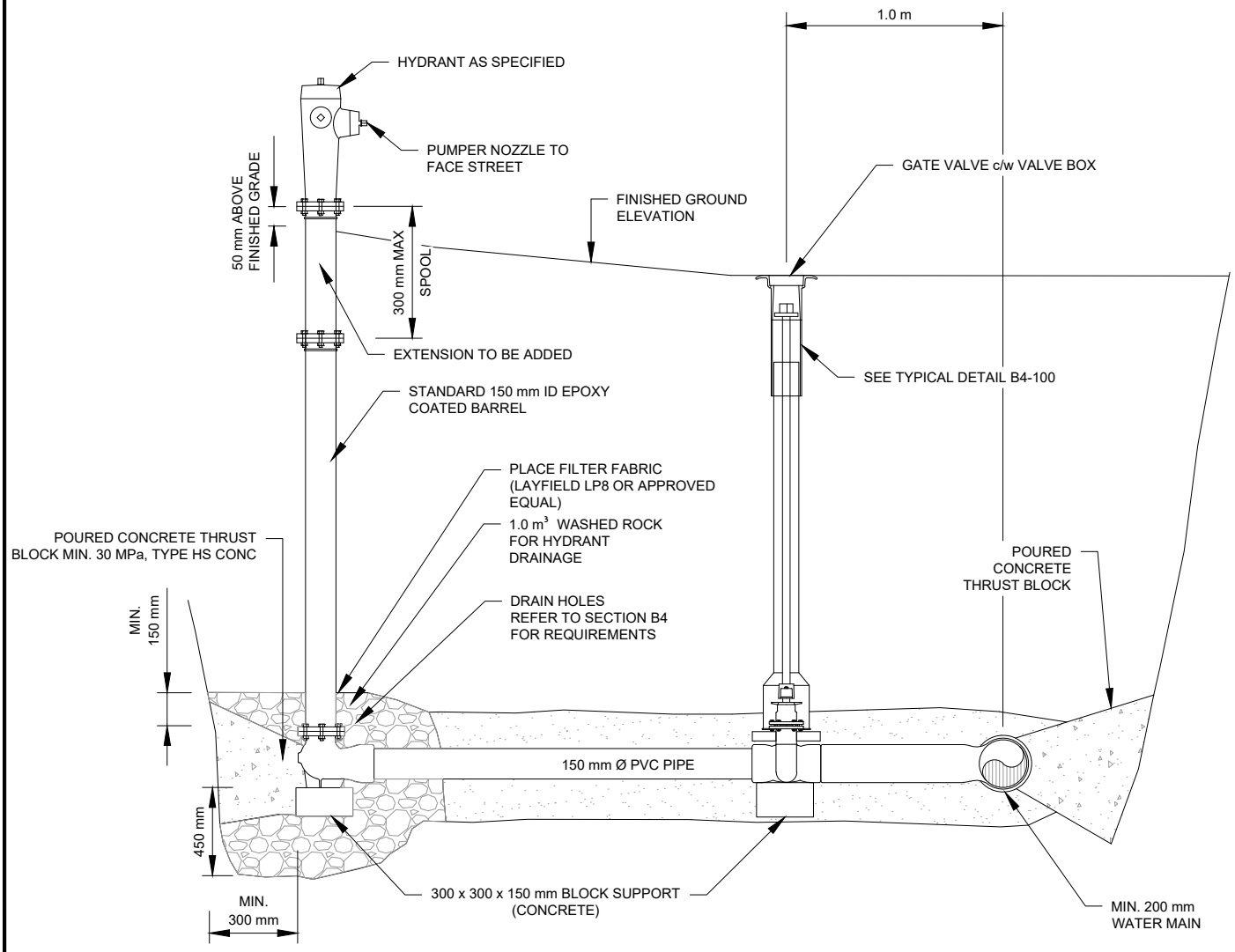
(2) BOLTS SHALL BE WRAPPED WITH DENSO PASTE AND TAPE

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Valve Installation

TYPICAL DETAIL	B4-200	
Date: JULY 2023		Rev. 0



NOTES:

(1) HYDRANT TO BE SET PLUMB WITH BARREL EXTENSIONS TO SUIT DEPTH OF BRANCH. BRANCH TO BE SET LEVEL WITH A MIN. OF 3.0 m OF COVER ABOVE TOP OF PIPE. EXTENSION TO BE INSTALLED BETWEEN HYDRANT AND TOP OF BARREL.

(2) ALL THRUST BLOCKING TO BE AGAINST UNDISTURBED TRENCH WALL WITH DRAIN HOLES CLEAR OF CONCRETE.

(3) VALVE BOX TO BE INSTALLED IN VERTICAL POSITION WITH TOP FLUSH WITH FINISHED GRADE.

(4) HYDRANT SHALL BE COMPRESSION TYPE AS SPECIFIED.

(5) ALL CAST IRON VALVES AND FITTINGS SHALL BE CATHODICALLY PROTECTED BY 2.3 kg SACRIFICIAL ANODES, HYDRANT SHALL BE CATHODICALLY PROTECTED BY 5.5 kg SACRIFICIAL ANODE.

(6) HYDRANT TO BE SUPPLIED WITH BREAKAWAY FLANGE.

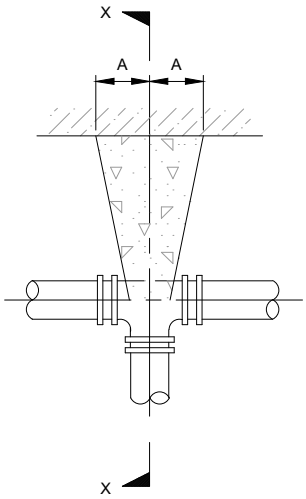
(7) IN NO CASE SHALL A HYDRANT VALVE BE LOCATED IN A SIDEWALK

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

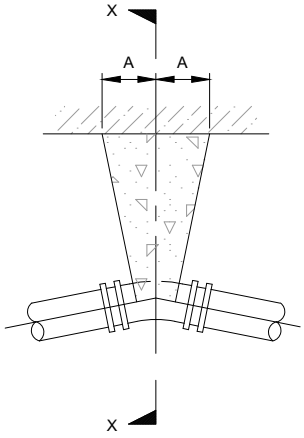
SMOKY LAKE REGION

Hydrant Installation

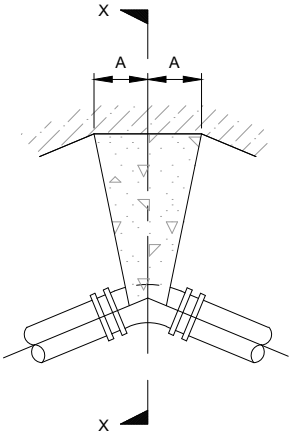
TYPICAL DETAIL	B4-300	
Date: JULY 2023		Rev. 0



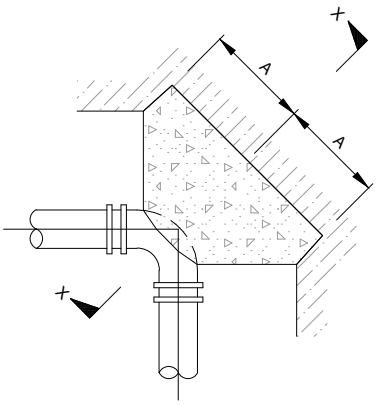
TEE



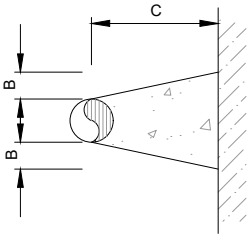
11 1/4° & 22 1/2° BENDS



45° BENDS



90° BENDS



SECTION X-X

PIPE SIZE	FITTINGS															
	TEE & DEAD END				11 1/4° & 22 1/2° BENDS				45° BEND				90° BEND			
	A	B	C	BEARING AREA	A	B	C	BEARING AREA	A	B	C	BEARING AREA	A	B	C	BEARING AREA
	(mm)	(mm)	(mm)	(m²)	(mm)	(mm)	(mm)	(m²)	(mm)	(mm)	(mm)	(m²)	(mm)	(mm)	(mm)	(m²)
150	348	100	275	0.244	159	75	225	0.095	311	75	225	0.187	575	75	225	0.345
200	433	150	400	0.433	211	100	300	0.169	415	100	300	0.332	766	100	300	0.613
250	521	200	525	0.677	264	125	375	0.264	518	125	375	0.518	958	125	375	0.958
300	609	250	650	0.975	317	150	450	0.380	622	150	450	0.746	1149	150	450	1.379
400	867	300	800	1.733	423	200	600	0.676	829	200	600	1.327	1532	200	600	2.451
450	954	350	925	2.194	476	225	675	0.856	933	225	675	1.679	1724	225	675	3.102
600	1393	400	1100	3.900	634	300	900	1.522	1244	300	900	2.985	2298	300	900	5.515
750	1741	500	1375	6.094	793	375	1125	2.378	1555	375	1125	4.664	2873	375	1125	8.618

NOTES:

(1) ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

(2) DESIGN BASIS:
a. HYDRAULIC DESIGN PRESSURE 690 kPa (100 psi)
b. SOIL BEARING CAPACITY 50 kPa (1044 lb/sq.ft)(SOFT CLAY)

(3) CONCRETE THRUST BLOCK BEARING SURFACE AREA AND PARAMETER "A","B", & "C" MUST BE ADJUSTED IF HYDRAULIC DESIGN PRESSURE AND SOIL BEARING CAPACITY ARE DIFFERENT THAN SHOWN IN NOTE 2, DESIGN BASIS.

(4) HYDRAULIC DESIGN PRESSURE MUST INCLUDE HIGHEST OPERATING PRESSURE SCENARIO WITH SURGE PRESSURE INCLUDED.

(5) TEMPORARY BLOCKING MUST BE APPROVED BY THE MUNICIPALITY.

(6) CONCRETE STRENGTH SHALL BE 30 MPa AT 28 DAYS, SULPHATE RESISTANT.

(7) CONCRETE TO BE CLEAR OF BELLS AND TO BEAR AGAINST UNDISTURBED TRENCH WALLS.

(8) CONCRETE TO BE PLACED UNDER ALL FITTINGS.

(9) CONCRETE TO BE CURED FOR 24 HOURS PRIOR TO BACKFILLING.

(10) BOND BREAKER TO BE USED BETWEEN CONCRETE AND FITTINGS.

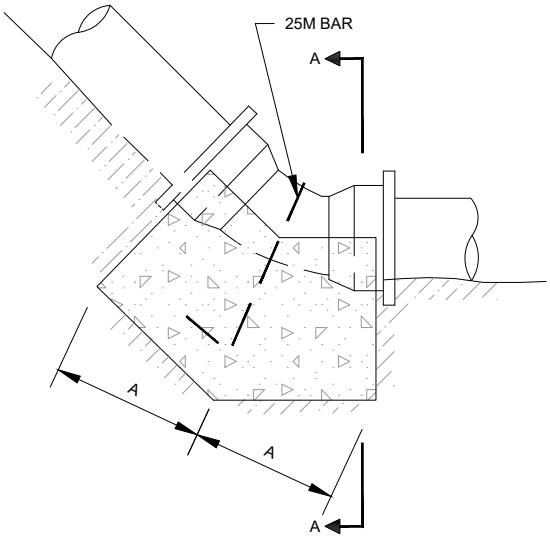
(11) IF THE DESIGN IS BASED ON INFORMATION NOT VERIFIED IN THE FIELD AND NOT SUPPORTED BY HYDRAULIC MODELING / CALCULATIONS, A MIN. FACTOR OF SAFETY OF 1.50 SHOULD BE APPLIED TO ALL TABULATED BEARING AREAS.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

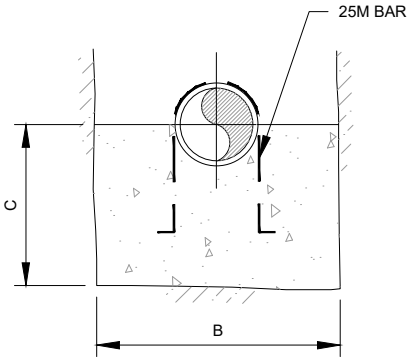
SMOKY LAKE REGION

Poured Concrete Thrust Blocks for Horizontal Tees and Bends

TYPICAL DETAIL	B4-301	
Date: JULY 2023		Rev. 0



ELEVATION



SECTION A-A

PIPE SIZE	FITTINGS							
	11 $\frac{1}{4}$° & 22 $\frac{1}{2}$° BENDS				45° BEND			
	A	B	C	BEARING AREA	A	B	C	BEARING AREA
	(mm)	(mm)	(mm)	(m^2)	(mm)	(mm)	(mm)	(m^2)
150	106	450	375	0.095	207	450	375	0.187
200	169	500	400	0.169	332	500	400	0.332
250	240	550	425	0.264	471	550	425	0.518
300	317	600	450	0.380	662	600	450	0.746
400	483	700	500	0.676	948	700	500	1.327
450	571	750	525	0.856	1119	750	525	1.679
600	845	900	600	1.522	1658	900	600	2.985
750	1132	1050	675	2.378	2221	1050	675	4.664

NOTES:

(1) ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

(2) DESIGN BASIS:
a.HYDRAULIC DESIGN PRESSURE 690kPa (100psi)
b.SOIL BEARING CAPACITY 50kPa (1044 lb/sq.ft)(SOFT CLAY)

(3) CONCRETE THRUST BLOCK BEARING SURFACE AREA AND PARAMETER "A","B", & "C" MUST BE ADJUSTED IF HYDRAULIC DESIGN PRESSURE AND SOIL BEARING CAPACITY ARE DIFFERENT THAN SHOWN IN NOTE 2, DESIGN BASIS.

(4) HYDRAULIC DESIGN PRESSURE MUST INCLUDE HIGHEST OPERATING PRESSURE SCENARIO WITH SURGE PRESSURE INCLUDED.

(5) TEMPORARY BLOCKING MUST BE APPROVED BY THE MUNICIPALITY.

(6) CONCRETE STRENGTH SHALL BE 30MPa AT 28 DAYS, SULPHATE RESISTANT.

(7) CONCRETE TO BE CLEAR OF BELLS AND TO BEAR AGAINST UNDISTURBED TRENCH BOTTOM.

(8) CONCRETE TO BE PLACED UNDER ALL FITTINGS.

(9) CONCRETE TO BE CURED FOR 24 HOURS PRIOR TO BACKFILLING.

(10) BOND BREAKER TO BE USED BETWEEN CONCRETE AND FITTINGS.

(11) IF THE DESIGN IS BASED ON INFORMATION NOT VERIFIED IN THE FIELD AND NOT SUPPORTED BY HYDRAULIC MODELING / CALCULATIONS, A MIN. FACTOR OF SAFETY OF 1.50 SHOULD BE APPLIED TO ALL TABULATED BEARING AREAS.

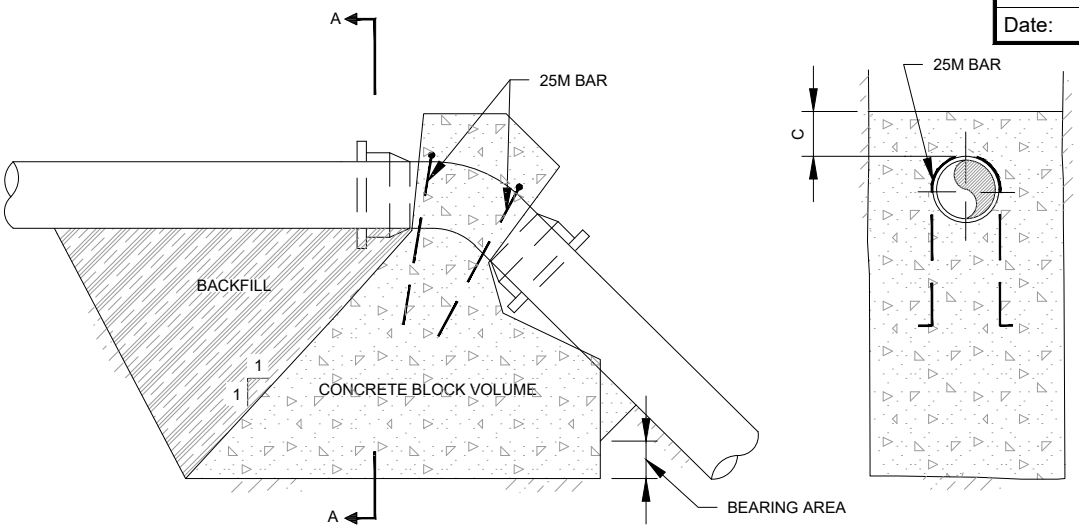
Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

SMOKY LAKE REGION

Poured Concrete Thrust Blocks for Vertical Bends (Downward Thrust)

TYPICAL DETAIL	B4-302	
Date: JULY 2023		Rev. 0



ELEVATION

SECTION A-A

PIPE SIZE	FITTINGS					
	11 1/4° & 22 1/2° BENDS			45° BEND		
	BLOCK VOL.	C	BEARING AREA	BLOCK VOL.	C	BEARING AREA
	(m^3)	(mm)	(m^2)	(m^3)	(mm)	(m^2)
150	0.4	375	0.019	0.7	375	0.071
200	0.7	400	0.033	1.3	400	0.127
250	1.1	425	0.052	2.0	425	0.198
300	1.6	450	0.074	2.9	450	0.286
400	2.8	500	0.132	5.2	500	0.508
450	3.6	525	0.167	6.6	525	0.643
600	6.3	600	0.297	11.7	600	1.142
750	9.9	675	0.464	18.3	675	1.785

NOTES:

(1) ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

(2) DESIGN BASIS:
a. HYDRAULIC DESIGN PRESSURE 690 kPa (100 psi)
b.SOIL BEARING CAPACITY 50 kPa (1044 lb/sq.ft)(SOFT CLAY)

(3) CONCRETE THRUST BLOCK BEARING SURFACE AREA MUST BE ADJUSTED IF HYDRAULIC DESIGN PRESSURE AND SOIL BEARING CAPACITY ARE DIFFERENT THAN SHOWN IN NOTE 2, DESIGN BASIS.

(4) HYDRAULIC DESIGN PRESSURE MUST INCLUDE HIGHEST OPERATING PRESSURE SCENARIO WITH SURGE PRESSURE INCLUDED.

(5) TEMPORARY BLOCKING MUST BE APPROVED BY THE MUNICIPALITY.

(6) CONCRETE STRENGTH SHALL BE 30 MPa AT 28 DAYS, SULPHATE RESISTANT.

(7) CONCRETE TO BE CLEAR OF BELLS AND TO BEAR AGAINST UNDISTRUBED TRENCH WALLS.

(8) CONCRETE TO BE PLACED UNDER ALL FITTINGS.

(9) CONCRETE TO BE CURED FOR 24 HOURS PRIOR TO BACKFILLING.

(10) BOND BREAKER TO BE USED BETWEEN CONCRETE AND FITTINGS.

(11) IF THE DESIGN IS BASED ON INFORMATION NOT VERIFIED IN THE FIELD AND NOT SUPPORTED BY HYDRAULIC MODELING / CALCULATIONS, A MIN. FACTOR OF SAFETY OF 1.50 SHOULD BE APPLIED TO ALL TABULATED BEARING AREAS.

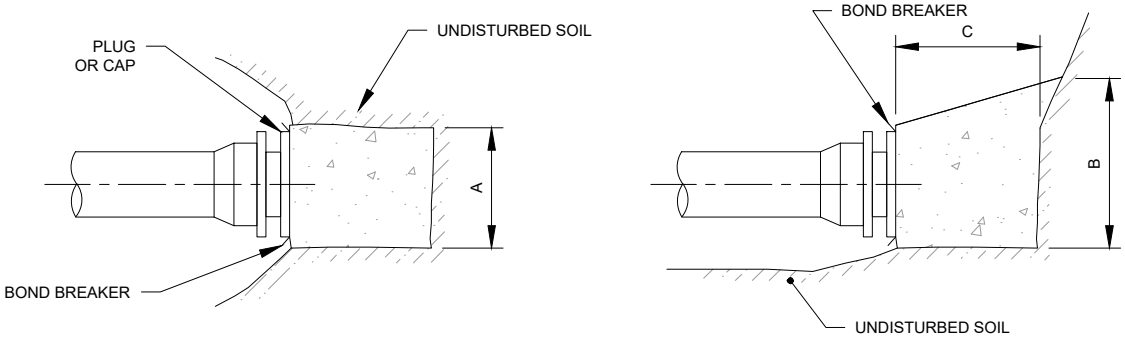
Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

SMOKY LAKE REGION

Poured Concrete Thrust Blocks for Vertical Bends (Upward Thrust)

TYPICAL DETAIL	B4-303	
Date: JULY 2023		Rev. 0



MINIMUM DIMENSIONS IN mm				
SIZE OF PIPE	A	B	C	BEARING AREA
100	430	250	200	0.11
150	700	350	200	0.24
200	870	500	200	0.43
250	1040	650	275	0.68
300	1220	800	350	0.98
400	1730	1000	400	1.73
450	1910	1150	475	2.19
600	2790	1400	500	3.90
750	3480	1750	625	6.09

NOTES:

(1) ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

(2) DESIGN BASIS:
a.HYDRAULIC DESIGN PRESSURE 690 kPa (100 psi)
b.SOIL BEARING CAPACITY 50 kPa (1044 lb/sq.ft)(SOFT CLAY)

(3) CONCRETE THRUST BLOCK BEARING SURFACE AREA AND PARAMETER "A","B", & "C" MUST BE ADJUSTED IF HYDRAULIC DESIGN PRESSURE AND SOIL BEARING CAPACITY ARE DIFFERENT THAN SHOWN IN NOTE 2, DESIGN BASIS.

(4) HYDRAULIC DESIGN PRESSURE MUST INCLUDE HIGHEST OPERATING PRESSURE SCENARIO WITH SURGE PRESSURE INCLUDED.

(5) TEMPORARY BLOCKING MUST BE APPROVED BY THE MUNICIPALITY.

(6) CONCRETE STRENGTH SHALL BE 30 MPa AT 28 DAYS, SULPHATE RESISTANT.

(7) CONCRETE TO BE CLEAR OF BELLS AND TO BEAR AGAINST UNDISTURBED TRENCH WALLS.

(8) CONCRETE TO BE PLACED UNDER ALL FITTINGS.

(9) CONCRETE TO BE CURED FOR 24 HOURS PRIOR TO BACKFILLING.

(10) BOND BREAKER TO BE USED BETWEEN CONCRETE AND FITTINGS.

(11) IF THE DESIGN IS BASED ON INFORMATION NOT VERIFIED IN THE FIELD AND NOT SUPPORTED BY HYDRAULIC MODELING / CALCULATIONS, A MIN. FACTOR OF SAFETY OF 1.50 SHOULD BE APPLIED TO ALL TABULATED BEARING AREAS.

(12) THRUST BLOCKS FOR DEAD ENDS TO BE LOCATED A MINIMUM OF 6.0 m FROM VALVES.

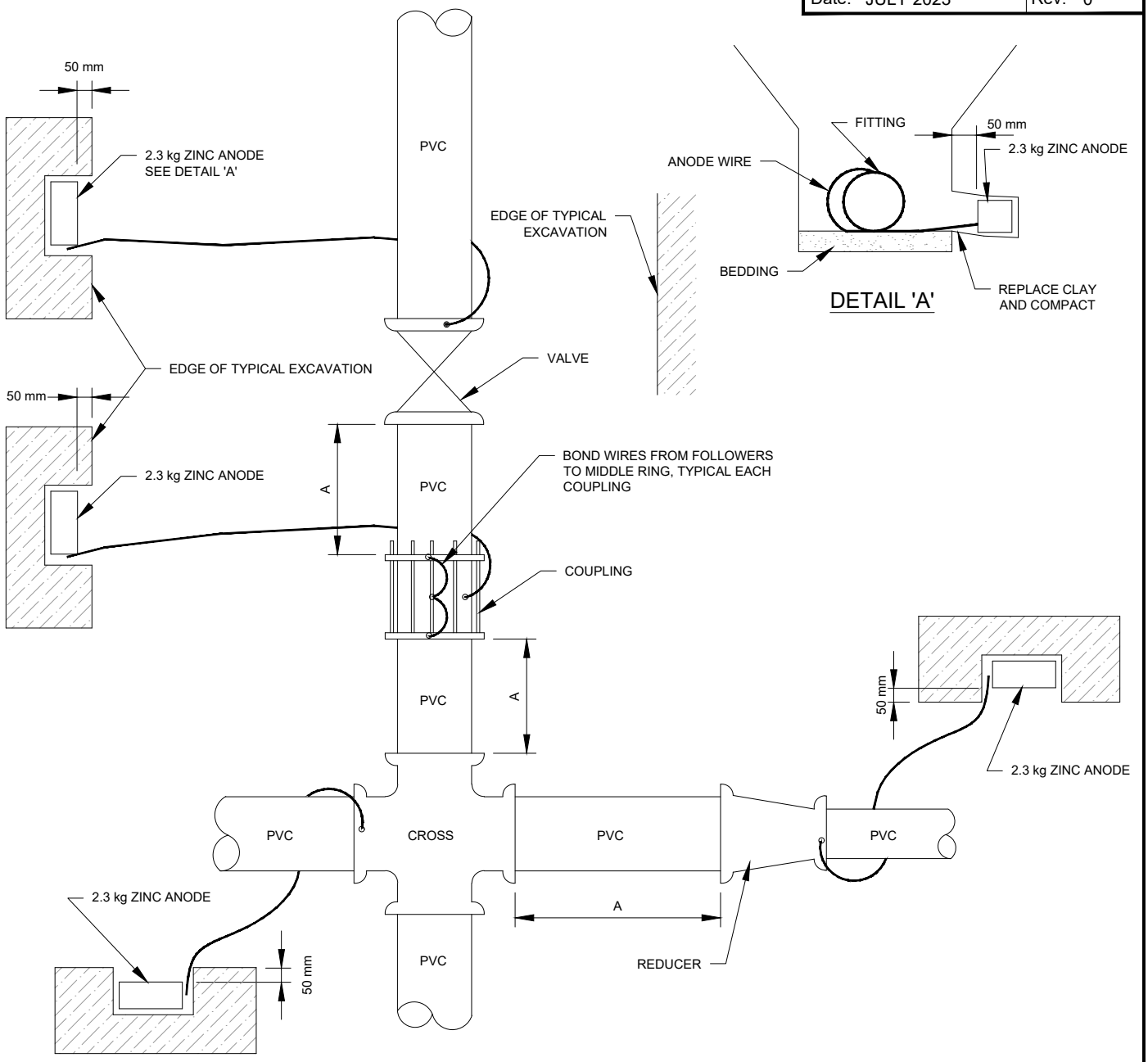
Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

HISTORIC VILNA
Smoky Lake COUNTY
VILLAGE OF WASKATENAU
TOWN OF SMOKY LAKE 1923-2023

SMOKY LAKE REGION

Poured Concrete Thrust Blocks for Dead Ends

TYPICAL DETAIL	B4-400
Date: JULY 2023	Rev. 0



NOTES:

(1) MINIMUM DISTANCE FROM ANODE TO PIPE, FITTING, VALVE OR HYDRANT IS 150 mm.

(2) INSTALL ANODE AT APPROXIMATE PIPE DEPTH IN NATIVE SOIL.

(3) BOND WIRES MAY BE USED TO PROTECT UP TO TWO FITTINGS WITH ONE ANODE WHEN DIMENSION 'A' DOES NOT EXCEED ONE (1) METER.

(4) ALL ZINC ANODES ON FITTINGS AND VALVES ARE 2.3 kg.

(5) ZINC ANODES TO BE EMBEDDED INTO TRENCH WALL TO PROVIDE FOR A MINIMUM OF 50mm OF NATIVE CLAY COMPLETELY SURROUNDING THE ANODE.

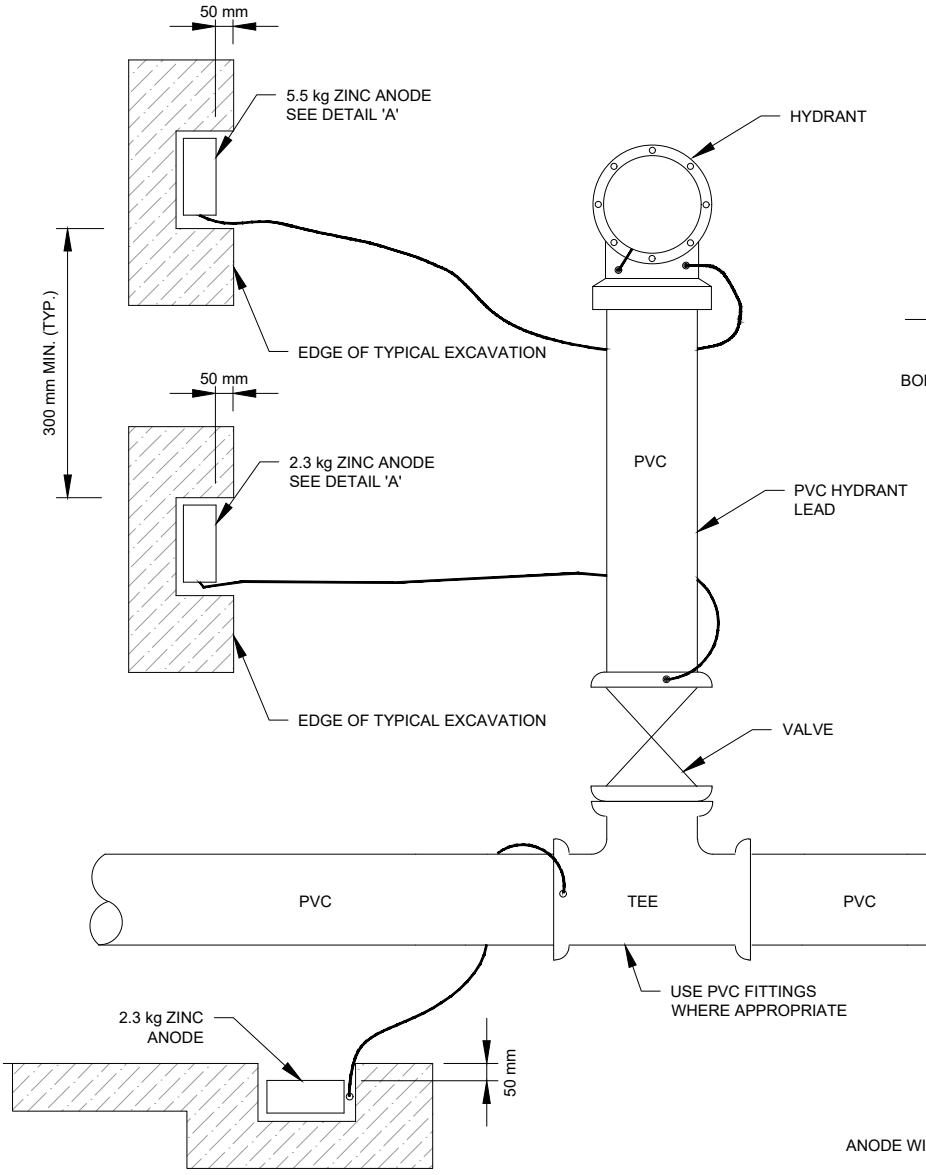
(6) ANODES TO BE AT LEAST 300 mm CLEAR OF THRUST BLOCK.

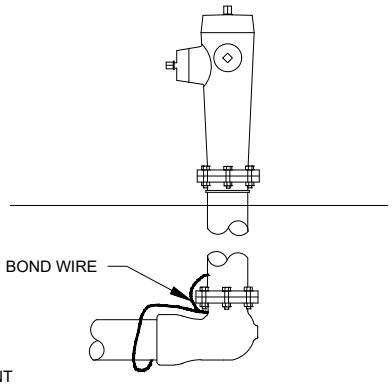
Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

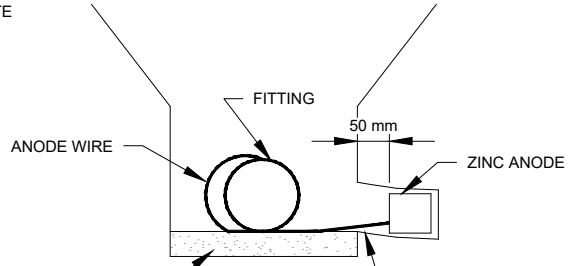
Anode Installation for Iron Fittings used with PVC Watermains

TYPICAL DETAIL	B4-401	
Date: JULY 2023		Rev. 0





HYDRANT ELEVATION



DETAIL 'A'

NOTES:

(1) MINIMUM DISTANCE FROM ANODE TO PIPE, FITTING, VALVE, OR HYDRANT IS 150 mm.

(2) INSTALL ANODE AT APPROX. PIPE DEPTH IN NATIVE SOIL.

(3) ZINC ANODES TO BE EMBEDDED INTO TRENCH WALL TO PROVIDE FOR A MINIMUM OF 50 mm OF NATIVE CLAY COMPLETELY SURROUNDING THE ANODE.

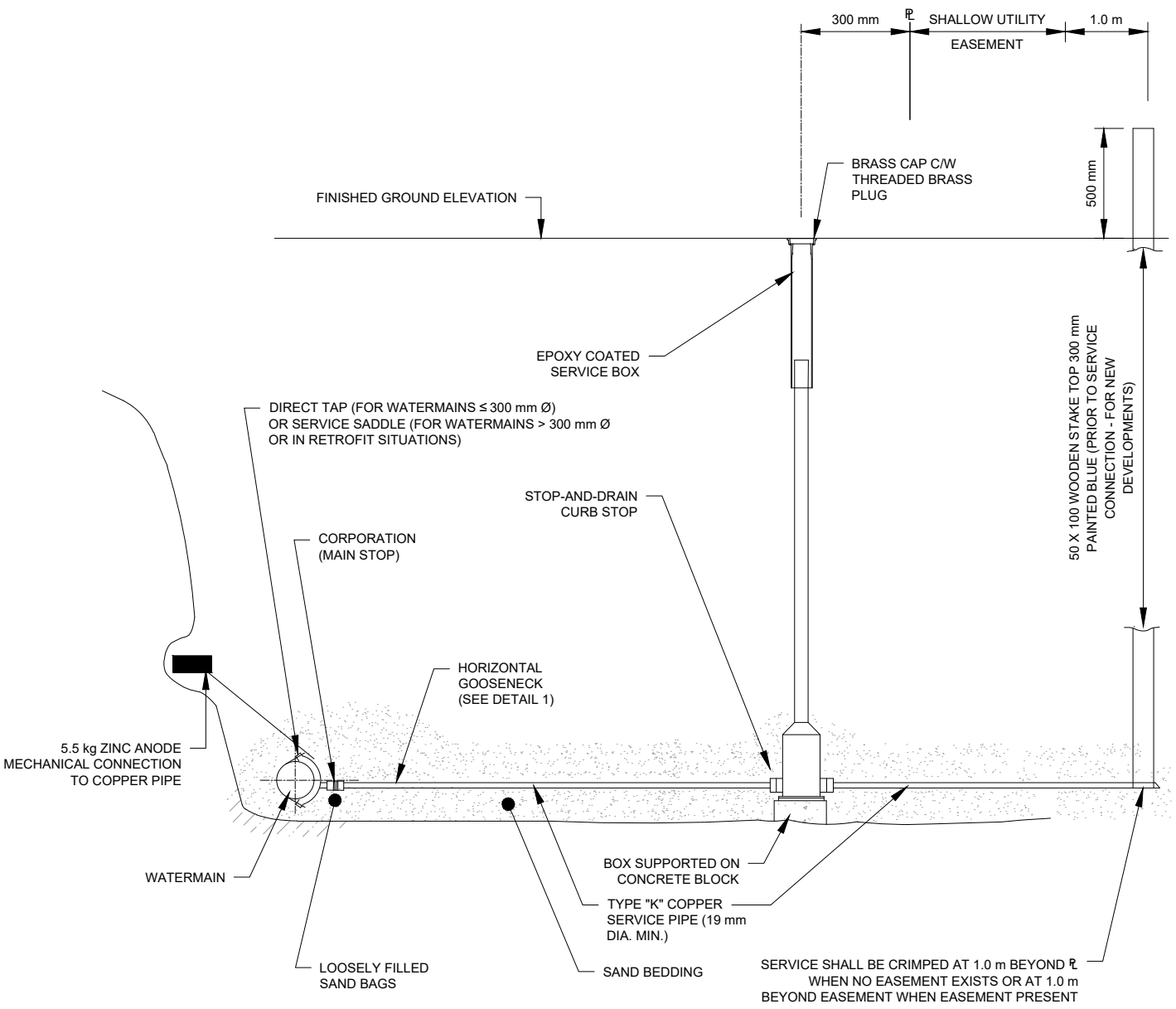
(4) ANODES TO BE AT LEAST 300 mm CLEAR OF THRUST BLOCK.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Anode Installation at Hydrants

TYPICAL DETAIL	B4-500
Date: JULY 2023	Rev. 0



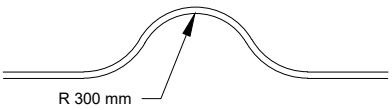
NOTES:

(1) SERVICES TO BE INSTALLED AT RIGHT ANGLES TO WATERMAINS WHERE POSSIBLE.

(2) SERVICE BOXES TO BE INSTALLED PLUMB.

(3) DIAMETER OF COPPER SERVICE PIPE TO BE UNIFORM FROM CORPORATION STOP TO METER.

(4) MINIMUM COVER OVER SERVICE PIPES TO BE 2.75 m AT THE PROPERTY LINE.



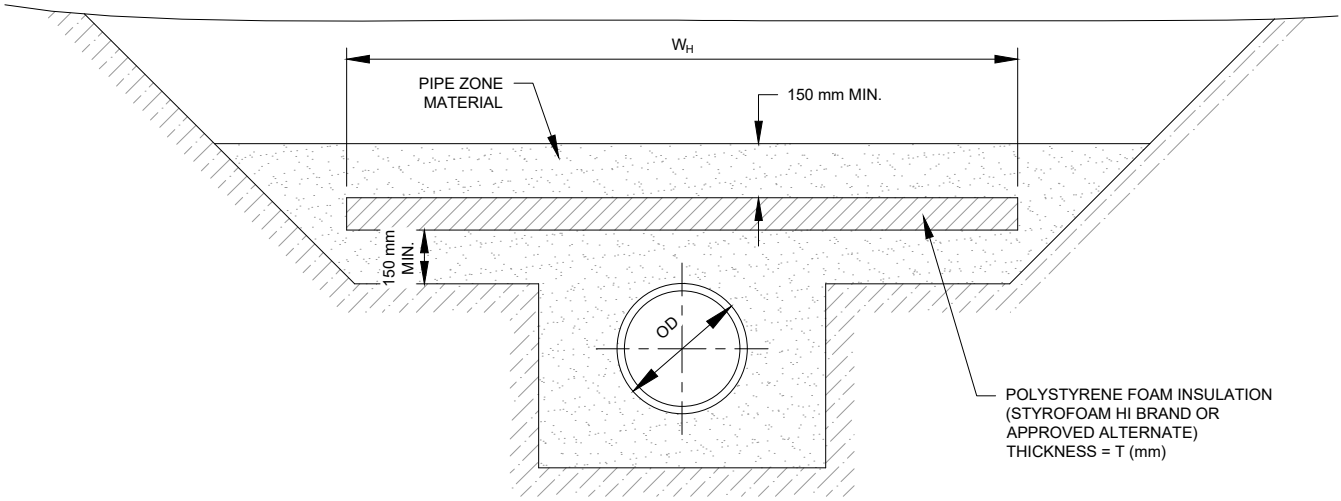
DETAIL 1- PLAN VIEW
HORIZONTAL GOOSENECK

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

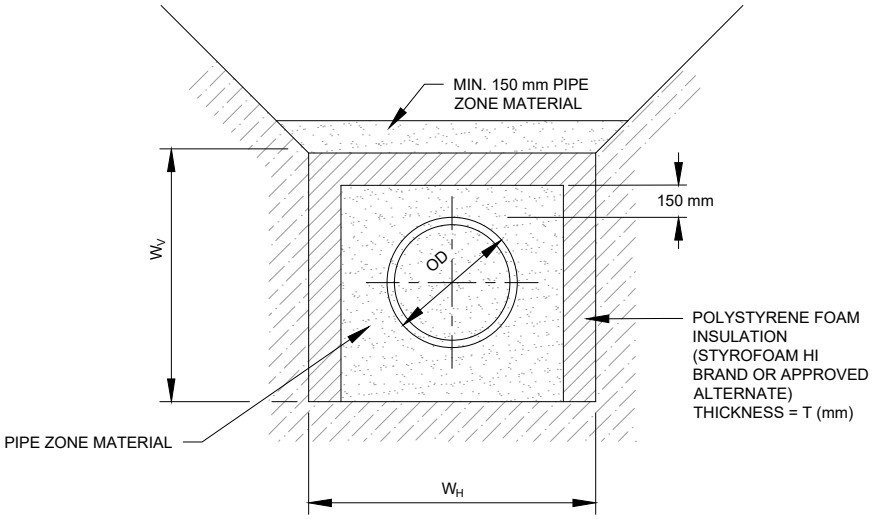
SMOKY LAKE REGION

Water Service Connection

TYPICAL DETAIL	B4-600
Date: JULY 2023	Rev. 0



SHEET INSULATION



BOX INSULATION

X (m)	T (mm)	WIDTH OF INSULATION (W) FOR OUTSIDE PIPE DIAMETERS (m)			
		0.15	0.20	0.25	0.30
1.6	65	2.7	2.7	2.8	2.8
1.8	50	2.3	2.3	2.4	2.4
2.0	50	1.9	1.9	2.0	2.0
2.2	40	1.5	1.5	1.6	1.6
2.4	25	1.1	1.1	1.2	1.2
2.6	25	0.7	0.7	0.8	0.8

NOTES:

X = DEPTH FROM GROUND SURFACE TO BOTTOM OF INSULATION (METRES)
W = WIDTH OF INSULATION (METRES) = $W_H + 2(W_V)$
OD = OUTSIDE DIAMETER OF PIPE

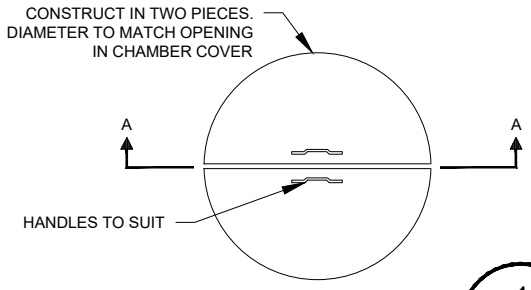
THIS TABLE HAS BEEN GENERATED BASED ON A FROST DEPTH OF 3 m. IF THE GEOTECHNICAL REPORT SPECIFIES A DIFFERENT FROST DEPTH, THE CONSULTANT IS RESPONSIBLE FOR CONFIRMING THE WIDTH OF ANY REQUIRED INSULATION.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

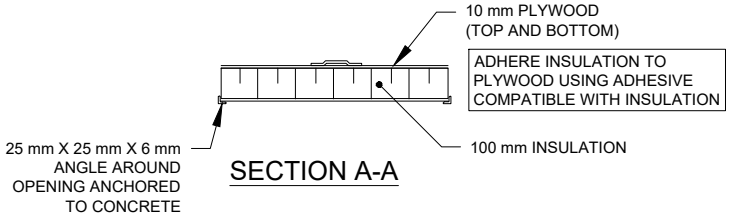
SMOKY LAKE REGION

Pipe Insulation

TYPICAL DETAIL	B4-700	
Date: JULY 2023		Rev. 0



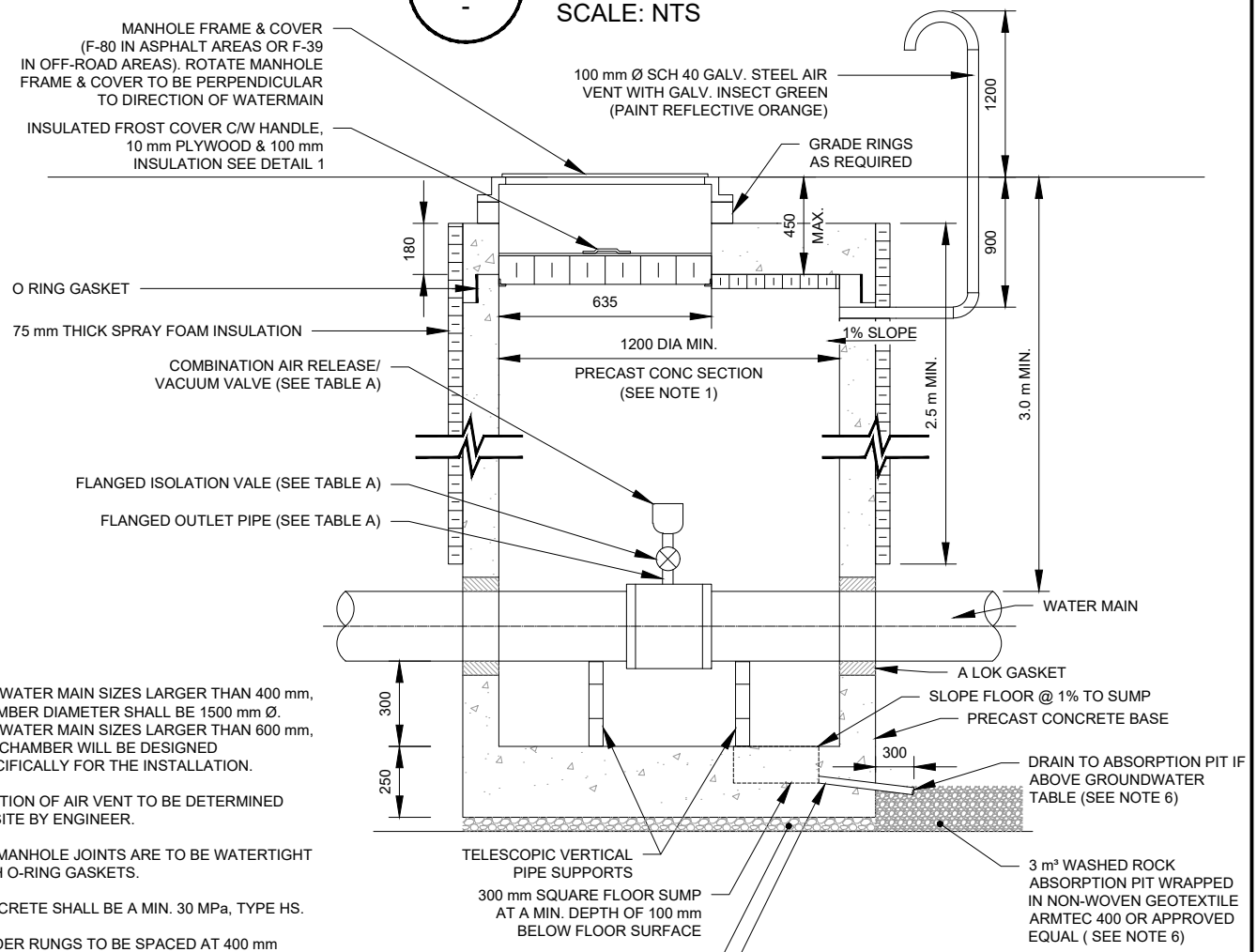
PLAN



SECTION A-A

1 - FROST COVER DETAIL

SCALE: NTS



NOTES:

(1) FOR WATER MAIN SIZES LARGER THAN 400 mm, CHAMBER DIAMETER SHALL BE 1500 mm Ø. FOR WATER MAIN SIZES LARGER THAN 600 mm, THE CHAMBER WILL BE DESIGNED SPECIFICALLY FOR THE INSTALLATION.

(2) POSITION OF AIR VENT TO BE DETERMINED ON-SITE BY ENGINEER.

(3) ALL MANHOLE JOINTS ARE TO BE WATERTIGHT WITH O-RING GASKETS.

(4) CONCRETE SHALL BE A MIN. 30 MPa, TYPE HS.

(5) LADDER RUNGS TO BE SPACED AT 400 mm MAX. FIRST RUNG TO BE 600 mm MAX. BELOW FRAME. LAST RUNG TO BE MAX. 300 mm ABOVE BOTTOM.

(6) IF NOT ABOVE GROUNDWATER TABLE, CHAMBER SUMP TO BE DESIGNED TO BE PUMPED TO A STORM OR SANITARY SEWER.

(7) THIS DETAIL IS A GUIDELINE ONLY. SHOP DRAWINGS ARE REQUIRED TO BE SUBMITTED AND APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.

(8) DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

TABLE A

WATER COMBINATION AIR VALVE	ISOLATION VALVE	INLET/OUTLET PIPE
25	25 BALL VALVE	25
50	50 BALL VALVE	50
75	75 BUTTERFLY VALVE	75
100	100 BUTTERFLY VALVE	100

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Air Release / Air Vacuum Valve Chamber

B5 FRANCHISE UTILITIES

B5.1 General

.1 All work necessary for the installation of gas, power, street lighting, telephone, and cable shall be the responsibility of the Developer and the installation of these utilities will be a condition of development.

.2 In addition to the financial responsibilities, the Developer must initiate and coordinate the design, approval, and construction of these services. The actual design and construction of each utility is normally handled by the respective utility company.

.1 If ATCO Electric's (or the service provider's) turnkey process is being implemented, the Developer will be responsible for completing the design and construction of the power, streetlights, communications, and possibly gas.

.3 Alleys are the preferred location for shallow utilities; however, four-party trenching (one common trench for telephone, cable, gas, and electric) located within a 3.5 m Easement on property is also an accepted trench configuration; refer to **Typical Detail B5-100**.

.4 **Section B5** provides some of the basic procedures and requirements for the installation of franchise utilities in Urban areas.

.5 For basic procedures and requirements for the installation of franchise utilities in Rural areas, refer to **Section C5**.

B5.2 Design Standards

B5.2.1 Design and Approval

.1 To coordinate design of gas, power, street lighting, telephone, and cable systems, it is necessary to first classify and designate cross-sections for each street (and walkway) within a subdivision area, in relation to **Typical Details B1-100**, **D2-100**, **D3-100**, and **D4-100**.

.2 Upon approval of a tentative Subdivision Plan, the Developer's Consultant shall circulate to each utility company copies of the approved Subdivision Plan, complete street classifications, utility alignments, and any other information the utility companies may require.

.1 The utility companies shall indicate on this plan their basic design, complete with all rights-of-way, easements, and PUL requirements, and return it to the Developer's Consultant.

.1 If ATCO Electric's (or the service provider's) turnkey process is being implemented, the Developer will be responsible for completing the design and construction of the power, streetlights, communications, and possibly gas.

.3 After checking for and eliminating potential conflicts, the Developer's Consultant shall prepare a servicing plan showing all franchise utilities on a site plan. This site plan will also show the Municipal Improvements.

.4 This plan shall then be circulated to, and approved by, the respective utility companies. The plan will then be included with the other engineering drawings submitted by the Developer's Consultant to the Municipality for acceptance.

B5.2.2 Location of Utilities

.1 Both overhead and underground power are acceptable.

.2 All distribution cables for primary and secondary power, telephone, cable, and streetlight feeders, may be installed in one common 300 mm wide trench at the required alignment.

.3 Streetlights shall be placed at locations not interfering with proposed driveways and shall be located in line with the extensions of common property lines between two lots, or as otherwise required by ATCO Electric (or service provider).

.4 The face of the posts, poles, pedestals, and transformers shall be at least 1 m clear of the face of the curb. Refer to the typical cross-sections at the end of **Section B1**.

.5 The minimum depth of cover over shallow utilities shall be 1 m from finished grade or as required by the franchise utility.

DID YOU KNOW?

Vilna has unique requirements for the installation of power infrastructure.

Refer to Section D3 – Special Provisions for the Village of Vilna.

B5.2.3 Separation from Other Utilities

.1 The franchise utilities shall be separated from the deeper municipal utilities (i.e., water, sanitary sewer, and storm sewer) by not less than 3.0 m laterally. Refer to the typical cross-sections at the end of **Section B1**.

.2 A separation of 1.2 m from other franchise utilities is also required; common (four-party) trench installations excepted.

B5.3 Installation

B5.3.1 Road Crossings

.1 Adequate ducts shall be installed under roadways prior to their construction to accommodate the installation of power, telephone, and cable.

.2 Where the road crossings are installed after the construction of road improvements, they shall be installed via an appropriate trenchless method to avoid disruption of the surface improvements.

B5.3.2 Site Preparation

.1 The Developer shall pre-grade all boulevards, alleys, and/or easements to within ±150 mm of finish grade where franchise utilities are to be installed in accordance with the franchise utilities' standards.

B5.3.3 Survey and Record Information

.1 The Developer shall be responsible for laying out all work, lines, and levels as required to proceed with the entire installation and for the preservation of all such stakes and marks during construction.

.2 Record information (shapefiles) shall be provided to the Municipality for incorporation into the Regional GIS database.

B5.3.4 Compaction of Trenches

.1 All trenches located on municipal property or within municipal easements are to be compacted to the following standards:

- 95% SPMDD for trenches in boulevards and landscaped areas.
- 97% SPMDD for trenches under roadways, with the top 300 mm of subgrade material compacted to 100% SPMDD.
- Restore granular base course to a thickness matching that of the existing roadway, compacted to 100% SPMDD.
- Restore asphaltic concrete pavement to a thickness matching that of the existing roadway, compacted to 98% Marshall Density.

B5.3.5 Rights-of-Way, Easements, and Public Utility Lots

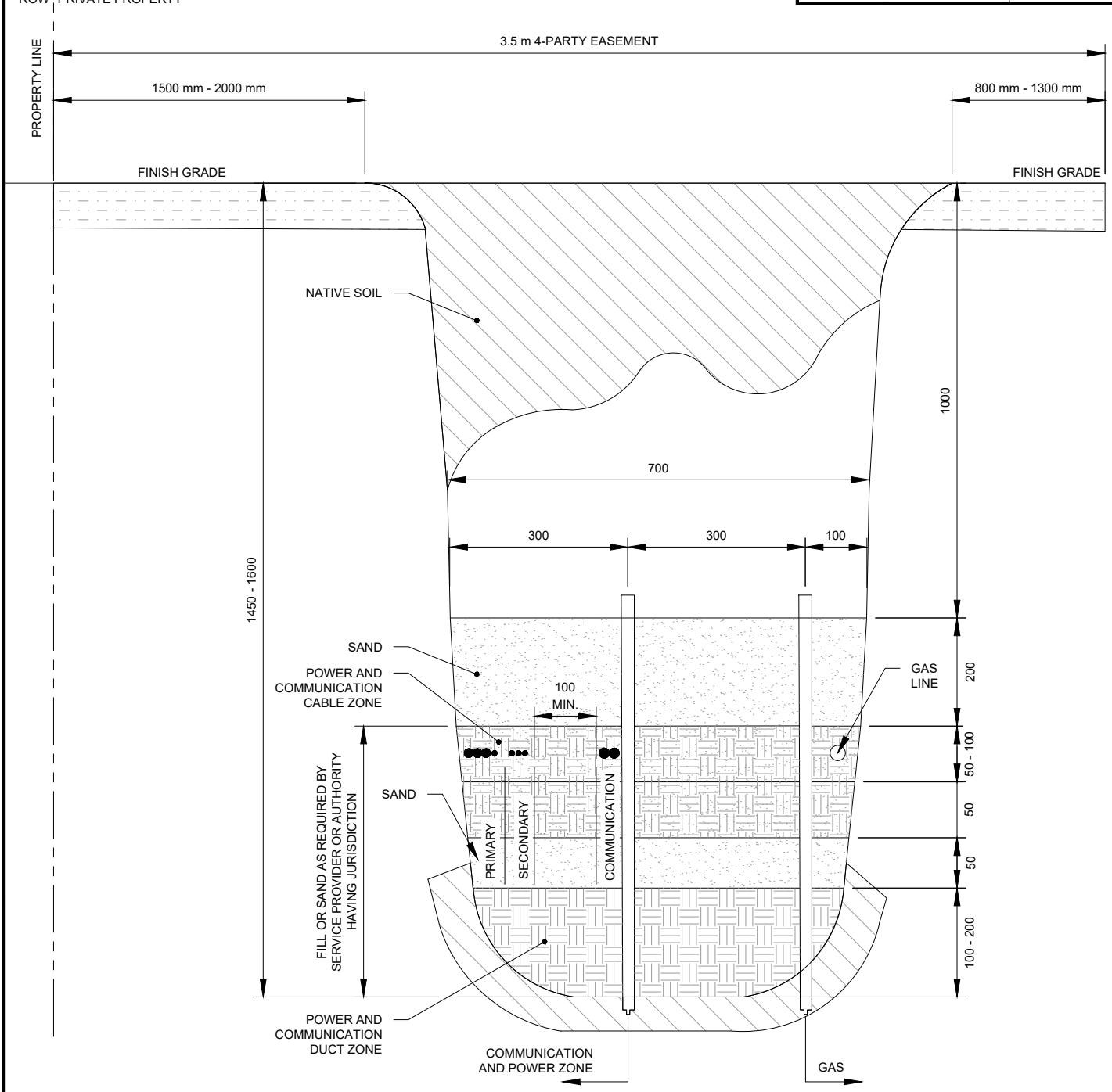
.1 The Developer shall provide, to the satisfaction of the utility companies, rights-of-way, easements, or PULs to accommodate the utility servicing, registered in the name of the Municipality.

.2 Easements shall be registered on each lot prior to the sale of any lot in the development area.

B5.4 Typical Details – Urban Franchise Utilities

Standard Detail No.	Title
B5-100	Franchise Utility Placement within 3.5 m Easement

TYPICAL DETAIL	B5-100	
Date: JULY 2023		Rev. 0



NOTES:

(1) ENSURE 0.30 m MINIMUM SEPARATION BETWEEN GAS LINE AND CLOSEST DUCT/CABLE

(2) STAKES INSTALLED AT 3.00 m INTERVALS

(3) KEEP PRIMARY CABLE THE GREATEST DISTANCE FROM THE GAS LINE

(4) ALL MEASUREMENTS IN MILLIMETERS UNLESS NOTED OTHERWISE

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Franchise Utility Placement
Within 3.5 m Easement

B6 LANDSCAPING, SITE FURNISHINGS, AND FENCING

B6.1 General

.1 **Section B6** provides an outline for the minimum requirements for development of Public Lands (Open Spaces and Roadways) in Urban areas.

.2 **Section C6** provides an outline for the minimum requirements for development of Public Lands (Open Spaces and Roadways) in Rural areas.

.3 **Typical Details** relating to landscaping, site furnishings, and fencing are provided at the end of **Section B6**.

B6.2 Public Lands

B6.2.1 Open Space

.1 **Open Spaces** include Public Land that is classified as Municipal Reserve Lots (Parks), Environmental Reserve Lots, Public Utility Lots, Stormwater Management Facilities, and Utility Corridors.

B6.2.2 Roadways

.1 These are classified as arterial, collector, and local road rights-of-way (ROWs). The landscape of these ROWs may include the boulevard between private property and the curb (if present) and cul-de-sac islands.

B6.3 Supplementary Definitions

.1 The following words shall have the meaning hereinafter assigned to them:

Term	Definition
Restoration	The process of fully re-establishing a target level of ecosystem function and biodiversity to a degraded habitat, as defined by the reference habitat. This includes species composition and vegetation community structure.
Naturalization	The deliberate reintroduction of species that are native to a given area or are well adapted to the climate circumstance; activities that are intended to improve and enhance the natural environment. The biodiversity and ecosystem function of a naturalized ecosystem is lower compared to a reference habitat but higher compared to a reclaimed ecosystem.
Reclamation	A type of habitat restoration that aims to stabilize disturbed lands to an ecologically productive use. A reclaimed ecosystem has less biodiversity and ecosystem function compared to a reference habitat, and the least compared to other types of habitat restoration.
Low Impact Development (LID)	A land development and stormwater management approach that works with nature to manage stormwater as close to the source as possible. LID focuses on maintaining and restoring the natural hydrological processes of a site.

B6.4 Reference Documents

.1 The following documents are a source of additional information and are referenced within this document:

- Canadian Nursery Stock Standard Ninth Edition, Canadian Nursery Landscape Association (CNLA);
- Landscape Alberta Nursery Trades Association (LANTA); and
- Weed Control Act.

B6.5 General Guidelines

.1 The following general landscape requirements apply to all public lands noted above and establish the minimum requirements for landscape development in Urban areas.

.2 All landscaping is to be designed to minimize maintenance costs and labour.

.3 Practices such as xeriscaping and zero-scaping are encouraged, where appropriate, and will be subject to acceptance by the Municipality.

B6.5.1 Plant Material Protection

.1 Plant material to be preserved on the site shall be of high quality and worthy of preservation.

.1 All plant material to be preserved shall be accepted by the Municipality.

.2 All plant material to remain on site shall be protected during all work on the site.

.1 Protection will be required for trunks, branches, and root systems of all plant material to be saved.

.3 Passage of heavy equipment, stockpiling of gravel, soil, or building materials and spillage of gasoline, oil, solvents, and other chemicals will not be allowed under the tree canopy.

.4 Temporary fencing will be required around all plant material to be preserved.

.5 Existing grades around plant material are to be retained.

.1 If existing grades around plant material to remain are altered (either raised or lowered), the Developer will be responsible for constructing remedial measures to compensate for the grade changes.

.6 If the grade or elevation of surrounding land is altered in a manner which will adversely effect retained plant material, the Developer will be responsible for all remedial work.

.1 Plant material must not suffer from any grade changes.

.2 The Developer will also be responsible for replacing all plant material that has died or suffered due to construction disturbance or grade changes.

.7 Landscaped areas are to have a maximum slope of 3H:1V.

.1 Slopes in excess of 3H:1V will require additional erosion control measures and are subject to acceptance by the Municipality.

.8 If grades are to be lowered, two remedial techniques will be acceptable to the Municipality:

- Tree mounds; and
- Retaining walls.

.9 The Developer will be responsible for supplying water to plant material where the grades have been lowered, for the first growing season.

.10 If grades are to be raised around plant material to be preserved, the Contractor will be responsible for constructing tree wells to the satisfaction of the Municipality.

B6.5.2 Topsoil

.1 Topsoil shall be free of stones larger than 25 mm in diameter, debris, quack grass, restricted noxious weeds, any other plants, and inorganic matter.

.2 Topsoil for vegetative purposes shall be tested for N, P, K, Mg, soluble salt content, and pH value. The Developer shall be responsible for all appropriate soil testing.

.3 Any chemical deficiencies indicated by the soil analysis report shall be rectified by the application of the appropriate fertilizers and additives.

.4 Topsoil shall consist of fertile natural loam containing a maximum of 10% organic matter by dry weight, maximum 40% sand, maximum 30% clay, and minimum 30% silt by dry weight.

.5 Topsoil shall have a hydrogen ion concentration ranging from pH 6.0 to pH 7.5, shall contain no toxic materials, and shall be capable of sustaining vigorous plant growth.

.6 If organic material is required to meet the organic matter specification for topsoil listed above, peat moss shall be added in the field and mixed with cultivation equipment. The peat moss shall meet the following specifications:

- Shall be free of toxic material, live plants, live roots, and seeds;
- Shall be delivered in a pulverized condition; and
- The source shall be approved prior to mixing with the topsoil.

.7 Topsoil shall be spread over the entire area to be seeded or sodded and shall be applied to a compressed depth of no less than 100 mm (for areas to be sodded) and no less than 150 mm (for areas to be seeded).

.8 Areas for planting beds shall be excavated and filled with topsoil to a depth of 600 mm below finished grade.

B6.5.3 Seeding

.1 Areas to be seeded (in lieu of sodding) to be accepted by Municipality. Acceptance to be granted on the basis of:

- Intensity of use of the area to be covered;
- Size of the area to be covered.

.2 Generally, seeding will not be considered acceptable for patchwork in an existing, established turfed areas; i.e., if a Developer, utility company, or any third party disturbs an established turfed area, sodding, not seeding, will be considered the only acceptable remedial treatment.

.3 Seeding may be accepted in low traffic areas and for large quantities, with the acceptance of the Municipality.

.4 Grass seed shall be certified Canada #1 Grade Seed, meeting the requirements of the Seed Act of Canada. The seed is to be delivered in the original containers giving the following information:

- Analysis of seed mixture;
- Percentage of pure seed production;
- Year of seed production;
- Net weight;
- Date when bagged and location; and
- Name of supplier.

The Developer shall provide proof upon request of Certification of Compliance with the Canadian Wheat Board Act (Seeds Act).

.5 Composition of Seed Mixtures shall be:

Boulevards	Roadside	Naturalization	Wet Meadow
55% Red Fescue	55% Red Fescue	35% Awned Wheatgrass	30% Fowl Bluegrass
20% Kentucky Blue Grass	30% Kentucky Blue Grass	25% Slender Wheatgrass	20% Tufted Hair Grass
15% Annual Rye	15% Annual Rye	15% Western Wheatgrass	15% Giant Wild Rye
10% Canada Blue Grass		15% Rocky Mountain Fescue	10% Awned Wheatgrass
		5% Western Porcupine grass	10% Western Wheatgrass
		5% Junegrass	10% Sloughgrass
			5% Annual Ryegrass

.6 Seed must be capable of producing a minimum germination rate of 75% in a germination test.

.7 All areas to be seeded shall be given a layer of topsoil as specified in **Section B6.5.2**.

.8 Before seeding, the topsoil surface shall be brought to a firm, even but fine graded condition, without local depressions or elevations by dragging, raking, rolling, or other suitable means. The degree of firmness shall be such that footprints in the prepared surface shall penetrate not less than 6 mm and not more than 12 mm.

.9 All pebbles, stones, roots and debris shall be removed from the finished soil surfaces.

.10 The seed shall be evenly applied at a rate of not less than 3.5 kg per 100 m^2.

.11 Seeding shall not be carried out in wind velocities above 8 km/hr.

.12 After application of the seed, the seed shall be incorporated into the soil with wire rakes or some other suitable means. After the seeded area has been raked, the seeded area is to be rolled with a light turf roller.

.13 After seeding, the Developer shall give the seeded area a light watering with a fine spray to an absorbed depth of not less than 25 mm.

.14 The seeded area shall be appropriately maintained by the Developer; i.e., watering, rolling, fertilizing, until the time of final inspection and acceptance by the Municipality.

.15 Appropriate Maintenance to be determined by weather conditions, soil conditions, time of year and growing condition of the seed. A 2 year Maintenance schedule is to be submitted to the Municipality for acceptance at the time of the CCC inspection.

.16 At the time of final inspection and acceptance by the Municipality, the grass shall:

- Be mowed to a minimum height of 50 mm if area is to be maintained;
- Cover 100% of the seeded area;
- Be completely weed free;
- Be completely free of thin, bare, and dead spots; and
- Be in an overall healthy growing condition, satisfactory to the Municipality.

.17 The Developer shall be responsible for providing and maintaining adequate barricades and signs to warn traffic entering the seeded area until the time of final inspection and acceptance by the Municipality.

B6.5.4 Hydroseeding

.1 Hydroseeding will be acceptable on steep slopes, in hard to reach areas, and for large areas to be seeded. Areas to be hydroseeded must be accepted by the Municipality.

.2 All areas to be hydroseeded shall be given a layer of topsoil as specified in **Section B6.5.2**.

.3 Before hydroseeding, the topsoil surface shall be brought to a firm, even but fine graded condition, without local depressions or elevations by dragging, raking, rolling, or other suitable means. The degree of firmness shall be such that footprints in the prepared surface shall penetrate not less than 6 mm and not more than 12 mm.

.4 All pebbles, stones, roots, and debris shall be removed from the finished soil surface.

.5 Water used for hydraulic and wood cellulose fibre mulching shall be free of any impurities which would inhibit germination or otherwise adversely affect the growth.

.6 The material used for mulching shall be specially prepared wood cellulose fibre or an equal substitute. It shall contain no growth or germination inhibiting factors and shall form, after application, a blotter like ground cover which will allow absorption and percolation of water.

.7 The tackifier shall be an approved non-asphalt product, water dilatable with no detrimental effects on germination or existing plants.

.8 Seed shall be applied evenly at a rate of not less than 3.5 kg per 100 m^2. Seed type as specified in **Section B6.5.3**.

.9 A suitable fertilizer shall be applied at a rate of 11 kg per 100 m^2.

.10 Grass seed and fertilizer shall be thoroughly mixed and uniformly distributed by means of an approved hydraulic seeder over the area to be hydroseeded.

.11 The work shall be done only in good weather and on ground free of frost, snow, ice, and standing water.

.12 The hydroseeded area shall be appropriately maintained by the Developer; i.e., watering, fertilizing, cutting, etc., until the time of final inspection and acceptance by the Municipality.

.13 Appropriate Maintenance to be determined by weather conditions, soil conditions, time of year, and growing condition of the seed. A 2 year Maintenance schedule is to be submitted to the Municipality for acceptance, at the time of the CCC inspection.

.14 At the time of final inspection, the grass shall:

- Be mowed to a minimum height of 50 mm if area is to be maintained;
- Cover 100% of the seeded area;
- Be well established;
- Be completely free of weeds, thin, bare, and dead spots; and
- Be in an overall healthy growing condition satisfactory to the Municipality.

B6.5.5 Sodding

.1 Sodding shall be installed in all areas of intensive use and for all patchwork and remedial work in areas of established turf.

.2 All areas to be sodded shall be given a layer of topsoil as specified in **Section B6.5.2**.

.3 Sod to be installed for general use shall consist of No. 1 Nursery Sod consisting of a uniform mixture in the following proportions:

- Kentucky Blue Grass Blend: 75% by weight; and
- Creeping Red Fescue: 25% by weight.

.4 The sod shall be:

- A minimum of 18 months old;
- Free of noxious weeds and debris;
- 25 mm - 30 mm in thickness;
- Cut in strips of uniform width;
- Sufficiently moist so that no burning of the edges has occurred; and
- Have a vigorous healthy growth.

.5 Sod shall be laid evenly and in staggered rows.

.6 Sod shall be laid at right angles to all slopes. Secure sod to all steep slopes with pegs. Pegs shall not protrude above the surface of the sod.

.7 The Developer shall be responsible for providing and maintaining adequate barricades and signs to warn traffic entering sodded areas, until the time of final inspection and acceptance by the Municipality.

.8 The Developer shall be responsible for appropriately maintaining the sodded areas; i.e., watering, rolling, fertilizing, and mowing until the time of final inspection and acceptance by the Municipality.

.9 Appropriate Maintenance to be determined by weather conditions, soil conditions, time of year, and growing conditions of the sod. A 2 year Maintenance schedule is to be submitted to the Municipality for acceptance at the time of the CCC inspection.

.10 At the time of inspection and acceptance by the Municipality, the sod shall be:

- Mowed to a minimum of 50 mm and maximum of 75 mm height;
- Well established over 100% of the sodded area;
- Completely free of weeds, thin, bare, and dead spots; and
- In an overall healthy condition satisfactory to the Municipality.

B6.6 Naturalization

.1 Naturalization is acceptable for non-programmable or low-use open spaces/stormwater management facilities.

.2 Developer's Consultant to select native trees and seed to reduce the need for ongoing maintenance. The tree sizes are to be specified on plans and can be reduced to 40 mm calliper (deciduous), 2.0 m height (coniferous).

.3 Mowing of naturalized seed mixtures to be completed only to establish plant health and must maintain a minimum height of 100 mm to 150 mm. Once seed is established, no additional mowing is to be completed.

.4 Seed shall be applied evenly at a rate of not less than 3.5 kg per 100 m^2.

.5 Seed type and installation process shall be as specified in **Section B6.5.3**.

.6 At the time of final inspection, the grass shall:

- Be grown to full natural height;
- Cover 100% of the seeded area;
- Be well established;
- Be completely free of weeds, thin, bare, and dead spots; and
- Be in an overall healthy growing condition satisfactory to the Municipality.

B6.7 Plant Material

.1 All plant material shall be of first grade quality, free from insects, disease, and physical injury, shall have a strong fibrous root system, and must be structurally sound.

.2 All plant material shall have straight stems, well and characteristically branched for the species.

.3 All plant material shall conform to the Horticultural Standards for nursery stock of the LANTA.

.4 Where possible, trees shall be setback a minimum distance, measured from the center of the tree, from above and below ground utilities and property lines as indicated in **Table B6-1**.

Table B6-1
Tree Setbacks from Utilities and Property Lines

Utility/Property Line	Distance
Light Standards/Power Hardware	3.5 m
Fire Hydrants	3.5 m
Stop/Yield Signs	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
Crosswalks	3.5 m
Shallow Underground Utilities (Power/Gas/Communication)	1.0 m
Gas or Oil Right-of-Way	Contact Utility
Sanitary and Storm Sewers	2.0 m
Sanitary and Storm Sewer Manholes	2.0 m
Watermains	2.5 m
* Ensure trees do not create sightline obstructions for vehicles approaching intersections/crosswalks.	
* Distance from overhead power utilities shall be as per the requirements established by the Utility Authority.	

.5 At the time of planting, all deciduous/coniferous trees shall conform to **Table B6-2**.

Table B6-2
Tree Size Requirements

Deciduous Trees			
Height	**Calliper**	**Staking/Ties**	**Rootball Diameter**
2.4 – 3.0 m	40 mm	1 stake w/tie	600 mm
3.0 – 3.5 m	50 mm	2 stakes w/ties	700 mm
3.5 – 4.5 m	75 mm	2 stakes w/ties	850 mm
4.5 – 5.5 m	100 mm	2 stakes w/ties	1,050 mm
Coniferous Trees			
Height	**Spread**	**Staking/Ties**	**Rootball Diameter**
1.8 – 2.0 m	975 mm – 1.0 m	2 stakes w/ties	850 mm
2.0 – 2.5 m	1.0 m – 1.3 m	2 stakes w/ties	850 mm
2.5 – 3.5 m	1.3 m – 1.5 m	3 guy wires w/anchors	1,220 mm

.6 **Table B6-3** lists all approved trees and shrubs within the Region. Alternate trees or shrubs may be approved following submission of a request for variance to the Municipality, dependant on quantity and location. Plants identified in the Government of Alberta FireSmart Guide to Landscaping are indicated with * after Common Name and are considered lower risk.

Table B6-3
Approved Tree and Shrub Species

Botanical Name	Common Name
Deciduous	
Acer x freemanii - cultivars	Autumn Blaze/Sienna Glen Maple *
Acer rubrum – cultivars	Northwood/Autumn Spire/Red Rocket Maple *
Acer tataricum	Amur Maple *
Betula papyrifera	Paper Birch *
Crataegus mordenensis ‘Toba’, ‘Snowbird’	Hawthorn *
Fraxinus nigra	Black Ash
Fraxinus mandshurica	Manchurian Ash
Malus, x adstringens	Flowering Crab Apple *
Populus balsamifera	Balsam Poplar *
Populus tremuloides	Trembling Aspen *
Populus tremula ‘erecta’	Swedish Columnar Aspen *
Populus x Brooks No. 6	Brooks No. 6 Poplar *
Populus x jackii ‘Northwest’	Northwest Poplar *
Prunus maakii	Amur Cherry *
Salix acutifolia	Cut Leaf Willow
Salix discolour	Pussy Willow
Salix pentandra	Laurel Leaf Willow
Sorbus aucuparia	European Mountain Ash *
Sorbus decora	Showy Mountain Ash *
Syringa reticulate	Japanese Tree Lilac

Botanical Name	Common Name
Tilia x flavescens	Dropmore Linden *
Tilia cordata	Little Leaf Linden *
Ulmus americana	American Elm
Coniferous	
Abies balsamea	Balsam Fir
Larix sibirica	Siberian Larch
Picea glauca	White Spruce
Picea pungens	Colorado Green Spruce
Pinus, contorta 'latifolia'	Lodgepole Pine
Pinus ponderosa	Ponderosa Pine *
Pinus Sylvestris	Scots Pine
Deciduous Shrubs	
Alnus crispa	Green Alder
Amelanchier alnifolia	Saskatoon *
Arctostaphylos uva-ursi	Bearberry
Cornus alba	Dogwood species and cultivars
Cornus sericea	Dogwood species and cultivars *
Elaeagnus commutata	Wolf Willow *
Hippophae rhamnoides	Sea Buckthorn
Philadelphus lewisii	Mock Orange *
Potentilla fruticosa	Shrubby cinquefoil *
Physocarpus opulifolius Var.	Ninebark *
Prunus tomentosa	Nanking Cherry *
Prunus triloba multiplex	Double Flowering Plum *
Rosa acicularis	Prickly Wild Rose
Rosa woodsia	Woods Rose *
Rosa, x rugosa	Explorer Rose Cultivars *
Rosa, x arkansana	Parkland Rose Cultivars
Salix	Willow species and cultivars *
Sorbaria sorbifolia	False Spirea
Spiraea	Spirea species and cultivars *
Symphoricarpus albus	Snowberry *
Syringa	Lilac species and cultivars *
Viburnum trilobum	Highbush Cranberry *
Viburnum opulus	European Cranberry *
Coniferous Shrubs	
Juniperus horizontalis	Creeping Juniper cultivars
Juniperus communis	Common Juniper
Juniperus sabina	Savin Juniper cultivars
Juniperus scopulorum	Rocky Mountain Juniper
Picea abies	Nest Spruce cultivars

Botanical Name	Common Name
Pinus mugo	Mugo Pine cultivars

.7 At the time of inspection and final acceptance by the Municipality, the plant material shall:

- Conform to the standards for plant material listed above;
- Be planted and staked for CCC, and have stakes removed and be stable at FAC; and
- Exhibit 2 years of healthy growth to the satisfaction of the Municipality.

B6.8 Mulches

.1 All mulch to be bark or coniferous/deciduous wood chip mulch with a size range of 50 mm to 100 mm and be free of non-organic material, wood preservatives, and diseased wood.

.2 Mulch shall contain no more than 5% total volume of soil, sawdust, and peat moss.

.3 The following mulches are prohibited for use unless otherwise accepted by the Municipality: rock, gravel, riprap, shale, peat moss, manures, paper products, plastics, rubbers, and lumber containing chemicals or preservatives.

B6.9 Site Furniture

.1 The following sections outlining site furniture are to be used as a guideline for all Urban development within the Region unless otherwise accepted.

.2 All site furniture (benches, picnic tables, waste receptables, etc.) is subject to acceptance by the Municipality.

DID YOU KNOW?

Vilna has unique requirements for site furniture.

Refer to **Section D3 – Special Provisions for the Village of Vilna.**

B6.9.1 General

.1 Furnishings are to be surface mounted unless otherwise accepted by the Municipality.

.2 All fasteners shall be stainless steel.

.3 Frame shall be constructed of steel with a powder coated finish unless otherwise accepted by the Municipality.

.4 Finish to provide a minimum of 10 years of protection from the elements.

.5 Seating and tabletop surface shall be shaped with rounded edges and corners and smooth surfaces.

.6 Install all site furniture as per manufacturer's specifications.

.7 All site furniture to be installed plumb and level and be aligned as per the landscape layout plans. Exposed mounting hardware to be painted to match site furniture colour following installation.

.8 All site furniture shall be inspected prior to installation to ensure the furniture is free of all defects; site furniture with defects will be rejected and shall be replaced immediately.

B6.9.2 Setbacks

.1 The following setbacks shall be required:

- **Benches:** 2.0 m minimum from edge of walkway or multi-use trail;
- **Waste Receptacles:** 2.0 m minimum from edge of walkway or multi-use trail and minimum 2.0 m from benches or picnic tables (due to odours, wasps, etc.);

- **Picnic Tables:** 1.0 m minimum from edge of walkway or multi-use trail;

.2 Ensure a minimum 300 mm hard surface mowing strip from furniture to mown grass areas.

B6.9.3 Bench Nodes

.1 Bench nodes are required every 500 m along trail systems; waste receptacles to be placed at nodes where they are easily accessible to be emptied.

B6.10 Uniform Fencing

.1 All fencing to be constructed 150 mm inside private property with the posts on the interior of the fence alignment.

.1 Uniform wood fencing shall be constructed as accepted by the Municipality. Colour of stain shall be indicated on the landscape plans and accepted by the Municipality.

.2 Chain link fencing and gates shall be constructed as accepted by the Municipality. Finish and colour shall be indicated on the landscape plans and accepted by the Municipality.

.2 Uniform fencing shall be constructed adjacent to and at the following locations:

- Arterial roadways;
- PULs;
- Municipality-owned lands; e.g., Fire Hall sites, etc.;
- Multi-family sites;
- Neighbourhood Commercial sites;
- Institutional sites; and
- Other areas as required by the Municipality.

.3 Single-sided wood fence is the minimum standard for Residential properties.

.4 Fences located within 1.5 m of a building structure, such as gates, are required to be constructed of fire-resistant materials; refer to FireSmart: Protecting Your Community from Wildfire.

.5 Gates may be installed on all Residential lots which back onto a PUL or public park. Gates shall be located approximately at the mid-point of each lot and shall be constructed to open inwards onto private property.

B6.11 Specific Requirements by Area

B6.11.1 Municipal Reserves (MRs)

.1 Municipal Reserves (MRs) and park areas shall be graded, topsoiled, seeded, and planted with trees and shrubs to the satisfaction of the Municipality.

.1 Sod may be required adjacent to walkways and other areas of intensive use at the discretion of the Municipality.

.2 A MR shall include trees installed at a rate of 75 per ha. Sports fields, courts, sledding hills, buildings, infrastructure, and other recreation facilities, such as playgrounds, are not included in the area calculation for required planting.

.3 Five shrubs may be substituted for one tree, up to a maximum of one-third of the total required tree quantity. Shrubs shall be massed within planting beds.

.4 The minimum setbacks for tree planting shall be as outlined in **Table B6-1**.

.5 All tree planting within a MR shall be set back a minimum distance of 3.0 m from adjacent private property lines, as measured from the center of the tree trunk.

.6 Furniture shall be provided by the Developer and placed at strategic locations where a walkway is also provided.

.7 Bollards shall be installed, to limit vehicular access.

.8 Where a walkway is designated as an emergency access route, adequate clearance shall be provided for vehicular access.

.9 Uniform chain link fencing shall be provided between MRs and private property and must be a minimum of 1.2 m in height. Fences must be built a minimum of 150 mm within private property.

.10 Fencing adjacent to parkland that contains, or will contain, sports fields shall be a minimum of 1.5 m in height.

.11 Gates are required where private property backs onto open spaces and MR lands.

B6.11.2 Public Utility Lots (PULs)

.1 PUL areas shall be graded, topsoiled, and seeded to the satisfaction of the Municipality. Sod may be required adjacent to walkways and other areas of intensive use at the discretion of the Municipality.

.2 Furniture shall be provided by the Developer and placed at strategic locations where a walkway is also provided.

.3 Bollards shall be installed to limit vehicular access.

.4 Where a walkway is designated as an emergency access route, adequate clearance shall be provided for vehicular access.

.5 Uniform chain link fencing shall be provided between PULs and private property and must be a minimum of 1.2 m in height.

B6.11.3 Stormwater Management Facilities (SWMFs)

.1 Areas surrounding constructed wetlands, wet ponds, and dry ponds must be graded, topsoiled, seeded, and planted with trees and shrubs to the satisfaction of the Municipality. Sod may be required adjacent to walkways and other areas of intensive use at the discretion of the Municipality.

.2 A SWMF shall include trees installed at a rate of 75 per ha.

.3 Shrubs shall be massed within planting beds.

.4 The area below the Normal Water Level (NWL) shall not be included in the area measurement.

.5 The minimum setbacks for tree planting shall be as outlined in **Table B6-1**.

.6 All tree planting within a SWMF shall be set back a minimum distance of 1.0 m from adjacent private property lines as measured from the center of the tree trunk.

.7 Wood chip mulch shall not be used in planting beds below the 1:25 year water line.

.8 Naturalized planting schemes below the 1:5 year water line are encouraged.

.9 SWMF areas shall be weed and erosion free at CCC and FAC inspections and for the duration of the Warranty Period.

.10 Uniform fencing shall be provided between SWMFs and private property and must be a minimum of 1.2 m in height.

B6.11.4 Utility Corridors (ROWs)

.1 The Developer's Consultant shall contact the appropriate Utility Authority regarding acceptable grading, topsoil, seeding and planting on utility corridors or ROWs.

.2 The Developer's Consultant shall submit design drawings to the utility companies for approval of development.

.3 Where the Utility Authority will not allow landscaping in the ROW, the requirement for that portion of the landscaping will be waived by the Municipality. Written confirmation from the Utility Authority is required.

.4 The Developer's Consultant shall contact the Utility Authority to review designs and achieve permission in the form of a Crossing Agreement. The Crossing Agreement is to be submitted with any design plans.

.5 Utility corridors where landscaping is permitted shall be planted with trees at a rate of 75 per ha.

.6 All tree planting shall adhere to the required setbacks outlined in **Table B6-1**.

.7 Shrubs shall be massed within planting beds.

.8 Uniform fencing shall be provided adjacent to Major Utility Corridors and must be a minimum of 1.8 m in height.

B6.11.5 Roadways

.1 Arterial ROWs and all boulevards shall be graded, topsoiled, and seeded between uniform fence and the back of sidewalk or curb (where present) to the satisfaction of the Municipality. Sod may be required adjacent to walkways and other areas of intensive use at the discretion of the Municipality.

.2 Boulevards and medians (where present) shall be designed to include continuous large planting beds with trees, shrubs, and groundcovers to the satisfaction of the Municipality. Shrub planting shall be low growing with a maximum height of 500 mm.

.3 Trees are to be located as per recommended spacing and required setbacks (measured from center of the tree trunk) along roadways as per **Table B6-1**.

.4 Traffic and pedestrian sightlines in road ROWs must be respected as per the guidelines set out by the Transportation Association of Canada.

.5 Alternative tree species for roadway planting, selected for their high canopy and low maintenance qualities, shall be considered and are subject to acceptance by the Municipality.

.6 All boulevard, island, and median designs must be low maintenance.

.7 Medians shall be 4.0 m or wider for tree planting; shrub planting is acceptable in narrower medians.

.8 Turf areas within road islands and medians (where present) are subject to acceptance by the Municipality.

.9 Uniform double-sided wood fencing shall be required adjacent to all arterial roadways and must be a minimum of 1.8 m in height.

B6.12 Warranty Period

.1 The Developer shall be responsible for, and at their own expense to remedy, any defect, fault, or deficiency in the completed works during the 2-year Warranty Period.

.2 Landscape Maintenance shall be conducted throughout the Warranty Period and shall include all measures necessary to establish and maintain plant material in an acceptable, vigorous, and healthy growing condition. The Maintenance activities are to include:

- Watering during establishment period and weekly throughout the Warranty Period;
- Weeding monthly;
- Mowing at regular intervals to maintain a maximum of 75 mm height;
- Pruning any broken, damaged, or diseased branches; and
- Structural Pruning prior to FAC by an International Society of Arboriculture (ISA) Certified Arborist.

.3 Monthly Maintenance logs are to be kept throughout the Warranty Period and submitted for review prior to FAC including all Maintenance items listed above.

.4 Pesticide/herbicide applications for control of weeds is prohibited.

.5 All weeds are to be controlled at CCC and throughout the Warranty Period, with full eradication at the time of FAC. All noxious weeds are to be removed and disposed of prior to flowerings wherever possible to reduce the rate of seed spread.

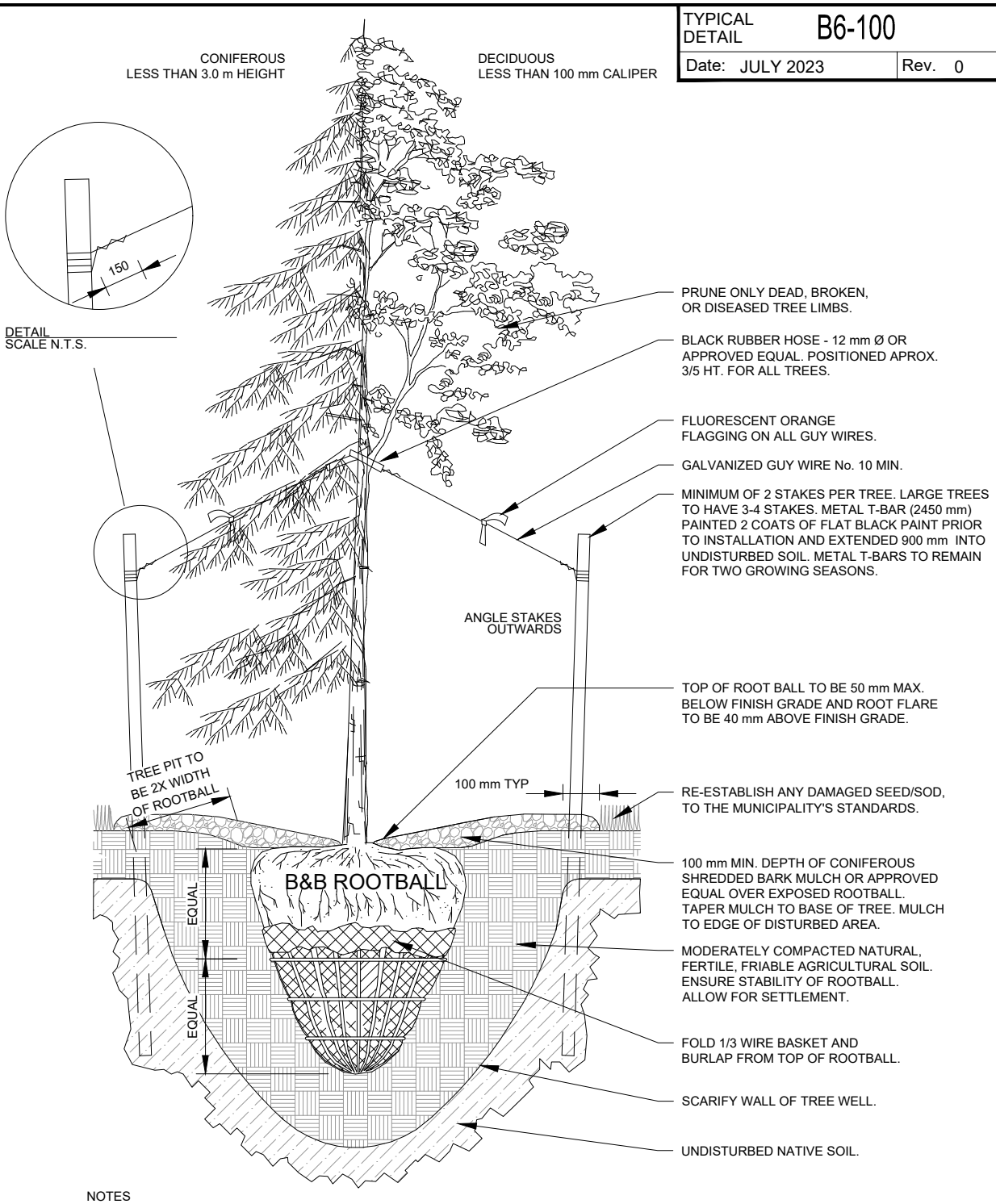
.6 At the time of FAC site review, a maximum mortality/disturbance rate for that year's plant material is 25% of the overall plant count.

.7 Third party damage occurring during the Warranty Period will be reviewed by the Municipality on a case-by-case basis; upon review and consideration by the Municipality, the Developer may be held responsible for the third-party damage.

B6.13 Typical Details – Urban Landscaping

Standard Detail No.	Title
B6-100	Typical Tree Planting
B6-110	Typical Shrub Planting
B6-200	Sod Installation
B6-300	Wood Screen Fence
B6-350	Chain Link Fence
B6-360	Chain Link Fence Gate

TYPICAL DETAIL	B6-100
Date: JULY 2023	Rev. 0



NOTES

1. SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE MUNICIPALITY'S DESIGN STANDARDS
2. POSITION TREE STAKES INTO DIRECTION OF PREVAILING WINDS AS MINIMUM UTILITY SETBACKS PERMIT
3. ALL TREE STAKES TO HAVE A MINIMUM 1.0m CLEARANCE FROM ALL U/G POWER, TELEPHONE AND GAS ALIGNMENTS
4. FOR TREE INSTALLATION ON SLOPES, USE COMPACTED NATIVE SOIL TO FORM A SMALL BERM ALONG THE DOWNHILL EDGE OF TREE PIT TO PREVENT RUNOFF DURING WATERING
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SPECIFIED OTHERWISE

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	J.B.
Approved:	K.S.
Date:	JULY 2023

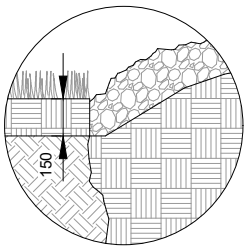
Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

SMOKY LAKE REGION

Typical Tree Planting

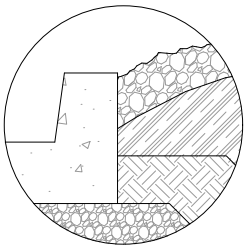
Time: 11:55am
Date: Jul 17, 2023
File: \\ae.ca\data\working\edm\2022-3451-00\land\model\3451-00_B6-100.dwg by
Xrefs:

TYPICAL DETAIL	B6-110
Date: JULY 2023	Rev. 0



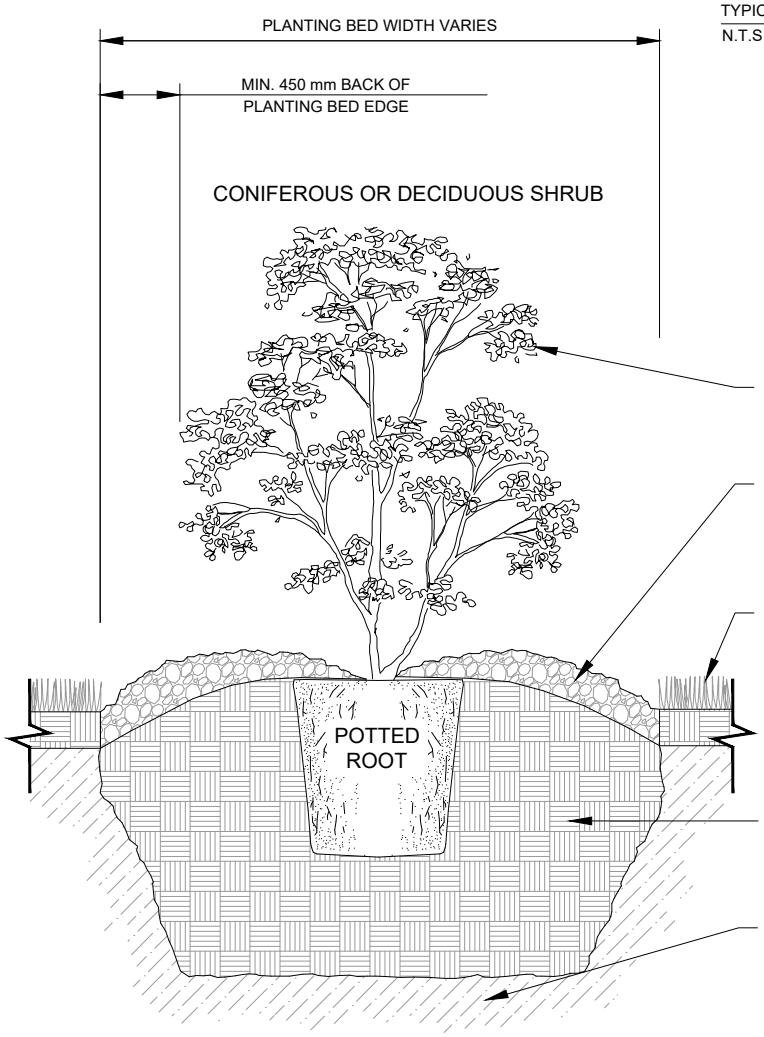
TYPICAL EDGING DETAIL

N.T.S



CONCRETE CURB DETAIL

N.T.S.



PRUNE ONLY DEAD, BROKEN, OR DISEASED SHRUB BRANCHES (DECIDUOUS ONLY). SHRUB LAYOUT AS PER PLANTING PLAN.

100 mm MIN. DEPTH CONIFEROUS SHREDDED BARK MULCH OR APPROVED EQUAL. TAPER MULCH TO BASE OF SHRUB.

RE-ESTABLISH ANY DAMAGED SEED/SOD, TO THE MUNICIPALITY'S STANDARDS.

450 mm MIN. DEPTH MODERATELY COMPACTED NATURAL, FERTILE, FRIABLE AGRICULTURAL SOIL. SOIL MIX: 3 PARTS FERTILE SOIL; 1 PART HORTICULTURAL PEAT MOSS; 1 PART SHARP SAND. ENSURE STABILITY OF ROOTBALL.

UNDISTURBED NATIVE SOIL

NOTES:

(1) SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP CONFORM TO THE MUNICIPALITY'S STANDARDS

(2) CONTRACTOR TO ALLOW FOR 20% SETTLEMENT WHEN PLACING SHRUB.

(3) CONTAINER IS TO BE REMOVED CAREFULLY FROM ROOT SYSTEM SO AS NOT TO DISTURB THE PLANT. SHRUB SHALL NOT BE PULLED FROM CONTAINER.

(4) PLANTING BED EDGERS ARE NOT REQUIRED, BUT MAY BE INCLUDED IF FLUSH TO THE GROUND.

(5) APPROVED SHRUB BED EDGERS AS PER ENLARGEMENTS.

(6) ALL SHRUB BED HOLES TO BE DUG BY HAND WHEN CLOSER THAN 1.0m TO U/G POWER, TELEPHONE AND GAS ALIGNMENTS.

(7) FOR SHRUB INSTALLATION ON SLOPES, USE COMPACTED NATIVE SOIL TO FORM A SMALL BERM ALONG THE DOWNHILL EDGE OF SHRUB BED TO PREVENT RUNOFF DURING WATERING.

(8) ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SPECIFIED OTHERWISE.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	J.B.
Approved:	K.S.
Date:	JULY 2023

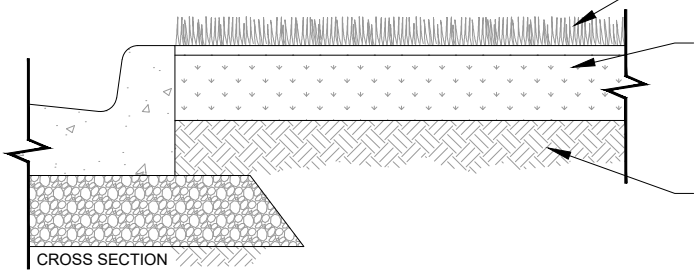
Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

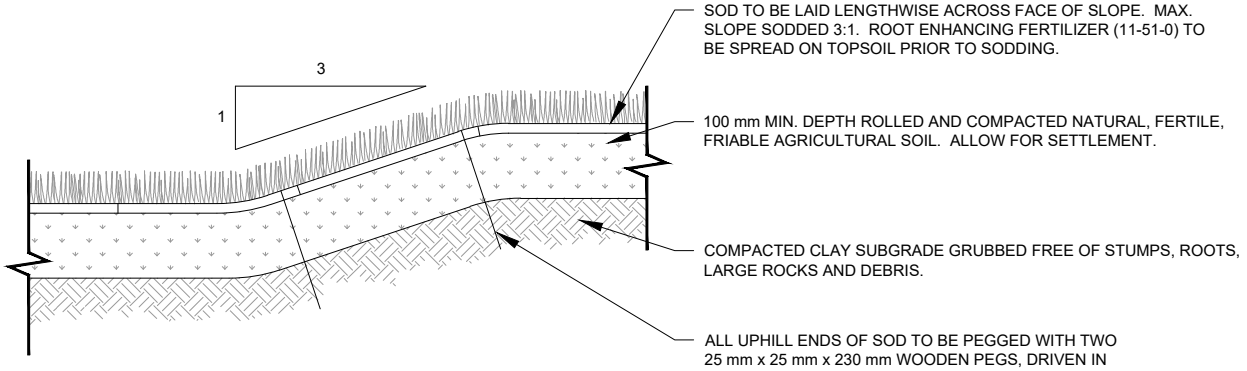
SMOKY LAKE REGION

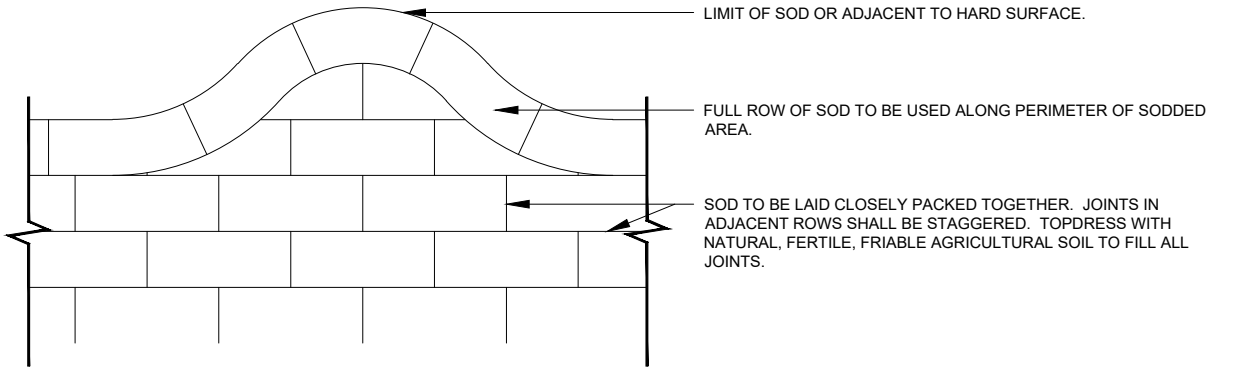
Typical Shrub Planting

Time: 12:02pm
Date: Jul 17, 2023
File: \\ae.ca\data\working\edm\2022-3451-00\land\model\3451-00_B6-110.dwg by
Xrefs:

TYPICAL DETAIL	B6-200
Date: JULY 2023	Rev. 0







NOTES:

(1) SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE MUNICIPALITY'S STANDARDS.

(2) LIMIT OF SOD AS SHOWN ON LANDSCAPE DRAWINGS. ANY REPAIRS REQUIRED BEYOND THE LIMIT ARE THE SOLE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR.

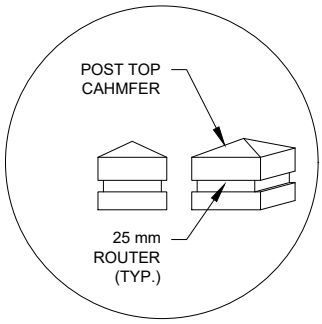
(3) ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SPECIFIED OTHERWISE

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	J.B.
Approved:	K.S.
Date:	JULY 2023

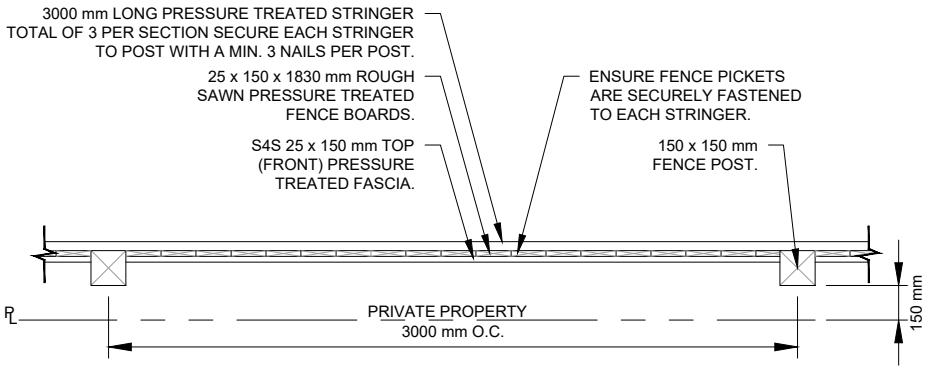
SMOKY LAKE REGION

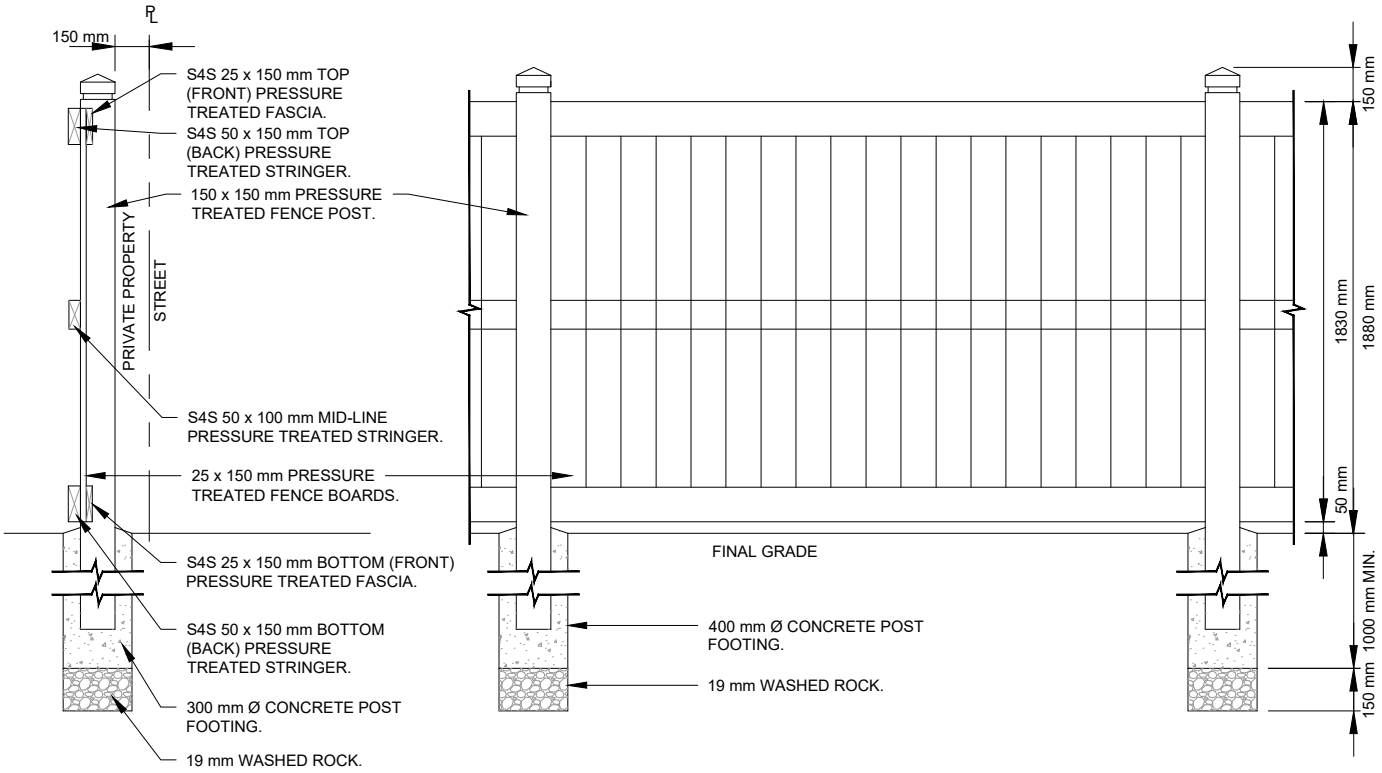
Sod Installation

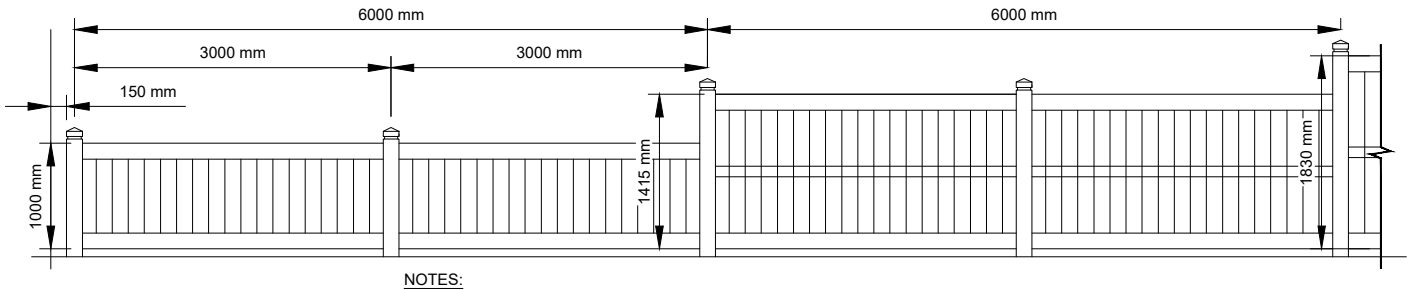
TYPICAL DETAIL	B6-300
Date: JULY 2023	Rev. 0



TYPICAL POST CAP
N.T.S.







NOTES:

1. ALL PROPERTY POSTS TO BE 150 mm INSIDE PRIVATE PROPERTY LINE.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SPECIFIED OTHERWISE.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	J.B.
Approved:	K.S.
Date:	JULY 2023

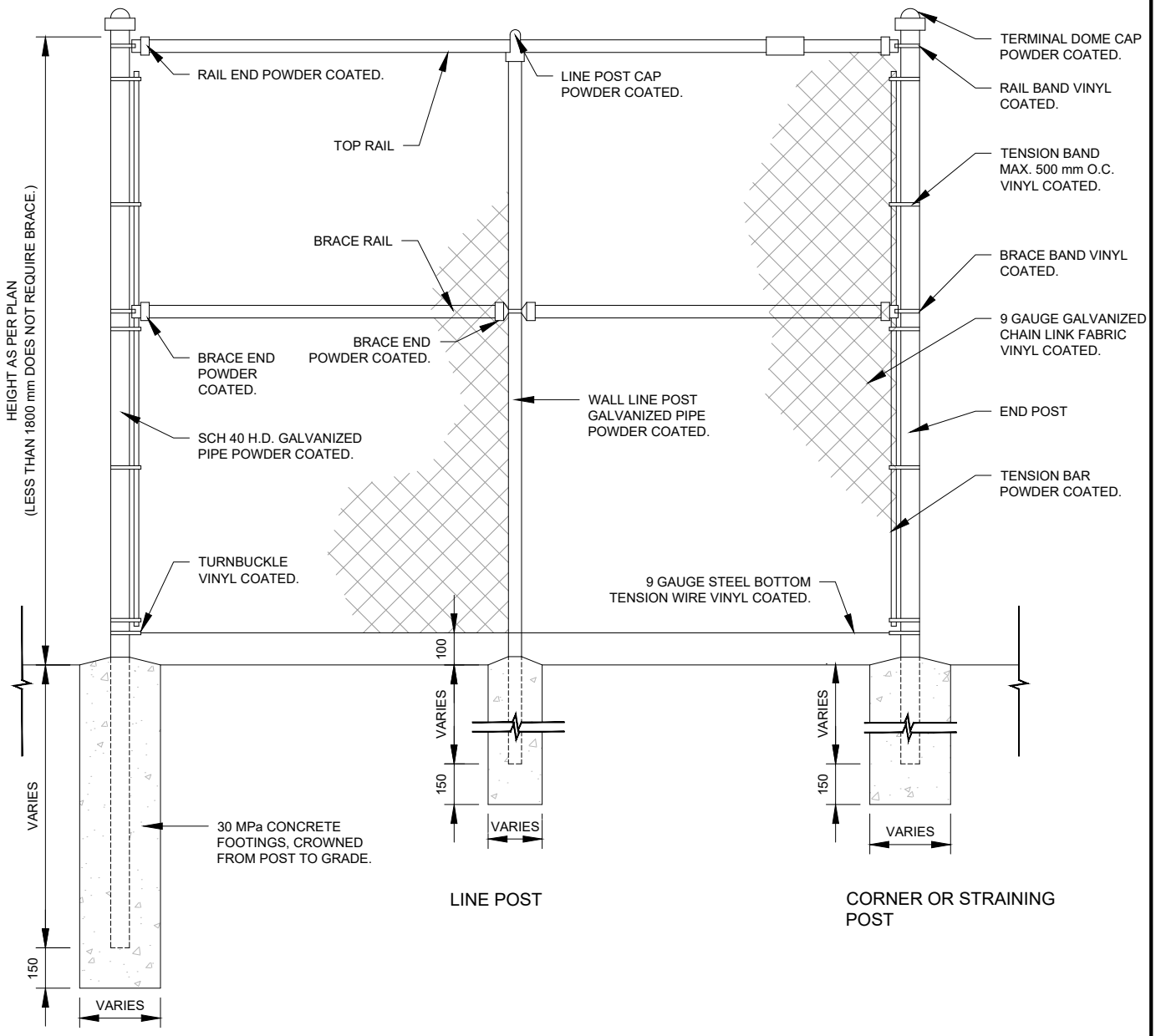
HISTORIC VILNA
Smoky Lake COUNTY
VILLAGE OF WASKATENAU
TOWN OF SMOKY LAKE 1923-2023

SMOKY LAKE REGION

Wood Screen Fence

Time: 9:17am
Date: Jul 12, 2023
File: \\ae.ca\data\working\edm\2022-3451-00\land\model\3451-00_B6-300.dwg by
Xrefs:

TYPICAL DETAIL	B6-350
Date: JULY 2023	Rev. 0



END OR GATE POST

LINE POST

CORNER OR STRAINING POST

NOTES:

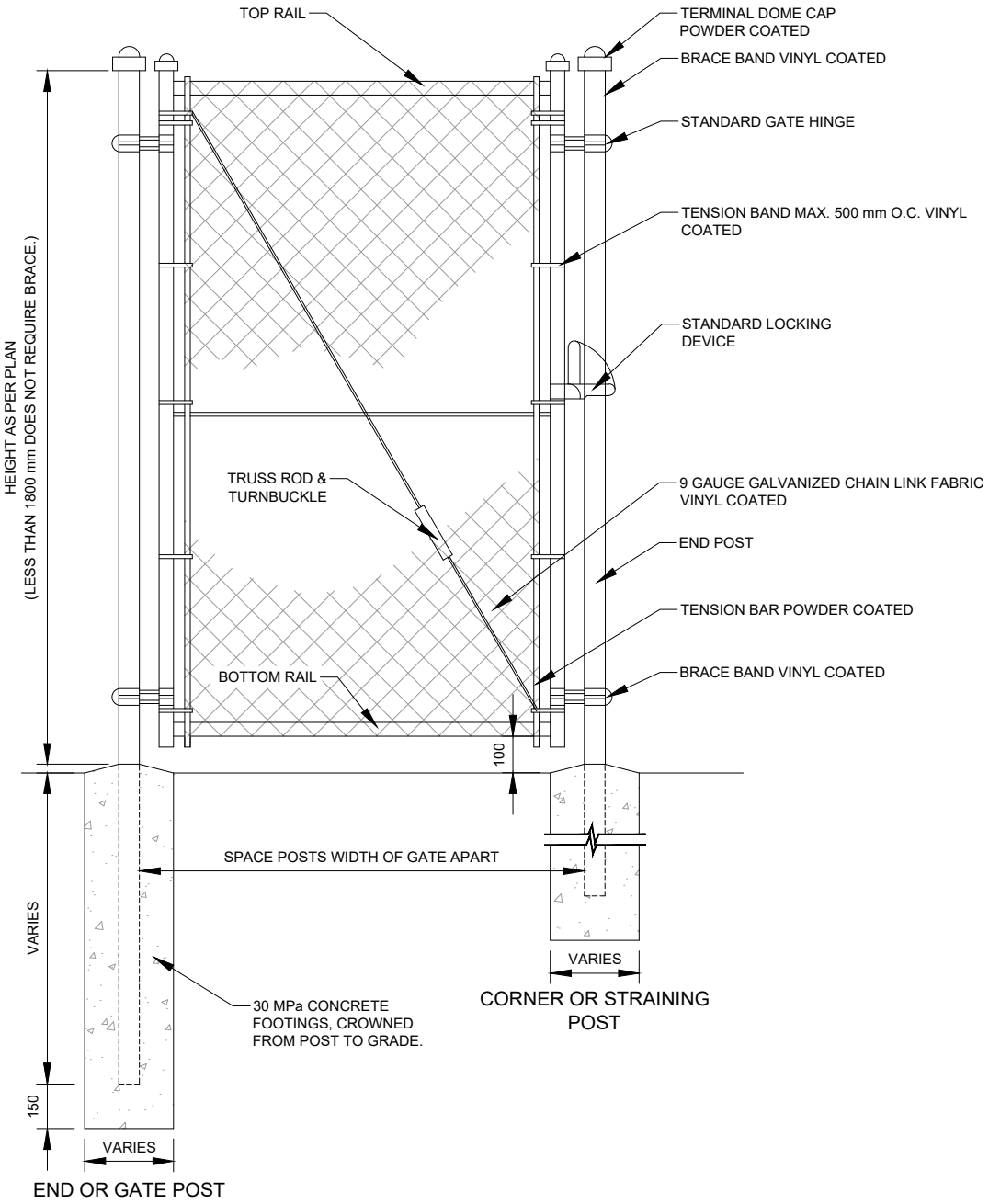
1. SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE MUNICIPALITY'S STANDARDS.
2. WIRE MESH TO BE NINE GAUGE BEFORE VINYL COATING. COLOUR TO BE APPROVED BY THE MUNICIPALITY.
3. SELVAGE KNUCKLED NO MORE THAN 25 mm ABOVE TOP RAIL AND BOTTOM TENSION WIRE.
4. ALL WIRE TIES TO BE NINE GAUGE AT MAXIMUM 500 mm O.C.
5. ALL TERMINAL DOME CAPS, RAIL ENDS AND LINE POST CAPS TO BE CAST ALUMINUM.
6. ALL DIMENSION ARE IN MILLIMETERS UNLESS SPECIFIED OTHERWISE.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	J.B.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Chain Link Fence

TYPICAL DETAIL	B6-360	
Date: JULY 2023		Rev. 0



NOTES:

1. SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE MUNICIPALITY'S STANDARDS.
2. WIRE MESH TO BE NINE GAUGE BEFORE VINYL COATING. COLOUR TO BE APPROVED BY THE MUNICIPALITY.
3. SELVAGE KNUCKLED NO MORE THAN 25 mm ABOVE TOP RAIL AND BOTTOM TENSION WIRE.
4. ALL WIRE TIES TO BE NINE GAUGE AT MAXIMUM 500 mm O.C.
5. ALL TERMINAL DOME CAPS, RAIL ENDS AND LINE POST CAPS TO BE CAST ALUMINUM.
6. ALL DIMENSION ARE IN MILLIMETERS UNLESS SPECIFIED OTHERWISE.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	J.B.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Chain Link Fence Gate

B7 PLAYGROUNDS

B7.1 Preface

.1 **Section B7** addresses the planning, design, and construction of children's playgrounds.

.2 These standards shall apply to all new playgrounds and those undergoing redevelopment.

.3 The Municipality supports a "designed" approach to development of play and natural learning spaces under its jurisdiction.

.4 The Developer shall establish a comprehensive "program" from which to establish the design.

.1 As part of this process, input is to be sought from children, students, caregivers, and associated staff.

.5 The Developer shall use a "universal design" approach in the preparation of a site master plan which complies with all applicable codes and regulations and provides for a diverse range of settings and play opportunities.

.6 Units of measurement are converted from imperial measurements and are exact metric conversions. To parallel the CAN/CSA Z614 standard, all measurements shall have a ±2% variance allowance.

B7.2 Intent

.1 The intent of **Section B7** is to state the Municipality's interpretation of the Canadian Standards Association (CSA) CAN/CSA Z614 Children's Playground Equipment and Surfacing and to outline supplemental standards.

.1 The standard identifies requirements intended to meet design objectives in a manner that promotes positive play experiences in a safe environment which has been designed considering the Municipality's environment.

.2 CAN/CSA Z614 Children's Playground Equipment and Surfacing has been adopted as a minimum standard.

.2 In the event that the CSA Technical Committee on Children's Playground Equipment and Surfacing releases an updated version of CAN/CSA Z614, the updated version shall take precedence and replace the existing standard on the date of release.

.1 Playground designs that have not received final acceptance shall be evaluated and modified to comply with the new standard.

.3 Exceptions to the standard may be reviewed upon submission of documentation in support of the requested change by the Developer's Consultant.

.1 This information should provide examples of the proposed exception that can be either field inspected or reviewed through literature.

.2 The Developer's Consultant is responsible to provide the documentation.

B7.3 Supplementary Definitions

.1 The following words shall have the meaning hereinafter assigned to them:

Term	Definition
Annex H	A supplemental document approved for CAN/CSA Z614 titled "Children's Playspaces and Equipment that are Accessible to Persons with Disabilities". The document outlines minimum requirements for playground accessibility. It is written in mandatory language for where it is required as a policy.

Term	Definition
Canadian Standards Association (CSA)	A non-profit governing body of independent, autonomous organizations that work towards the further development and improvement of voluntary standardization in the national interest. CAN/CSA Z614 Children's Playground Equipment and Surfacing is the standard developed by the Technical Committee on Children's Play Equipment and Surfacing. Any reference to CAN/CSA Z614 shall mean the most recent version of the document.

B7.4 Equipment

B7.4.1 Chain

.1 To eliminate lacerations caused from peeling plastic, and to allow inspection to determine the degree of wear, all metal chain shall be free from plastic or rubber coating.

B7.4.2 Climbing Walls

.1 Grasping and standing points must be secured with at least two fasteners to prevent rotation.

.2 No rock-climbing wall shall be positioned in a manner to function as a sole means to link or access platforms (bridging).

.3 To prevent injuries from striking lower internal components during a fall, multi-dimensional (spatial geometric) stand-alone and attached climbers shall not incorporate lower, inner horizontal elements that are constructed of metal rungs or chains. (Examples: jungle gyms and castle towers.)

B7.4.3 Overhead Equipment

.1 All overhead equipment rungs shall be free from plastic or rubber coating.

B7.4.4 Platforms

.1 Spaces between adjacent platforms shall be closed off to prevent crawl through motion and entrapment.

B7.4.5 Roofs – Design Guidelines

.1 Roof designs should not have easily accessible hand holds or gripping points on the roof and no accessible ornamental features on the top of the roof (flags, chimneys, banners, etc.).

.2 Roof designs shall have no adjacent components/features located in a way that promotes access to another roof.

.3 Roofs shall overhang outside of the support posts to make them harder to climb.

B7.4.6 Roofs – Unintended Use and Access to Roof

.1 Equipment design shall not encourage access to the roof.

.1 Hazardous use is promoted when the upper surfaces of roofs become directly or indirectly accessible by the relative positioning of:

- Barrier panels;
- Climbers having rungs positioned higher than the adjoining deck; and
- Any climbable component higher than the platform.

B7.4.7 Sand and Water Tables

.1 Sand and water tables must drain freely.

B7.4.8 Slides

.1 All slides shall be stainless steel.

.1 To minimize solar heating of the sliding surface, slides shall be positioned with chutes facing between northwest and east locations.

.2 A no-encroachment zone shall be provided in front of the lower exit protective surfacing zone of a slide regardless of the vertical height.

.3 Slide exit points shall be installed over a rubber protective surface that extends a minimum distance of 1.2 m beyond the edge of the apparatus.

B7.4.9 Swings

.1 Senior swing belt seats and tot swing bucket seats shall not be located within the same bay.

B7.4.10 Telescopes

.1 Telescopes shall not have the ability to retain liquid.

B7.5 Other Hazard Controls

.1 Above grade cross-structural bracing systems shall not be permitted in the Municipality.

.2 Footings cannot protrude above the subbase. If a subbase grade elevation change exists, the footing shall conform to grade.

.3 Equipment attached to decking (chain ladders, slides, arch climbers, fire poles, etc.) shall be anchored in concrete. Pinning in clay is not acceptable.

.4 Talk tube pipes and mounting clamps shall be buried within the subgrade.

B7.6 Protective Surfaces

.1 Regardless of the type of protective surfacing, all playground footprints shall have compliant weeping tile that allows sub-drainage from the footprint to an approved outflow system.

.2 The following safety surfacing materials are approved for use:

- Sand;
- Engineered wood fibre; and
- Poured-in-place rubber.

.3 A single type of surfacing is preferred, to limit cross contamination of loose materials within each other or migration onto poured-in-place surfacing.

.4 Seamless application of rubber is strongly preferred.

.5 There shall be no change of surfacing within fall zones.

.6 Alternative materials may be considered but shall be subject to the deviation approval process.

B7.7 Spray Decks

.1 Spray decks shall have no climbable structures.

.2 There shall be no features designed for exiting into pools of water (i.e., water slides).

.3 No loose surfacing shall be located within 10 m of spray decks.

B7.8 Testing Methods

.1 See all testing methods in the current CAN/CSA Z614.

.2 The playground shall remain closed until all testing protocol has been implemented and compliance achieved.

B7.9 Annex H

.1 The Municipality encourages building barrier free playgrounds and providing support and increasing opportunities for people of all abilities to grow and learn together through outdoor play.

.2 The scope of Annex H does not include the area surrounding or beyond the playground, such as parking areas, washrooms, drinking fountains, or recreation facilities.

.1 For more information about accessible design beyond the playground, see CAN/CSA B651.

B7.10 Equipment Layout Design Acceptance Process

.1 The general process for obtaining acceptance of equipment layout design plans shall be as follows:

.1 The site development plan is to be confirmed and accepted prior to finalization of equipment layout design.

.1 Fencing, lighting, walkways, washrooms, storage, emergency phone, trees, park furniture, garbage receptacles, etc. are amenities for consideration for playspace facilities on a project-by-project basis and must take into account the location and surrounding/adjacent land uses.

.2 The Municipality will review the proposed equipment layout.

.3 The supplier shall be contacted about equipment and/or layout concerns identified by the Municipality and will be given the opportunity to provide feedback and/or suggest alternate equipment or layout.

.4 Upon receipt of final equipment acceptance by the Municipality, the project can proceed to construction.

.5 All design changes shall be communicated to the Municipality for acceptance, prior to implementation.

.6 Playground equipment shall be constructed and installed according to the specifications as shown on the accepted design plans, notes, and manufacturers' specifications.

.1 Equipment suppliers' plans shall include the following:

- Project title/description;
- Equipment layout plan revision number and date of revision;
- Itemized list of equipment to be installed;
- Listing/logo of each equipment supplier represented;
- Statement of CSA compliance;

- Specified protective surface zones around the equipment, with no change of surfacing within entry;
- Specified no-encroachment zones;
- Heights of all decks/platforms, overhead apparatus, and swing crossbars;
- Built-in scale;
- 3D drawings from all 4 angles;
- 3D drawings of all roofs in the playground design;
- Roof heights, showing distances from all climbable structures and components;
- Installation detail for roof design;
- Table specifying the number and type of ground level play components, identifying accessible components meeting the requirements of Annex H;
- Age-specific designation for applicable equipment;
- PDF version of the AutoCAD drawing;
- Drawing in metric, to scale;
    - All drawing layers that are required for use by the Municipality turned on (i.e., play apparatus, fall zones, labels, pour-in-place layout, piles);
    - External references associated with the drawing;
    - Blocks associated with the drawings;
    - Drawing in 2D;
- Equipment drawn in the playground pod;
- Equipment labelled;
- Pile layout for all equipment;
- Fall height chart;
- Universal Access chart specifying the number and type of ground level play components, identifying accessible components meeting the requirements of Annex H;
- PDF highlighting the piles the installer would like staked by survey; and
- CSA conformance disclaimers.

B7.11 Identification and Correction of Deficiencies

.1 The Municipal inspectors are authorized to identify and prioritize deficiencies by applying the CSA standard, the Municipality's playground standard, and their professional judgment to identify hazardous conditions and maintenance concerns.

.2 Deficiencies shall be documented by the Developer's Consultant.

.3 In determining or clarifying a deficiency and its severity, the inspectors are authorized to:

.1 Assign class hazard criteria to prioritize correction deadlines;

.2 Quote references from or provide an interpretation of CSA and the Municipality's playground standards; and

.3 Document deficiencies in cases where no written standard currently exists.

.4 The Municipality shall make every effort to identify and correct hazards and maintenance concerns on the plan prior to installation. They shall use their professional judgment to determine deficiencies pertaining to equipment relationships that encourage hazardous use on plans and as-built composite structures.

.5 All equipment deficiencies shall be corrected by the supplier and accepted by the Review Committee.

B7.12 Equipment Hazard Classification

.1 The Municipal inspectors shall assign class hazard criteria to indicate the nature and priority of repairs:

Equipment Hazard Class	Criteria [1]	Correction	Correction Timeline [2]
Class A	Any condition which has the potential to be life threatening or can cause severe, permanent injury	Equipment shall be removed, modified, or replaced	The playground will not be opened until deficiencies are rectified
Class B	Any condition which has the potential to cause serious but non-disabling injury	Equipment shall be removed, modified, or replaced	The playground will not be opened until deficiencies are rectified
Class C [3]	Any condition which can cause slight injury or may not cause injury but does not meet current standards	Equipment may be removed, modified, replaced, or be placed on a one-year trial and be monitored, or may require no action or follow-up	14 working days, or as negotiated

Notes:

[1] Hazard priority ranking classification adapted from the International Loss Control Institute. Currently published in the Consumer Product Safety Commission (CPSC) Playground Audit Guide.

[2] Upon issuance of the inspection report.

[3] Equipment hazards and all construction related deficiencies.

B7.13 Responsibilities of the Supplier/Contractor

.1 The supplier shall provide a Canadian Playground Safety Institute (CPSI) certified installer for playground equipment.

.1 The certified installer shall be on site at all times during the installation of the playground equipment.

.2 The playground site shall not be opened until all deficiencies are corrected and the CCC is issued.

.1 Upon issuance of CCC, the Municipality will provide notice to the Contractor to remove the security fencing, if appropriate for the stage of site development.

.3 The supplier is responsible to provide the Municipality with a fully stocked maintenance kit and a manufacturer's installation/maintenance manual upon the completion of each playground installation before the playground will be opened.

.1 The manuals will include detailed specifications for each component.

.4 The Developer's Consultant shall provide a schedule to the Municipality prior to construction commencement.

B8 TESTING PROCEDURES

B8.1 General

.1 It shall be the responsibility of the Developer and/or Developer's Representative to ensure that the Contractor adheres to the minimum testing requirements outlined in **Section B8** or **Section C7**, as appropriate.

.2 The Developer shall submit all test data performed by the accredited testing company to the Municipality as per the requirements outlined in **Section A2**.

.1 Failure to receive test results will be considered sufficient cause for not accepting such work.

B8.2 Roadway Materials Testing

.1 The requirements for roadway materials testing are outlined in **Table B8-1**.

Table B8-1
Specifications for Roadway Materials Testing

Location of Testing	Required Compaction	Frequency of Testing
Site Grading	97% of SPMDD under roadways at ±2% of OMC 97% of SPMDD under sidewalks at ±2% of OMC 95% of SPMDD in landscaped areas at ±2% of OMC	1 test every 1,000 m^2 per lift, or minimum 3 tests for small areas
Sand Bedding	Minimum of 95% of SPMDD	1 test every 100 m per lift, or minimum 3 tests for small areas
Trench Backfill	Minimum of 97% of SPMDD at ±2% of OMC Minimum of 100% of one-mould maximum dry density Maximum moisture content: PL + (PI/3) to a maximum of 5% above the PL	1 test every 100 m per every 2nd lift, or minimum 3 tests for small areas
Subgrade Preparation	Minimum of 100% of SPMDD at ±2% of OMC under pavement structures, concrete curbs, concrete gutters, concrete monolithic sidewalks, Commercial and lane crossings, and asphalt walkways. Minimum of 97% of SPMDD at ±2% of OMC under concrete separate sidewalks, curb ramps, slabs, and shared use trails made of concrete pavers, brick pavers, or granular materials.	1 test every 1,000 m^2 for roads 1 test every 100 m for sidewalks or curb/gutter Minimum 3 tests for small areas
Granular Base Course	Minimum of 100% of SPMDD under roads, curb, and gutters, Commercial and lane crossings, concrete monolithic sidewalks, curb ramps, and shared use trails. Minimum of 97% of SPMDD under asphalt or concrete separate sidewalks, and median or island strips.	1 test every 1,000 m^2 for roads 1 test every 100 m for sidewalks Minimum 3 tests for small areas

(See next page for continuation)

Location of Testing	Required Compaction	Frequency of Testing
Asphalt Pavement	Pavement shall conform to Alberta Transportation's H, M, L, or S mix where practical. Refer to **Table B1-4** for required density.	1 Mix Analysis every 1,000 tonnes (min. 1/day) Asphalt content and density every 500 tonnes 1 core every 1,000 m^2
Concrete	Compressive strength: 30 MPa Air: 5.5% to 8.0% Slump: 60 mm ± 20 mm Max. Aggregate Size: 20 mm	1 test every 50 m^3 (min. 1/day)

Notes:

1. SPMDD: Standard Proctor Maximum Dry Density
2. OMC: Optimum Moisture Content
3. PL: Plastic Limit
4. PI: Plastic Index
5. The above ±2% moisture content is for clay materials
6. Moisture content for high plastic clay requires recommendation by a Geotechnical Engineer

.2 The Developer shall engage a qualified materials testing firm to take representative samples of all materials to be incorporated into the pavement structure, to prepare mix designs for acceptance by the Municipality, and to carry out quality control testing during construction.

B8.3 Sanitary Sewer Testing

.1 Testing of installed pipes shall depend on the elevation of existing groundwater and shall consist of the following:

- Infiltration or exfiltration test;
- Video inspection test; and
- Deflection test (if required).

B8.3.1 Infiltration Test

.1 This test shall be performed where the existing groundwater level is at least 1.0 m above the pipe crown in the upstream manhole.

.2 Install a watertight plug at the upstream end of the pipeline test section.

.3 Discontinue dewatering operations for at least 3 days before test measurements are to commence and, during this time, keep thoroughly wet at least one-third of the pipe invert perimeter.

.4 Prevent damage to pipe and bedding material due to floatation and erosion.

.5 Place 90° V-notch weir, or other measuring device acceptable to Municipality, in invert of sewer at each manhole.

.6 Measure rate of flow over a minimum of 1 hour, with recorded flows for each 5 min interval.

.7 Allowable infill: 4.6 L/day/mm diameter/km of length for PVC pipe.

.8 Repair and retest the sanitary sewers as required until the test results are within the specified limit.

.9 Repair visible leaks regardless of test results.

B8.3.2 Exfiltration Test

.1 The test section shall be filled with water, allowing displacement of air in the line, and shall stand for 24 hours.

.2 Prior to the test, add enough water to ensure a head of 1 m over the pipe crown in the upstream manhole. Pressures in excess of 7.6 m water head at the lowest point are not recommended.

.3 The test duration shall be 2 hours.

.4 The water level shall be measured at the beginning and end of the test in order to calculate the exfiltration.

.5 Allowable leakage: 4.6 L/day/mm diameter/km of length for PVC pipe.

.6 Repair and retest the sanitary sewers as required until the test results are within the specified limit.

.7 Repair visible leaks regardless of test results.

B8.3.3 Video Inspection Test

.1 CCTV inspections of the sanitary sewer system shall be carried out by the Developer at construction completion and at the end of the Warranty Period.

.2 One digital copy in colour format, and of acceptable clarity, quality, and colour, along with inspection reports and summaries of the CCTV inspection, shall be supplied to the Municipality prior to issuing the Construction Completion Certificate and Final Acceptance Certificate.

.3 The NASSCO PACP (Pipeline Assessment and Certification Program) pipe rating system is to be used for all CCTV inspections.

.4 The CCTV report shall include the location of all service connections together with a statement of opinion as to whether the service connections are leaking.

.5 Any deficiencies found during this test shall be promptly remedied by the Developer at their expense.

.1 Repair all defects which will impair the structural integrity or the performance of the sewer system including improper joints; cracked, sheared, or excessively deflected pipe; sags and rises which pond water in excess of twice the allowable deviation from grade; protruding service connections; and visible infiltration or exfiltration.

.2 Prior to undertaking any repairs, a meeting with the Municipality is required to review the proposed construction method.

.6 Allowable deviation from grade: the invert of the pipe shall not deviate from the design grade by more than 6 mm plus 20 mm per metre of diameter and should not be consistently high or low.

B8.3.4 Deflection Test

.1 Where CCTV inspections show evidence of excessive or non-symmetrical deflection, formal deflection tests shall be conducted.

.2 A mandrel shall be pulled through the pipe in such a manner so as to ensure that excessive force is not used to advance the device through any deflected portion of the pipe.

.3 Deflection testing shall be performed in conjunction with a CCTV inspection. The mandrel shall be located in front of, and in clear view of, the CCTV camera. An appropriate distance is typically from 1.5 to 2.5 pipe diameters in front of the television camera.

.4 The mandrel shall be cylindrical in shape, constructed with 9 evenly spaced arms.

.5 Mandrels larger than 450 mm in diameter shall be constructed of special breakdown devices to facilitate entry through access manholes.

.6 The barrel section of the mandrel shall have a contact length of at least 75% of the base inside diameter of the pipe.

.7 The outside diameter of the mandrel shall not be less than 95% of the inside diameter of the sewer.

.8 The mandrel material shall be steel.

.9 If the mandrel is unable to pass through the pipe, the Contractor is to measure the exact inside diameter of the pipe with a deflectometer. If the pipe deflections are found to exceed 5% at FAC, the pipe is to be replaced.

B8.3.5 Testing of Force Mains

.1 Force mains shall be tested as described for watermains.

B8.4 Storm Sewer Testing

.1 Testing of installed pipe shall consist of the following:

- CCTV inspections of the entire storm sewer system, including catch basin leads, as per **Section B8.3.3**; and
- Deflection testing as per **Section B8.3.4** (for PVC storm sewers and catch basin leads).

.2 All testing and repair of deficiencies found during the testing shall be rectified by the Developer at their own expense.

.3 Prior to undertaking any repairs, a meeting with the Municipality is required to review the proposed construction method.

B8.5 Watermain Testing

B8.5.1 Filling and Flushing Strategies

B8.5.1.1 Submissions

.1 A filling strategy is required for all projects. The purpose of a filling strategy is to create an agreed upon plan for the staging and direction of fill for a new watermain.

.2 A flushing strategy is required for all projects. The purpose of a flushing strategy is to create an agreed upon plan for the staging and direction and rate of flow of water for flushing a watermain prior to commissioning.

.3 Filling and flushing strategies must be signed and sealed by an Engineer.

B8.5.1.2 Requirements for Filling and Flushing Strategies

.1 All source water must come from a clean, potable source.

.2 There must be only one source valve for each stage of fill.

.3 Valves should be planned such that unidirectional flows are achieved. The water should not loop back on itself.

B8.5.1.3 Specific Requirements for Filling Strategies

.1 The filling strategy must consist of a drawing indicating the following:

- Air release locations;
- High points on transmission mains;
- Water source for each fill;
- Staging of fill:
  - Current fill highlighted
  - Completed fill highlighted
- All valve positions are to be indicated for each stage; and
- Legend clearly indicating the symbology on the drawing.

.2 Air release locations should be at or near the high point of the watermain.

.3 A copy of the accepted filling strategy must be on site during filling activities.

B8.5.1.4 Specific Requirements for Flushing Strategies

.1 Flushing runs must be less than 450 m in length. The ideal flushing run length is 200 m.

.2 Watermains less than or equal to 300 mm in diameter should have a flush velocity of 1.5 m/s.

.3 Watermains greater than 300 mm in diameter should have a flush velocity of 0.9 m/s.

.4 Water must be exchanged a minimum of 5 times to achieve a completed flush. Water quality sampling reports must confirm a completed flush.

.5 During a flush, the source water should flow from larger pipe to smaller pipe, whenever possible.

.6 The flushing strategy should include:

- A written flushing procedure;
- A spreadsheet indicating:
  - Order of flushing segments;
  - Water supply (source valve);
  - Discharge location;
  - All valve positions for each flushing segment;
  - Pipe details for each flushing segment;
  - Required discharge volume (to achieve 5 times the volume of the flushing segment);
  - Ideal flow velocity for the size of the watermain;
  - Ideal flow rate to achieve the velocity;
  - Type and size of ports to discharge the water;
  - Number of ports;
  - Estimated flow rate; and
  - Required flush time.

- A drawing indicating the following:
  - Water supply (source);
  - Current flush;
  - Completed flush;
  - Opened valve;
  - Closed valve;
  - Discharge location; and
  - Legend clearly indicating the symbology on the drawing.
- Each flushing segment should have its own drawing.

.7 Use **Table B8-2** to find the number of ports required to achieve the requisite velocity.

Table B8-2
Number of Ports Required to Achieve Velocity for Flushing

Pipe Diameter (mm)	Required Flow (L/s) for 0.9 m/s Velocity	Hydrant Nozzles Required [1, 2]		Required Flow (L/s) for 1.5 m/s Velocity	Hydrant Nozzles Required [1, 2]	
		63.5 mm	114 mm		63.5 mm	114 mm
200	N/A	N/A	N/A	47.1	1	N/A
250	N/A	N/A	N/A	73.6	2	1
300	N/A	N/A	N/A	106.0	2	1
350	86.6	2	1	N/A	N/A	N/A
400	113.1	2	1	N/A	N/A	N/A
450	143.1	2	1	N/A	N/A	N/A

Notes:

[1] Assuming a residual pressure of 280 kPa.

[2] With a 280 kPa residual pressure, a hydrant flowing to atmosphere will discharge 63 L/s from a 63.5 mm nozzle and 158 L/s from a 114 mm steamer (Source: AWWA C651).

B8.5.2 Pressure and Leakage Test

.1 Refer to AWWA C605 and AWWA M23 for information on pressure and leakage testing for PVC watermains.

.2 Install all water services and air relief services.

.3 Partially or completely backfill the excavation before testing.

.4 Wait for concrete thrust blocks to cure: minimum of 3 days in the case of high early strength concrete or a minimum of 7 days in the case of normal concrete.

.5 Ensure that main stops are open and curb stops are closed.

.6 Inform the Municipality of the date, time, and location of the pressure and leakage tests at least 72 hours prior to the test time. Failure to notify the Municipality may result in tests being unacceptable.

.7 Open all main valves in the test section.

.8 Open all hydrant control valves in the test section and be sure hydrants are closed. All hydrants shall be inspected prior to pressure testing to ensure that they are properly installed and that nipples are threaded or locked in place.

.9 Inform other construction crews or Contractors and check that no valves are being operated during the test.

.10 Test duration shall be 2 hours.

.11 Maximum length of distribution watermain test sections shall be 450 m.

.12 Ensure air is expelled from the section of watermain by exhausting trapped air at high points and dead ends. Air content can be minimized through the following procedure:

- Lay the pipeline to grade when possible;
- Bleed air from the pipe slowly; and
- Fill the watermain at a velocity of less than 0.6 m/s.

.13 Test pressure will be 150% of the working pressure or 1,035 kPa, whichever is greater, at the point of test but not less than 125% of normal working pressure at the highest elevation on the test section.

.14 Raise the watermain pressure to the appropriate test pressure using either a hand or motor-powered pump located at a hydrant. The hydrant valve will be completely opened and the flow rate will be controlled by the valve at the pump.

.15 Mark the gauge and the level of water in the storage barrel at the beginning of the test. Take care in these marks since they are the basis for calculating water loss.

.16 Maintain the test pressure within ± 20 kPa of the specified test pressure for the duration of the test.

.17 Pump the test section back to the test pressure at the end of the first 30 min. If the allowable leakage is exceeded, air may be trapped. Remove trapped air and repeat the test.

.18 During the test, walk along the test section and check for signs of leakage or distress at all exposed appurtenances or fittings.

.19 No allowance can be made for services or in-line valves.

.20 Allowable leakage shall be calculated based on the following formula:

$Q_m = L \times D \times P^{0.5}/795{,}000$

Where: Q_m = quantity of make-up water (L/hr)
L = length of pipe section being tested (m)
D = nominal diameter of pipe (mm)
P = average test pressure (kPa)

No installation will be accepted if the quantity of make-up water is greater than that determined by the above formula. Record the leakage test results on the Leakage Test Form provided at the end of **Section B9**.

.21 For testing HDPE sanitary force mains, adjust the procedure for PVC watermains as follows:

- Hydrostatic test pressure shall be 1.5 times the pressure class.
- Maintain 1.5 times the pressure class for 4 hours and add water as needed. Do not measure this volume. Hydrostatic pressure expands pipe.
- Begin Test: Reduce pressure to 10 psi (70 kPa) below 1.5 times pressure class. Monitor pressure for 1 hour.
- The pipe is acceptable if the pressure drop over 1 hour does not exceed 5%.

B8.5.3 Flushing

.1 Upon completion of pressure and leakage testing, watermains shall be thoroughly flushed to remove all foreign matter.

.2 Water systems which will not provide watermain flushing velocities of at least 3.0 m/s shall be flushed using foam pigs prior to disinfecting.

B8.5.4 Disinfection

.1 Provide at least 72 hours notice to the Municipality prior to disinfection. Perform disinfection in the presence of Municipal staff.

.2 Complete flushing operations before beginning disinfection. Disinfection may be done with hydrostatic leakage testing.

.3 New valves and hydrants are to be open to ensure they are disinfected.

.4 Disinfect watermains and water services.

.5 Disinfect using continuous-feed method with liquid chlorine, solution-feed chlorinator, and booster pump in accordance with AWWA C651. Introduce chlorine solution for disinfection at appurtenance used for initial flushing of test section.

.6 Chlorine feed and discharge rates to be in accordance with **Table B8-3**. Discharge rate to be accepted by the Municipality. Ensure free chlorine residual of initial chlorine solution is between 25 mg/L and 75 mg/L. Chlorine gas will not be permitted for chlorination.

.7 Open new hydrants and valves on section of watermain being tested. Supply water for chlorinator from hydrant on active system or water tank. Use pump to inject chlorine solution into pipe if using water tank.

.8 Continue feeding chlorinate solution for the length of time indicated in **Table B8-3** for pipe size, length, and discharge rate.

.9 Isolate the watermain or water service containing chlorine solution and maintain for 24 hours.

.10 Determine the chlorine residual after 24-hour retention time using the “drop dilution” method or the method indicated in AWWA C651 in the presence of the Municipality. Acceptable minimum free chlorine residual after 24 hours is 10 mg/L.

.11 Ensure chlorine residual in hydrants used for introducing the chlorine solution does not exceed 75 mg/L at the conclusion of chlorination.

.12 Perform final flushing of pipe with potable water using the appurtenance used for initial flushing once actual chlorine residual is acceptable. Continue flushing until chlorine residual is less than 2 mg/L. Test chlorine residual in the presence of the Municipality. The Developer’s Representative shall complete the Disinfection Report provided at the end of **Section B8**.

.13 Chlorinated water flushed from the pipe shall be dechlorinated prior to discharging to the storm sewer or the environment. Ensure the flushing rate of chlorine does not exceed the allowable rate acceptable to the Municipality.

.14 Disinfect watermains less than 5.5 m long and watermain repairs by swabbing or spraying with a maximum 5% solution of chlorine or a 1% hypochlorite solution either before or after installation.

Table B8-3
Disinfection Feed Rate

Nominal Size of Pipe (mm)					150	200	250	300	350	400	450
Litres of Water per 100 m of Pipe					1,827	3,248	5,075	7,308	9,948	12,993	16,444
				10 mg/L	0.018	0.032	0.051	0.073	0.099	0.130	0.164
				25 mg/L	0.046	0.081	0.127	0.182	0.249	0.325	0.411
				50 mg/L	0.091	0.162	0.254	0.365	0.499	0.650	0.822
				75 mg/L	0.137	0.243	0.381	0.548	0.746	0.974	1.233
Discharge Rate (L/min.)	mg/L				Approximate Flow Through Time for 100 m of Pipe (Hours – Minutes)						
	10	25	50	75							
	Feed Rate (kg/day)				150	200	250	300	350	400	450
100	1.4	3.6	7.2	10.8	0-18	0-32	0-51	1-13	1-39	2-09	2-44
150	2.2	5.4	10.8	16.2	0-12	0-21	0-33	0-49	1-06	1-29	1-50
200	2.9	7.2	14.4	21.6	0-09	0-16	0-25	0-37	0-50	1-05	1-22
250	3.6	9.0	18.0	27.0	0-07	0-13	0-20	0-29	0-40	0-52	1-06
300	4.3	10.8	21.6	32.4	0-06	0-11	0-17	0-24	0-35	0-43	0-55
350	5.0	12.6	25.2	37.8	0-05	0-09	0-15	0-21	0-28	0-37	0-47
400	5.8	14.4	28.8	43.2	0-05	0-08	0-13	0-18	0-25	0-32	0-41
450	6.5	16.2	32.4	48.6	0-04	0-07	0-11	0-16	0-22	0-29	0-36

B8.5.5 Bacteriological Samples

.1 Bacteriological testing shall be carried out by the Developer's Representative and the results shall be acceptable to the local Health Authority and the Municipality.

.2 Two sets of 2 samples shall be taken at least 24 hours apart from the end of the main section of pipe being tested. One set of 2 samples shall be taken from the end of each branch of pipe connected to the main section (where branches are more than 3 m long). Samples shall be taken from the discharge pipe used for leakage testing after adequate flushing time to replace water in the discharge pipe.

.3 The Developer's Representative shall submit the samples to an accredited laboratory as soon as possible after obtaining. Samples that cannot be submitted within 1 hour after collection shall be stored in an iced cooler at 4°C during transport to the laboratory. Samples shall be submitted for processing no more than 30 hours after obtaining.

.4 Disinfection shall be acceptable when bacteriological test results from both samples show total Coliform results are < 1 colony forming unit (cfu) per 100 mL, Heterotrophic Plate Count (HPC) does not exceed 500 cfu per mL and total chlorine residual does not exceed 2 mg/L after flushing.

.5 The Developer's Representative shall enter the bacteriological test results on the Disinfection Report provided at the end of **Section B8** once received from the laboratory.

.6 If either sample fails bacteriological testing, repeat flushing and the Developer's Representative shall take 2 new samples for testing. If either of the second set of samples taken fail bacteriological testing, repeat disinfection and flushing and the Developer's Representative shall take 2 new samples for testing. Repeat this procedure until acceptable results are obtained.

B8.5.6 Test Results

.1 All testing results shall be documented and submitted to the Municipality for acceptance prior to commissioning the system and the issuance of a Construction Completion Certificate.

DISINFECTION FORM

The following form shall be prepared by the Developer's Representative for submission to Smoky Lake County.

CHLORINATION

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length (m): _____

Pipe Type: _____

Location of No. 1 Flush and Chlorinating Corp.: _____

Location of No. 2 Flush and Chlorinating Corp.: _____

Rate of Discharge: _____ L/min. Rate of chlorine feed: _____ kg/day

Flow through time: _____ hrs - mins. Residual at finish: _____ mg/L

FINAL FLUSHING

Date: _____

Time started: _____ Chlorine residual _____ mg/L

Time finished: _____ Chlorine residual _____ mg/L

SAMPLES FOR RESIDUAL CHLORINE TEST

Sample No.	Sample Location	Discharge Rate (L/min.)	Time Taken	Date Taken	Chlorine Residual

_____ _____

Operator's Name Operator's Signature

_____

Company Name Address Phone No.

SAMPLES FOR BACTERIOLOGICAL TEST

Sample No.	Location Taken	Time Taken	Date Taken	Total Coliforms	HPC

_____

Testing Laboratory

_____ _____

Date Testing Submitted Date Testing Completed

Consulting Firm: _____

Developer's Respresentative's Signature: _____

DISINFECTION FORM

The following form shall be prepared by the Developer's Representative for submission to the Town of Smoky Lake.

CHLORINATION

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length (m): _____

Pipe Type: _____

Location of No. 1 Flush and Chlorinating Corp.: _____

Location of No. 2 Flush and Chlorinating Corp.: _____

Rate of Discharge: _____ L/min. Rate of chlorine feed: _____ kg/day

Flow through time: _____ hrs - mins. Residual at finish: _____ mg/L

FINAL FLUSHING

Date: _____

Time started: _____ Chlorine residual _____ mg/L

Time finished: _____ Chlorine residual _____ mg/L

SAMPLES FOR RESIDUAL CHLORINE TEST

Sample No.	Sample Location	Discharge Rate (L/min.)	Time Taken	Date Taken	Chlorine Residual

_____ _____

Operator's Name Operator's Signature

_____

Company Name Address Phone No.

SAMPLES FOR BACTERIOLOGICAL TEST

Sample No.	Location Taken	Time Taken	Date Taken	Total Coliforms	HPC

_____

Testing Laboratory

_____ _____

Date Testing Submitted Date Testing Completed

Consulting Firm: _____

Developer's Respresentative's Signature: _____

HISTORIC VILNA

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DISINFECTION FORM

The following form shall be prepared by the Developer's Representative for submission to the Village of Vilna.

CHLORINATION

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length (m): _____

Pipe Type: _____

Location of No. 1 Flush and Chlorinating Corp.: _____

Location of No. 2 Flush and Chlorinating Corp.: _____

Rate of Discharge: _____ L/min. Rate of chlorine feed: _____ kg/day

Flow through time: _____ hrs - mins. Residual at finish: _____ mg/L

FINAL FLUSHING

Date: _____

Time started: _____ Chlorine residual _____ mg/L

Time finished: _____ Chlorine residual _____ mg/L

SAMPLES FOR RESIDUAL CHLORINE TEST

Sample No.	Sample Location	Discharge Rate (L/min.)	Time Taken	Date Taken	Chlorine Residual

_____ _____

Operator's Name Operator's Signature

_____

Company Name Address Phone No.

SAMPLES FOR BACTERIOLOGICAL TEST

Sample No.	Location Taken	Time Taken	Date Taken	Total Coliforms	HPC

_____

Testing Laboratory

_____ _____

Date Testing Submitted Date Testing Completed

Consulting Firm: _____

Developer's Respresentative's Signature: _____

VILLAGE OF WASKATENAU

DISINFECTION FORM

The following form shall be prepared by the Developer's Representative for submission to the Village of Waskatenau.

CHLORINATION

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length (m): _____

Pipe Type: _____

Location of No. 1 Flush and Chlorinating Corp.: _____

Location of No. 2 Flush and Chlorinating Corp.: _____

Rate of Discharge: _____ L/min. Rate of chlorine feed: _____ kg/day

Flow through time: _____ hrs - mins. Residual at finish: _____ mg/L

FINAL FLUSHING

Date: _____

Time started: _____ Chlorine residual _____ mg/L

Time finished: _____ Chlorine residual _____ mg/L

SAMPLES FOR RESIDUAL CHLORINE TEST

Sample No.	Sample Location	Discharge Rate (L/min.)	Time Taken	Date Taken	Chlorine Residual

Operator's Name _____ Operator's Signature _____

Company Name _____ Address _____ Phone No. _____

SAMPLES FOR BACTERIOLOGICAL TEST

Sample No.	Location Taken	Time Taken	Date Taken	Total Coliforms	HPC

Testing Laboratory _____

Date Testing Submitted _____ Date Testing Completed _____

Consulting Firm: _____

Developer's Respresentative's Signature: _____

LEAKAGE TEST FORM

The following form shall be prepared by the Developer's Representative for submission to Smoky Lake County.

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length of Test Section: _____

Pipe Type: _____ Number of Joints: _____

Allowable Leakage per Hour (L) _____ (for test pressure of: kPa)

Actual Leakage per Hour (L) _____ (for test pressure of: kPa)

Pump Start Time	Meter Reading	Pump Stop Time	Meter Reading	Total Loss (L)

High Pressure Water Meter Used (Brand name, model, and serial number)

_____

Date meter tested and calibrated: _____

Date complete: _____ Operator's Signature: _____

Company: _____ Company's Address: _____

Phone No: _____

Developer's Respresentative's Signature: _____

TOWN OF SMOKY LAKE 1923-2023

LEAKAGE TEST FORM

The following form shall be prepared by the Developer's Representative for submission to the Town of Smoky Lake.

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length of Test Section: _____

Pipe Type: _____ Number of Joints: _____

Allowable Leakage per Hour (L) _____ (for test pressure of: kPa)

Actual Leakage per Hour (L) _____ (for test pressure of: kPa)

Pump Start Time	Meter Reading	Pump Stop Time	Meter Reading	Total Loss (L)

High Pressure Water Meter Used (Brand name, model, and serial number)

_____

Date meter tested and calibrated: _____

Date complete: _____ Operator's Signature: _____

Company: _____ Company's Address: _____

Phone No: _____

Developer's Respresentative's Signature: _____

HISTORIC VILNA

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LEAKAGE TEST FORM

The following form shall be prepared by the Developer's Representative for submission to the Village of Vilna.

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length of Test Section: _____

Pipe Type: _____ Number of Joints: _____

Allowable Leakage per Hour (L) _____ (for test pressure of: kPa)

Actual Leakage per Hour (L) _____ (for test pressure of: kPa)

Pump Start Time	Meter Reading	Pump Stop Time	Meter Reading	Total Loss (L)

High Pressure Water Meter Used (Brand name, model, and serial number)

_____

Date meter tested and calibrated: _____

Date complete: _____ Operator's Signature: _____

Company: _____ Company's Address: _____

Phone No: _____

Developer's Respresentative's Signature: _____

VILLAGE OF WASKATENAU

LEAKAGE TEST FORM

The following form shall be prepared by the Developer's Representative for submission to the Village of Waskatenau.

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length of Test Section: _____

Pipe Type: _____ Number of Joints: _____

Allowable Leakage per Hour (L) _____ (for test pressure of: kPa)

Actual Leakage per Hour (L) _____ (for test pressure of: kPa)

Pump Start Time	Meter Reading	Pump Stop Time	Meter Reading	Total Loss (L)

High Pressure Water Meter Used (Brand name, model, and serial number)

_____

Date meter tested and calibrated: _____

Date complete: _____ Operator's Signature: _____

Company: _____ Company's Address: _____

Phone No: _____

Developer's Respresentative's Signature: _____

Part C
RURAL

C1 ROADWAY SYSTEMS

C1.1 General

.1 **Section C1** covers the general design and construction of roads, alleys, trails, ditches, and accessories to be built or re-built within Rural areas in the Smoky Lake Region.

.2 For requirements pertaining to roadways with an Urban cross-section (i.e., paved roadways), refer to **Section B1**.

.3 **Typical Details** relating to Rural roadway design and construction are provided at the end of **Section C1**.

.4 Specific construction requirements, construction materials, and procedures are not included in the REDS.

C1.2 Traffic and Transportation

.1 **Section C1** covers the transportation and traffic engineering aspects of Rural roadway and walkway design in the Smoky Lake Region.

.2 These standards are the minimum requirements for Rural roadway and walkway facilities.

.3 Changes in the design values may be considered, provided that the changes are justified and the added benefits provided by the Developer's Consultant are to the Municipality's satisfaction.

.4 All designs shall conform to the relevant Area Structure Plan (if available), the Transportation Master Plan (if available), and shall ensure the safe and efficient movement of traffic and pedestrians.

.5 Sufficient access points to Rural and Urban collectors shall be provided to the satisfaction of the Municipality.

.6 Roadway capacity and safety can be affected by the following factors:

- **Roadway Geometrics** - Road right-of-way, road width, lane width, storage turn bay lengths and geometrics, grade and curvature, intersection configuration, etc.
- **Traffic Characteristics** - Traffic volume, speed, traffic composition, traffic fluctuations, saturation flow, etc.
- **Road "Frictions"** - Traffic control measures, parking conditions, access locations and numbers, driver sight distance, street furniture, etc.

C1.3 Road Classification and Geometric Standards

.1 The classification and designation of roads and walkways shall be undertaken during the subdivision planning stages; it shall commence with conceptual planning, to ensure road, walkway, utility, and right-of-way requirements can be coordinated, established, and accepted in the design stages of subdivision development.

C1.3.1 General

.1 Roads are classified based on a functional hierarchy. The road classifications are local, collector, and arterial.

.2 The design standards for Rural roads shall be in accordance with the geometric design standards outlined in "Geometric Design Guide for Canadian Roads" published by TAC. Alberta Transportation's Highway Geometric Design Guide may also be applicable.

.3 Typical cross-sections are included with the **Typical Details** at the end of **Section C1**.

.4 **Table C1-1** provides a summary of the geometric guidelines for Rural Residential local roadways; refer to the end of **Section C1.3**.

C1.3.2 Arterial Roadways

.1 Arterial roadways generally serve to carry traffic between activity centres; i.e., connecting with collectors, other arterials, or freeways, but not local streets.

.2 The Region does not contain many municipally owned arterial roadways. Should an arterial roadway be required in the future, consult with the Municipality to confirm right-of-way and design requirements.

C1.3.3 Collector Roadways

.1 Collector roadways provide local access to frontage developments and collect traffic from several local streets or from an Industrial area, and channel it towards the arterial roadway system.

.2 A collector street can connect with local streets, other collectors, or intermittently with arterial roadways; however, their location should minimize the potential for use as a short-cut between arterial roadways.

.3 The Region does not contain many municipally owned collector roadways. Should a collector roadway be required in the future, consult with the Municipality to confirm right-of-way and design requirements.

C1.3.4 Local Roadways

.1 Local roadways are intended solely to provide access to individual properties.

.2 The level of traffic on a local roadway is not generally a problem; however, the volume can be controlled if the maximum length is set at 600 m.

.3 Local roadways should only be permitted to connect with other local roadways or with collector roadways.

.4 All sites should provide sufficient on site parking to meet demands.

.5 The majority of roadways within the Region have been developed to a local standard. These standards focus on the requirements for local roadways.

Table C1-1
Rural Road Classification and Geometric Guidelines

Design Criteria	Rural Residential Local Roadway
Parking	No
Service	Access
Flow Characteristic	Interrupted Flow
Design Speed (km/hr)	50
Road Width (m) [1]	8.50 m
Travel Lanes (m)	2 @ 4.25 m
Radii (m) for Cul-de-Sac	14.0 m to EOG [2]
Right-of-Way Width (m)	30
Max. Gradient (%)	8
Min. Stop Sight Distance (m)	65
K, Crest (m)	11
K, Sag (m)	10
Max. Superelevation (m/m)	0.06
Typical Detail No.	C1-100

Notes:

[1] Road width dimension is EOG to EOG.

[2] EOG = edge of gravel.

[3] Minimum radii for horizontal curves shall be as per the TAC Geometric Design Guide for Canadian Roads.

C1.4 Pavement Structures

.1 A geotechnical investigation and independent road structure design are required for all developments and shall be based on a 20-year design life for in situ conditions and projected traffic volume.

.1 Additional road structure strengths and/or materials may be required in areas with poor subgrade materials, for areas with trucked water and sanitary service, and for heavy Industrial applications, pending the results of the geotechnical investigation.

.2 Where road use is mixed (i.e., Commercial and Residential), the road structure shall meet the higher load criteria.

.2 Roadways in all Rural subdivision developments shall be surfaced with gravel.

.3 Good roadway industry construction practices and techniques shall be employed.

C1.5 Road Construction Requirements

C1.5.1 General

.1 Roadway construction shall be in accordance with the detailed design drawings, specifications, and REDS, and accepted by the Municipality.

.2 The work shall be carried out in an efficient manner with acceptable equipment and capable personnel.

.3 The Municipality or an appointed representative shall have access to the site at all times and shall promptly be provided with all test results and information necessary to assess the Contractor's performance.

.4 The Municipality must be notified prior to and have the option to be present at any proof rolls (pre- and post-cement-stabilization) or backfilling operations.

C1.5.2 Clearing and Grubbing

.1 The Developer shall locate all underground utilities and protect all survey control monuments prior to construction.

.2 The surface of the ground within the clearing limits shall be cleared of all trees, logs, stumps, roots, undergrowth, rocks, boulders, structures, debris, and rubbish of any nature. Roots and stumps shall be removed to a minimum depth of 0.6 m below rough grade.

.3 All material cleared and grubbed shall be disposed off-site at a location acceptable to the Municipality.

.4 Burning of debris on site is not permitted.

.5 The Developer shall ensure positive drainage is maintained throughout all stages of site clearing.

C1.5.3 Topsoil Stripping

.1 Topsoil shall be stripped to full depth.

.2 Topsoil shall not be used as backfill.

.3 Topsoil may be stockpiled for use on other parts of the project.

C1.5.4 Excavation and Earthwork

.1 All excavation shall be carried out within the limits of the proposed work.

.2 For road construction, the right-of-way shall be graded to tie into the existing or proposed lot elevations at the property line and shall be left in a neat and tidy condition.

.3 The Developer shall ensure positive drainage is maintained throughout all stages of rough grading.

C1.5.5 Embankment Construction

.1 Native backfill deemed suitable for embankment construction, as per the geotechnical investigation, shall be used; otherwise, imported material shall be used for embankment construction.

.2 Material shall be placed in lifts not exceeding 300 mm in uncompacted depth and shall be compacted in accordance with the requirements outlined in the geotechnical investigation.

C1.5.6 Temporary Roads and Accesses

.1 Plans for temporary roads, accesses, and detours shall be approved by the Municipality.

.2 All-weather type construction will be required, and the Developer is responsible for all Maintenance of temporary roads, accesses, and detours.

.3 All signage, channelization, detours, closures, etc., shall be in accordance with the Manual of Uniform Traffic Control Devices for Canada as published by TAC.

C1.5.7 Snow Removal

.1 The Municipality shall be responsible for snow removal once a Construction Completion Certificate has been executed.

C1.5.8 Maintenance of Existing Facilities

.1 The existence and location of underground utilities indicated on the plans that have been determined from the Municipality's records are not guaranteed.

.2 The Developer is responsible to ensure that existing services, such as sewer mains, watermains, roadways, and landscaped areas, are not disturbed or become inoperable as a result of actions by the Developer, their agents, or Contractors.

.3 Existing services shall not be exposed to loadings beyond their design capacities.

.4 Existing services shall continuously be maintained and cleaned by the Developer where their actions are cause for additional Maintenance.

C1.5.9 Staged Construction

.1 Staged construction shall be to the satisfaction of the Municipality.

.2 The Developer shall meet with the Municipality, prior to the submission of the detailed engineering drawings, to confirm the approach for staged construction.

.3 The Developer is responsible for all Maintenance of partially completed works which have been opened for use. All partially completed works shall be completed prior to commencing with the next stage of construction.

.4 Temporary turnarounds are required and shall have an adequately designed road structure, signage, jersey barriers, and/or other requirements the Municipality deems necessary for future maintenance and in the event that the temporary turnaround becomes permanent and shall satisfy any requirements the Fire Department may have.

C1.6 Materials

C1.6.1 General

.1 Materials used in roadway construction shall be from sources acceptable to the Municipality.

.2 Manufactured goods shall meet the standard manufacturer's specifications and the accepted roadway specifications.

.3 Under no circumstances shall defective, rejected, or substandard materials be used in the construction of roadways.

C1.6.2 Fill

.1 Trench backfill under roadways shall be as follows:

- **Class I** – use of imported granular backfill; or
- **Class II** – use of native backfill (granular material no greater than 63.5 mm); and
- **Class III** – under landscaped areas within the road right-of-way.

.2 Trench backfill for rehabilitation projects under existing roadways shall be approved granular material, compacted to 100% SPMDD.

.3 Fill areas under the subgrade shall be compacted to a minimum of 97% SPMDD.

.4 All materials shall be compacted in layers such that a uniform compaction is obtained.

C1.6.3 Subgrade

.1 Subgrade under the roadway structure shall be constructed of suitable soils, free from organic and frost susceptible materials.

.2 Subgrade preparation shall typically include scarification to a minimum depth of 300 mm, windrowing material to the side, compaction of exposed surface to 97% SPMDD (at optimum moisture content), replacement of windrowed material to line/grade and compacted to 100% SPMDD (at optimum moisture content).

.3 Cement-stabilization of the subgrade may be required; if so, the type of cement, depth of stabilization, and rate of cement to be used shall be as specified in the geotechnical report.

.4 The prepared subgrade shall be proof rolled and witnessed by the Developer's Representative and the Municipality.

.1 The Municipality shall be notified at least one (1) week prior to the proof roll.

.5 Under no circumstance shall the subgrade be covered with the granular base course until the Developer's Representative has received test results indicating the requirements for density and moisture content have been met and a successful proof roll has been attained.

.6 The prepared subgrade shall be proof rolled and witnessed by the Developer's Representative and the Municipality. Follow the requirements for proof roll outlined in **Section B1.6.3**.

C1.6.4 Granular Road Base and Surface Course

.1 Granular road base and surface course materials shall be compacted to 100% SPMDD.

.2 **Granular surface course materials** shall be Alberta Transportation Designation 4 meeting the following gradation:

Metric Sieve µm	Percent %
20 000	100
10 000	35 - 77
5 000	15 - 55
1 250	0 - 30
80	0 - 12

.3 **Granular base course materials** shall be Alberta Transportation Designation 2 meeting the following gradation:

Metric Sieve µm	Percent %
20 000	100
16 000	84 - 94
10 000	63 - 86
5 000	40 - 67
1 250	20 - 43
630	14 - 34
400	11 - 28
315	9 - 26
160	5 - 18
80	2 - 10

.4 **Granular subbase materials** shall be Alberta Transportation Designation 6 meeting the following gradation:

Metric Sieve µm	Percent %
80 000	100
50 000	55 – 100
25 000	38 - 100
16 000	32 - 85
5 000	20 - 65
315	6 - 30
80	2 - 10

.5 Granular base course and granular subbase course materials shall have the following properties:

Property	Granular Base Course	Granular Subbase Course
+5,000 µm with ≥ 2 fractured faces (% mass)	60 min.	
Plasticity Index	NP-6	NP-8
LA abrasion wear (% mass)	50 max.	

.6 The Developer shall retain a materials testing firm to establish the following for the aggregate proposed to be used:

- Sieve analysis;
- Crush count;
- Optimum moisture content; and
- Minimum dry density.

.7 The results of the materials testing shall be submitted to the Municipality for acceptance at least 3 business days prior to the granular material being used. A minimum of one set of tests shall be submitted for each 500 tonnes of aggregate used.

C1.7 Construction Standards

C1.7.1 General

.1 Construction standards used for roadways shall generally be as accepted in the construction industry.

C1.7.2 Competent Labour

.1 The Developer shall at all times employ skilled and competent labour for all construction operations.

.2 The Municipality shall retain the right to require the removal of incompetent labour.

C1.7.3 Equipment

.1 The construction equipment shall be maintained in proper operating conditions.

.2 The Municipality shall retain the right to order the removal or repair of improperly maintained equipment.

.3 Equipment shall be used in accordance with the manufacturer's recommendations and within the rated capacities specified.

C1.8 Traffic Control Devices and Street Signs

.1 Traffic control devices and street signs shall be installed by the Developer and shall be in accordance with the "Manual of Uniform Traffic Control Devices for Canada," issued by TAC.

.2 Traffic control devices and street signs are the primary means of regulating, warning, and guiding all traffic. These devices and signs should fulfill a need, command attention, convey a clear and simple meaning, command respect, and give adequate time for proper response.

.3 Street name signs and traffic control signs shall be installed as per the TAC "Manual of Uniform Traffic Control Devices for Canada" and as per **Typical Details C1-200**.

.4 **Street name blades:**

- .1 3M™ Diamond Grade™ DG³ reflective sheeting shall be used for street name signs.
- .2 Street name blades for local streets shall be 150 mm, double-sided, colour to be confirmed with the Municipality.
- .3 Street name blades for collector and arterial streets shall be 225 mm, double-sided, colour to be confirmed with the Municipality.
- .4 Street name signs shall be installed by the Developer as per the accepted Traffic Control Devices and Street Signs plan.
- .5 The use of dual-purpose signs (street name over stop sign, or street name over yield sign) is to be limited, wherever feasible.

.5 Pedestrian crossing signals shall be provided by the Developer at their own expense where required.

C1.9 Roadway Illumination

C1.9.1 General Street Lighting Requirements

.1 Street lighting shall be arranged for and coordinated by the Developer.

.2 Streetlight cables shall be installed underground with an acceptable type of corrosion resistant steel post streetlights, complete with LED fixtures. The Developer shall consult with the Municipality regarding Dark Sky preferences for light fixtures.

.3 Street lighting shall be installed in all new subdivisions. The Developer shall install all streetlight infrastructure at the time of development at the Developer's cost and as per ATCO Electric (or Lakeland REA, or service provider, as amended) requirements.

.4 Street lighting design shall be in accordance with the TAC Guide for the Design of Roadway Lighting, Illuminating Engineering Society (IES) standards, and in accordance with ATCO Electric (or Lakeland REA, or service provider, as amended) requirements.

.5 No capital costs are to be amortized; the Developer is to pay all capital contribution.

C1.9.2 Rural Street Lighting Requirements

.1 The minimum requirements for Rural streetlighting shall be:

- .1 At all access points to arterial roads, secondary highways, and primary highways.
- .2 At all high density country Residential subdivisions in accordance with TAC Rural standard and Illuminating Engineering Society (IES) standards.
- .3 At internal park areas that do not abut onto a lighted street.
- .4 At common areas such as mailbox pull-outs, Commercial areas, trail crossings, school grounds, and Industrial areas.

C1.10 Sound Abatement

.1 A noise impact assessment may be required for new developments.

.2 Berms or elevated contoured embankments shall be used for sound abatement along arterial roadways, highways, and/or railways as required by the regulatory authorities and the Municipality.

.3 The subdivision side of the embankment shall include gentle slopes of no more than 4H:1V.

.4 Rights-of-way may require widening to accommodate sound abatement berms/embankments.

.5 Sound barrier fences may also be accepted by the Municipality upon submission of an acceptable design.

C1.11 Service Roads

.1 Service roads may be acceptable to the Municipality for highway Commercial access.

.2 Design of service roads shall satisfy all requirements of Alberta Transportation and shall be subject to approval by Alberta Transportation and acceptance by the Municipality.

C1.12 Haul Routes

.1 The County has a Haul Road Agreement in order to establish a method of protecting municipally controlled roads and to facilitate a reasonable and effective maintenance of roads used for heavy hauling.

.2 The Haul Road Agreement provides the Municipality with the ability to give permission to use roads for a Major Hauling Activity.

.3 Major Hauling Activity is defined as heavy and multiple loads carried out over a relatively long period of time which may, at the discretion of the Municipality, be subject to a Haul Road Agreement. Refer to the Haul Road Agreement for more information.

.4 Minor Hauling Activity is defined as any hauling which, at the discretion of the Municipality, is of such nature as to not conform to the definition of a Major Haul Activity. Refer to the Haul Road Agreement for more information.

.5 The Municipality shall be notified prior to the start of any hauling activity and shall be notified when the project is started and completed.

.6 The Municipality will advise of any weight restrictions or other road restrictions/bans.

.7 The cost of meeting the conditions of the Haul Road Agreement will be borne by the party responsible for the hauling activity.

.8 Dust control is to be maintained at all times, per the requirements outlined in the Haul Road Agreement.

.9 The Municipality may inspect the designated haul road prior, during, and after the completion of the project, or at any time during the term of the Haul Road Agreement.

.1 The Municipality will stop the project if the Municipality, in its sole discretion, judges that the conditions of permission are not being fulfilled satisfactorily.

.10 The terms and conditions in the Haul Road Agreement will take precedence over the Clauses in **Section C1.12** of this document.

C1.13 Dead-End Roads

.1 Other than for staged development, dead-end roads shall not be allowed in Industrial subdivisions.

.2 In Residential subdivisions, all dead-end roads shall be provided with a cul-de-sac or turnaround consistent with the requirements outlined in the **Typical Details** and TAC requirements.

.1 “Hammerhead” turnarounds are not permitted.

.3 Contact the Municipality for requirements for dead-end roads, including maximum lengths and populations served, as well as whether a second access or emergency access is required.

.4 Reflectorized barricades shall be provided at all dead-end roads.

C1.14 Rural Approaches and Driveways

.1 Rural road approaches and driveways shall be in accordance with the geometric standards of the TAC Geometric Design Guide for Canadian Roads and as modified herein as well as the requirements of the Municipality’s Land Use Bylaw.

.2 Driveway widths shall be site-specific, to meet the needs of the development, at the discretion of the Municipality.

.3 All driveways shall be constructed to the same structure as the adjoining roadway with the same surfacing extending to the property line.

.4 Where trucked water and sanitary service is required, internal private driveways/accesses shall be designed to accommodate the expected wheel loads.

.5 All Residential subdivision developments shall require the Developer to construct one driveway to each lot.

.6 Driveways to Industrial/Commercial lots are not required to be constructed by the Developer unless the locations are known. The lot owner/Developer will be responsible for constructing such driveways to the standards outlined herein.

.7 Driveways shall be directly opposite an existing roadway or access, where possible.

.1 Where it is not possible to locate a driveway opposite an existing roadway or access, there shall be a minimum of 90 m between accesses (centreline to centreline), regardless of which side of the road the accesses are located on.

.2 Driveways/accesses shall have a minimum sightline of 170 m in both directions.

.8 Driveways/access shall have a slope of 0.6% to 2.0% for a minimum of 10 m from the road edge.

.1 Transition from these grade requirements to grade on private property is recommended to be by way of a 10 m long vertical curve.

.2 Final grade of driveways/accesses on private property is recommended to be between a minimum of 0.6% and a maximum of 8%.

C1.15 Pedestrian Pathways

C1.15.1 Trails

.1 Pedestrian trails shall generally be gravel.

.2 Refer to **Typical Details**.

.3 The location of pedestrian trails shall conform to the current Parks, Open Spaces and Trails Master Plan (if available) and relevant Area Structure Plan (if available).

.4 Trails shall have a minimum cross-slope of 2% and a maximum cross-slope of 4%.

DID YOU KNOW?

Smoky Lake County has unique trail requirements.

Refer to Section D1 – Special Provisions for Smoky Lake County.

C1.15.2 Walkways

.1 Walkways provided within utility rights-of-way shall have a minimum width of 3 m.

C1.16 Community Mailboxes

.1 The Developer shall accommodate community mailbox locations when community mailbox locations are identified as being required.

.2 In general, community mailbox location criteria and requirements are as follows:

.1 Along flankage (sideyard) of corner lots, between the front and rear property lines.

.2 Provide additional 0.5 m x 5.0 m Easement if encroaching on private property.

.3 Next to an Open Space or playground, where possible.

.4 On the predominantly homecoming side of the street.

.5 Not along arterial roadways.

.6 Not within a utility Easement or above a utility.

.7 The location shall not impede pedestrian and vehicle sight distances.

.3 Additional requirements for Rural applications include:

- Road widening; and/or;
- Right-of-way widening, where necessary.
- Refer to **Typical Detail C1-400**.

.4 Mailboxes shall be placed on a 120 mm thick concrete pad, or as required by Canada Post; bricks/paving stones are not permitted.

C1.17 Roadways CCC/FAC and Deficiency Repair Requirements

C1.17.1 Inspection Requirements

.1 The surface improvement being inspected is to be clean and free of debris.

.2 The Developer's Representative/Contractor has inspected the site and verified that all improvements are in satisfactory condition.

.3 Noncompliance with any of the above is sufficient reason to cancel the inspection.

.4 Deficient areas to be marked with spray paint and cross-referenced to the numbers used on the written deficiency list and index map.

C1.17.2 General Repair Requirements

.1 All Maintenance and repair work is to be carried out in accordance with the REDS, except as herein noted.

.2 Provide verbal notice to the Municipality at least 72 hours prior to commencement of repair work.

.3 Contractor to provide written notice to occupants of affected and/or adjoining properties at least 72 hours prior to commencement of repair work.

.4 All roadways, ditches, landscaped areas, private walks, and driveways shall be cleaned of any repair debris within 24 hours of completion.

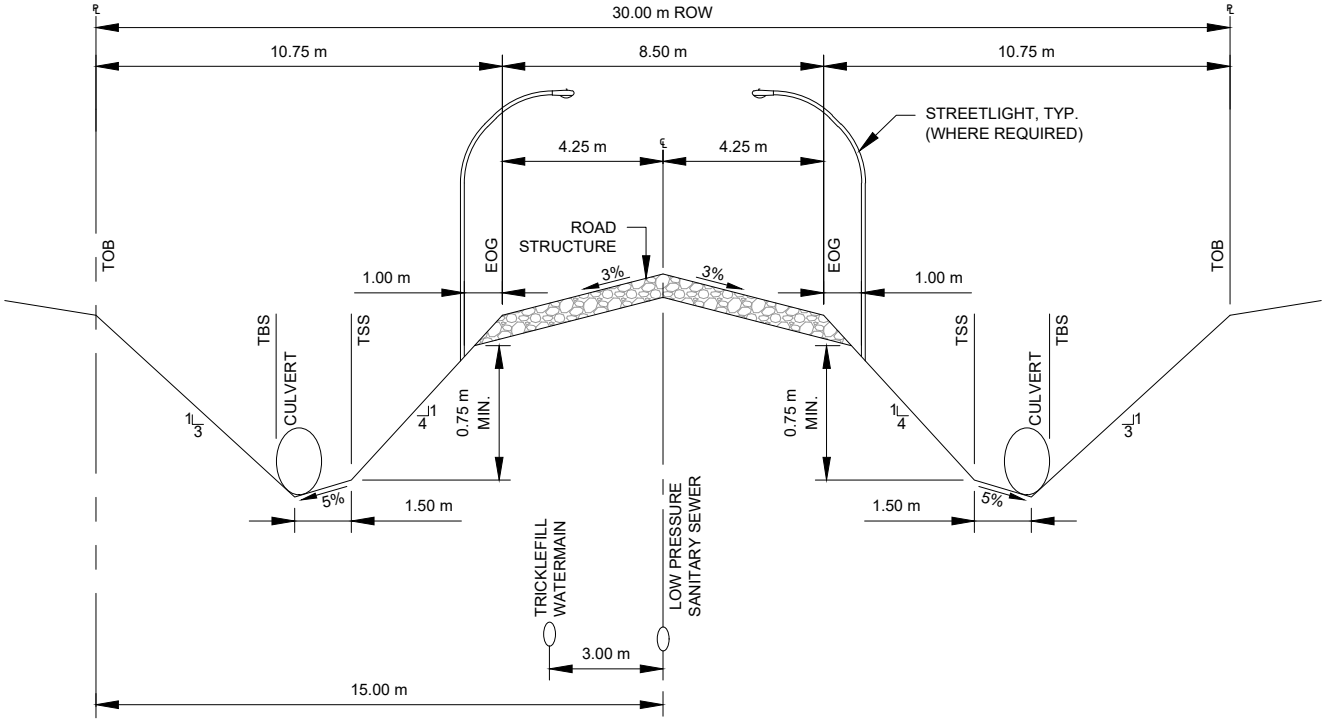
.5 Materials, placement, and testing must conform to the requirements of the REDS and/or as required by the Municipality.

.6 All coordination and costs of barricading and materials testing shall be the responsibility of the Developer.

C1.18 Typical Details – Rural Roadway Systems

Standard Detail No.	Title
C1-100	Rural Residential Local Roadway
C1-110	Rural Residential Cul-de-Sac
C1-200	Sign Installation
C1-300	Rural Residential Approach
C1-400	Rural Shoulder Widening at Community Mailbox Pull-out

TYPICAL DETAIL	C1-100	
Date:	JULY 2023	Rev. 0



NOTES:

(1) MINIMUM LONGITUDINAL SLOPE OF DITCH IS 0.6%.

(2) POSITIVE DRAINAGE IS TO BE MAINTAINED AT ALL LOCATIONS.

(3) DITCH DEPTH TO BE AS PER GEOTECHNICAL RECOMMENDATIONS.

(4) ROAD STRUCTURE TO BE AS PER GEOTECHNICAL RECOMMENDATIONS.

(5) EOG = EDGE OF GRAVEL.

(6) TSS = TOE OF SIDE SLOPE.

(7) TBS = TOE OF BACK SLOPE.

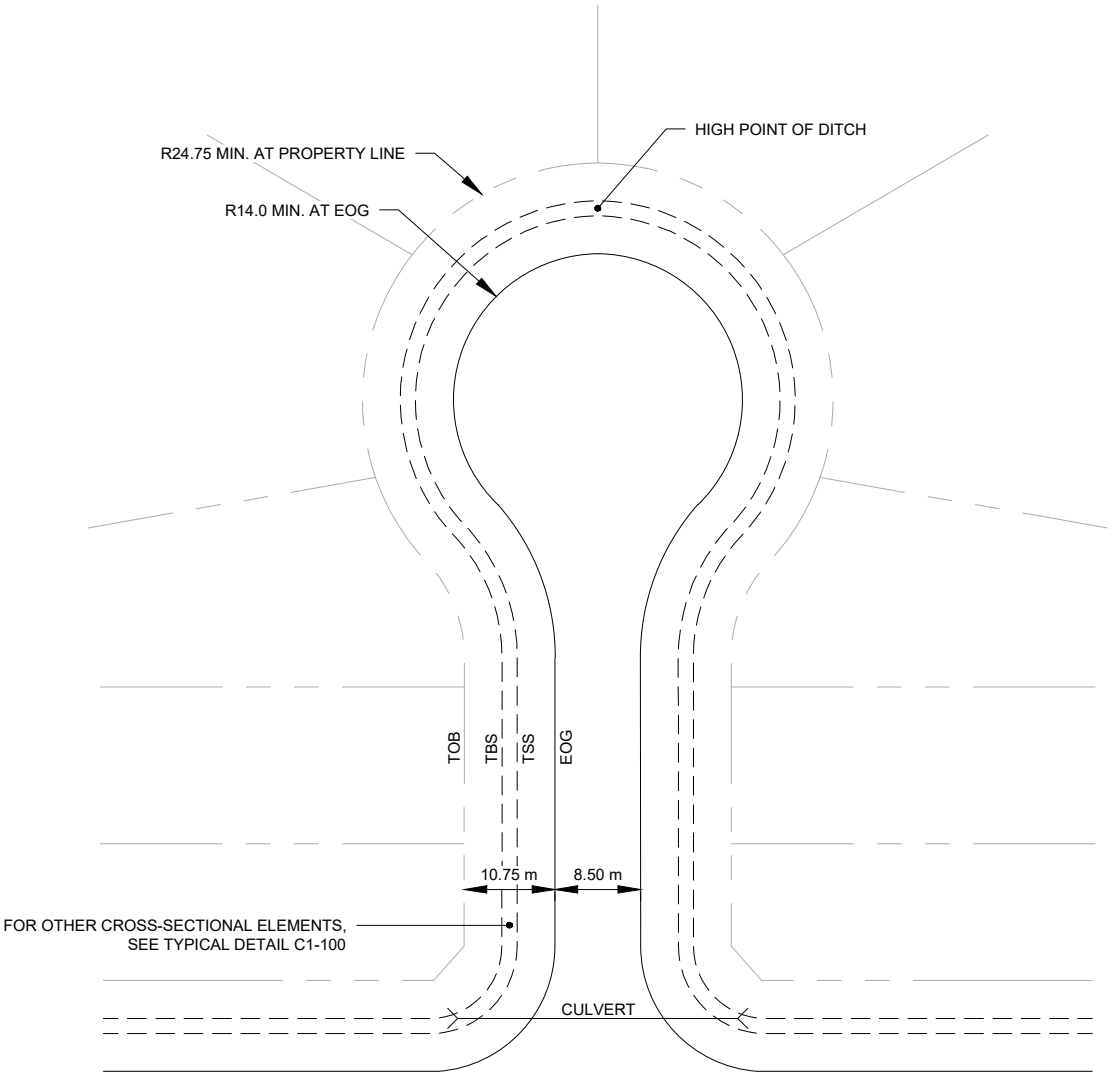
(8) TOB = TOP OF BANK.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Rural Residential Local Roadway

TYPICAL DETAIL	C1-110	
Date:	JULY 2023	Rev. 0



NOTES:

(1) THE MINIMUM CROWN SLOPE WITHIN THE CUL-DE-SAC SHALL BE 3%.

(2) DIMENSIONS ARE IN METRES, UNLESS NOTED OTHERWISE.

(3) POSITIVE DRAINAGE IS TO BE MAINTAINED AT ALL LOCATIONS.

(4) EOG = EDGE OF GRAVEL.

(5) TSS = TOE OF SIDE SLOPE.

(6) TBS = TOE OF BACK SLOPE.

(7) TOB = TOP OF BANK.

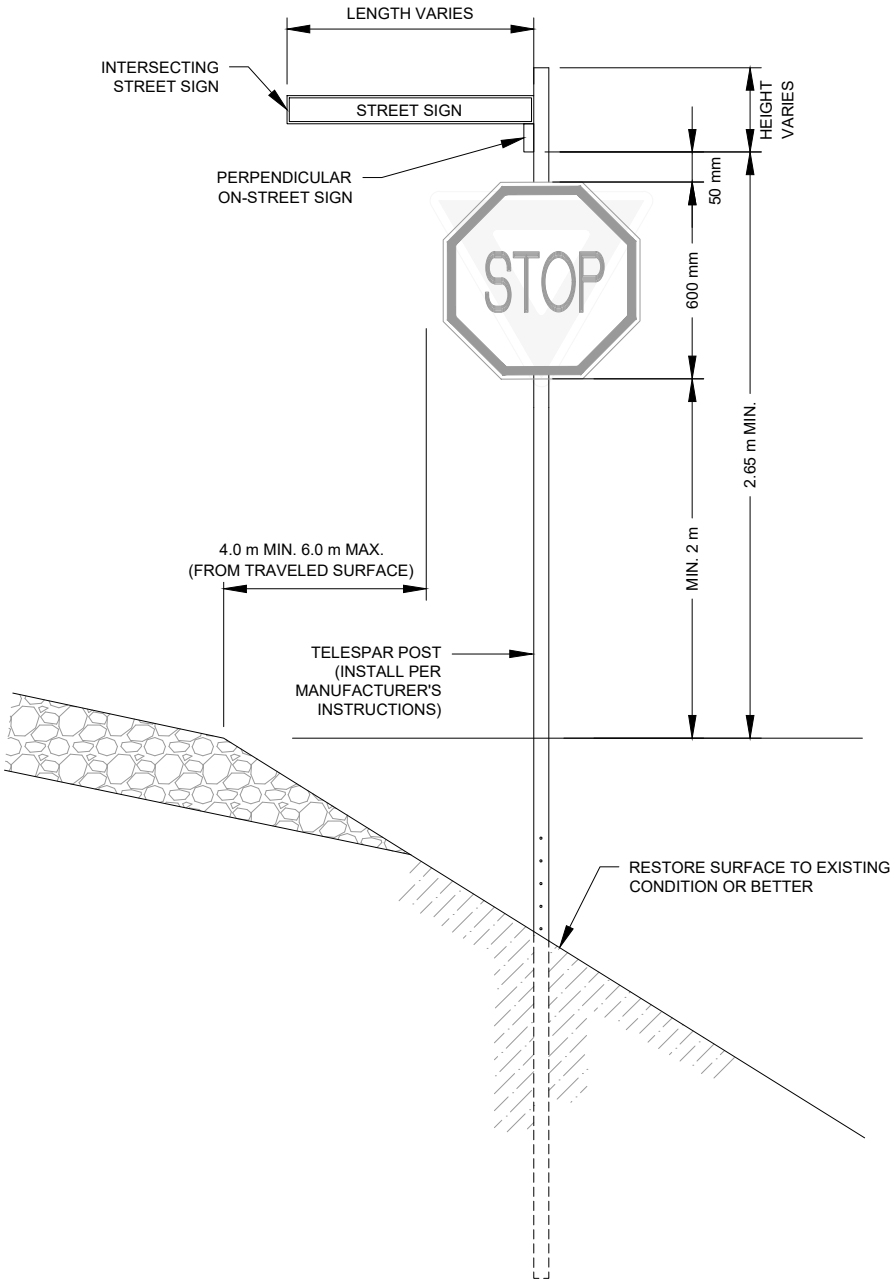
Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

SMOKY LAKE REGION

Rural Residential Cul-de-Sac

TYPICAL DETAIL	C1-200	
Date: JULY 2023		Rev. 0



NOTE:

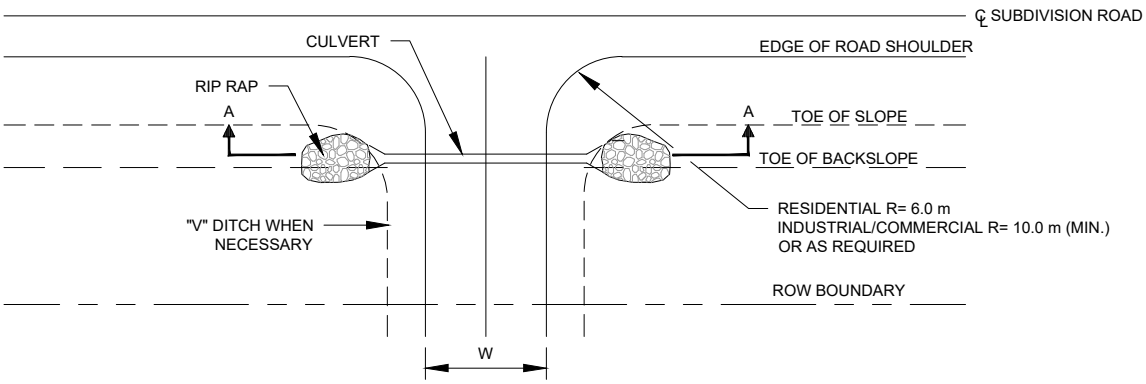
(1) IN LOCATIONS WHERE A STOP OR YIELD SIGN IS NOT CURRENTLY REQUIRED, THE STREET NAME SIGNAGE IS TO BE INSTALLED TO PROVIDE A SPACE FOR A STOP OR YIELD SIGN SHOULD THEY BE REQUIRED IN THE FUTURE.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

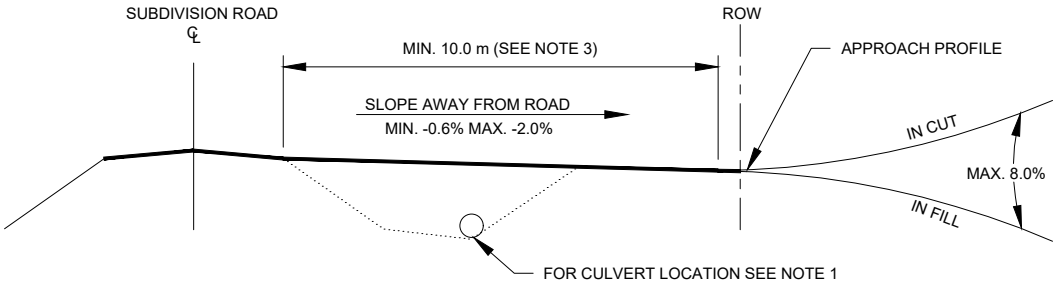
SMOKY LAKE REGION

Sign Installation

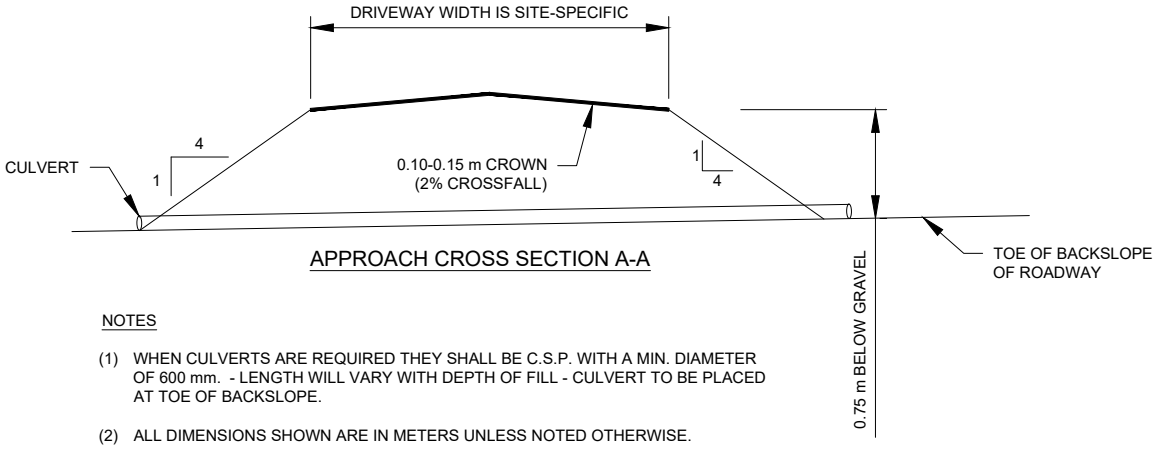
TYPICAL DETAIL	C1-300	
Date: JULY 2023		Rev. 0



APPROACH PLAN



DITCH AND CULVERT LOCATION



APPROACH CROSS SECTION A-A

NOTES

(1) WHEN CULVERTS ARE REQUIRED THEY SHALL BE C.S.P. WITH A MIN. DIAMETER OF 600 mm. - LENGTH WILL VARY WITH DEPTH OF FILL - CULVERT TO BE PLACED AT TOE OF BACKSLOPE.

(2) ALL DIMENSIONS SHOWN ARE IN METERS UNLESS NOTED OTHERWISE.

(3) MIN. APPROACH LENGTH - FROM EDGE OF ROAD SHOULDER TO R/W BOUNDARY.

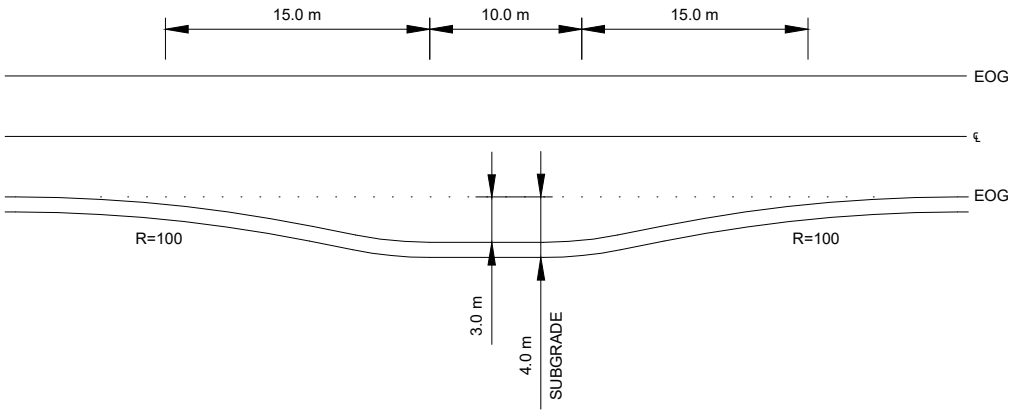
(4) STRUCTURE OF DRIVEWAY TO MATCH THAT OF ROADWAY.

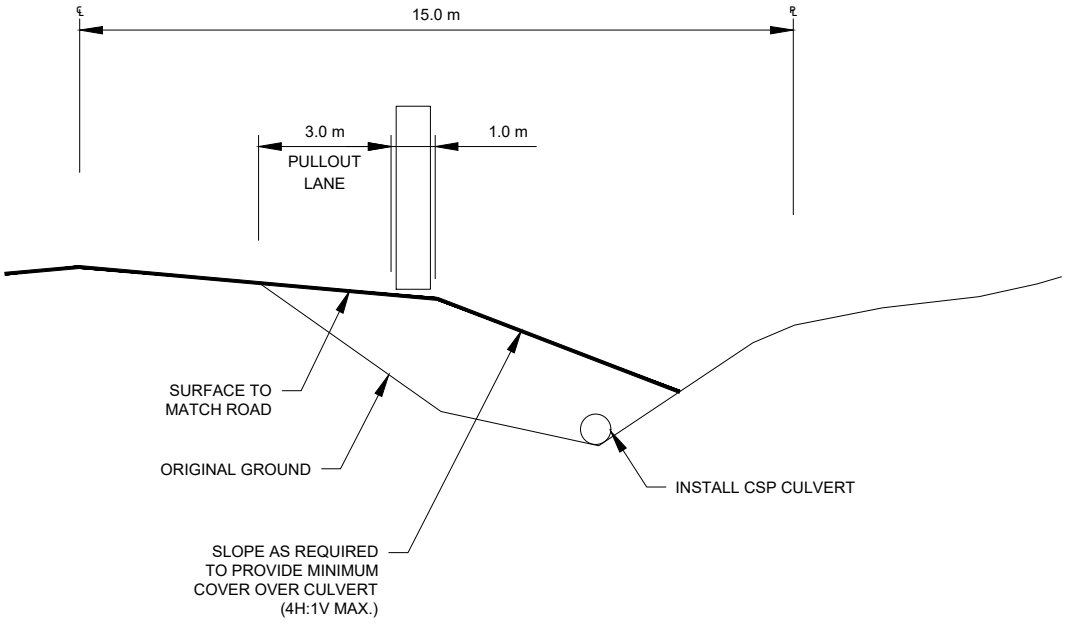
Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Rural Residential Approach

TYPICAL DETAIL	C1-400
Date: JULY 2023	Rev. 0





NOTE:

(1) EOG = EDGE OF GRAVEL.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Rural Shoulder Widening at
Community Mailbox Pull-out

C2 SANITARY SEWER SYSTEMS

C2.1 General

.1 **Section C2** covers the design and construction of Rural sanitary sewer mains and appurtenances to be built or re-built in the Smoky Lake Region.

.2 For requirements pertaining to gravity sanitary sewer design, refer to **Section B2**.

.3 **Typical Details** relating to Rural sanitary sewer system construction are provided at the end of **Section C2**.

.4 These standards provide the minimum design criteria, general construction requirements, and construction materials for consulting Engineers to use in their preparation of specifications and drawings.

.1 These standards may be exceeded if warranted by the design consultant.

.2 Good engineering practices and designs must prevail on all projects.

C2.2 Design Flow

.1 The low pressure sewer system shall be designed based on the probable maximum number of pumps operating simultaneously, which is a function of the total number of pumps connected to the system, per **Table C2-1**.

.2 The design flow can be determined as the product of the maximum number of pumps in operation simultaneously and the capacity of the average pump within the system.

Table C2-1
Low Pressure Sewer System Design Flow

Total Number of Pumps Connected to System	Maximum No. of Pumps Operating Simultaneously
1	1
2 – 3	2
4 – 9	3
10 – 18	4
19 – 30	5
31 – 50	6
51 – 80	7
81 – 113	8
114 – 146	9
147 – 179	10
180 – 212	11
213 – 245	12
246 – 278	13
279 – 311	14
312 – 344	15

.3 Assume zero inflow and infiltration for a closed system.

C2.3 Pipe Flow Formula

.1 Use Hazen-Williams formula:

$Q = CD^{2.63}s^{0.54} * 278.5$

Where: Q = Rate of flow (L/s)
D = Internal pipe diameter (m)
s = Slope of hydraulic grade line (m/m)
C = Roughness coefficient = 120 for all mains

C2.4 Velocity

.1 Force mains shall be designed such that the velocity falls within 0.76 m/s and 1.5 m/s.

C2.5 Minimum Force Main Pipe Diameter

Application	Minimum Diameter
Single Family - Service Connection	38 mm
Force Mains in - Residential Areas	100 mm (50 mm and 75 mm diameter mains may be allowed at upstream ends of systems, as required to meet the minimum velocity specified in **Section C2.4**)
Force Mains in - Non-Residential Areas	As required to maintain the minimum velocity specified in

C2.6 Minimum Depth of Cover

.1 Sanitary sewers require a minimum cover of 3 m from finished surface to pipe crown and shall be of sufficient depth to satisfy the following criteria:

- Permit all private sewage systems to connect to the sewer main;
- Prevent freezing;
- Clear other underground utilities; and
- Prevent damage from surface loading.

.2 When it is not feasible to provide 3 m cover from finished surface to pipe crown, the sewer shall be insulated as per **Typical Detail C4-300**.

C2.7 Manhole Spacing

.1 Discharge manholes shall be provided periodically along the force main, preferably at intersections, to receive flows from upstream flush points.

C2.8 Sewer Location

.1 Low pressure sewer mains shall be located within the municipal road right-of-way as per the typical cross-section (**Typical Detail C1-100**).

.2 Utility rights-of-way shall be provided for all utilities not located within road rights-of-way or PULs.

- Minimum width of 6 m is required for one or two utilities.
- Minimum width of 8 m is required for three utilities.

.3 The low pressure sanitary service for a Residential lot shall be installed in a common trench with the water service.

.1 Services shall be located under landscape areas, offset from the driveway/approach as per **Typical Detail C2-400**.

.2 Multi-family Residential and non-residential sanitary and water services require 3 m horizontal separation.

.4 Sanitary sewer mains shall maintain the following clearances from watermains and power/telephone/cable infrastructure:

- Minimum 3.0 m horizontal clearance unless sewer depth requires increased spacing.
- Minimum 0.5 m vertical clearance above or below at crossings; however, sanitary sewer mains shall cross under watermains wherever possible.

C2.9 Isolation Valves

.1 Isolation valves, at a maximum spacing of 300 m, are recommended along the main line as a means to isolate a section for servicing, repair, or regular maintenance.

.2 Isolation valves should be installed at intersections to allow each branch to be isolated.

.3 Isolation valves are to be plug valves or ball valves, equipped with a gear actuator and non-rising stem to be operable from ground level.

C2.10 Flush Points

.1 Flush points are recommended at the end of every branch, at intermediate points along long stretches of pipe, and at low points.

C2.11 Combination Air/Vacuum Valves

.1 Combination air/vacuum valves are required at the sewer high points or wherever needed to release entrapped air during normal operation when a pump stops, or the sewer is drained.

C2.12 Discharge Manhole Details

.1 Refer to **Typical Detail C2-100** at the end of **Section C2**.

.2 Manhole frames and covers shall be exposed when located in landscape areas.

.3 To abandon a manhole, plug all pipes with non-shrink grout, remove and dispose the manhole to 1.0 m below ground and fill remainder with fillcrete.

C2.13 Service Connections

.1 Refer to **Typical Details C2-400** and **C2-410** at the end of **Section C2**.

.2 Sanitary sewer services for Commercial, Industrial, multi-family, or Institutional areas, unless otherwise accepted by the Municipality, shall only be made after the service requirements have been determined and a permit, approving the installation, is issued by the Municipality.

.3 Sanitary sewer services shall be designed as a single connection from the main to the property line.

.4 Sanitary sewer services shall terminate 1 m past the property line or 1 m past the shallow utility Easement.

.5 Services shall be located 1 m offset from the driveway/approach as per **Typical Detail C2-400**.

.6 All sanitary sewer services shall require a minimum of 2.75 m of cover at property line, from finished surface to pipe crown. Sanitary services shall be insulated at ditch crossings.

.7 Sanitary sewer services shall be HDPE building service pipe conforming to CSA specification B137.1.

.8 A curb stop, labelled “SEWER”, and a service box located 0.3 m inside the road right-of-way is required on all low pressure sewer service connections.

.9 A check valve is required, located on private property.

.10 The end of sanitary sewer services shall be adequately plugged to prevent the entry of earth, water, or other deleterious material into the pipe.

- .1 Furthermore, the end of the pipe shall be marked by a vertical, nominal size 2" x 4" timber set at the service invert and extending 0.5 m above the ground surface.
- .2 The top 300 mm of the exposed portion of this marker shall be painted red.
- .3 These marker stakes are required prior to issuance of a Construction Completion Certificate for the development.

.11 Roof leaders and building foundation drain sump pumps shall not be connected to the sanitary sewer system; refer to **Section C3** of these Regional Engineering Design Standards (REDS).

.12 Grease, suspended solids, and sediment traps shall be provided at all food processing establishments, shopping centres, service stations, car washes, hotels/motels, manufacturing, equipment servicing and cleaning facilities, institutions (churches, schools, etc.) and any other facility that is anticipated to discharge sediment and/or grease.

.13 The County does not permit the use of inspection chambers. Should a means of sampling wastewater from a private property be required, a sampling manhole shall be used.

C2.14 Service Abandonment

.1 If a service connection is to be abandoned, the main stop shall be closed, and the service pipe cut and removed.

C2.15 Service Connection Records

.1 The Developer's Consultant shall provide detailed service reports for all installed services.

.2 Service reports shall provide information related to pipe diameter, invert elevations at the property line, location of services relative to property line(s), manholes or plug valves, and lot number.

.3 A sample service report is provided in **Section A3**.

C2.16 Special Conditions

.1 Special design requirements such as pipe foundations, special bedding, anchors, etc., may be required for certain soil conditions.

.2 All special designs are subject to acceptance by the Municipality.

C2.17 Materials and Specifications

C2.17.1 Pipe

.1 Pipe materials shall be selected using a rational design method, with the following information as a guide.

.2 The Developer's Consultant is responsible to ensure that the selected pipe material and class is suitable for the proposed application (site conditions, depth of installation, etc.).

.3 Alternative pipe materials will be evaluated through a variance request submitted by the Developer's Consultant. Developer's Consultant shall provide a justification for the request for variance.

.4 Alternative pipe materials shall not be installed without receiving written authorization from the Municipality.

Table C2-2
Acceptable Pipe Materials for Force Mains

Material	Specification
Casing Pipe (Steel)	CAN3-Z245.1, Grade 241*
High Density Polyethylene (HDPE)	AWWA C906, DR11 or approved
Steel (Yellow Jacket, epoxy lined)	ASTM A53, Grade B, standard wall or approved

* or higher as required by crossing owner.

C2.17.2 Manholes

.1 Precast manhole sections and grade rings shall conform to CAN/CSA A257.4 and shall be manufactured using sulphate-resistant Type 50 cement.

.2 Manhole sections shall be precast reinforced concrete sections conforming to ASTM C478 and CSA A257.4. All precast units shall be marked with manufacturer's identification, date of casting, type of cement, and CSA standard.

.3 Manhole steps shall be standard safety type, aluminium forged of 6061-T6 alloy having a minimum tensile strength of 260 MPa.

.4 All manhole sections shall have flexible watertight joints sealed with rubber gaskets conforming to ASTM C443 and grouted inside and outside with non-shrink grout.

.5 Manholes shall be fitted with the appropriate cast iron frame and cover conforming to Class 35B ASTM A48. All castings shall be true to form and dimension, and shall be free from faults, sponginess, cracks, blowholes, or other defects affecting their strength.

.6 Precast manhole bases shall be used wherever possible with pre-cored connection holes and watertight Duraseal or A-Lok joints or approved equal. Benching is not required for discharge manholes.

C2.17.3 Pipe Bedding

.1 Granular material for bedding of pipes in sound dry soils shall be Class B sand (refer to **Typical Detail B2-100**) conforming to **Table C2-3**:

Table C2-3
Class B Sand Bedding Material Gradation

Standard Sieve Size (µm)	% Passing
10 000	100
5 000	70 - 100
1 600	5 - 20
80	0 - 12

.2 Washed rock wrapped in filter cloth shall be used in areas with high water table.

.1 Washed rock shall consist of washed, crushed, or screened stone or gravel consisting of hard and durable particles meeting the gradation limits specified in **Table C2-4** and shall be free from sand, clay, cementitious, organic, and other deleterious material.

Table C2-4
Washed Rock Bedding Material Gradation

Standard Sieve Size (µm)	% Passing
25 000	100
5 000	10 (max.)
80	2 (max.)

C2.17.4 Trench Section

.1 For trenching and bedding details, refer to **Typical Detail B2-150** provided at the end of **Section B2**.

C2.17.5 Corrosion Protection

.1 All concrete used in a sanitary sewer system shall be made with sulphate-resistant cement.

.2 One (1) digital (PDF) copy of a specialist's evaluation of cathodic protection requirements shall be supplied to the Municipality for all steel applications.

C2.17.6 Tracer Wire

.1 All underground non-metallic pressure pipe systems shall be installed with a continuous tracer wire.

.2 For open trench installations, tracer wire shall be a minimum 12 gauge solid copper wire with plastic coating, attached to the piping system every 3 m with PVC tape.

.3 For trenchless installations, tracer wire shall be a minimum 12 gauge copper cladded high strength steel wire.

.4 The wire shall terminate above ground at every valve box and air release valve.

.1 The wire shall be of sufficient length to allow the wire to be uncoiled and extended 0.3 m above ground.

.5 Where spliced-in connections occur, a manufacturer-approved watertight direct bury connector shall be used to provide electrical continuity.

.6 The Developer shall provide a tracer wire report to the Municipality, conforming the lines were able to be located with locating equipment.

.7 Tracer wire installation shall be considered complete and acceptable when the Municipality can locate the underground infrastructure using locating equipment.

C2.17.7 Private Sewage Systems

.1 All installations of private sewage systems shall be in accordance with the Safety Codes Council: Alberta Private Sewage System – Standard of Practice.

.2 In general, private sewage systems are required for Rural Residential and Industrial/Commercial developments without reasonable access to a common sewage collection and disposal system.

.3 The owner of a private sewage system shall ensure the system:

- Is maintained;
- Is operated within the design parameters of the system; and
- Effectively treats and disposes of the sewage and effluent.

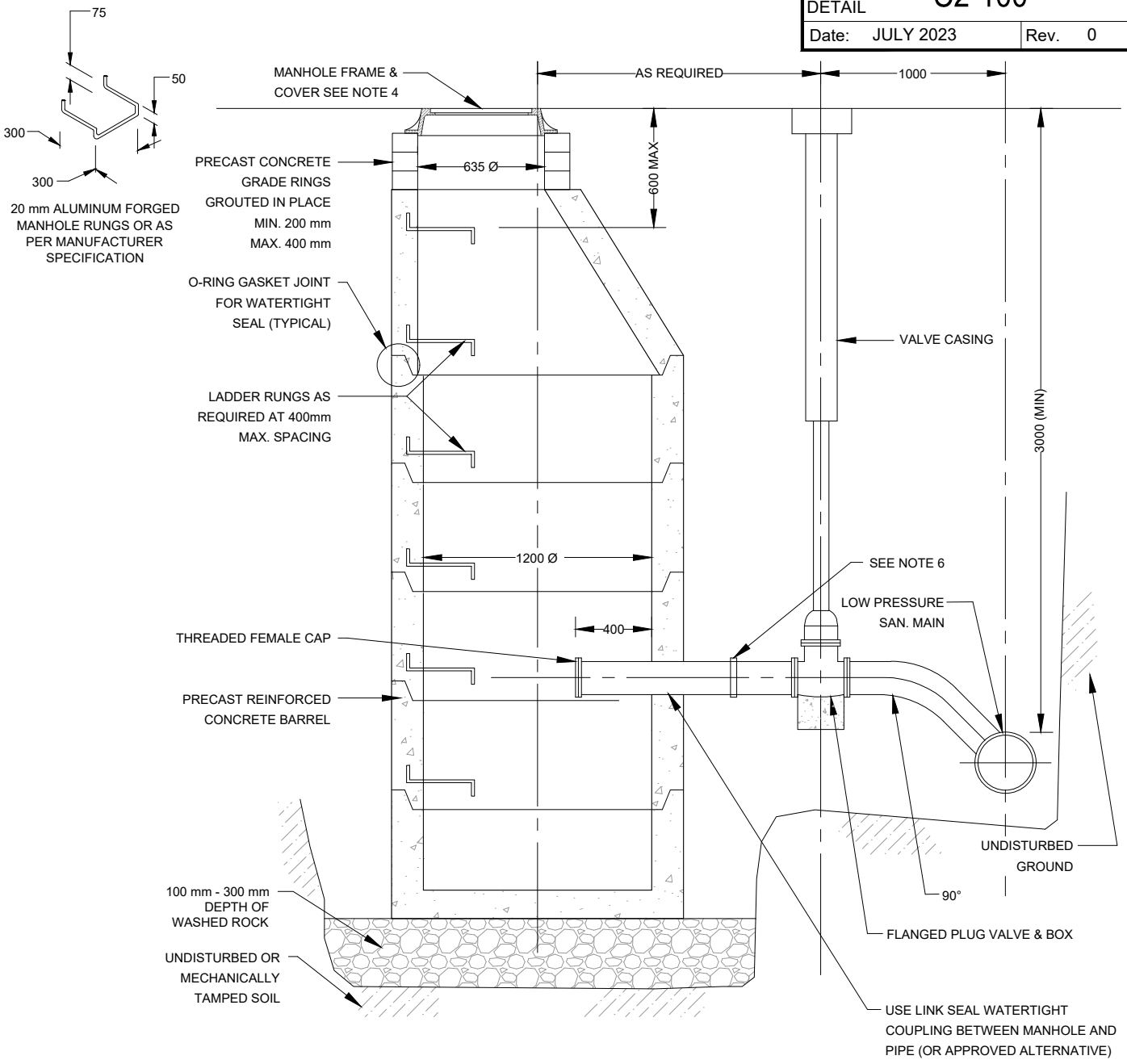
.4 The use of septic tanks is preferred over the use of septic fields.

.5 The Developer's Consultant is responsible for selecting a septic tank(s) of the appropriate size for the proposed development. An access road to the tank is required and shall be designed to accommodate sewage collection truck wheel loads. Refer to **Section C1**.

C2.18 Typical Details – Rural Sanitary Sewer Systems

Standard Detail No.	Title
C2-100	1200 mm Diameter Precast Discharge Manhole
C2-200	Flush Point
C2-300	Isolation Valve
C2-400	Rural Service Layout
C2-410	Low Pressure Sanitary Service Connection
C2-500	Air Release/Air Vacuum Valve Chamber

TYPICAL DETAIL	C2-100	
Date: JULY 2023		Rev. 0



NOTES:

(1) PRECAST RINGS, CONES AND BARRELS TO MEET CURRENT A.S.T.M. C478 AND CSA A257.4 STANDARDS.

(2) VERTICAL SIDE OF CONICAL TOP TO BE SITUATED TO ALLOW ACCESS WITHOUT CONFLICTING WITH FLOW CHANNEL.

(3) RETROFIT RUNGS TO BE EPOXIED IN PLACE (NO PLASTIC SLEEVES).

(4) F-39 FRAME AND COVER FOR GRAVELED AND OFF ROAD AREAS.

(5) DIMENSIONS ARE IN MILLIMETRES UNLESS SPECIFIED OTHERWISE.

(6) HDPE DR11 PIPE TO BE RESTRAINED WITH DRISCOPLEX MOLDED WALL ANCHOR ENCASED IN CONCRETE. CONTRACTOR TO CONFIRM VOLUME OF CONCRETE WITH ENGINEER PRIOR TO INSTALLATION.

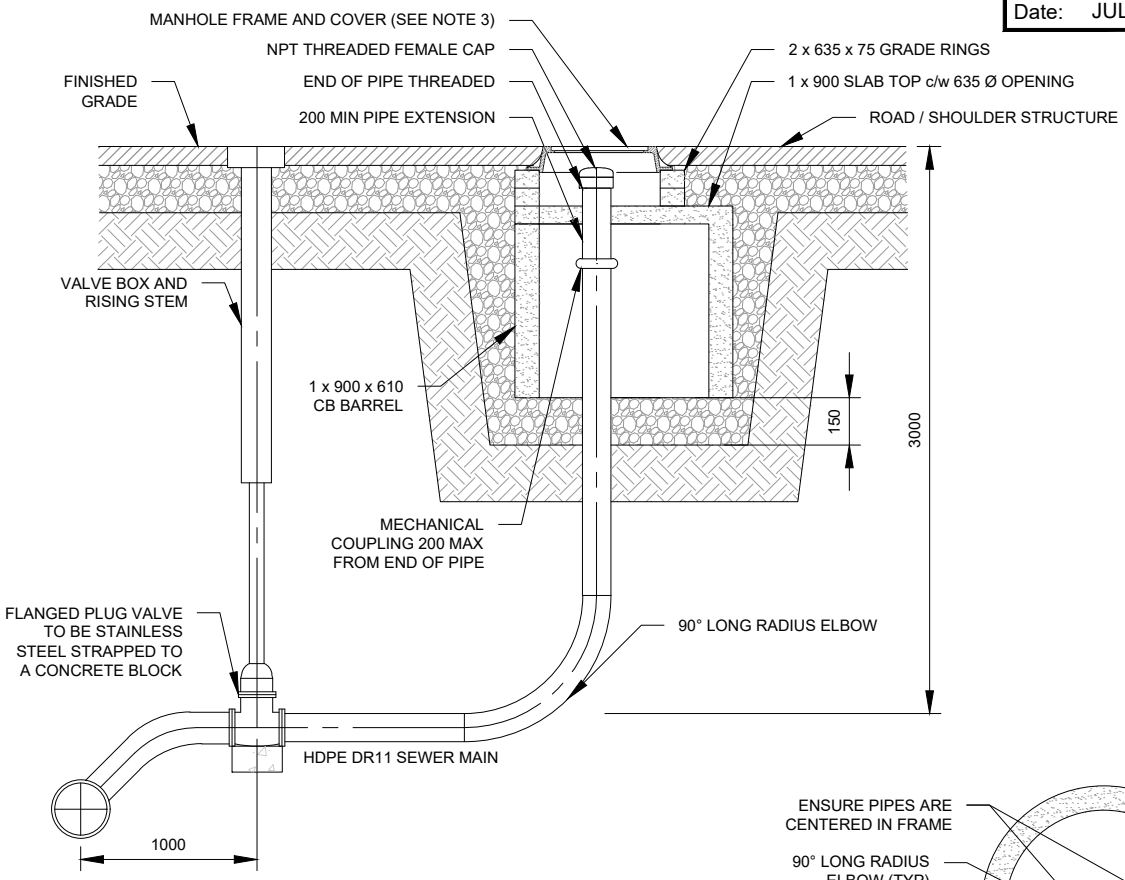
(7) PIPE TO DRAIN TO MANHOLE AT 1.00%.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

1200 mm Diameter Precast Discharge Manhole

TYPICAL DETAIL	C2-200	
Date: JULY 2023		Rev. 0



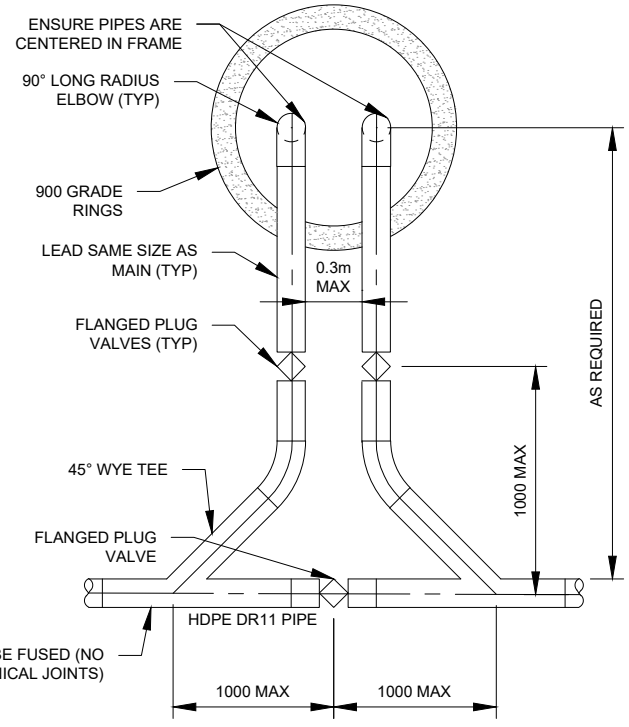
NOTES:

(1) ALL DIMENSIONS SHOWN ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

(2) SEE DETAIL B FOR ADDITIONAL INFORMATION.

(3) F-39 FRAME AND COVER GRAVELED AND OFF ROAD AREAS.

A - PROFILE N.T.S.



B - PLAN N.T.S.

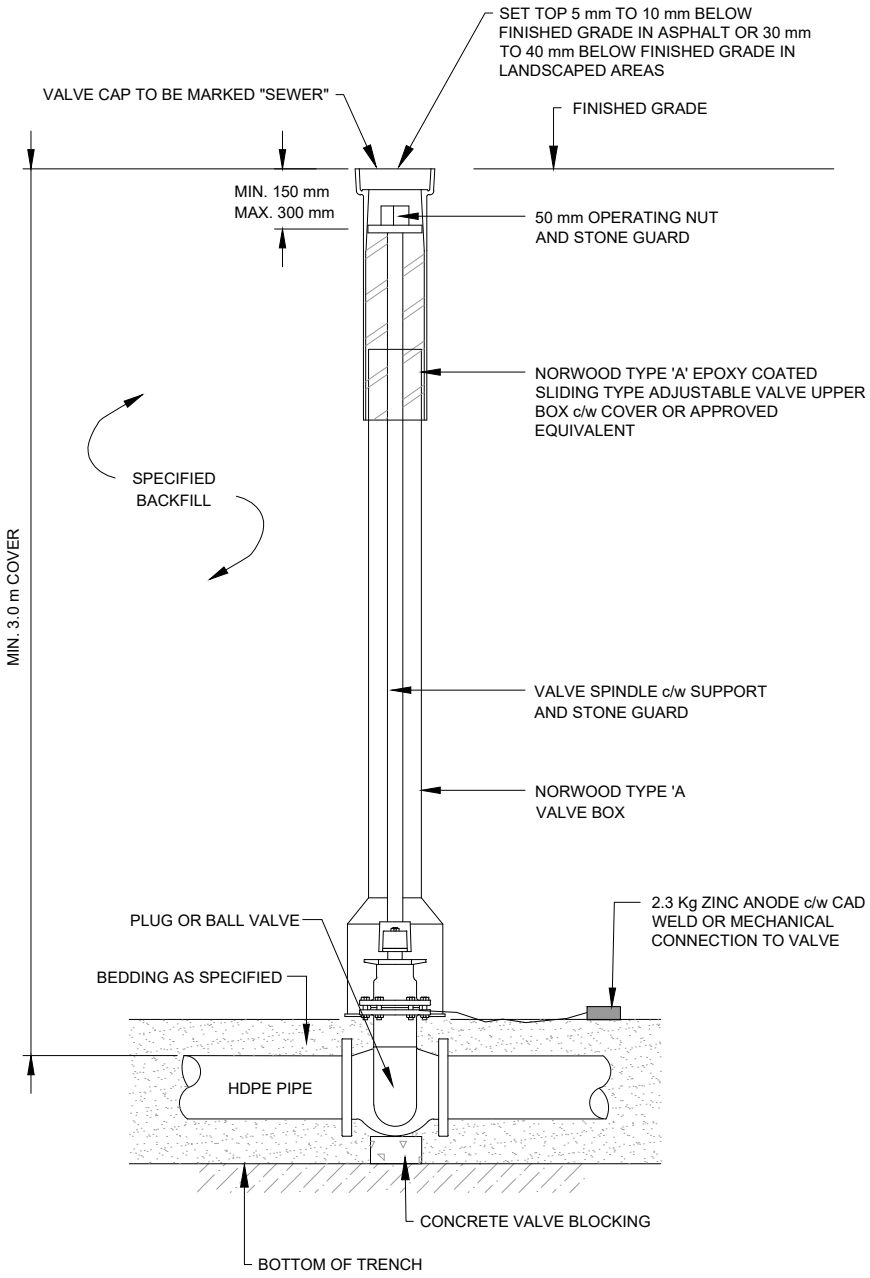
Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Flush Point

Time: 12:30pm
Date: Jul 17, 2023
File: \\ae.ca\data\working\edm\2022-3451-00\civil\model\Revised_Typical_Details\B2\3451-00_C2-200.dwg by
Xrefs:

TYPICAL DETAIL	C2-300	
Date: JULY 2023		Rev. 0



NOTES:

(1) SHOULD THE DEVELOPER'S CONSULTANT DETERMINE THAT THRUST BLOCKING IS REQUIRED FOR THE LOW PRESSURE SEWER SYSTEM, THE THRUST BLOCKS SHALL MEET THE REQUIREMENTS OF SECTION B4.12.

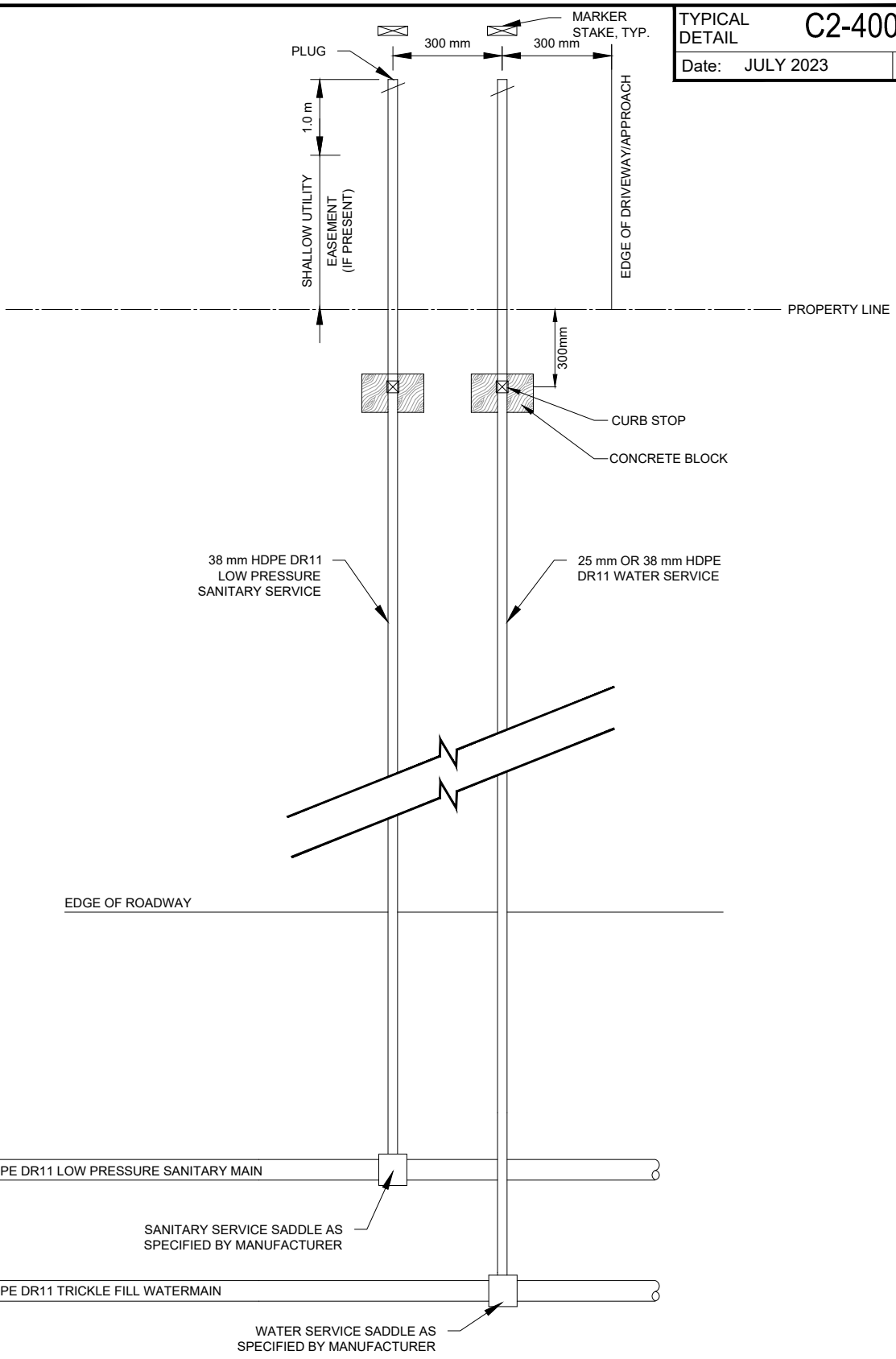
(2) BOLTS SHALL BE WRAPPED WITH DENSO PASTE AND TAPE.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Low Pressure Sanitary Sewer Isolation Valve

TYPICAL DETAIL	C2-400	
Date: JULY 2023		Rev. 0



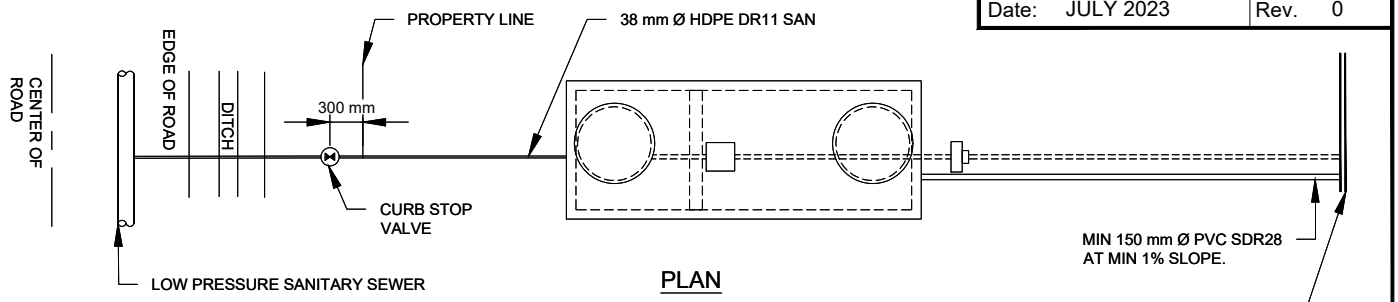
Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

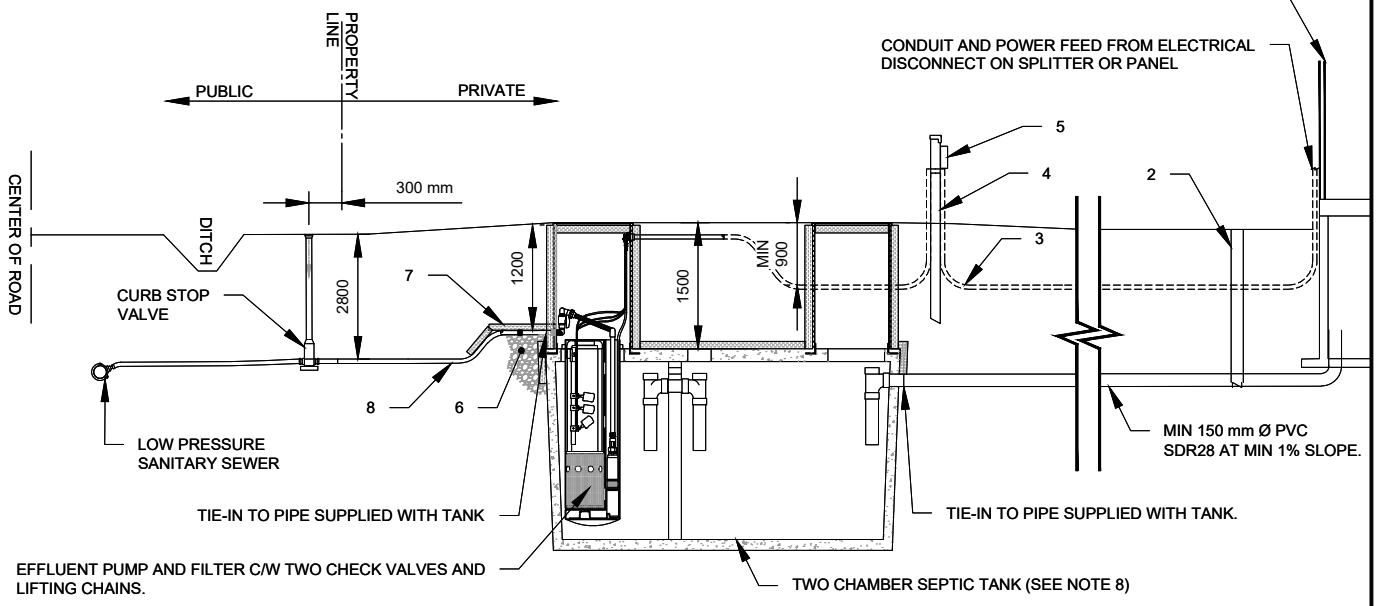
SMOKY LAKE REGION

Rural Service Layout

TYPICAL DETAIL	C2-410	
Date: JULY 2023		Rev. 0



PLAN



SECTION

GENERAL NOTES:

1) CONTRACTOR TO FOLLOW ALL APPLICABLE MUNICIPAL BYLAWS AND REGULATORY CODES AND REQUIREMENTS.
2) CONTRACTOR TO CONFIRM INSULATION REQUIREMENTS FOR TANKS TO ENSURE ADEQUATE MEASURES ARE TAKEN TO PROTECT AGAINST FREEZING.
3) CONTRACTOR TO VERIFY ANTI-FLOTATION REQUIREMENTS FOR TANKS WITH TANK SUPPLIER.
4) SIZE OF THE SEPTIC TANK IS TO BE DESIGNED BY CERTIFIED CONTRACTOR.
5) UTILITY LOCATES AND WORKING WITH SUBSURFACE CONDITIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR.
6) ALL PIPE INSTALLED WITH LESS THAN 2.75 m COVER WILL REQUIRE INSULATION. IF PIPE IS INSTALLED WITH LESS THAN 2.75 m COVER USING TRENCHLESS METHODS, PRE-INSULATED PIPE IS TO BE INSTALLED, WITH INSULATION THICKNESS TO BE DETERMINED BY THE SUPPLIER.
7) ALL DIMENSIONS SHOWN IN MILLIMETERS UNLESS NOTED OTHERWISE.
8) ON-SITE SEPTIC TANK EFFLUENT PUMP (STEP) SYSTEM IS DEPICTED. ON-SITE GRINDER SYSTEM IS ALSO ACCEPTABLE.
9) THIS DETAIL IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE-SPECIFIC DESIGN IS REQUIRED FROM DESIGNER / ENGINEER.

LEGEND AND SPECIFICATIONS:

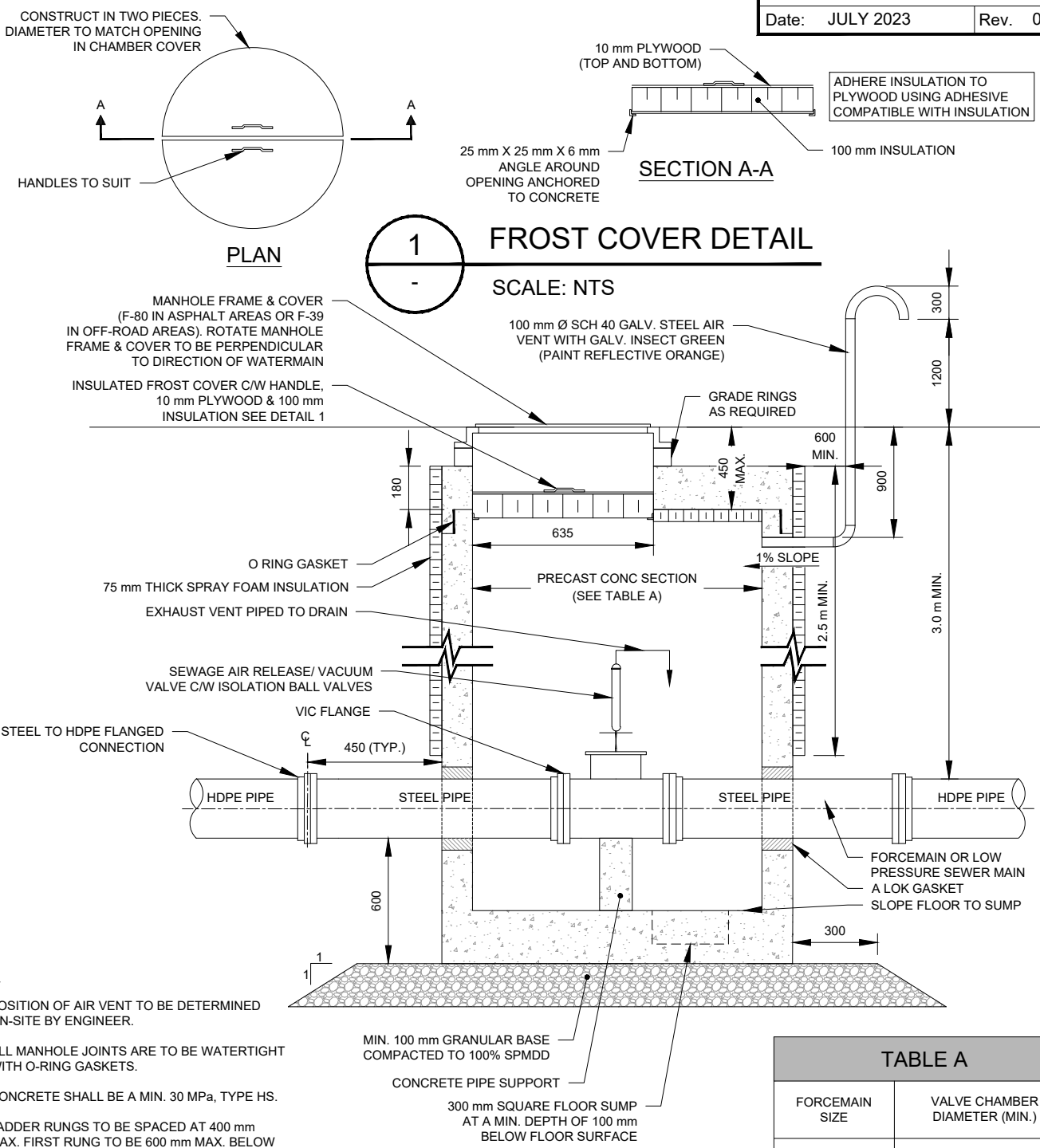
1) POWER SUPPLY FOR PUMP AND CONTROL CIRCUIT FROM THE LOAD SIDE OF THE ELECTRICAL METER. ALL WIRING ARRANGEMENTS SHALL BE IN STRICT ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE (CEC) AND AS APPROVED BY THE AUTHORITY HAVING JURISDICTION (AHJ).
2) MAINLINE ADAPTA VALVE INSTALLED ON WASTEWATER LINE FROM DWELLING.
3) UNDERGROUND ELECTRICAL CONDUIT TO PUMP CONTROL PANEL.
4) 89x89 PRESSURE TREATED WOODEN PEDESTAL FOR MOUNTING CONTROL PANEL. POST TO BE BURIED MIN 0.6 m DEEP. CENTER OF CONTROL PANEL TO BE 1.2 m ABOVE GROUND.
5) MVP (STANDARD) CONTROL PANEL (EXTERNALLY MOUNTED).
6) 40 mm SCREENED ROCK.
7) INSULATE ANY PIPE WITH LESS THAN 2.75 m OF COVER.
8) 38 mm HDPE DR11 PIPE.

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Low Pressure Sanitary Service Connection

TYPICAL DETAIL	C2-500
Date: JULY 2023	Rev. 0



NOTES:

(1) POSITION OF AIR VENT TO BE DETERMINED ON-SITE BY ENGINEER.

(2) ALL MANHOLE JOINTS ARE TO BE WATERTIGHT WITH O-RING GASKETS.

(3) CONCRETE SHALL BE A MIN. 30 MPa, TYPE HS.

(4) LADDER RUNGS TO BE SPACED AT 400 mm MAX. FIRST RUNG TO BE 600 mm MAX. BELOW FRAME. LAST RUNG TO BE MAX. 300 mm ABOVE BOTTOM.

(5) THIS DETAIL IS A GUIDELINE ONLY. SHOP DRAWINGS ARE REQUIRED TO BE SUBMITTED AND APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.

(6) DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

TABLE A	
FORCEMAIN SIZE	VALVE CHAMBER DIAMETER (MIN.)
<100	1200
100 -150	1500
200 - 300	1800
400 - 450	2100
500+	CUSTOM SIZED TO SUIT AND AS APPROVED BY MUNICIPALITY

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Air Release / Air Vacuum Valve Chamber

C3 STORM DRAINAGE SYSTEMS

C3.1 General

.1 **Section C3** covers the design and construction of Rural storm drainage systems and appurtenances to be built or re-built in the Smoky Lake Region.

.2 For requirements pertaining to Urban storm drainage systems, refer to **Section B3**.

.3 **Typical Details** relating to Rural storm drainage system construction are provided at the end of **Section C3**.

.4 These standards provide the minimum design criteria, general construction requirements, and construction materials for consulting Engineers to use in their preparation of specifications and drawings.

.1 These standards may be exceeded if warranted by the design consultant.

.2 Good engineering practices and designs must prevail on all projects.

C3.2 Stormwater Management Plan

.1 Stormwater runoff generated from within the subdivision shall be routed through a stormwater management facility as required to regulate the rate of outflow prior to discharge, unless otherwise accepted by the Municipality.

.2 Stormwater management facilities shall be designed in accordance with the "Stormwater Management Guidelines" prepared by Alberta Environment and in accordance with good engineering practice.

.1 Evaporation ponds are not permitted and will not be accepted by the Municipality.

.3 A phased construction approach to match the expected development sequence may be acceptable to the Municipality, provided the requirements of this guideline are met.

.1 Temporary ponds and structures, without the required facilities and design components per this guideline, are not acceptable.

.4 Prior to submission of any detailed design, a stormwater management plan shall be prepared by the Developer and submitted to the Municipality for acceptance.

.5 The stormwater management plan shall be consistent with the standards outlined herein and shall:

.1 Identify the impact of the proposed development on the watershed;

.2 Identify and quantify the amount of upstream drainage entering the proposed development lands, including all points of entry;

.3 Identify all existing flow channels, drainage patterns or routes, and containment areas;

.4 Identify the point(s) of discharge from the lands, as well as the type and calculated capacity of the receiving drainage facility(ies), whether natural, man-made, or a combination of both;

.5 Provide details of required stormwater retention/detention facilities;

.6 Provide details of water quality enhancement facilities; and

.7 Identify all licensing requirements and/or approvals as may be required by Provincial or Federal environmental acts.

C3.3 Minor and Major System Definitions

.1 Each drainage system shall consist of the following components:

.1 **Minor System:** pipes, open channels, and water courses which convey flows of a 5-year return frequency, without surcharging; and

.2 **Major System:** surface flood paths, roadways, and water courses which convey flows of a 100-year return frequency. The major system shall include culverts crossing roadways.

C3.4 Design Flows

.1 Design flows shall be computed using one or more of the following methods:

C3.4.1 Rational Method

.1 $Q = CIA/360$

Where: Q = Design flow (m^3/s)
A = Drainage area (ha)
I = Rainfall intensity (mm/hr)
C = Runoff coefficient

.2 The Rational Method is applicable for minor system design for watersheds (less than 65 ha) which discharge into detention facilities or other outlets acceptable to the Municipality.

C3.4.2 Hydrograph Methods

.1 Computer modelling shall be used for stormwater drainage design for:

- Residential and Commercial/Industrial development areas greater than 65 ha in size;
- Any development requiring storage or detention facilities; and
- Alternatively, computer modelling may be used for areas smaller than those outlined above.

.2 The 4-hour Chicago distribution hyetographs should be used for analysis of major and minor conveyance systems by computer simulation.

.3 When the design of stormwater management is involved, the 24-hour Huff distribution design hydrographs should be used.

.4 Contact the Municipality prior to design to confirm the type of modelling software to be used in the design.

C3.5 Runoff Coefficient, C

.1 Runoff coefficients for storm events with return periods of up to 10-years shall be taken from **Table C3-1**.

Table C3-1
Runoff Coefficients for 5-Year and 10-Year Event Return Periods

Description	Runoff Coefficient		
	Minimum	Average	Maximum
Roofs		0.95	
Industrial			
Light	0.50	0.65	0.80
Heavy	0.60	0.75	0.90
Residential			
Rural	0.25	0.33	0.40
Parks/Cemeteries	0.10	0.18	0.25
Playgrounds	0.20	0.28	0.35
Railroad Yards	0.20	0.28	0.35
Unimproved	0.10	0.20	0.30

Notes:

1. Values within the range specified depend on the soil type (sand is minimum, clay is maximum) and on the nature of the development.
2. For storms with return periods of more than 10 years, increase the specified values as follows, up to a maximum coefficient of 0.95:
   - 25-Year: Add 10%
   - 50-Year: Add 20%
   - 100-Year: Add 25%

C3.6 Rate of Precipitation

.1 The most up to date Intensity-Duration-Frequency (IDF) curves published by EPCOR Drainage shall be used for design purposes, unless otherwise requested by the Development Officer. The Development Officer may require that the Developer review data from other nearby climate stations and provide a comparison to the EPCOR Drainage IDF curves to justify which shall be used in the design.

.1 The 5-year IDF curve shall be used for the design of minor systems.

.2 The 100-year IDF curve shall be used for the design of major systems.

.2 The time of concentration is the sum of the inlet time and travel time.

.1 Inlet time is the time required for runoff to become established and drain to the inlet of the storm sewer system.

.2 The inlet time shall be as per **Figure C3-1**, obtained from the United States Department of Agriculture Natural Resources Conservation Service Part 630 Hydrology, National Engineering Handbook (May 2010).

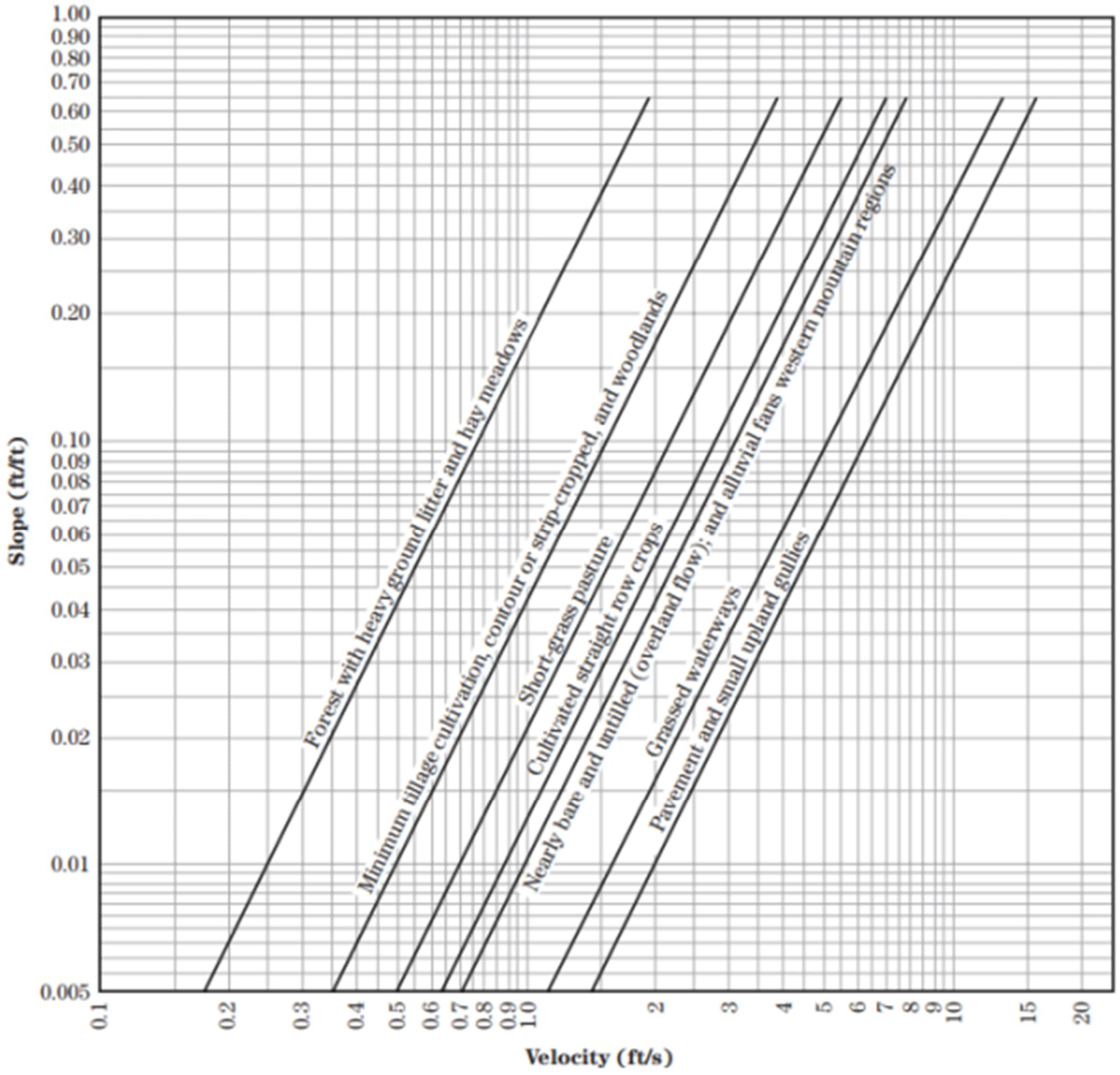


Figure C3-1
Velocity versus Slope for Shallow Concentrated Flow

.3 Travel time is the time required for the flow to travel within the storm drainage system to the design location. Travel time shall be determined based on the travel time within the ditch(es) upstream of the design location.

C3.7 Rough Grading

.1 To provide basic positive drainage until a lot is developed, the lot(s) shall be rough graded, allowing for earth balancing of future basement excavation and landscaping.

.2 Rough grading shall ensure positive drainage is maintained in the interim; the Developer shall be responsible to remove and properly dispose of standing water on lots.

.1 Rough grading of lots to ensure positive drainage is required prior to requesting a CCC inspection.

.3 Rough grading shall be carried out without damage to the root and branch systems of existing plant material to be retained.

.4 All sites requiring topsoil shall be rough graded to within 150 mm of final grade.

.5 At the toes of slopes and banks, grades shall be smoothly rounded to a minimum slope of 8H:1V. All slopes, banks and disturbed areas, as a result of the development, are to be feathered to meet with existing grades.

.6 The maximum allowable slope for berms shall be 4H:1V, unless otherwise acceptable to the Municipality.

.1 Slopes of 3H:1V may be acceptable in areas of minimal pedestrian traffic and for the side slopes of ditches.

.2 The use of slopes of 3H:1V must be accepted by the Municipality prior to implementation.

.7 All fill material required for rough grading shall be free of sticks, stones, and debris greater than 7 cm and any other material which may be subject to rot or corrosion.

.8 The Developer shall be responsible for clean up after rough grading operations; the area around the lot being graded shall be left in a developable condition.

C3.8 Final Site and Lot Grading

.1 Each lot shall be graded to drain to the roadway ditch system. Cross-lot drainage is not permitted.

.2 Sufficient ground elevations of neighbouring (surrounding) properties, roads, and easements shall be obtained to identify existing drainage patterns through and adjacent to the development. Provide details on how on site surface runoff will be accommodated to protect existing and proposed structures and neighbouring properties from stormwater inundation.

.3 Provide details on how existing off-site surface runoff that travels through the property will continue to be accommodated to protect existing and proposed structures and neighbouring properties.

.4 Provide details indicating how surface runoff leaving the property will be controlled to prevent erosion and stormwater pollutants from contaminating adjacent surface water or downstream water bodies.

.5 Where feasible, lot grading plans shall be prepared such that rear to front drainage is provided throughout the subdivision.

.6 Split drainage or front-to-back drainage is only permitted when the lot is located such that there is a roadway, public right-of-way, or stormwater management facility at both the front and back of the lot.

.7 Front-to-back drainage shall slope from the property line; i.e., drainage within a municipal right-of-way shall be contained within the municipal right-of-way and shall not drain through private property.

.8 Areas around buildings shall be graded away from the foundations to prevent flooding. The site grading plan shall identify the proposed finished floor elevations of all new and existing structures including dwellings, garages, decks, sheds, and patios.

.9 Identify the percentage of lot development pre- and post-development.

.10 Identify the percentage of permeable and impermeable surfaces pre- and post-development.

.11 Identify roof leader discharge points.

.12 Lots lower than adjacent roadways shall be avoided.

.13 Building foundations shall be above the major system hydraulic grade line for a 100-year storm event, plus a minimum of 0.3 m freeboard.

.1 This requirement may not apply to replacement of structures/developments within existing flood plains.

.2 In these areas, suitable precautions, such as mounting electrical panels above the 1:100-year hydraulic grade line, shall be taken.

.14 Reserves and public lands shall be graded to drain towards roadway ditches.

C3.9 Lot Grading Tolerances

.1 The Developer shall ensure that all lots are graded in accordance with the accepted lot grading plan and only for the portion(s) of the lots that are to be developed (i.e., portion(s) of the lots that are to remain in pre-development conditions are not required to be graded).

.2 Rough grading tolerance: 150 mm below finished grade.

.3 Final grading tolerance: ±25 mm from finished grade.

C3.10 Foundation Drains

.1 Foundation drains shall be pumped to the surface and drain overland to the roadway ditch (refer to **Typical Detail B3-200**).

.2 The system shall be dedicated to the collection of foundation drain flows produced from basement sump pump discharge only.

.3 Roof drains shall discharge to surface and shall not be connected to the foundation drain.

.4 Installation and maintenance of on-lot components are the responsibility of the homeowner.

.5 Under no circumstances shall a foundation drain service be discharged to the sanitary system.

.6 The Developer's Consultant shall estimate weeping tile flows as part of the detailed geotechnical investigation.

.1 The geotechnical investigation shall include an assessment of the pre-development subsurface soil and groundwater, and the anticipated post-development conditions.

.2 The geotechnical investigation shall estimate weeping tile flows and define any special design and construction measures to be taken for foundations or other infrastructure that may be impacted by weeping tile flows.

.3 Where significant flows are anticipated from the foundation drain, these flows shall be added to the flows used to confirm the size of roadway ditches to ensure an adequate level of service is provided by the drainage system.

.4 Where high flows are expected such that sump pumps will be required to pump continuously, or run excessively, the Developer shall present alternative solution(s) to the Municipality.

C3.11 Roof Drainage

.1 Roof drainage from Residential and non-residential buildings shall be discharged to the ground and dispersed via splash pads at the downspouts.

.1 The point of discharge shall be a minimum of 1.2 m away from the building (including downspout extensions) to ensure positive drainage.

C3.12 Flow Capacities

C3.12.1 Storm Sewers and Open Channels

.1 Manning's formula shall be used to calculate pipe and open channel capacities:

$Q = (AR^{(2/3)}s^{0.5})/n$

Where: Q = Pipe or open channel capacity (m^3/s)
A = Cross-sectional area of pipe or open channel (m^2)
R = Hydraulic radius (area/wetted perimeter) (m)
s = Slope of hydraulic grade line (m/m)
n = Roughness coefficient = 0.013 for smooth-walled pipe (for example: PVC, concrete)
= 0.024 for corrugated steel pipe (unpaved)
= 0.020 for corrugated steel pipe (invert paved)
= 0.033 for gravel lined channels
= 0.020 for concrete or asphalt lined channels
= 0.050 for natural streams and grassed channels

C3.12.2 Culverts

.1 Use the inlet control and outlet control methods referred to in:

- The Handbook of Steel Drainage and Highway Construction Products, by the Corrugated Steel Pipe Institute
- The Handbook of Concrete Culvert Pipe Hydraulics, by the Portland Cement Association
- Design Guidelines for Bridge Size Culverts, by Alberta Transportation

C3.13 Minimum Depth of Cover

.1 The minimum depth of cover, to pipe crown, shall be as follows:

Storm Sewer Infrastructure/Location	Minimum Depth of Cover
Culverts crossing roads	Greater of half the culvert diameter or 500 mm
Catch basin leads at the catch basin	Minimum 1.8 m

C3.14 Minimum Pipe Diameter

Storm Sewer Infrastructure	Minimum Diameter
Culverts crossing roads	600 mm
Catch basin leads	250 mm

C3.15 Minimum Velocity

.1 All storm sewers shall be designed with velocities ranging from 0.90 m/s to 1.0 m/s where feasible, based on Manning's formula, when flowing at the design (part-full) flow.

.2 Velocities below 0.60 m/s will not be allowed.

.3 Special design considerations are required when velocities exceed 3.0 m/s.

C3.16 Ditches

.1 Ditches shall be designed to convey the 1:100 year flow. The 1:100 year flow shall be contained within the ditch with no flooding of the road surface or adjacent properties.

.2 The minimum floor elevation for lots adjacent to a ditch shall be 0.3 m above the 1:100 year water elevation.

.3 The minimum allowable ditch grade shall be 0.6%.

.4 Ditch grades in excess of 2.0% shall be protected against erosion through rock ditch checks, silt fences, Enviroberm fences, and/or erosion control blankets. Steep ditches may require drop structures.

.5 The minimum ditch bottom width shall be 1.5 m, sloping away from the roadway at a minimum of 5.0%.

C3.17 Catch Basins

.1 Catch basins may be used to drain a trap low area.

.2 All catch basin bodies shall be precast concrete sections conforming to the most recent ASTM specifications and constructed to provide a 500 mm sump to trap rocks and gravel.

.3 All catch basin sections shall have flexible watertight joints sealed with rubber gaskets conforming to ASTM C443.

.4 Precast catch basins shall have pre-cored connection holes and watertight Duraseal or A-Lok joints or approved equal.

.5 Catch basin leads shall be installed to provide a minimum depth of cover of 1.8 m, measured from finished grade to pipe crown, unless otherwise accepted.

.6 The minimum slope of catch basin leads shall be 2%.

.7 Catch basin leads shall generally discharge directly into roadway ditches.

.8 The maximum length of a catch basin lead shall be 18 m.

.1 Where catch basin leads in excess of 18 m in length are required, a catch basin manhole must be installed to intercept surface runoff.

.9 To abandon a catch basin, follow the procedure for the abandonment of manholes as outlined in **Section B3.21**.

.10 Catch basin grade rings and the catch basin frame shall be installed within 50 mm of plumb with catch basin shaft. A clear distance of 810 mm must be provided within the catch basin.

C3.18 Side/Rear Yard Swales and French Drains

.1 Swales are required to intercept runoff between adjacent private properties where the overall gradient of the land is perpendicular to the property lines.

.2 Swales servicing three or more lots must be within a registered drainage Easement.

.3 Grass swales may be used in Rural areas.

.4 The longitudinal slope of a grassed swale should be at least 2%, where practical, with provision for erosion protection.

.5 Drainage easements of a minimum width of 3.0 m are to be registered with the Plan of Subdivision.

.6 Restrictive covenants are required to be registered on titles of private properties where drainage easements and related infrastructure are installed.

.7 Design consideration shall be given to the proper interception of lateral flow into the swale, and the discharge of the flow into the roadway ditch at the end of the swale.

C3.19 Culverts

.1 Culverts shall be designed to convey the 1:100 year flow.

.2 Culvert size requirements shall be determined through the stormwater drainage analysis; however, the minimum size of culverts shall be as follows, and in no case shall a culvert less than 400 mm diameter be installed, except in retrofit situations, at the discretion of the Development Officer and subject to acceptance by the Municipality.

Location/Application of Culvert	Minimum Diameter
Roadway cross culvert	600 mm
Residential driveway culvert	600 mm
Industrial driveway culvert	600 mm

.3 Culverts shall be new galvanized CSP (corrugated steel pipe) with a minimum wall thickness of 1.6 mm, or as required by the loading criteria, and a profile of 68 mm x 13 mm.

.4 All culverts shall be installed in accordance with the manufacturer's recommendations and shall be installed complete with bevelled end sections, on both the inlet and outlet ends, with the invert extended to the toe of the side slope.

.5 Marker posts shall be installed at culvert ends, for location purposes, and shall extend to 1 m above road centreline elevation. Marker posts shall meet Alberta Transportation standards.

.6 Box culverts may also be acceptable to the Municipality, provided that the Developer's Consultant provides sufficient supporting documentation outlining the design and construction considerations.

.7 Riprap shall be placed around the inlet and outlet of all culverts; refer to **Typical Detail B3-500** at the end of **Section B3**.

.1 Generally, Alberta Transportation Class 1M riprap, meeting the requirements of **Table C3-3**, shall be used; however, it is the responsibility of the Developer's Consultant to select a class of riprap appropriate to the site and flow conditions.

Table C3-3
Class 1M Riprap Requirements

Criteria	Value
Nominal Mass	7 kg
Nominal Diameter	175 mm
None greater than	40 kg/300 mm
20% to 50%	10 kg/200 mm
50% to 80%	7 kg/175 mm
100% greater than	3 kg/125 mm

.8 Geotextile filter fabric shall be a non-woven fabric with the following minimum properties:

Property	Value
Grab Strength	650 N
Elongation (Failure)	50%
CBR Puncture Strength	1,800 N
Burst Strength	2.1 MPa
Trapezoidal Tear	250 N
Minimum Fabric Overlap	300 mm

C3.20 Materials and Specifications

C3.20.1 Pipe

.1 Pipe materials shall be selected using a rational design method, with the following information as a guide.

.2 The Developer's Consultant is responsible to ensure that the selected pipe material and class is suitable for the proposed application (site conditions, depth of installation, etc.).

.3 Alternative pipe materials will be evaluated through a variance request submitted by the Developer's Consultant. Developer's Consultant shall provide a justification for the request for variance.

.4 Alternative pipe materials shall not be installed without receiving written authorization from the Municipality.

Table C3-4
Acceptable Pipe Materials for Storm Sewers

Material	Specifications
Reinforced Concrete	CAN/CSA A257.2
PVC	ASTM D3034, CSA B182.2, Class DR35
Corrugated Steel Pipe (culverts only)	CSA-G401, stiffness AASHO-M-36

.5 Culverts shall be Corrugated Steel Pipe.

C3.20.2 Bedding Materials

.1 Bedding material shall be in accordance with **Section C2.17.3**.

C3.20.3 Trench Section

.1 Trench section material shall be in accordance with **Section C2.17.4**.

C3.20.4 Catch Basins

.1 Catch basin material shall be in accordance with **Section B3.22**.

C3.21 Outfall Structures

.1 A hydraulic analysis is required for outfalls, to ensure that exit velocities will not negatively impact natural watercourses.

.2 Appropriate erosion control measures, including energy dissipaters, are to be provided downstream of the outfall.

.3 All storm sewer outfalls shall be constructed with lockable grates to allow maintenance but prevent entrance of unauthorized personnel. Where required, guardrails, and/or fences shall be installed to provide fall protection.

.4 Outfall structures shall be designed with consideration of aesthetics as they are generally located within parks, ravines, and on riverbanks. Concrete end treatment is recommended.

C3.22 Major Systems

C3.22.1 Roadways and Overland Flow Routes

.1 Continuity of overland flow routes between adjacent developments shall be maintained.

.2 The lowest building opening adjacent to roadways or overland flow routes shall be a minimum of 300 mm above the maximum water elevation.

C3.22.2 Stormwater Management Facilities

.1 Stormwater management facilities shall be designed to meet Alberta Environment guidelines and the following sections.

C3.22.2.1 General Stormwater Management Facility Requirements

.1 Stormwater management facilities shall be sized such that there will be storage for a 1:100-year storm event (using Huff distribution design hydrographs), plus adequate freeboard to contain the maximum historical event.

.2 Stormwater management facilities shall control the release rate to the pre-development flow rate. Contact the Municipality for a copy of the current Regional Stormwater Management Plan to confirm the release rate required for the development area.

.1 Should the downstream infrastructure or water body(ies) be unable to accommodate the restricted release rate, the release rate shall be further restricted based on the available downstream capacity.

.3 The preference is that a maximum of two stormwater management facilities be used to manage the runoff from a single quarter section.

.1 The Municipality may approve a variance from this criterion if suitable justification is provided by the Developer's Consultant.

.4 All outflow piping shall be sized for a flow twice that of the maximum designed control flow.

.5 Water release shall be controlled via an orifice or other accepted means and shall include provisions for increasing the release rate in an emergency.

.6 The minimum floor elevation for lots surrounding a stormwater management facility shall be 0.3 m above the high water level.

.7 The lowest building opening for lots surrounding a stormwater management facility shall be 0.5 m above the high water level.

.8 An emergency overland drainage swale shall be provided from the downstream end of the stormwater management facility to the receiving stream with capacity to transport storm runoff should a downstream malfunction occur.

.9 If an emergency overland flow path to the receiving channel is not feasible, the stormwater management facility shall be sized to be able to accommodate two back-to-back 1:100-year storm events.

.1 This may be achieved by proving that the combined available storage in the active zone and freeboard zone are sufficient to store the second 1:100-year storm event after 96 hours.

.2 If the drawdown time from the first 1:100-year storm event is longer than 96 hours, the Developer's Consultant shall take into consideration that the full active storage zone is not available for the second storm event, which may result in additional freeboard being required.

.10 Wet ponds and constructed wetlands require warning signs, posted along the perimeter of the PUL, to prohibit activities that may present a danger to public health and safety or interfere with the operation of the facility; refer to **Typical Detail B3-600**.

.11 Stormwater management facilities require an outlet control structure.

.12 The Developer's Consultant shall submit a design for all outlet control structures, detailing:

- Size and configuration of concrete chamber;
- Types of hatches (must be lockable);
- How the structure will be accessed for maintenance (all-weather access suitable for a hydro-vac truck is required);
- Locations of safety railings around the hatches;
- Provision for kickplates at the base of railings;
- Locations and models of davit bases (if required – Developer's Consultant to discuss this requirement with the Municipality);
- Locations and models of water level control gates (if required); and
- Location and size of orifice and provisions for increasing the release rate for rapid drawdown.

.13 Discharge from stormwater management facilities shall be by gravity; no pumped discharge shall be permitted.

C3.22.2.2 Design of Dry Ponds

.1 **Dry ponds** (detention storage) temporarily store stormwater runoff to promote the settlement of runoff pollutants and to restrict discharge to predetermined levels to reduce downstream flooding and erosion potentials.

.1 They are often designed as two-stage facilities: the upper stage (flood fringe area) is designed to store large, infrequent storms; the lower stage (extended detention stage) is designed to store and promote sedimentation of smaller, more frequent storms.

.2 Unlike a wet pond; however, the lower stage is designed to empty completely between storm events. Low flows are not usually detained.

.2 Dry ponds should only be used when topographical or planning constraints exist which limit the use of wet ponds or constructed wetlands.

.3 All dry ponds shall be offline storage. A low flow bypass shall direct storm runoff around the dry pond during minor rain events.

.4 Dry ponds shall be located in a PUL which covers up to the 5-year water level.

.5 Side slopes shall not be steeper than 5H:1V within public property and shall not be steeper than 7H:1V within private property.

.6 The pond bottom shall be graded to provide positive drainage to the outlet, with a minimum longitudinal slope of 2% and minimum lateral slope of 1.5%.

.1 A French drain may be required below the invert of the longitudinal slope, depending on the intended recreational use of the dry pond.

.7 All surfaces, including the bottom, shall be topsoiled and seeded with approved materials, except for the low flow channel which can be either aquatic type plants or a riprapped channel.

.8 The maximum storage depth shall be 3 m, as measured from the invert of the outlet pipe.

.9 Provide a landscaped or riprapped channel to accommodate the 1:5-year event and low flow condition.

.10 Dry ponds shall be designed as an amenity to the development with Open Space for passive play and links to pedestrian walkways for use by the public.

C3.22.2.3 Design of Wet Ponds

.1 **Wet ponds** (retention storage) temporarily store stormwater runoff to promote the settlement of runoff pollutants and to restrict discharge to predetermined levels to reduce downstream flooding and erosion potentials.

.1 They are often designed as two-stage facilities: the upper stage (flood fringe area) is designed to store large, infrequent storms; the lower stage (extended detention stage) is designed to store and promote sedimentation of smaller, more frequent storms.

.2 Wet ponds shall have a minimum surface area at normal water level (NWL) of 2 ha.

.1 If a wet pond is not to become a publicly owned and maintained facility, a surface area of less than 2 ha may be permitted, upon acceptance by the Municipality and Alberta Environment.

.3 The active storage depth shall be as required to provide storage for a 1:100-year storm event.

.4 An impervious pond bottom shall be constructed of material with a permeability coefficient in the order of $1x10^{-6}$ cm/s.

.5 A minimum pond depth of 2 m, from pond bottom to NWL, shall be required; however, a 3 m depth is preferred.

.6 Dead bay areas are not permitted.

.7 All inlet and outlet pipes shall be submerged a minimum of 1 m below NWL and shall be marked by a post at the surface. Inlet and outlet pipe inverts shall be a minimum of 150 mm above the pond bottom.

.8 Inlets and outlets shall be located to maximize the detention time and circulation within the wet pond.

.9 The side slopes of the pond shall, generally, not be steeper than 7H:1V from free board elevation to 1 m below NWL; however, when space limitations exist, side slopes of 5H:1V may be permitted. Side slopes of 3H:1V are permitted from pond bottom to 1 m below NWL.

.10 The normal water elevation shall be such that the roadside ditches shall not surcharge during a 1:5-year storm.

.11 The shoreline treatment of the pond shall consist of a band of granular material, from 0.3 m above to 0.3 m below NWL, on top of woven polypropylene geotextile fabric. The granular material shall be chemically sterilized, shall be 75 mm minimum size, and shall be installed in a 250 mm thick layer. An evaluation of wave action shall be made and, if necessary, additional bank protection shall be provided.

.12 A buffer strip shall be provided between NWL and the 1:25-year flood level. The difference between the NWL and the 1:25-year flood level shall be limited to 1 m of vertical rise.

C3.22.2.4 Design of Constructed Wetlands

.1 **Constructed wetlands** (retention storage) improve water quality and control peak discharge rates by retaining runoff for a prolonged period.

  .1 Relatively deep permanent pools are maintained at the inlet and outlet and along low flow paths to minimize resuspension of settled pollutants.

  .2 Relatively shallow extended detention storage areas with extensive plantings (submergent and emergent) make up the majority of the permanent storage.

.2 The size of a constructed wetland should be approximately 5% of the watershed area that it will be servicing.

.3 Approximately 25% of the surface area at NWL should consist of deep pools (at inlets(s) and the outlet) which are 2.4 m to 3.0 m deep to allow for settleable solids removal.

.4 Average permanent wetland water depth shall be 0.3 m with 1 m deep zones for flow redistribution and for fish and submerged or floating aquatic vegetation habitat.

.5 The normal water elevation shall be such that the collection system shall not surcharge to an elevation greater than the lowest catch basin invert in the collection system during a 1:5-year storm.

.6 Active storage shall be 0.3 m to 0.6 m deep. Fluctuation in excess of 1 m above NWL should be infrequent to avoid killing vegetation.

.7 The side slopes shall generally be no steeper than 7H:1V; however, where space limitations exist, the side slopes may be as steep as 5H:1V.

.8 A length to width ratio of 3:1 is preferred; however, if space limitations exist, the length to width ratio can be as low as 1:1, provided that additional considerations are made to maximize the travel time through the wetland for treatment and to prevent short-circuiting.

.9 The deep zone shall be sloped at 1.0% from inlet to outlet and the shallow marshy areas are to have a smooth bottom to promote sheet flow through the system.

.10 An impervious pond bottom shall be constructed of material with a permeability coefficient in the order of $1x10^{-6}$ cm/s.

.11 Dead bay areas are not permitted.

.12 All inlet and outlet pipes shall be submerged a minimum of 1 m below NWL and shall be marked by a post at the surface. Inlet and outlet pipe inverts shall be a minimum of 150 mm above the wetland bottom.

.13 Design with the landscape, not against it; take advantage of natural topography and drainage patterns.

.14 Incorporate as much "edge" as possible and design in conjunction with a buffer and the surrounding land and aquatic systems.

.15 Design to protect the wetland from any potential high flows and sediment loads.

.16 Design for self-sustainability and to minimize maintenance; however, an all-weather maintenance access is required to all deep pool areas for sediment removal.

C3.22.2.5 Recreation

.1 Recreational use of wet and dry ponds will be regulated by the Municipality. Recreational uses are not permitted for constructed wetlands.

.2 Suitable recreational facilities such as bicycle trails, benches, trees, etc. shall be provided for stormwater management facilities.

.3 Primary recreational activities will not be allowed on or in wet ponds. Signage will be posted, prohibiting primary recreational activities, i.e., all water-based activities where there is body contact with the water, such as swimming and wading.

C3.22.2.6 Erosion

.1 Construction of new developments shall be undertaken in a manner such that erosion of the site and sediment discharge via runoff to the receiving stream are minimized.

.2 The Developer's Consultant shall be required to submit a formal erosion and sedimentation control plan to the Municipality.

.3 Adequate erosion protection will be required for all natural and man-made water courses within the new development.

.4 Outfalls of storm sewers shall be designed to control local erosion to the conveyance channel or receiving stream and shall not change the hydraulic characteristics of the receiving stream.

C3.22.2.7 Maintenance

.1 The Developer shall be responsible for any defects of the works and lands associated with the stormwater management facility, including adjacent park lands, for the duration of the Warranty Period.

.2 The Developer shall assume full responsibility with respect to the operation and Maintenance of the stormwater management facility(ies) in all aspects relating to flows, water volumes, surface debris, aeration, hydrological cycle, hydraulic performance, utility devices such as outlet structures, vegetation control, insect control, and on-shore facilities until issuance of a Final Acceptance Certificate (FAC).

.3 The Developer will be responsible for siltation and debris problems which are caused due to poor erosion control for the development. Should siltation and debris problems occur in the stormwater management facility(ies) that are the result of stormwater draining from lands beyond the Developer's control, the Municipality shall assume responsibility for any necessary remedial actions.

.4 The monitoring and Maintenance of water quality to eliminate any nuisance factors and to protect against health hazards shall be the responsibility of the Developer during the Warranty Period.

C3.22.2.8 Boundary Control and Use

.1 All stormwater management facility and shoreline areas must be sufficient to accommodate the 1:100-year design event and will be retained in public ownership (i.e., within a PUL).

.2 Land above the 1:100-year design flood level within lots that back onto a stormwater management facility, when no overflow is provided, shall be protected by a restrictive covenant registered against the title of the property.

  .1 The restrictive covenant shall indicate that the land is subject to flooding and that the owner will not construct any permanent structures susceptible to flood damage.

.3 If the provision of public access to the shoreline is being considered, fencing of a uniform type shall be constructed by the Developer along the 100-year event elevation to separate public from private lands.

.4 Noxious Industrial land uses are considered unacceptable adjacent to or upstream of stormwater management facilities.

.5 Minimum lot dimensions and rear yard depths, as measured from the property line, shall conform to the requirements of the Municipality's Land Use Bylaw and relevant Area Structure Plan (if available).

C3.22.2.9 Legal Liability and Safety

.1 Given that primary water contact (i.e., swimming and wading) will be forbidden, supervision will not be provided.

.2 Proper and adequate signage to alert people to the potential hazards ("No Swimming – Deep Water", "Subject to Flooding", etc.) shall be provided by the Developer; refer to **Typical Detail B3-600**.

.3 Fencing of municipal park areas shall be determined during the detailed design stage in consultation with the Municipality and shall be provided by the Developer.

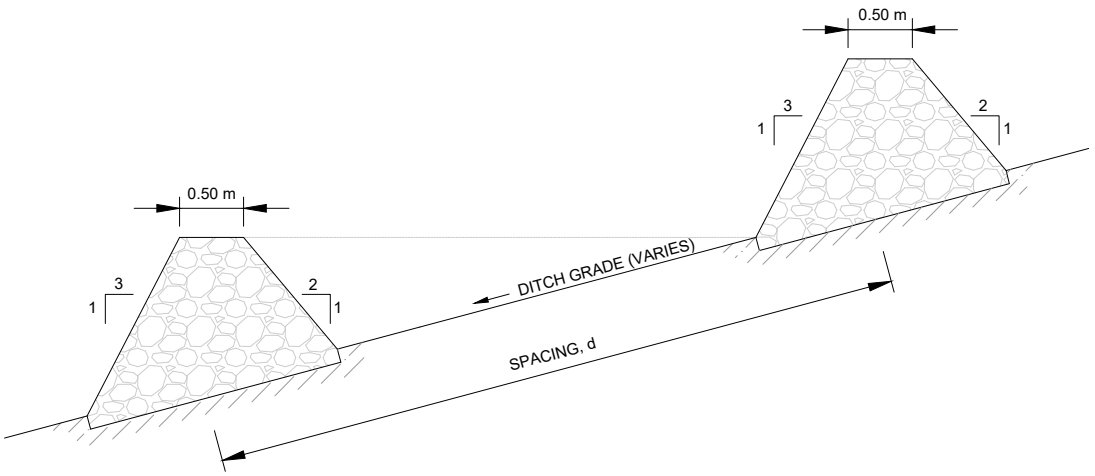
C3.23 Erosion Control

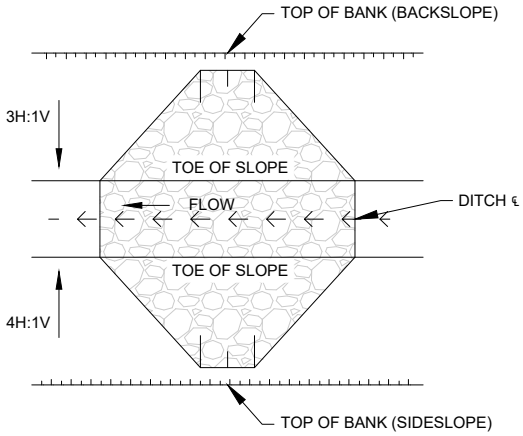
.1 All storm drainage systems, including pipe outlets and other drainage channel outlets or overflows, shall be designed to control erosion that may result from piped or overland stormwater flows and discharge into the storm drainage system.

C3.24 Typical Details – Rural Storm Drainage Systems

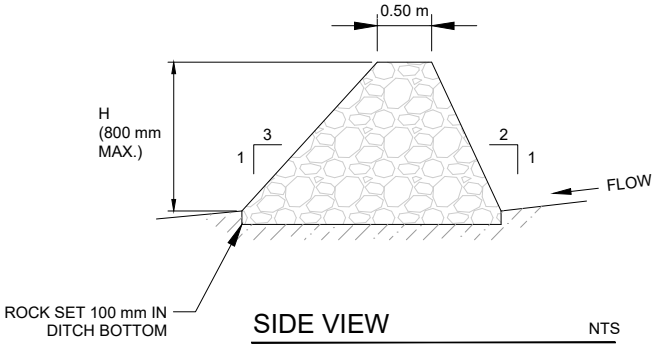
Standard Detail No.	Title
C3-100	Rock Check Dam

TYPICAL DETAIL	C3-100	
Date: JULY 2023		Rev. 0

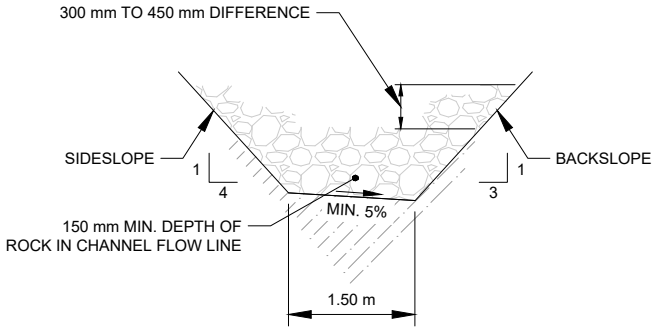




TOP VIEW NTS



SIDE VIEW NTS



FRONT VIEW NTS

NOTES:

(1) ROCK TO BE 75 mm TO 300 mm MIN.

(2) SUITABLE FOR FLOW VELOCITY NOT EXCEEDING 1.5 m/s.

(3) SUITABLE FOR DRAINAGE AREAS NOT EXCEEDING 4 ha.

(4) SUITABLE FOR GRADES FROM 5% TO 8%.

(5) SPACING (d) AND ROCK SIZE (D_{50}) TO BE DETERMINED BY ENGINEER BASED ON HYDRAULIC CONDITIONS.

(6) THIS DETAIL IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE-SPECIFIC DESIGN IS REQUIRED FROM DESIGNER/ENGINEER.

D_{50} OF ROCK (mm)	MAXIMUM FLOW DEPTH OVER ROCK (mm)
75	50
150	100

SUGGESTED ROCK DIAMETER AND OVERFLOW DEPTHS

Scale:	Not To Scale
Drawn By:	D.C.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Rock Check Dam

C4 WATER DISTRIBUTION SYSTEM

C4.1 General

.1 **Section C4** covers the design and construction of Rural watermains and appurtenances to be built or re-built in the Smoky Lake Region.

.2 For requirements pertaining to full pressure water distribution systems, refer to **Section B4**.

.3 Refer to the **Typical Details** at the end of **Section C4** for details relating to the construction of Rural water distribution systems.

.4 This section provides the minimum acceptable standard for general construction requirements, construction materials, and construction procedures.

.1 These standards may be exceeded wherever appropriate.

.2 Good engineering practices and designs must prevail on all projects.

.5 Trickle fill water distribution systems and/or truck fill service shall be considered for Rural developments, unless otherwise specified by the Municipality.

.1 In a trickle fill water distribution system, a small-diameter distribution pipe supplies water to a private water storage facility (holding tank/cistern) on each lot.

.2 The small-diameter pipe and the ability to operate at lower pressures than conventional water distribution systems make this an economical alternative of providing domestic water distribution without fire suppression.

.3 A trickle fill water distribution system may be appropriate for retrofitting existing Rural areas serviced by truck fill systems, as the trickle fill system can be plumbed into existing cisterns.

.4 The implementation of a trickle fill water distribution system will only be accepted on a neighbourhood-wide basis, in agreement with the appropriate Area Structure Plan, **Section C4**, and at the Municipality's discretion.

.5 Application for a trickle fill service connection must include detailed engineering design drawings of the service pipe, holding tank/cistern, and plumbing/mechanical details.

C4.2 Design Flow

.1 Trickle fill water distribution systems and truck fill service shall be designed in accordance with the design manual of the American Water Works Association (AWWA) as part of the overall municipal distribution system.

.2 The system shall be capable of delivering the peak day demand.

.3 Velocities shall not exceed 1.5 m/s during normal operation.

.4 The rate of water demand is based on Residential population. The water demand shall be based on the ultimate subdivision design population in the Area Structure Plan or, if the ultimate subdivision design population is unknown, based on a country Residential population density of 5 people/ha.

.5 The minimum per capita water demands for Rural areas within the Smoky Lake Region are as follows:

Land Use	Water Demand
Average Day Demand (ADD) – Trickle Fill	240 L/c/d
Average Day Demand (ADD) – Truck Fill	120 L/c/d
Peak Day Demand (PDD)	2.5 times ADD

C4.3 Design Computations

.1 Use Hazen-Williams formula:

$Q = CD^{2.63}s^{0.54} * 278.5$

Where: Q = Rate of flow (L/s)
D = Internal pipe diameter (m)
s = Slope of hydraulic grade line (m/m)
C = Roughness coefficient, as per **Table C4-1**

Table C4-1
Hazen-Williams Roughness Coefficients for Watermains

Pipe Material	Roughness Coefficient, C
High Density Polyethylene (HDPE)	130

.2 Network analysis shall be by the Hardy-Cross method or a suitable computer program.

C4.4 Pressure Requirements

.1 Pressures within a trickle fill water distribution system shall be in accordance with the following:

Scenario	Pressure
Minimum pressure at peak demand (at property line)	140 kPa
Maximum allowable pressure	550 kPa

C4.5 Minimum Main Pipe Diameter

.1 Watermain size requirements shall be confirmed by a Water Network Analysis (WNA) and may be increased, as considered necessary by the Municipality, to accommodate future development. In no case shall the diameter of a trickle fill water distribution main be less than 50 mm.

.2 A report from the Developer's Consultant is required to ensure that pipe sizing has been determined with consideration for the topography and population projections of the service area.

C4.6 Dead Ends

.1 Every effort is to be made to minimize the occurrence of dead-end watermains. Except in cul-de-sacs of less than 120 m length, all watermains shall be looped.

.2 All dead-end watermains shall be provided with a dry hydrant for flushing/maintenance purposes.

C4.7 Location

.1 Watermains shall be located within the municipal road right-of-way as per the typical cross-section (**Typical Detail C1-100**).

.2 Utility rights-of-way shall be provided for all utilities not located within road rights-of-way or PULs.

- Minimum width of 6 m is required for one or two utilities
- Minimum width of 8 m is required for three utilities

.3 Services shall be located under landscaped areas, offset 1 m from the driveway/approach as per **Typical Detail C2-400**.

.4 Watermains shall maintain the following clearances from other infrastructure:

- Minimum 3.0 m horizontal clearance from sanitary sewers, unless sewer depth requires increased spacing;
- Minimum 2.0 m horizontal clearance from power/telephone/cable infrastructure (including services, streetlights, and power poles);
- Minimum 0.5 m vertical clearance above or below utilities at crossings;
- Minimum 3.5 m horizontal clearance from trees.

C4.8 Minimum Depth of Cover

.1 Minimum depth of cover shall be 3 m from finished grade to pipe crown, unless otherwise recommended by the geotechnical report or the Engineer of Record, and shall be sufficient to:

- Prevent freezing; and
- Clear other underground utilities.

.2 When it is not feasible to provide 3 m depth of cover from finished surface to pipe crown, the watermain shall be insulated as per **Typical Detail C4-300**.

C4.9 Valving

.1 In general, valves shall be located as follows:

.1 Outside of intersections, in line with the corner cuts of the street:

- 3 valves at cross intersections; and
- 2 valves at tee intersections.

.2 Valves shall be located a minimum of 30 m from arterial or highway intersections.

.3 Valves shall be provided at both ends of PULs, walkways, and easements, located 0.5 m from the property line, inside municipal right-of-way.

.4 A maximum of 4 valves shall be closed to isolate any one section of watermain.

C4.10 Blow-off Locations

.1 A blow-off shall be located at each high point along the trickle fill water distribution system.

C4.11 Service Connections

.1 Refer to **Typical Details C4-200** for service connection installation details.

.2 A water demand of 2.0 L/min/unit restricted flow feeding into an on-lot cistern with proper storage capacity shall be used to confirm the service size for a single residential application.

.3 A water service for a country Residential residence shall have a minimum diameter of 25 mm or 38 mm, as determined by the Developer's Consultant, and shall be HDPE DR11.

.4 Water and sanitary services shall have a minimum horizontal separation of 0.3 m from each other and shall be installed in a common service trench.

.5 Water services shall have a minimum depth of cover of 2.75 m at the property line, measured from finished grade to pipe crown. Water services shall be insulated at ditch crossings.

.1 Services with less than 2.75 m of cover shall be insulated.

.6 Services shall terminate 1 m past the property line or 1 m past the shallow utility Easement.

.7 Services shall be located such that they do not conflict with driveway locations, offset 1 m from the driveway/approach as per **Typical Detail C2-400**.

.8 Pack joint curb stops shall be a minimum of 1.8 m from power infrastructure located in the shallow utility Easement.

.9 Service connections shall be made by means of a fused saddle or fused in-line tee.

.10 All fittings and joints must be assembled by electro-fusion or butt-fusion for HDPE piping.

.11 Services shall be one piece; no mechanical connections are permitted between the main connection and service valve.

.12 The minimum distance between corporation (main) stops shall be 600 mm.

C4.12 Thrust Blocking

.1 Should the Developer's Consultant determine that thrust blocking is required for a trickle fill water distribution system, the thrust blocks shall meet the requirements of **Section B4.12**.

C4.13 Chamber Drainage

.1 Chambers or manholes containing valves, blow-offs, meters, or other appurtenances shall not be connected directly to a sanitary sewer by gravity, nor shall blow-offs or air release valves be connected to any sewer.

.2 Such chambers or manholes shall be:

- Drained to absorption pits underground where they are above the groundwater table; or
- Pumped to a sanitary sewer.

.3 Chambers shall be insulated to prevent freezing where necessary.

C4.14 Service Connection Abandonment

.1 If an existing service connection is to be abandoned, the main stop shall be closed and the service pipe shall be cut at the goose neck and removed.

C4.15 Truck Fill Water Systems

.1 Where a piped distribution system is impractical and individual landowners supply their own storage of water in the form of holding tanks or cisterns, the following general standards shall be followed:

.1 Clearances as required by the Safety Codes Council and Alberta Environment.

.2 Fill points for tanks shall be easily accessible and kept clear of obstructions.

.3 The recommended tank size is 4,500 L or larger, as determined by the Developer's Consultant.

.4 The on-lot truck fill infrastructure shall be protected from freezing.

.5 The holding tank or cistern shall be protected from surface water inflow.

.6 Adequate venting shall be provided.

.7 The holding tank or cistern shall be complete with a lockable cover and external fill gauge.

.8 Water meters with remote external readers are required.

.9 The access road to the holding tank/cistern shall be designed to accommodate a loaded water truck's wheel loads.

.2 Where groundwater will be the source of water supply, the on-lot water system shall be in accordance with applicable Alberta Environment guidelines.

C4.16 Materials and Specifications

C4.16.1 Pipe

.1 Pipe materials shall be selected using a rational design method, with the following information as a guide.

.2 The Developer's Consultant is responsible to ensure that the selected pipe material and class is suitable for the proposed application (site conditions, depth of installation, method of installation, etc.).

.3 Alternative pipe materials will be evaluated through a variance request submitted by the Developer's Consultant. Developer's Consultant shall provide a justification for the request for variance.

.4 Alternative pipe materials shall not be installed without receiving written authorization from the Municipality.

Table C4-2
Acceptable Pipe Materials for Watermains

Material	Specification
High Density Polyethylene (HDPE)	AWWA C906, DR11 or approved

C4.16.2 Fittings

.1 Main connections shall be made by means of a fused saddle or fused in-line tee.

.2 All fittings and joints must be assembled by electro-fusion or butt-fusion for all HDPE piping. No mechanical connections are permitted.

Table C4-3
Acceptable Materials for Fittings

Material	Specifications
High Density Polyethylene (HDPE)	AWWA C906, DR11 or approved

C4.16.3 Cathodic Protection

.1 Cathodic protection for buried **non-steel metallic valves**:

.1 All buried non-steel metallic valves shall be cathodically protected with 2.3 kg zinc anodes.

.2 Zinc anodes shall conform to ASTM B418.

.3 Refer to **Typical Detail B4-400** for typical anode installation.

.2 **Anode Requirements**:

.1 Zinc anodes shall be Type II in accordance with ASTM B418.

.2 The anode container shall consist of a water permeable cardboard tube or bag.

.3 The anode shall be centered in the tube and backfilled with material sufficient to cover all parts of the anode to a minimum thickness of 25 mm.

.4 The backfill material shall possess a maximum resistivity of 50 ohm-cm when wet and as measured by the soil box method in ASTM G57.

.5 The water used for wetting the backfill should be distilled or demineralised and no more than 15% - 20% water by weight should be added.

C4.16.4 Bedding Materials

.1 Bedding material for pipes shall conform to **Typical Detail B2-100** and the gradation identified in **Section C2.17.3**.

C4.16.5 Trench Section

.1 Trench section material shall be in accordance with **Section C2.17.4**.

C4.16.6 Gate Valves

.1 Gate valves shall be in accordance with AWWA C509 and the following:

.1 Gate valves shall have an epoxy-coated iron body, bronze mounted, and are to be cathodically protected. Refer to **Typical Details**.

.2 Bolts shall be wrapped with Denso paste and tape.

.3 Valves shall be resilient seat gates with non-rising stem, to open by turning in a counterclockwise direction.

.4 The position of the valve in line shall be vertical.

.5 Stem seals shall be O-ring.

.6 Valve boxes with operating stem and 50 mm square operating nut are required on all valves. All valve boxes shall be sliding Norwood Type A or approved equivalent.

C4.16.7 Service Connections

.1 **Water Service Pipe**:

.1 Approved materials for water services and associated appurtenances are listed in **Tables C4-4** through **C4-6**.

.2 Services shall be HDPE DR11.

.2 **Water Service Fittings**:

.1 Service connections shall be made by means of a fused saddle or fused in-line tee.

.2 All fittings and joints must be assembled by electro-fusion or butt-fusion for HDPE piping.

.3 Services shall be one piece; no mechanical connections are permitted between the main connection and service valve.

.4 Curb stop shall be copper to copper invert and key stop and drain.

.5 Non-draining curb stops are to be provided in areas with high water table.

.6 All fittings shall be able to withstand a test pressure of 1,035 kPa.

Table C4-4
Acceptable Materials for Pack Joint Corporation (Main) Stops

Manufacturer	Model/Type	Comments
Ford	F1001	Conforming to AWWA C800, or approved equivalent suitable for HDPE *must have appropriate stiffener

Table C4-5
Acceptable Materials for Pack Joint Curb Stops

Manufacturer	Model/Type	Comments
Ford	B77	Conforming to AWWA C800, or approved equivalent suitable for HDPE *must have appropriate stiffener

Table C4-6
Acceptable Materials for Trickle Fill Services

Material	Specifications
High Density Polyethylene (HDPE)	AWWA C906, DR11 or approved

C4.16.8 Tracer Wire

.1 All underground non-metallic pressure pipe systems shall be installed with a continuous tracer wire.

.2 For open trench installations, tracer wire shall be a minimum 12 gauge solid copper wire with plastic coating, attached to the piping system every 3 m with PVC tape.

.3 For trenchless installations, tracer wire shall be a minimum 12 gauge copper cladded high strength steel wire.

.4 The wire shall terminate above ground at every valve box and air release valve.

.1 The wire shall be of sufficient length to allow the wire to be uncoiled and extended 0.3 m above ground.

.5 Where spliced-in connections occur, a manufacturer-approved watertight direct bury connector shall be used to provide electrical continuity.

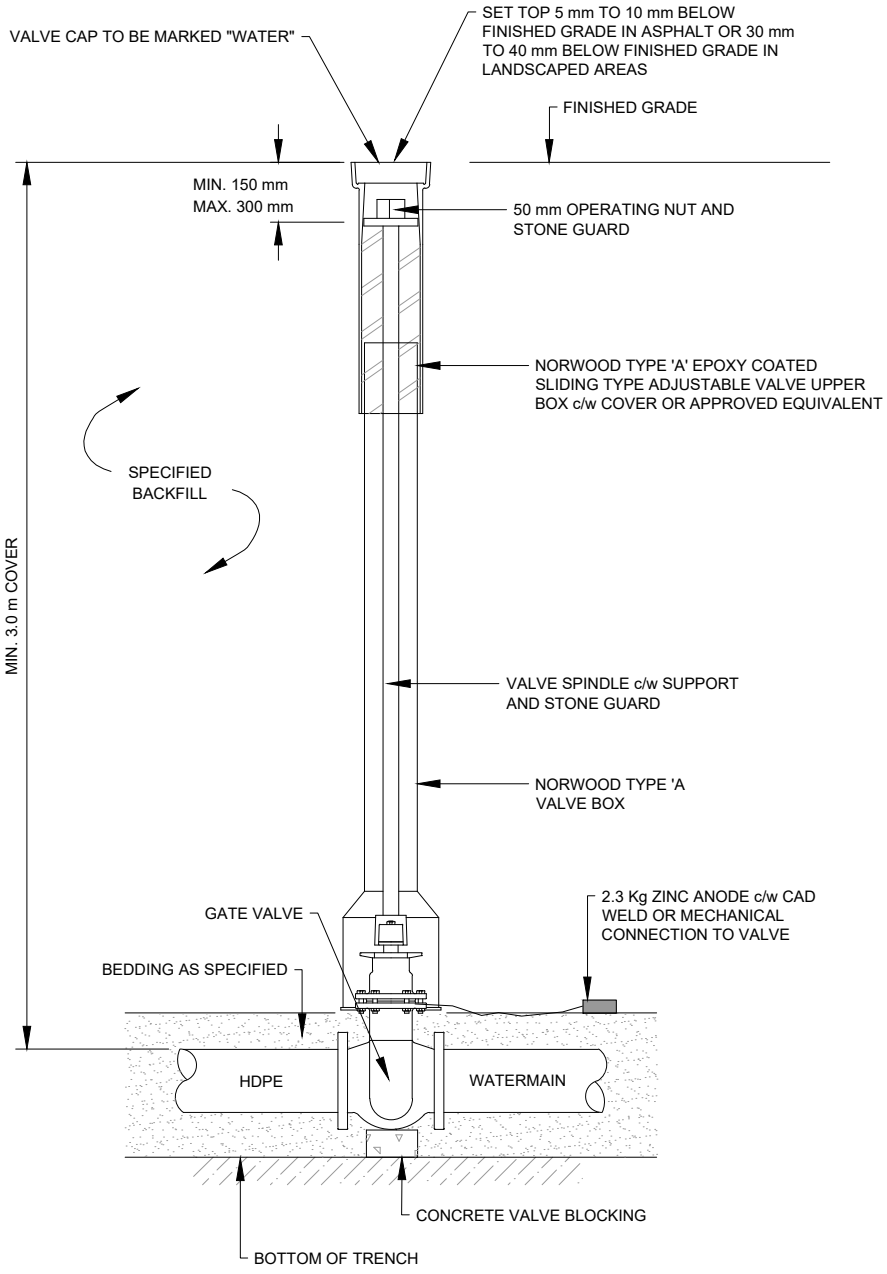
.6 The Developer shall provide a tracer wire report to the Municipality, conforming the lines were able to be located with locating equipment.

.7 Tracer wire installation shall be considered complete and acceptable when the Municipality can locate the underground infrastructure using locating equipment.

C4.17 Typical Details – Rural Water Distribution Systems

Standard Detail No.	Title
C4-100	Valve Installation
C4-200	Trickle Fill Water Service Connection
C4-300	Pipe Insulation

TYPICAL DETAIL	C4-100	
Date: JULY 2023		Rev. 0



NOTES:

(1) SHOULD THE DEVELOPER'S CONSULTANT DETERMINE THAT THRUST BLOCKING IS REQUIRED FOR THE TRICKLE FILL WATER DISTRIBUTION SYSTEM, THE THRUST BLOCKS SHALL MEET THE REQUIREMENTS OF SECTION B4.12.

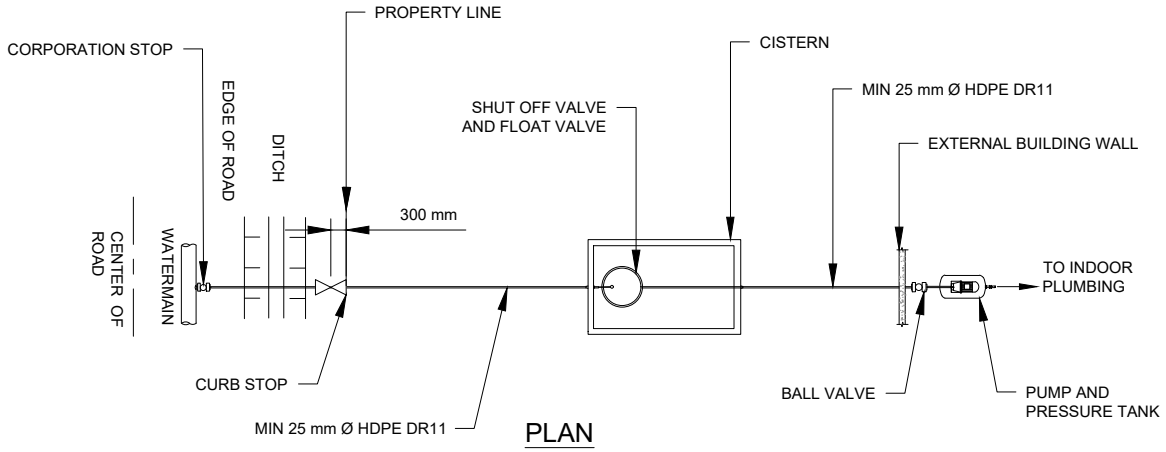
(2) BOLTS SHALL BE WRAPPED WITH DENSO PASTE AND TAPE

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

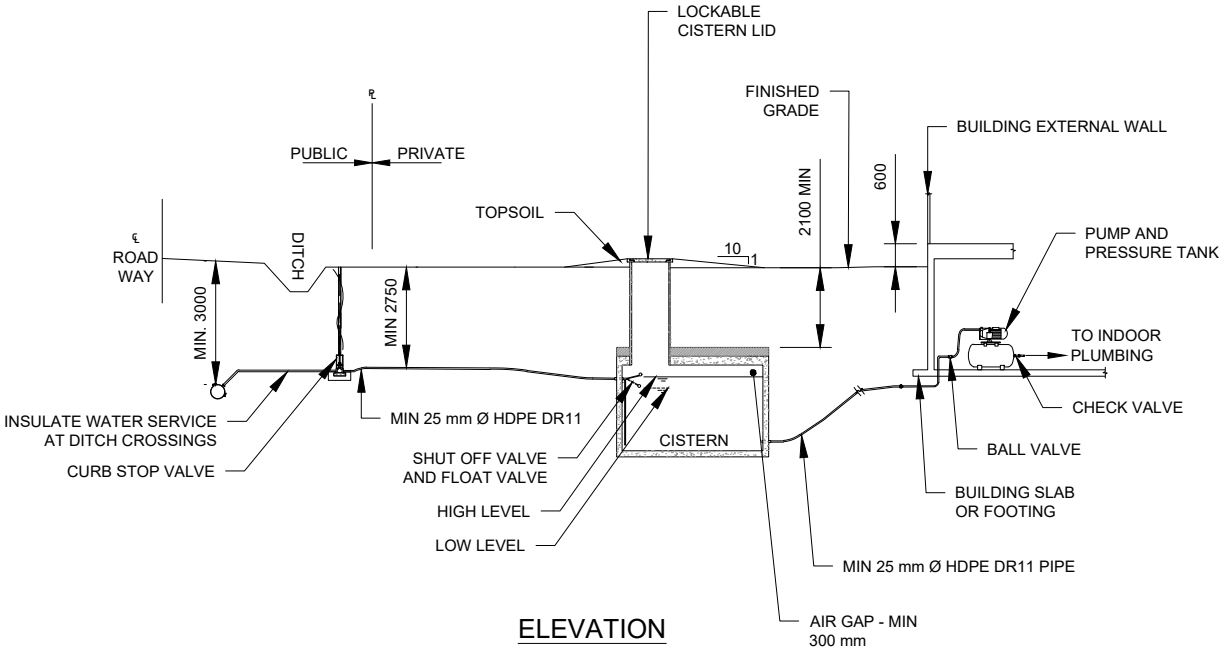
SMOKY LAKE REGION

Valve Installation

TYPICAL DETAIL	C4-200	
Date: JULY 2023		Rev. 0



PLAN



ELEVATION

NOTES:

(1) FLOW METER TO BE INSTALL BY MUNICIPALITY.

(2) DIAMETER OF HDPE SERVICE PIPE TO BE UNIFORM FROM CORPORATION STOP TO WATER METER.

(3) MINIMUM COVER OVER SERVICE PIPES TO BE 2.75 m AS SHOWN.

(4) SERVICE CONNECTION RECORDS TO SHOW ELEVATIONS AND LOCATION OF SERVICE FITTINGS.

(5) ALL DIMENSIONS SHOWN IN MILLIMETERS UNLESS NOTED OTHERWISE.

(6) THIS DETAIL IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE-SPECIFIC DESIGN IS REQUIRED FROM DESIGNER / ENGINEER.

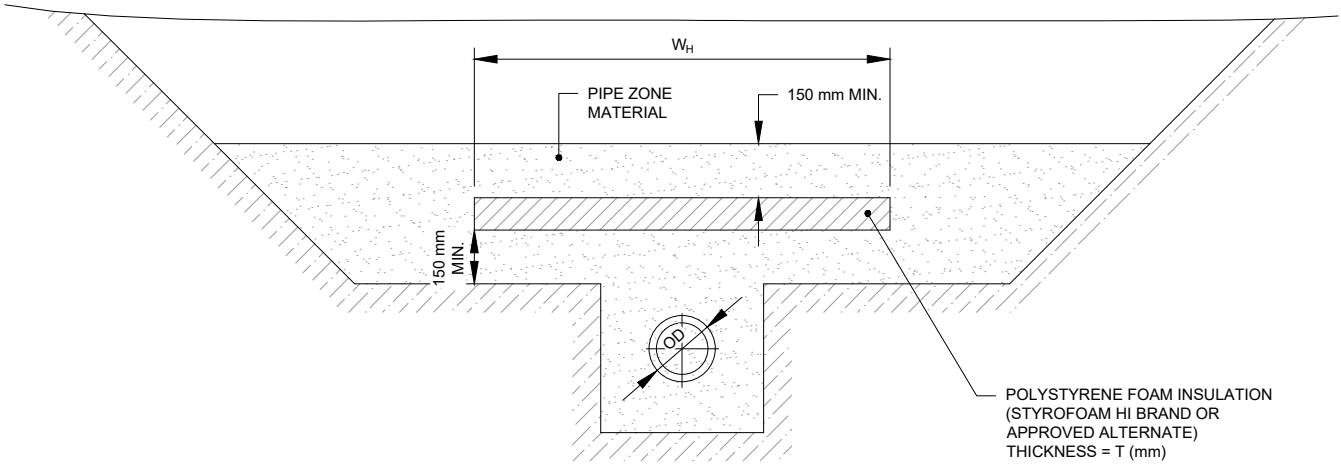
Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

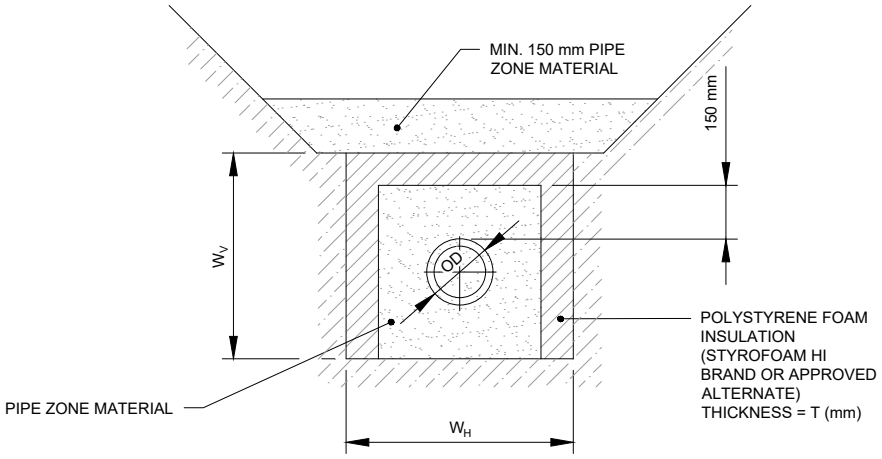
SMOKY LAKE REGION

Trickle Fill Water Service Connection

TYPICAL DETAIL	C4-300
Date: JULY 2023	Rev. 0



SHEET INSULATION



BOX INSULATION

X (m)	T (mm)	WIDTH OF INSULATION (W) FOR OUTSIDE PIPE DIAMETERS (m)		
		0.050	0.075	0.100
1.6	65	2.6	2.6	2.6
1.8	50	2.2	2.2	2.2
2.0	50	1.8	1.8	1.8
2.2	40	1.4	1.4	1.4
2.4	25	1.0	1.0	1.0
2.6	25	0.6	0.6	0.6

NOTES:

X = DEPTH FROM GROUND SURFACE TO BOTTOM OF INSULATION (METRES)
W = WIDTH OF INSULATION (METRES) = $W_H + 2(W_V)$
OD = OUTSIDE DIAMETER OF PIPE

THIS TABLE HAS BEEN GENERATED BASED ON A FROST DEPTH OF 3 m. IF THE GEOTECHNICAL REPORT SPECIFIES A DIFFERENT FROST DEPTH, THE CONSULTANT IS RESPONSIBLE FOR CONFIRMING THE WIDTH OF ANY REQUIRED INSULATION.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

SMOKY LAKE REGION

Pipe Insulation

C5 FRANCHISE UTILITIES

C5.1 General

.1 All work necessary for the installation of gas, power, street lighting, telephone, and cable shall be the responsibility of the Developer and the installation of these utilities will be a condition of development.

.2 In addition to the financial responsibilities, the Developer must initiate and coordinate the design, approval, and construction of these services. The actual design and construction of each utility is normally handled by the respective utility company.

.1 If ATCO Electric's (or Lakeland REA's, or service provider's, as amended) turnkey process is being implemented, the Developer will be responsible for completing the design and construction of the power, streetlights, communications, and possibly gas.

.3 Four-party trenching (one common trench for telephone, cable, gas, and electric) located within a 3.5 m Easement on property is an accepted trench configuration; refer to **Typical Detail B5-100**.

.4 **Section C5** provides some of the basic procedures and requirements for the installation of franchise utilities in Rural areas.

.5 **Section B5** provides some of the basic procedures and requirements for the installation of franchise utilities in Urban areas.

C5.2 Design Standards

C5.2.1 Design and Approval

.1 To coordinate design of gas, power, street lighting, telephone, and cable systems, it is necessary to first classify and designate cross-sections for each street (and walkway) within a subdivision area, in relation to **Typical Detail C1-100**.

.2 Upon approval of a tentative Subdivision Plan, the Developer's Consultant shall circulate to each utility company copies of the approved Subdivision Plan, complete street classifications, utility alignments, and any other information the utility companies may require.

.1 The utility companies shall indicate on this plan their basic design, complete with all rights-of-way, easements, and PUL requirements, and return it to the Developer's Consultant.

.1 If ATCO Electric's (or Lakeland REA's, or service provider's, as amended) turnkey process is being implemented, the Developer will be responsible for completing the design and construction of the power, streetlights, communications, and possibly gas.

.3 After checking for and eliminating potential conflicts, the Developer's Consultant shall prepare a servicing plan showing all franchise utilities on a site plan. This site plan will also show the Municipal Improvements.

.4 This plan shall then be circulated to, and approved by, the respective utility companies. The plan will then be included with the other engineering drawings submitted by the Developer's Consultant to the Municipality for acceptance.

C5.2.2 Location of Utilities

.1 Underground power is preferred; however, for isolated Rural applications where the installation of buried power may not be practical, aboveground power may be acceptable to the Municipality.

.1 Power poles shall be located 1 m from the property line, inside the road right-of-way, when no trees are present; unless otherwise required by the authority having jurisdiction.

.2 When trees are present, power poles shall be located 5 m from the property line, inside the road right-of-way; unless otherwise required by the authority having jurisdiction.

.2 All distribution cables for primary and secondary power, telephone, cable, and streetlight feeders, may be installed in one common 300 mm wide trench at the required alignment.

.3 Streetlights shall be placed at locations not interfering with proposed driveways and shall be located in line with the extensions of common property lines between two lots, or as otherwise required by ATCO Electric (or Lakeland REA, or service provider, as amended).

.4 The minimum depth of cover over shallow utilities shall be 1 m from finished grade, or as required by the franchise utility.

C5.2.3 Separation from Other Utilities

.1 The franchise utilities shall be separated from the deeper municipal utilities (i.e., water, sanitary sewer, and storm sewer) by not less than 3.0 m laterally. Refer to the typical cross-section at the end of **Section C1**.

.2 A separation of 1.2 m from other franchise utilities is also required; common (four-party) trench installations excepted.

C5.3 Installation

C5.3.1 Road Crossings

.1 Adequate ducts shall be installed under roadways prior to their construction to accommodate the installation of power, telephone, and cable.

.2 Where the road crossings are installed after the construction of road improvements, they shall be installed via an appropriate trenchless method to avoid disruption of the surface improvements.

C5.3.2 Site Preparation

.1 The Developer shall pre-grade all ditches and/or easements to within ±150 mm of finish grade where franchise utilities are to be installed in accordance with the franchise utilities' standards.

C5.3.3 Survey and Record Information

.1 The Developer shall be responsible for laying out all work, lines, and levels as required to proceed with the entire installation and for the preservation of all such stakes and marks during construction.

.2 Record information (shapefiles) shall be provided to the Municipality for incorporation into the Regional GIS database.

C5.3.4 Compaction of Trenches

.1 All trenches located on municipal property or within municipal easements are to be compacted to the following standards:

- 95% SPMDD for trenches in ditches and landscaped areas.
- 97% SPMDD for trenches under roadways, with the top 300 mm of subgrade material compacted to 100% SPMDD.
- Restore granular course to a thickness matching that of the existing roadway, compacted to 100% SPMDD.

C5.3.5 Rights-of-Way, Easements, and Public Utility Lots

.1 The Developer shall provide, to the satisfaction of the utility companies, rights-of-way, easements, or PULs to accommodate the utility servicing, registered in the name of the Municipality.

.2 Easements shall be registered on each lot prior to the sale of any lot in the development area.

C6 LANDSCAPING, SITE FURNISHINGS, AND FENCING

C6.1 General

.1 **Section C6** provides an outline for the minimum requirements for development of Public Lands (Open Spaces and Roadways) in Rural areas.

.2 **Section B6** provides an outline for the minimum requirements for development of Public Lands (Open Spaces and Roadways) in Urban areas.

.3 **Typical Details** relating to landscaping, site furnishings, and fencing are provided at the end of **Section C6**.

C6.2 Public Lands

C6.2.1 Open Space

.1 **Open Spaces** include Public Land that is classified as Municipal Reserve Lots (Parks), Environmental Reserve Lots, Public Utility Lots, Stormwater Management Facilities, and Utility Corridors.

C6.2.2 Roadways

.1 These are classified as arterial, collector, and local road rights-of-way (ROWs). The landscape of these ROWs may include the roadside ditches and entry feature areas (where applicable).

C6.3 Supplementary Definitions

.1 The following words shall have the meaning hereinafter assigned to them:

Term	Definition
Restoration	The process of fully re-establishing a target level of ecosystem function and biodiversity to a degraded habitat, as defined by the reference habitat. This includes species composition and vegetation community structure.
Naturalization	The deliberate reintroduction of species that are native to a given area or are well adapted to the climate circumstance; activities that are intended to improve and enhance the natural environment. The biodiversity and ecosystem function of a naturalized ecosystem is lower compared to a reference habitat but higher compared to a reclaimed ecosystem.
Reclamation	A type of habitat restoration that aims to stabilize disturbed lands to an ecologically productive use. A reclaimed ecosystem has less biodiversity and ecosystem function compared to a reference habitat, and the least compared to other types of habitat restoration.
Low Impact Development (LID)	A land development and stormwater management approach that works with nature to manage stormwater as close to the source as possible. LID focuses on maintaining and restoring the natural hydrological processes of a site.

C6.4 Reference Documents

.1 The following documents are a source of additional information and are referenced within this document:

- Canadian Nursery Stock Standard Ninth Edition, Canadian Nursery Landscape Association (CNLA);
- Landscape Alberta Nursery Trades Association (LANTA); and
- Weed Control Act.

C6.5 General Guidelines

.1 The following general landscape requirements apply to all public lands noted above and establish the minimum requirements for landscape development in Rural areas.

.2 All landscaping is to be designed to minimize maintenance costs and labour.

.3 Practices such as xeriscaping and zero-scaping are encouraged, where appropriate, and will be subject to acceptance by the Municipality.

C6.5.1 Plant Material Protection

.1 Plant material to be preserved on the site shall be of high quality and worthy of preservation.

.1 All plant material to be preserved shall be accepted by the Municipality.

.2 All plant material to remain on site shall be protected during all work on the site.

.1 Protection will be required for trunks, branches, and root systems of all plant material to be saved.

.3 Passage of heavy equipment, stockpiling of gravel, soil, or building materials and spillage of gasoline, oil, solvents, and other chemicals will not be allowed under the tree canopy.

.4 Temporary fencing will be required around all plant material to be preserved.

.5 Existing grades around plant material are to be retained.

.1 If existing grades around plant material to remain are altered (either raised or lowered), the Developer will be responsible for constructing remedial measures to compensate for the grade changes.

.6 If the grade or elevation of surrounding land is altered in a manner which will adversely effect retained plant material, the Developer will be responsible for all remedial work.

.1 Plant material must not suffer from any grade changes.

.2 The Developer will also be responsible for replacing all plant material that has died or suffered due to construction disturbance or grade changes.

.7 Landscaped areas are to have a maximum slope of 3H:1V.

.1 Slopes in excess of 3H:1V will require additional erosion control measures and are subject to acceptance by the Municipality.

.8 If grades are to be lowered, two remedial techniques will be acceptable to the Municipality:

- Tree mounds; and
- Retaining walls.

.9 The Developer will be responsible for supplying water to plant material where the grades have been lowered, for the first growing season.

C6.5.2 Topsoil

.1 Topsoil shall be free of stones larger than 25 mm in diameter, debris, quack grass, restricted noxious weeds, any other plants, and inorganic matter.

.2 Topsoil for vegetative purposes shall be tested for N, P, K, Mg, soluble salt content, and pH value. The Developer shall be responsible for all appropriate soil testing.

.3 Any chemical deficiencies indicated by the soil analysis report shall be rectified by the application of the appropriate fertilizers and additives.

.4 Topsoil shall consist of fertile natural loam containing a maximum of 10% organic matter by dry weight, maximum 40% sand, maximum 30% clay, and minimum 30% silt by dry weight.

.5 Topsoil shall have a hydrogen ion concentration ranging from pH 6.0 to pH 7.5, shall contain no toxic materials, and shall be capable of sustaining vigorous plant growth.

.6 If organic material is required to meet the organic matter specification for topsoil listed above, peat moss shall be added in the field and mixed with cultivation equipment. The peat moss shall meet the following specifications:

- Shall be free of toxic material, live plants, live roots, and seeds;
- Shall be delivered in a pulverized condition; and
- The source shall be approved prior to mixing with the topsoil.

.7 Topsoil shall be spread over the entire area to be seeded and shall be applied to a compressed depth of no less than 150 mm.

.8 Areas for planting beds shall be excavated and filled with topsoil to a depth of 600 mm below finished grade.

C6.5.3 Seeding

.1 Seeding will be accepted as a means to restore disturbed areas of established turf, at the discretion of the Municipality.

.2 Grass seed shall be certified Canada #1 Grade Seed, meeting the requirements of the Seed Act of Canada. The seed is to be delivered in the original containers giving the following information:

- Analysis of seed mixture;
- Percentage of pure seed production;
- Year of seed production;
- Net weight;
- Date when bagged and location; and
- Name of supplier.

The Developer shall provide proof upon request of Certification of Compliance with the Canadian Wheat Board Act (Seeds Act).

.3 Composition of Seed Mixtures shall be:

Roadside *	Wet Meadow **
30% Yukon Tall Fescue	20% Titan Timothy
25% Dahurian Wild Rye	35% Yukon Tall Fescue
10% Tall Wheatgrass	35% Carlton Smooth Brome
25% Carlton Smooth Brome	10% Reed Canary Grass
10% Slender Wheatgrass	

* Roadside seed mix shall be Prostock Saline Area Blend by UFA or approved alternate.

** Wet Meadow seed mix shall be Prostock Low Area Blend by UFA or approved alternate.

.4 Seed must be capable of producing a minimum germination rate of 75% in a germination test.

.5 All areas to be seeded shall be given a layer of topsoil as specified in **Section C6.5.2**.

.6 Before seeding, the topsoil surface shall be brought to a firm, even but fine graded condition, without local depressions or elevations by dragging, raking, rolling, or other suitable means. The degree of firmness shall be such that footprints in the prepared surface shall penetrate not less than 6 mm and not more than 12 mm.

.7 All pebbles, stones, roots and debris shall be removed from the finished soil surfaces.

.8 The seed shall be evenly applied at a rate of not less than 3.5 kg per 100 m^2.

.9 Seeding shall not be carried out in wind velocities above 8 km/hr.

.10 After application of the seed, the seed shall be incorporated into the soil with wire rakes or some other suitable means. After the seeded area has been raked, the seeded area is to be rolled with a light turf roller.

.11 After seeding, the Developer shall give the seeded area a light watering with a fine spray to an absorbed depth of not less than 25 mm.

.12 The seeded area shall be appropriately maintained by the Developer; i.e., watering, rolling, fertilizing, until the time of final inspection and acceptance by the Municipality.

.13 Appropriate Maintenance to be determined by weather conditions, soil conditions, time of year and growing condition of the seed. A 2 year Maintenance schedule is to be submitted to the Municipality for acceptance at the time of the CCC inspection.

.14 At the time of final inspection and acceptance by the Municipality, the grass shall:

- Be mowed to a minimum height of 50 mm if area is to be maintained;
- Cover 100% of the seeded area;
- Be completely weed free;
- Be completely free of thin, bare, and dead spots; and
- Be in an overall healthy growing condition, satisfactory to the Municipality.

.15 The Developer shall be responsible for providing and maintaining adequate barricades and signs to warn traffic entering the seeded area until the time of final inspection and acceptance by the Municipality.

C6.5.4 Hydroseeding

.1 Hydroseeding will be acceptable on steep slopes, in hard to reach areas, and for large areas to be seeded. Areas to be hydroseeded must be accepted by the Municipality.

.2 All areas to be hydroseeded shall be given a layer of topsoil as specified in **Section C6.5.2**.

.3 Before hydroseeding, the topsoil surface shall be brought to a firm, even but fine graded condition, without local depressions or elevations by dragging, raking, rolling, or other suitable means. The degree of firmness shall be such that footprints in the prepared surface shall penetrate not less than 6 mm and not more than 12 mm.

.4 All pebbles, stones, roots, and debris shall be removed from the finished soil surface.

.5 Water used for hydraulic and wood cellulose fibre mulching shall be free of any impurities which would inhibit germination or otherwise adversely affect the growth.

.6 The material used for mulching shall be specially prepared wood cellulose fibre or an equal substitute. It shall contain no growth or germination inhibiting factors and shall form, after application, a blotter like ground cover which will allow absorption and percolation of water.

.7 The tackifier shall be an approved non-asphalt product, water dilatable with no detrimental effects on germination or existing plants.

.8 Seed shall be applied evenly at a rate of not less than 3.5 kg per 100 m^2. Seed type as specified in **Section C6.5.3**.

.9 A suitable fertilizer shall be applied at a rate of 11 kg per 100 m^2.

.10 Grass seed and fertilizer shall be thoroughly mixed and uniformly distributed by means of an approved hydraulic seeder over the area to be hydroseeded.

.11 The work shall be done only in good weather and on ground free of frost, snow, ice, and standing water.

.12 The hydroseeded area shall be appropriately maintained by the Developer; i.e., watering, fertilizing, cutting, etc., until the time of final inspection and acceptance by the Municipality.

.13 Appropriate Maintenance to be determined by weather conditions, soil conditions, time of year, and growing condition of the seed. A 2 year Maintenance schedule is to be submitted to the Municipality for acceptance, at the time of the CCC inspection.

.14 At the time of final inspection, the grass shall:

- Be mowed to a minimum height of 50 mm if area is to be maintained;
- Cover 100% of the seeded area;
- Be well established;
- Be completely free of weeds, thin, bare, and dead spots; and
- Be in an overall healthy growing condition satisfactory to the Municipality.

C6.5.5 Sodding

.1 Sodding may be required by the Municipality on a site- or development-specific basis. Refer to **Section B6.5.5** if sodding is required.

C6.6 Naturalization

.1 Naturalization will be acceptable for non-programmable or low-use open spaces and stormwater management facilities.

.2 Developer's Consultant to select native trees and seed to reduce the need for ongoing maintenance. The tree sizes are to be specified on plans and can be reduced to 40 mm calliper (deciduous), 2.0 m height (coniferous).

.3 Mowing of naturalized seed mixtures to be completed only to establish plant health and must maintain a minimum height of 100 mm to 150 mm. Once seed is established, no additional mowing is to be completed.

.4 Seed shall be applied evenly at a rate of not less than 3.5 kg per 100 m^2.

.5 Seed type and installation process shall be as specified in **Section C6.5.3**.

.6 At the time of final inspection, the grass shall:

- Be grown to full natural height;
- Cover 100% of the seeded area;
- Be well established;
- Be completely free of weeds, thin, bare, and dead spots; and
- Be in an overall healthy growing condition satisfactory to the Municipality.

C6.7 Plant Material

.1 All plant material shall be of first grade quality, free from insects, disease, and physical injury, shall have a strong fibrous root system, and must be structurally sound.

.2 All plant material shall have straight stems, well and characteristically branched for the species.

.3 All plant material shall conform to the Horticultural Standards for nursery stock of the LANTA.

.4 Where possible, trees shall be setback a minimum distance, measured from the center of the tree, from above and below ground utilities and property lines as indicated in **Table C6-1**.

Table C6-1
Tree Setbacks from Utilities and Property Lines

Utility/Property Line	Distance
Light Standards/Power Hardware	3.5 m
Stop/Yield Signs	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 Ditches	1.0 m
Shallow Underground Utilities (Power/Gas/Communication)	1.0 m
Gas or Oil Right-of-Way	Contact Utility
Sanitary and Storm Sewers	2.0 m
Sanitary and Storm Sewer Manholes	2.0 m
Watermains	2.5 m
* Ensure trees do not create sightline obstructions for vehicles approaching intersections/crosswalks.	
* Distance from overhead power utilities shall be as per the requirements established by the Utility Authority.	

.5 At the time of planting, all deciduous/coniferous trees shall conform to **Table C6-2**.

Table C6-2
Tree Size Requirements

Deciduous Trees			
Height	**Calliper**	**Staking/Ties**	**Rootball Diameter**
2.4 – 3.0 m	40 mm	1 stake w/tie	600 mm
3.0 – 3.5 m	50 mm	2 stakes w/ties	700 mm
3.5 – 4.5 m	75 mm	2 stakes w/ties	850 mm
4.5 – 5.5 m	100 mm	2 stakes w/ties	1,050 mm
Coniferous Trees			
Height	**Spread**	**Staking/Ties**	**Rootball Diameter**
1.8 – 2.0 m	975 mm – 1.0 m	2 stakes w/ties	850 mm
2.0 – 2.5 m	1.0 m – 1.3 m	2 stakes w/ties	850 mm
2.5 – 3.5 m	1.3 m – 1.5 m	3 guy wires w/anchors	1,220 mm

.6 **Table C6-3** lists all approved trees and shrubs within the Region. Alternate trees or shrubs may be approved following submission of a request for variance to the Municipality, dependant on quantity and location. Plants identified in the Government of Alberta FireSmart Guide to Landscaping are indicated with * after Common Name and are considered lower risk.

Table C6-3
Approved Tree and Shrub Species

Botanical Name	Common Name
Deciduous	
Acer x freemanii - cultivars	Autumn Blaze/Sienna Glen Maple *
Acer rubrum – cultivars	Northwood/Autumn Spire/Red Rocket Maple *
Acer tataricum	Amur Maple *
Betula papyrifera	Paper Birch *
Crataegus mordenensis 'Toba', 'Snowbird'	Hawthorn *
Fraxinus nigra	Black Ash
Fraxinus mandshurica	Manchurian Ash
Malus, x adstringens	Flowering Crab Apple *
Populus balsamifera	Balsam Poplar *
Populus tremuloides	Trembling Aspen *
Populus tremula 'erecta'	Swedish Columnar Aspen *
Populus x Brooks No. 6	Brooks No. 6 Poplar *
Populus x jackii 'Northwest'	Northwest Poplar *
Prunus maakii	Amur Cherry *
Salix acutifolia	Cut Leaf Willow
Salix discolour	Pussy Willow
Salix pentandra	Laurel Leaf Willow
Sorbus aucuparia	European Mountain Ash *
Sorbus decora	Showy Mountain Ash *
Syringa reticulate	Japanese Tree Lilac
Tilia x flavescens	Dropmore Linden *
Tilia cordata	Little Leaf Linden *
Ulmus Americana	American Elm
Coniferous	
Abies balsamea	Balsam Fir
Larix sibirica	Siberian Larch
Picea glauca	White Spruce
Picea pungens	Colorado Green Spruce
Pinus, contorta 'latifolia'	Lodgepole Pine
Pinus ponderosa	Ponderosa Pine *
Pinus Sylvestris	Scots Pine
Deciduous Shrubs	
Alnus crispa	Green Alder
Amelanchier alnifolia	Saskatoon *
Arctostaphylos uva-ursi	Bearberry
Cornus alba	Dogwood species and cultivars
Cornus sericea	Dogwood species and cultivars *
Elaeagnus commutata	Wolf Willow *

Botanical Name	Common Name
Hippophae rhamnoides	Sea Buckthorn
Philadelphus lewisii	Mock Orange *
Potentilla fruticosa	Shrubby cinquefoil *
Physocarpus opulifolius Var.	Ninebark *
Prunus tomentosa	Nanking Cherry *
Prunus triloba multiplex	Double Flowering Plum *
Rosa acicularis	Prickly Wild Rose
Rosa woodsia	Woods Rose *
Rosa, x rugosa	Explorer Rose Cultivars *
Rosa, x arkansana	Parkland Rose Cultivars
Salix	Willow species and cultivars *
Sorbaria sorbifolia	False Spirea
Spiraea	Spirea species and cultivars *
Symphoricarpus albus	Snowberry *
Syringa	Lilac species and cultivars *
Viburnum trilobum	Highbush Cranberry *
Viburnum opulus	European Cranberry *
Coniferous Shrubs	
Juniperus horizontalis	Creeping Juniper cultivars
Juniperus communis	Common Juniper
Juniperus sabina	Savin Juniper cultivars
Juniperus scopulorum	Rocky Mountain Juniper
Picea abies	Nest Spruce cultivars
Pinus mugo	Mugo Pine cultivars

.7 At the time of inspection and final acceptance by the Municipality, the plant material shall:

- Conform to the standards for plant material listed above;
- Be planted and staked for CCC;
- Have stakes removed and be stable at FAC; and
- Exhibit 2 years of healthy growth to the satisfaction of the Municipality.

C6.8 Mulches

.1 All mulch to be bark or coniferous/deciduous wood chip mulch with a size range of 50 mm to 100 mm and be free of non-organic material, wood preservatives, and diseased wood.

.2 Mulch shall contain no more than 5% total volume of soil, sawdust, and peat moss.

.3 The following mulches are prohibited for use unless otherwise accepted by the Municipality: rock, gravel, riprap, shale, peat moss, manures, paper products, plastics, rubbers, and lumber containing chemicals or preservatives.

C6.9 Site Furniture

.1 The following sections outlining site furniture are to be used as a guideline for all Rural development within the Region unless otherwise accepted.

.2 All site furniture (benches, picnic tables, waste receptacles, etc.) is subject to acceptance by the Municipality.

C6.9.1 General

.1 Furnishings are to be surface mounted unless otherwise accepted by the Municipality.

.2 All fasteners shall be stainless steel.

.3 Frame shall be constructed of steel with a powder coated finish unless otherwise accepted by the Municipality.

.4 Finish to provide a minimum of 10 years of protection from the elements.

.5 Seating and tabletop surface shall be shaped with rounded edges and corners and smooth surfaces.

.6 Install all site furniture as per manufacturer's specifications.

.7 All site furniture to be installed plumb and level and be aligned as per the landscape layout plans. Exposed mounting hardware to be painted to match site furniture colour following installation.

.8 All site furniture shall be inspected prior to installation to ensure the furniture is free of all defects; site furniture with defects will be rejected and shall be replaced immediately.

C6.9.2 Setbacks

.1 The following setbacks shall be required:

- **Benches:** 2.0 m minimum from edge of walkway or multi-use trail.
- **Waste Receptacles:** 2.0 m minimum from edge of walkway or multi-use trail and minimum 2.0 m from benches or picnic tables (due to odours, wasps, etc.).
- **Picnic Tables:** 1.0 m minimum from edge of walkway or multi-use trail.

.2 Ensure a minimum 300 mm hard surface mowing strip from furniture to mown grass areas.

C6.9.3 Bench Nodes

.1 Bench nodes are required every 500 m along trail systems; waste receptacles to be placed at nodes where they are easily accessible to be emptied.

C6.10 Uniform Fencing

.1 All fencing to be constructed 150 mm inside private property with the posts on the interior of the fence alignment.

.1 Uniform wood fencing shall be constructed as accepted by the Municipality. Colour of stain shall be indicated on the landscape plans and accepted by the Municipality.

.2 Chain link fencing and gates shall be constructed as accepted by the Municipality. Finish and colour shall be indicated on the landscape plans and accepted by the Municipality.

.2 Uniform fencing shall be constructed adjacent to and at the following locations:

- Arterial roadways;
- PULs;
- Municipality-owned lands; e.g., Fire Hall sites, etc.;
- Multi-family sites;
- Neighbourhood Commercial sites;
- Institutional sites; and
- Other areas as required by the Municipality.

.3 Single-sided wood fence is the minimum standard for Residential properties.

.4 Fences located within 1.5 m of a building structure, such as gates, are required to be constructed of fire-resistant materials; refer to FireSmart: Protecting Your Community from Wildfire.

.5 Gates may be installed on all Residential lots which back onto a PUL or public park. Gates shall be located approximately at the mid-point of each lot and shall be constructed to open inwards onto private property.

C6.11 Specific Requirements by Area

C6.11.1 Municipal Reserves (MRs)

.1 Municipal Reserves (MRs) and park areas shall be graded, topsoiled, seeded, and planted with trees and shrubs to the satisfaction of the Municipality.

.2 A MR shall include trees installed at a rate of 75 per ha. Sports fields, courts, sledding hills, buildings, infrastructure, and other recreation facilities, such as playgrounds, are not included in the area calculation for required planting.

.3 Five shrubs may be substituted for one tree, up to a maximum of one-third of the total required tree quantity. Shrubs shall be massed within planting beds.

.4 The minimum setbacks for tree planting shall be as outlined in **Table C6-1**.

.5 All tree planting within a MR shall be set back a minimum distance of 3.0 m from adjacent private property lines, as measured from the center of the tree trunk.

.6 Furniture shall be provided by the Developer and placed at strategic locations where a walkway is also provided.

.7 Bollards shall be installed, to limit vehicular access.

.8 Where a walkway is designated as an emergency access route, adequate clearance shall be provided for vehicular access.

.9 Uniform chain link fencing shall be provided between MRs and private property and must be a minimum of 1.2 m in height. Fences must be built a minimum of 150 mm within private property.

.10 Fencing adjacent to parkland that contains, or will contain, sports fields shall be a minimum of 1.5 m in height.

.11 Gates are required where private property backs onto open spaces and MR lands.

C6.11.2 Public Utility Lots (PULs)

.1 PUL areas shall be graded, topsoiled, and seeded to the satisfaction of the Municipality.

.2 Furniture shall be provided by the Developer and placed at strategic locations where a walkway is also provided.

.3 Bollards shall be installed to limit vehicular access.

.4 Where a walkway is designated as an emergency access route, adequate clearance shall be provided for vehicular access.

.5 Uniform chain link fencing shall be provided between PULs and private property and must be a minimum of 1.2 m in height.

C6.11.3 Stormwater Management Facilities (SWMFs)

.1 Areas surrounding constructed wetlands, wet ponds, and dry ponds must be graded, topsoiled, seeded, and planted with trees and shrubs to the satisfaction of the Municipality.

.2 A SWMF shall include trees installed at a rate of 75 per ha.

.3 Shrubs shall be massed within planting beds.

.4 The area below the Normal Water Level (NWL) shall not be included in the area measurement.

.5 The minimum setbacks for tree planting shall be as outlined in **Table C6-1**.

.6 All tree planting within a SWMF shall be set back a minimum distance of 1.0 m from adjacent private property lines as measured from the center of the tree trunk.

.7 Wood chip mulch shall not be used in planting beds below the 1:25 year water line.

.8 Naturalized planting schemes below the 1:5 year water line are encouraged.

.9 SWMF areas shall be weed and erosion free at CCC and FAC inspections and for the duration of the Warranty Period.

.10 Uniform fencing shall be provided between SWMFs and private property and must be a minimum of 1.2 m in height.

C6.11.4 Utility Corridors (ROWs)

.1 The Developer's Consultant shall contact the appropriate Utility Authority regarding acceptable grading, topsoil, seeding and planting on utility corridors or ROWs.

.2 The Developer's Consultant shall submit design drawings to the utility companies for approval of development.

.3 Where the Utility Authority will not allow landscaping in the ROW, the requirement for that portion of the landscaping will be waived by the Municipality. Written confirmation from the Utility Authority is required.

.4 The Developer's Consultant shall contact the Utility Authority to review designs and achieve permission in the form of a Crossing Agreement. The Crossing Agreement is to be submitted with any design plans.

.5 Utility corridors where landscaping is permitted shall be planted with trees at a rate of 75 per ha.

.6 All tree planting shall adhere to the required setbacks outlined in **Table C6-1**.

.7 Shrubs shall be massed within planting beds.

.8 Uniform fencing shall be provided adjacent to Major Utility Corridors and must be a minimum of 1.8 m in height.

C6.11.5 Roadways

.1 Roadways shall be graded, topsoiled, and seeded between uniform fence and the roadway shoulder to the satisfaction of the Municipality.

.2 Traffic and pedestrian sightlines in road ROWs must be respected as per the guidelines set out by the Transportation Association of Canada.

.3 Uniform double-sided wood fencing shall be required adjacent to all arterial roadways and must be a minimum of 1.8 m in height.

C6.12 Warranty Period

.1 The Developer shall be responsible for, and at their own expense to remedy, any defect, fault, or deficiency in the completed works during the 2-year Warranty Period.

.2 Landscape Maintenance shall be conducted throughout the Warranty Period and shall include all measures necessary to establish and maintain plant material in an acceptable, vigorous, and healthy growing condition. The Maintenance activities are to include:

- Watering during establishment period and weekly throughout the Warranty Period;
- Weeding monthly;
- Mowing at regular intervals to maintain a maximum of 75 mm height;
- Pruning any broken, damaged, or diseased branches; and
- Structural Pruning prior to FAC by an International Society of Arboriculture (ISA) Certified Arborist.

.3 Monthly Maintenance logs are to be kept throughout the Warranty Period and submitted for review prior to FAC including all Maintenance items listed above.

.4 Pesticide/herbicide applications for control of weeds is prohibited.

.5 All weeds are to be controlled at CCC and throughout the Warranty Period, with full eradication at the time of FAC. All noxious weeds are to be removed and disposed of prior to flowerings wherever possible to reduce the rate of seed spread.

.6 At the time of FAC site review, a maximum mortality/disturbance rate for that year's plant material is 25% of the overall plant count.

.7 Third party damage occurring during the Warranty Period will be reviewed by the Municipality on a case-by-case basis; upon review and consideration by the Municipality, the Developer may be held responsible for the third-party damage.

C7 TESTING PROCEDURES

C7.1 General

.1 It shall be the responsibility of the Developer and/or Developer's Representative to ensure that the Contractor adheres to the minimum testing requirements outlined in **Section C7** or **Section B8**, as appropriate.

.2 The Developer shall submit all test data performed by the accredited testing company to the Municipality as per the requirements outlined in **Section A2**.

.1 Failure to receive test results will be considered sufficient cause for not accepting such work.

C7.2 Roadway Materials Testing

.1 The requirements for roadway materials testing are outlined in **Table C7-1**.

Table C7-1
Specifications for Roadway Materials Testing

Location of Testing	Required Compaction	Frequency of Testing
Site Grading	97% of SPMDD under roadways at ±2% of OMC 95% of SPMDD in landscaped areas at ±2% of OMC	1 test every 1,000 m^2 per lift, or minimum 3 tests for small areas
Sand Bedding	Minimum of 95% of SPMDD	1 test every 100 m per lift, or minimum 3 tests for small areas
Trench Backfill	Minimum of 97% of SPMDD at ±2% of OMC Minimum of 100% of one-mould maximum dry density Maximum moisture content: PL + (PI/3) to a maximum of 5% above the PL	1 test every 100 m per every 2nd lift, or minimum 3 tests for small areas
Subgrade Preparation	Minimum of 100% of SPMDD at ±2% of OMC under road structures. Minimum of 97% of SPMDD at ±2% of OMC under shared use trails made of granular materials.	1 test every 1,000 m^2 for roads 1 test every 100 m for trails Minimum 3 tests for small areas
Granular Base Course	Minimum of 100% of SPMDD under roads and shared use trails.	1 test every 1,000 m^2 for roads 1 test every 100 m for trails Minimum 3 tests for small areas

Notes:
1. SPMDD: Standard Proctor Maximum Dry Density
2. OMC: Optimum Moisture Content
3. PL: Plastic Limit
4. PI: Plastic Index
5. The above ±2% moisture content is for clay materials
6. Moisture content for high plastic clay requires recommendation by a Geotechnical Engineer

.2 The Developer shall engage a qualified materials testing firm to take representative samples of all materials to be incorporated into the road structure and to carry out quality control testing during construction.

C7.3 Sanitary Sewer Testing

.1 Force mains shall be tested as described for watermains.

C7.4 Storm Sewer Testing

.1 Testing of installed pipe shall consist of the following:

- CCTV inspections of culverts and catch basin leads, as per **Section B8.3.3**; and
- Deflection testing as per **Section B8.3.4** (for catch basin leads).

.2 All testing and repair of deficiencies found during the testing shall be rectified by the Developer at their expense.

.3 Prior to undertaking any repairs, a meeting with the Municipality is required to review the proposed construction method.

C7.5 Watermain Testing

C7.5.1 Filling and Flushing Strategies

C7.5.1.1 Submissions

.1 A filling strategy is required for all projects. The purpose of a filling strategy is to create an agreed upon plan for the staging and direction of fill for a new watermain.

.2 A flushing strategy is required for all projects. The purpose of a flushing strategy is to create an agreed upon plan for the staging and direction and rate of flow of water for flushing a watermain prior to commissioning.

.3 Filling and flushing strategies must be signed and sealed by an Engineer.

C7.5.1.2 Requirements for Filling and Flushing Strategies

.1 All source water must come from a clean, potable source.

.2 There must be only one source valve for each stage of fill.

.3 Valves should be planned such that unidirectional flows are achieved. The water should not loop back on itself.

C7.5.1.3 Specific Requirements for Filling Strategies

.1 The filling strategy must consist of a drawing indicating the following:

- Air release locations;
- High points on transmission mains;
- Water source for each fill;
- Staging of fill:
  - Current fill highlighted
  - Completed fill highlighted
- All valve positions are to be indicated for each stage; and
- Legend clearly indicating the symbology on the drawing.

.2 Air release locations should be at or near the high point of the watermain.

.3 A copy of the accepted filling strategy must be on site during filling activities.

C7.5.1.4 Specific Requirements for Flushing Strategies

.1 Flushing runs must be less than 450 m in length. The ideal flushing run length is 200 m.

.2 Watermains less than or equal to 300 mm in diameter should have a flush velocity of 1.5 m/s.

.3 Water must be exchanged a minimum of 5 times to achieve a completed flush. Water quality sampling reports must confirm a completed flush.

.4 During a flush, the source water should flow from larger pipe to smaller pipe, whenever possible.

.5 The flushing strategy should include:

- A written flushing procedure;
- A spreadsheet indicating:
  - Order of flushing segments;
  - Water supply (source valve);
  - Discharge location;
  - All valve positions for each flushing segment;
  - Pipe details for each flushing segment;
  - Required discharge volume (to achieve 5 times the volume of the flushing segment);
  - Ideal flow velocity for the size of the watermain;
  - Ideal flow rate to achieve the velocity;
  - Type and size of ports to discharge the water;
  - Number of ports;
  - Estimated flow rate; and
  - Required flush time.
- A drawing indicating the following:
  - Water supply (source);
  - Current flush;
  - Completed flush;
  - Opened valve;
  - Closed valve;
  - Discharge location; and
  - Legend clearly indicating the symbology on the drawing.
- Each flushing segment should have its own drawing.

.6 Flushing shall be performed as per AWWA C651 such that the required velocity is achieved.

C7.5.2 Pressure and Leakage Test

.1 Refer to AWWA M55 for information on pressure and leakage testing for HDPE watermains.

.2 Install all water services and air relief services.

.3 Partially or completely backfill the excavation before testing.

.4 Ensure that main stops are open and curb stops are closed.

.5 Inform the Municipality of the date, time, and location of the pressure and leakage tests at least 72 hours prior to the test time. Failure to notify the Municipality may result in tests being unacceptable.

.6 Open all main valves in the test section.

.7 Inform other construction crews or Contractors and check that no valves are being operated during the test.

.8 Maximum length of distribution watermain test sections shall be 450 m.

.9 Ensure air is expelled from the section of watermain by exhausting trapped air at high points and dead ends. Air content can be minimized through the following procedure:

- Lay the pipeline to grade when possible;
- Bleed air from the pipe slowly; and
- Fill the watermain at a velocity of less than 0.6 m/s.

.10 Test pressure will be 1.5 times the pressure class at the lowest point in the test section.

.11 Raise the watermain pressure to the appropriate test pressure using either a hand or motor-powered pump located at a blow-off.

.12 Maintain 1.5 times the pressure class for the duration of the test and add water as needed to keep the pressure constant. Do not measure this volume. Hydrostatic pressure expands pipe.

.13 Begin Test: Reduce pressure to 10 psi (70 kPa) below 1.5 times pressure class. Monitor pressure for 1 hour.

.14 During the test, walk along the test section and check for signs of leakage or distress at all exposed appurtenances or fittings.

.15 The pipe is acceptable if the pressure drop over 1 hour does not exceed 5%. Record the leakage test results on the Leakage Test Form provided at the end of **Section C7**.

.16 Under no circumstances should the total time for initial pressurization and time at test pressure exceed 8 h at 1.5 times the pressure class.

.17 If the test is not completed due to leakage, equipment failure, or any other reason within this total time, the test section should be depressurized and allowed to “relax” for at least 8 h before starting the next testing sequence.

C7.5.3 Flushing

.1 Upon completion of pressure and leakage testing, watermains shall be thoroughly flushed to remove all foreign matter.

.2 Water systems which will not provide watermain flushing velocities of at least 1.5 m/s shall be flushed using foam pigs prior to disinfecting.

C7.5.4 Disinfection

.1 Provide at least 72 hours notice to the Municipality prior to disinfection. Perform disinfection in the presence of Municipal staff.

.2 Complete flushing operations before beginning disinfection. Disinfection may be done with hydrostatic leakage testing.

.3 New valves are to be open to ensure they are disinfected.

.4 Disinfect watermains and water services.

.5 Disinfect using continuous-feed method with liquid chlorine, solution-feed chlorinator, and booster pump in accordance with AWWA C651. Introduce chlorine solution for disinfection at appurtenance used for initial flushing of test section.

.6 Chlorine feed and discharge rates shall be in accordance with AWWA C651. Discharge rate to be accepted by the Municipality. Ensure free chlorine residual of initial chlorine solution is between 25 mg/L and 75 mg/L. Chlorine gas will not be permitted for chlorination.

.7 Open new hydrants and valves on section of watermain being tested. Supply water for chlorinator from hydrant on active system or water tank. Use pump to inject chlorine solution into pipe if using water tank.

.8 Continue feeding chlorinate solution for the length of time appropriate for the pipe size, length, and discharge rate, as per AWWA C651.

.9 Isolate the watermain or water service containing chlorine solution and maintain for 24 hours.

.10 Determine the chlorine residual after 24-hour retention time using the “drop dilution” method or the method indicated in AWWA C651 in the presence of the Municipality. Acceptable minimum free chlorine residual after 24 hours is 10 mg/L.

.11 Ensure chlorine residual in hydrants used for introducing the chlorine solution does not exceed 75 mg/L at the conclusion of chlorination.

.12 Perform final flushing of pipe with potable water using the appurtenance used for initial flushing once actual chlorine residual is acceptable. Continue flushing until chlorine residual is less than 2 mg/L. Test chlorine residual in the presence of the Municipality. The Developer’s Representative shall complete the Disinfection Report provided at the end of **Section B8**.

.13 Chlorinated water flushed from the pipe shall be dechlorinated prior to discharging to the environment. Ensure the flushing rate of chlorine does not exceed the allowable rate acceptable to the Municipality.

.14 Disinfect watermains less than 5.5 m long and watermain repairs by swabbing or spraying with a maximum 5% solution of chlorine or a 1% hypochlorite solution either before or after installation.

C7.5.5 Bacteriological Samples

.1 Bacteriological testing shall be carried out by the Developer's Representative and the results shall be acceptable to the local Health Authority and the Municipality.

.2 Two sets of 2 samples shall be taken at least 24 hours apart from the end of the main section of pipe being tested. One set of 2 samples shall be taken from the end of each branch of pipe connected to the main section (where branches are more than 3 m long). Samples shall be taken from the discharge pipe used for leakage testing after adequate flushing time to replace water in the discharge pipe.

.3 The Developer's Representative shall submit the samples to an accredited laboratory as soon as possible after obtaining. Samples that cannot be submitted within 1 hour after collection shall be stored in an iced cooler at 4°C during transport to the laboratory. Samples shall be submitted for processing no more than 30 hours after obtaining.

.4 Disinfection shall be acceptable when bacteriological test results from both samples show total Coliform results are < 1 colony forming unit (cfu) per 100 mL, Heterotrophic Plate Count (HPC) does not exceed 500 cfu per mL and total chlorine residual does not exceed 2 mg/L after flushing.

.5 The Developer's Representative shall enter the bacteriological test results on the Disinfection Report provided at the end of **Section C7** once received from the laboratory.

.6 If either sample fails bacteriological testing, repeat flushing and the Developer's Representative shall take 2 new samples for testing. If either of the second set of samples taken fail bacteriological testing, repeat disinfection and flushing and the Developer's Representative shall take 2 new samples for testing. Repeat this procedure until acceptable results are obtained.

C7.5.6 Test Results

.1 All testing results shall be documented and submitted to the Municipality for acceptance prior to commissioning the system and the issuance of a Construction Completion Certificate.

LEAKAGE TEST FORM FOR HDPE PIPE

The following form shall be prepared by the Developer's Representative for submission to Smoky Lake County.

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length of Test Section: _____

Pipe Type: _____ Pressure Class: _____

Allowable Pressure Drop (kPa) _____ (for test pressure of: kPa)

Actual Pressure Drop (kPa) _____ (for test pressure of: kPa)

Pump Start Time	Meter Reading	Pump Stop Time	Meter Reading	Total Loss (kPa)

High Pressure Water Meter Used (Brand name, model, and serial number)

_____

Date meter tested and calibrated: _____

Date complete: _____ Operator's Signature: _____

Company: _____ Company's Address: _____

Phone No: _____

Developer's Respresentative's Signature: _____

TOWN OF SMOKY LAKE 1923-2023

LEAKAGE TEST FORM FOR HDPE PIPE

The following form shall be prepared by the Developer's Representative for submission to the Town of Smoky Lake.

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length of Test Section: _____

Pipe Type: _____ Pressure Class: _____

Allowable Pressure Drop (kPa) _____ (for test pressure of: kPa)

Actual Pressure Drop (kPa) _____ (for test pressure of: kPa)

Pump Start Time	Meter Reading	Pump Stop Time	Meter Reading	Total Loss (kPa)

High Pressure Water Meter Used (Brand name, model, and serial number)

_____

Date meter tested and calibrated: _____

Date complete: _____ Operator's Signature: _____

Company: _____ Company's Address: _____

Phone No: _____

Developer's Respresentative's Signature: _____

HISTORIC VILNA

A true Alberta boomtown...

LEAKAGE TEST FORM FOR HDPE PIPE

The following form shall be prepared by the Developer's Representative for submission to the Village of Vilna.

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length of Test Section: _____

Pipe Type: _____ Pressure Class: _____

Allowable Pressure Drop (kPa) _____ (for test pressure of: kPa)

Actual Pressure Drop (kPa) _____ (for test pressure of: kPa)

Pump Start Time	Meter Reading	Pump Stop Time	Meter Reading	Total Loss (kPa)

High Pressure Water Meter Used (Brand name, model, and serial number)

_____

Date meter tested and calibrated: _____

Date complete: _____ Operator's Signature: _____

Company: _____ Company's Address: _____

Phone No: _____

Developer's Respresentative's Signature: _____

VILLAGE OF WASKATENAU

LEAKAGE TEST FORM FOR HDPE PIPE

The following form shall be prepared by the Developer's Representative for submission to the Village of Waskatenau.

Date: _____

Project: _____ Drawing No.: _____

Location: _____ From: _____ To: _____

Pipe Size: _____ Length of Test Section: _____

Pipe Type: _____ Pressure Class: _____

Allowable Pressure Drop (kPa) _____ (for test pressure of: kPa)

Actual Pressure Drop (kPa) _____ (for test pressure of: kPa)

Pump Start Time	Meter Reading	Pump Stop Time	Meter Reading	Total Loss (kPa)

High Pressure Water Meter Used (Brand name, model, and serial number)

_____

Date meter tested and calibrated: _____

Date complete: _____ Operator's Signature: _____

Company: _____ Company's Address: _____

Phone No: _____

Developer's Respresentative's Signature: _____

Part D
SPECIAL PROVISIONS

D1 SMOKY LAKE COUNTY

D1.1 Special Provisions for Section C1 Rural Roadway Systems

.1 Section C1.15.1 Trails

.1 Trails shall be asphalt.

D2 TOWN OF SMOKY LAKE

D2.1 Special Provisions for Section B1 Urban Roadway Systems

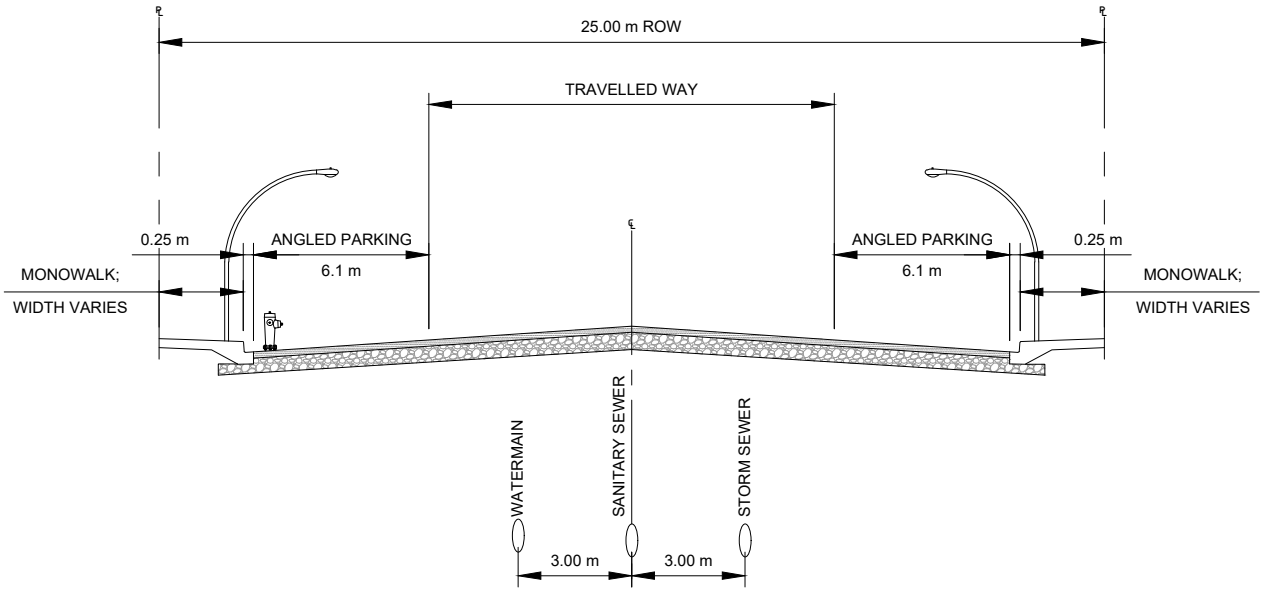
.1 Section B1.16 Curb and Gutter

.1 Rolled face curb and gutter is discouraged for new developments.

D2.2 Town of Smoky Lake Special Provision Typical Details

Standard Detail No.	Title
D2-100	Town of Smoky Lake Main Street

TYPICAL DETAIL	D2-100	
Date:	JULY 2023	Rev. 0



NOTES:

(1) FOR REHABILITATION OF THE TOWN'S MAIN STREET (WHEATLAND AVENUE), ENGINEER IS RESPONSIBLE TO CONFIRM CONFIGURATION OF CROSS-SECTIONAL ELEMENTS VIA TOPOGRAPHIC SURVEY PRIOR TO DESIGN.

(2) WIDTH OF MONOWALK VARIES DEPENDING ON LOCATION OF ADJACENT BUILDINGS. SOME BUILDING FACES ARE AT PROPERTY LINE AND SOME ARE OFFSET FROM PROPERTY LINE. EXTRA CONCRETE TO BE INSTALLED TO FILL THE GAP BETWEEN THE MONOWALK AND BUILDING FACE(S) AS REQUIRED.

(3) ACCOMMODATE STREET FURNITURE (BENCHES, STAIRS, PLANTERS, WASTE RECEPTACLES, ETC.) AS NECESSARY.

(4) STREET LIGHTS / OVERHEAD POWER POLES ARE TO BE LOCATED BEHIND THE CURB, WITHIN THE MONOWALK. SETBACK TO BE DETERMINED BY UTILITY.

(5) HYDRANTS, PROTECTED BY BOLLARDS, ARE TO BE LOCATED WITHIN THE ASPHALT IN SUCH A WAY SO AS NOT TO IMPACT THE GUTTER PAN.

(6) BOLLARDS MAY BE REQUIRED BETWEEN THE STREETLIGHTS AND THE TRAVELLED WAY. CONFIRM REQUIREMENTS WITH TOWN DURING DESIGN.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

SMOKY LAKE REGION

Town of Smoky Lake Main Street
(Wheatland Avenue)

D3 VILLAGE OF VILNA

D3.1 Special Provisions for Section B1 Urban Roadway Systems

.1 Section B1.16 Curb and Gutter

.1 Curb and gutter are discouraged for new developments. Grassed swales located within the roadway boulevard are to be used to convey stormwater runoff along roadways; refer to **Typical Detail B1-100**.

.2 Section B1.17.1 Sidewalks

.1 The Village's Main Street has unique sidewalk requirements; refer to **Typical Detail D3-200**.

D3.2 Special Provisions for Section B5 Urban Franchise Utilities

.1 Section B5.2.2 Location of Utilities

.1 Power shall be installed underground in the Village of Vilna. The installation of overhead power is not permitted.

D3.3 Special Provisions for Section B6 Urban Landscaping, Site Furnishings, and Fencing

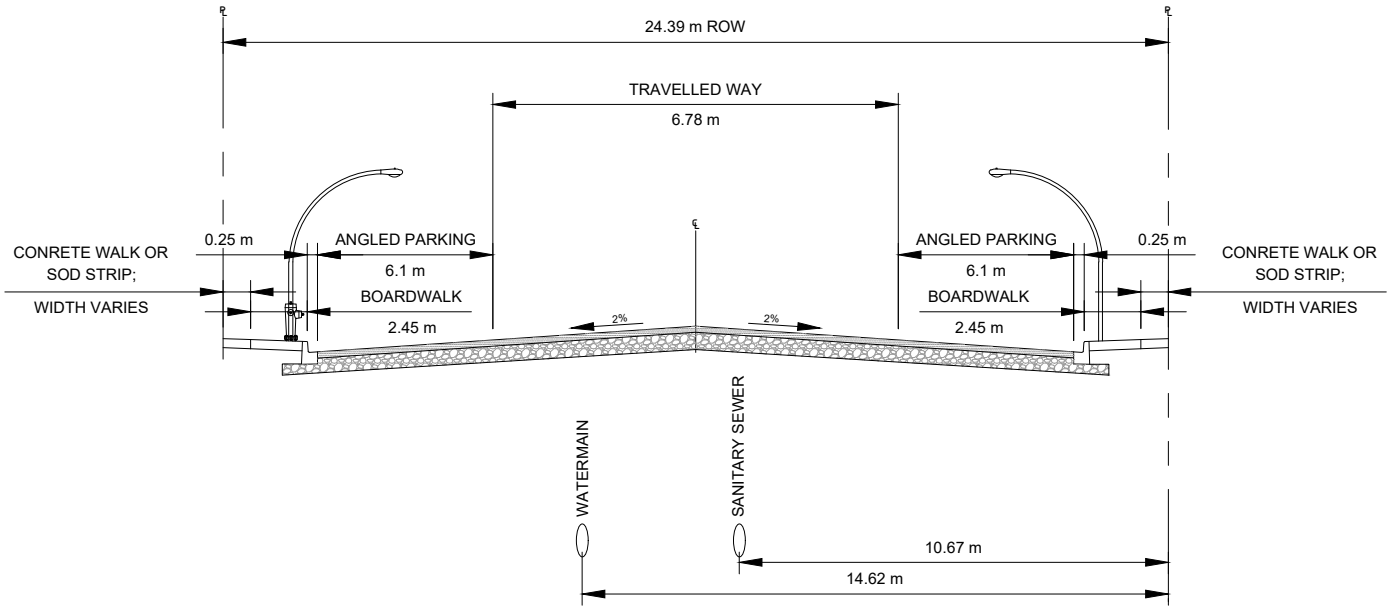
.1 Section B6.9 Site Furniture

.1 The Village of Vilna does not have standardized requirements for park furniture (i.e., benches, picnic tables, waste receptacles).

D3.4 Town of Smoky Lake Special Provision Typical Details

Standard Detail No.	Title
D3-100	Village of Vilna Main Street
D3-200	Boardwalk Sidewalk

TYPICAL DETAIL	D3-100	
Date:	JULY 2023	Rev. 0



NOTES:

(1) FOR REHABILITATION OF THE VILLAGE'S MAIN STREET (50 STREET), ENGINEER IS RESPONSIBLE TO CONFIRM CONFIGURATION OF CROSS-SECTIONAL ELEMENTS VIA TOPOGRAPHIC SURVEY PRIOR TO DESIGN.

(2) WIDTH OF CONCRETE WALK VARIES DEPENDING ON LOCATION OF ADJACENT BUILDINGS. SOME BUILDING FACES ARE AT PROPERTY LINE AND SOME OFFSET FROM PROPERTY LINE. EXTRA CONCRETE TO BE INSTALLED TO FILL THE GAP BETWEEN THE BOARDWALK AND BUILDING FACE(S) AS REQUIRED. AREAS WITHOUT CONCRETE BETWEEN THE BOARDWALK AND PROPERTY LINE ARE TO BE LANDSCAPED.

(3) ACCOMMODATE STREET FURNITURE (BENCHES, STAIRS, PLANTERS, WASTE RECEPTACLES, ETC.) AS NECESSARY.

(4) STREET LIGHTS ARE TO BE LOCATED BEHIND THE CURB, WITHIN THE BOARDWALK. SETBACK TO BE DETERMINED BY UTILITY.

(5) HYDRANTS ARE CURRENTLY LOCATED ON SIDE STREETS. CONFIRM REQUIREMENTS FOR HYDRANT PLACEMENT / LOCATION ALONG MAIN STREET WITH VILLAGE DURING DESIGN.

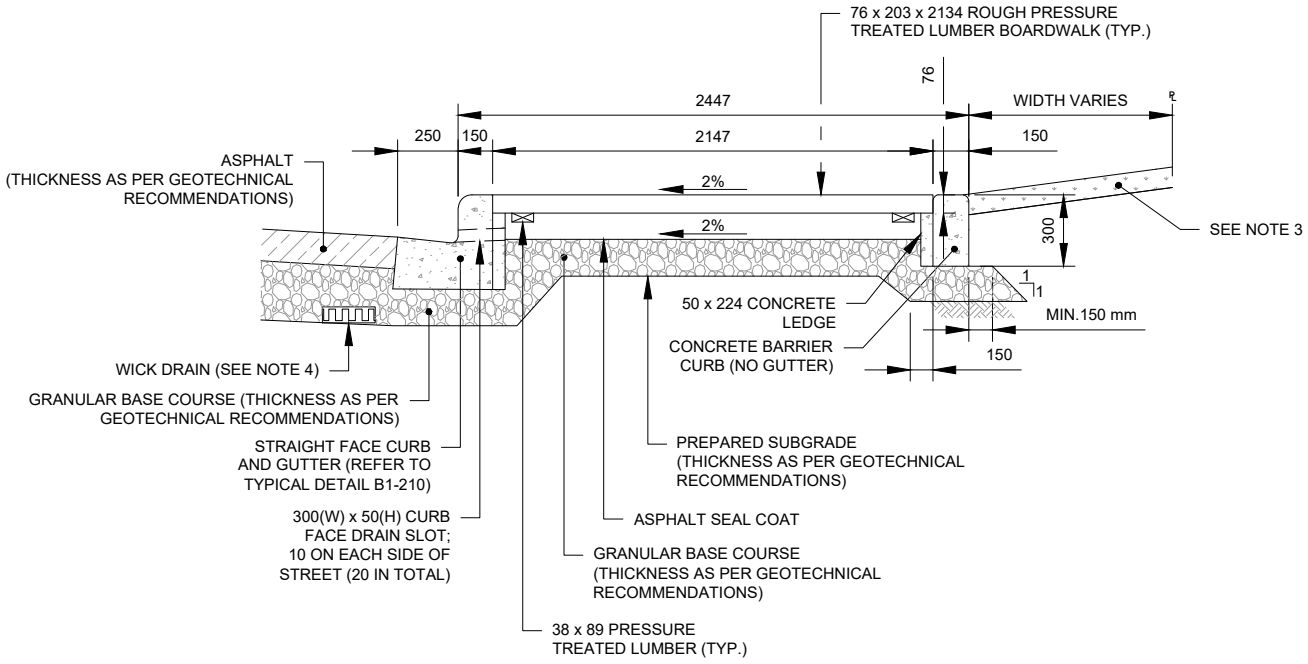
Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

SMOKY LAKE REGION

Village of Vilna Main Street (50 St)

TYPICAL DETAIL	D3-200	
Date:	JULY 2023	Rev. 0



NOTES:

(1) CONCRETE TO BE TYPE HS, 30 MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH 5.5% TO 8.0% AIR ENTRAINMENT.

(2) BACKFILL WITH SUITABLE MATERIAL AND COMPACT TO 95% BEHIND BACK OF CURB.

(3) 100 mm TOPSOIL AND SOD, OR
120 mm CONCRETE SIDEWALK (GRANULAR BASE COURSE AND PREPARED SUBGRADE AS PER GEOTECHNICAL RECOMMENDATIONS) DEPENDING ON LOCATION.

(4) WICK DRAIN APPLICABLE WHERE STORM SEWER EXISTS.

(5) WIDTH OF CONCRETE WALK VARIES DEPENDING ON LOCATION OF ADJACENT BUILDINGS. SOME BUILDING FACES ARE AT PROPERTY LINE AND SOME ARE OFFSET FROM PROPERTY LINE. EXTRA CONCRETE TO BE INSTALLED TO FILL THE GAP BETWEEN THE BOARDWALK AND BUILDING FACE(S) AS REQUIRED (WITH THE EXCEPTION OF THOSE AREAS THAT ARE LANDSCAPED BETWEEN THE BOARDWALK AND THE PROPERTY LINE).

(6) WOOD USED MAY BE PINE, FIR, HEMLOCK, OR SPRUCE DEPENDING ON AVAILABILITY AT TIME OF CONSTRUCTION. TYPE OF WOOD USED TO BE ACCEPTED BY VILLAGE PRIOR TO INSTALLATION. WOOD USED IS TO BE PRESSURE TREATED.

(7) DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

Historic Vilna · Smoky Lake County · Village of Waskatenau · Town of Smoky Lake 1923-2023

SMOKY LAKE REGION

Boardwalk Sidewalk

D4 VILLAGE OF WASKATENAU

D4.1 Special Provisions for Section B1 Urban Roadway Systems

.1 Section B1.3.4 Local Roadways

.1 Sidewalks are to be separate sidewalks; no monowalks are permitted for new developments.

.2 Section B1.16 Curb and Gutter

.1 Curb and gutter are discouraged for new developments. Grassed swales located within the roadway boulevard are to be used to convey stormwater runoff along roadways; refer to **Typical Detail B1-100**.

D4.2 Special Provisions for Section B3 Urban Storm Drainage Systems

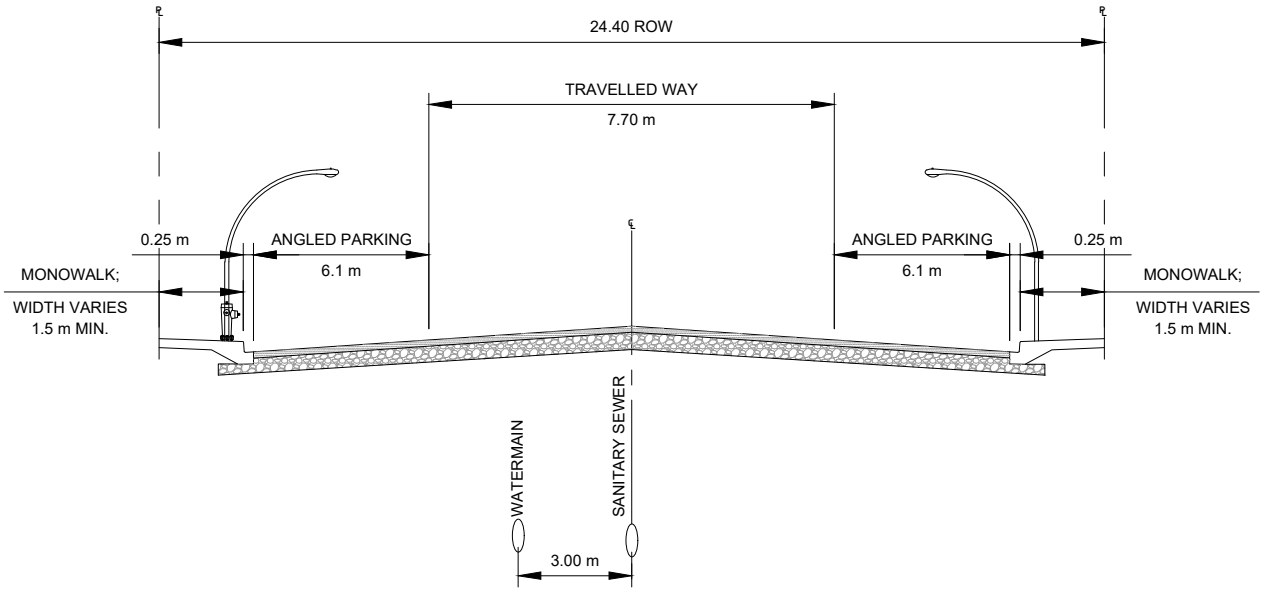
.1 Section B3.13 Pipe Location

.1 Storm sewer piping is discouraged for new developments. Conveyance of stormwater flows shall be via overland flow, through the use of grassed swales located within the roadway boulevard.

D4.3 Town of Smoky Lake Special Provision Typical Details

Standard Detail No.	Title
D4-100	Village of Waskatenau Main Street

TYPICAL DETAIL	D4-100	
Date:	JULY 2023	Rev. 0



NOTES:

(1) FOR REHABILITATION OF THE VILLAGE'S MAIN STREET (50 STREET), ENGINEER IS RESPONSIBLE TO CONFIRM CONFIGURATION OF CROSS-SECTIONAL ELEMENTS VIA TOPOGRAPHIC SURVEY PRIOR TO DESIGN.

(2) WIDTH OF MONOWALK VARIES DEPENDING ON LOCATION OF ADJACENT BUILDINGS. SOME BUILDING FACES ARE AT PROPERTY LINE AND SOME ARE OFFSET FROM PROPERTY LINE. EXTRA CONCRETE TO BE INSTALLED TO FILL THE GAP BETWEEN THE MONOWALK AND BUILDING FACE(S) AS REQUIRED.

(3) ACCOMMODATE STREET FURNITURE (BENCHES, STAIRS, PLANTERS, WASTE RECEPTACLES, ETC.) AS NECESSARY.

(4) STREET LIGHTS / OVERHEAD POWER POLES ARE TO BE LOCATED BEHIND THE CURB, WITHIN THE MONOWALK. SETBACK TO BE DETERMINED BY UTILITY.

(5) HYDRANTS, PROTECTED BY BOLLARDS, ARE TO BE LOCATED BEHIND THE CURB, WITHIN THE MONOWALK.

Scale:	Not To Scale
Drawn By:	T.L.
Checked By:	K.S.
Approved:	K.S.
Date:	JULY 2023

HISTORIC VILNA
Smoky Lake COUNTY
VILLAGE OF WASKATENAU
TOWN OF SMOKY LAKE 1923-2023

SMOKY LAKE REGION

Village of Waskatenau Main Street
(50 St)